

CASE FILE LIST

Case: HS2-012.

Title: HS2-012 Davenham Parish Council - Promoter.

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CASE FILE LIST

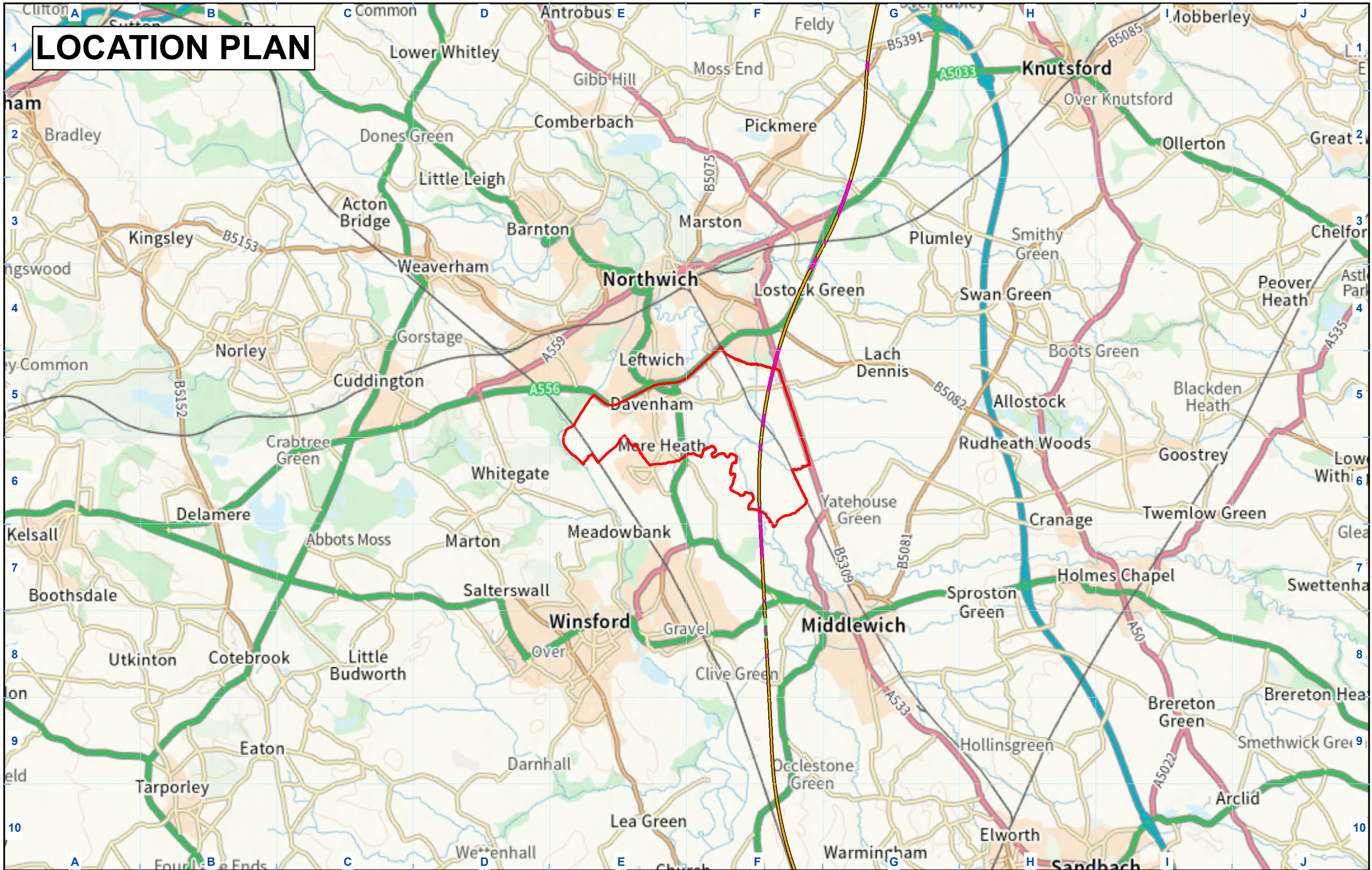
Case: HS2-012.

Title: HS2-012 Davenham Parish Council - Promoter.

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LOCATION PLAN



P207

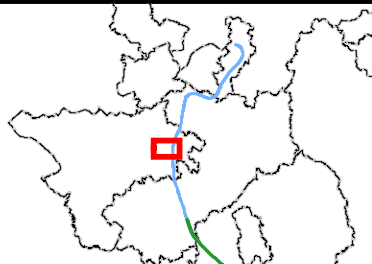
Legend

Phase 2b Western Leg Bill alignment February 2022

- Embankment
- Viaduct



Indicative extent of petitioner(s) land interests



High Speed Two
Petitioner Location Plan
Reference Drawing

Petitioner
Davenham Parish Council

Petition number
P2B-HS2-012

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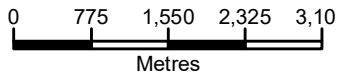
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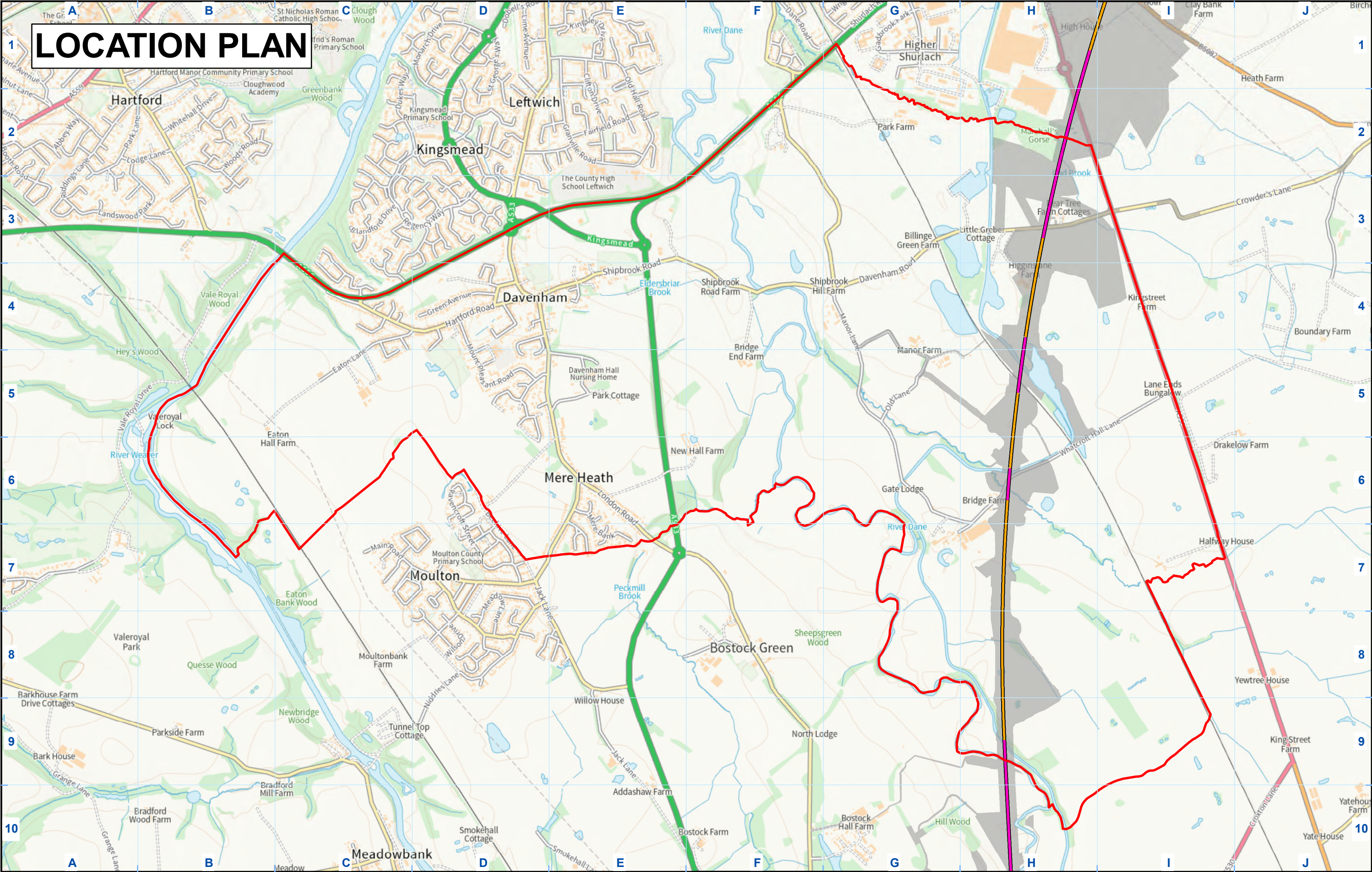
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Date: 18/08/22



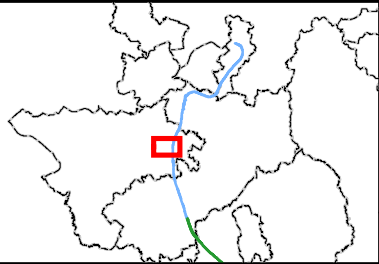
LOCATION PLAN

Legend

Phase 2b Western Leg Bill alignment February 2022

- Embankment
- Viaduct

- Indicative extent of petitioner(s) land interests
- hybrid Bill Limits



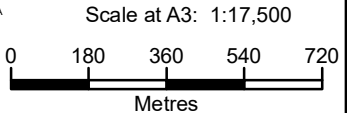
High Speed Two
Petitioner Location Plan
Reference Drawing

Petitioner
Davenham Parish Council
Petition number
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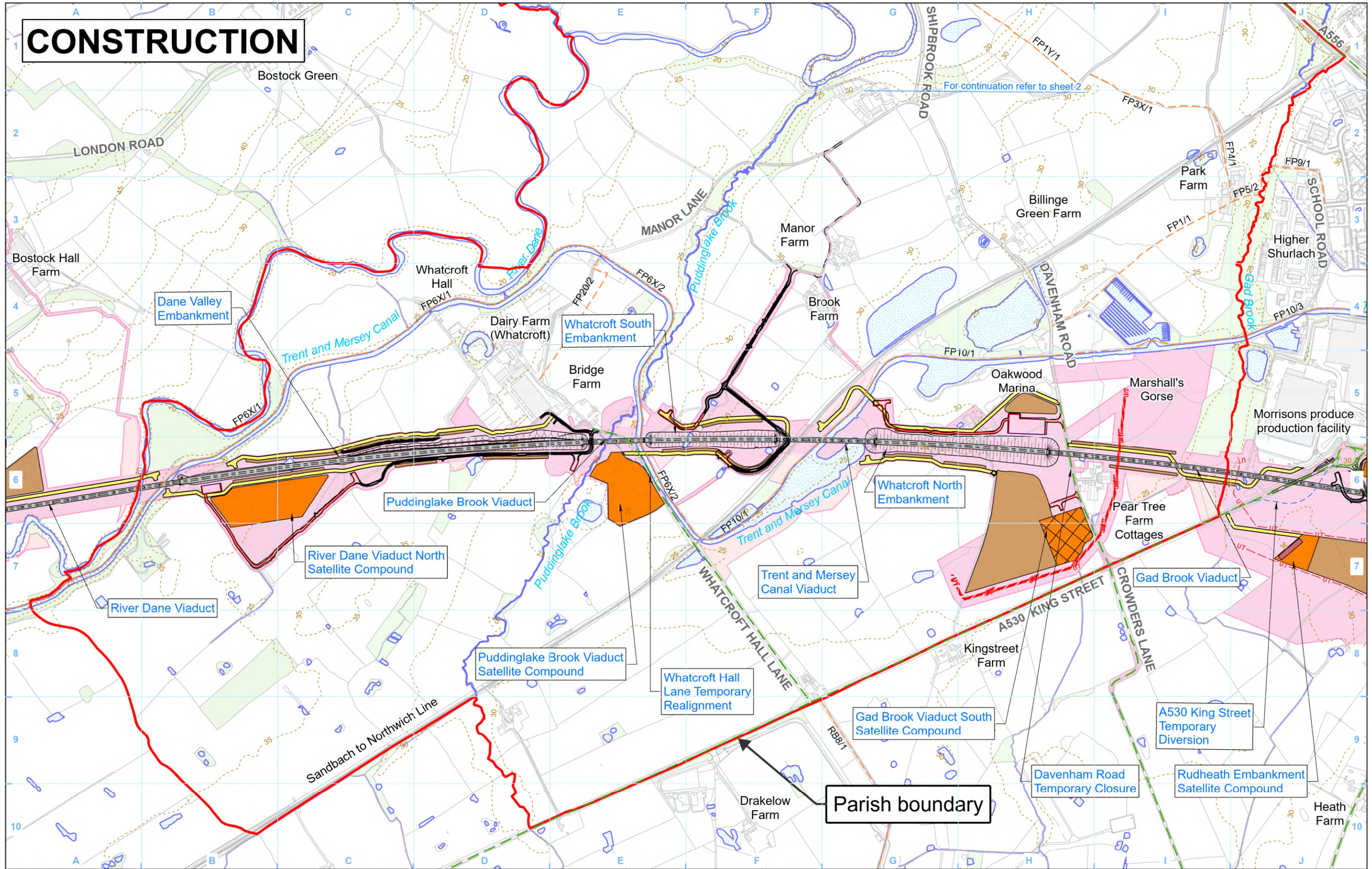
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Date: 18/08/22

CONSTRUCTION



Legend

- Indicative extents of Petitioner(s) land interests
- Satellite construction compound
- Temporary material stockpile
- Land potentially required during construction
- Land potentially required for mitigation planting
- Rail alignment formation
- Haul routes
- Temporary workers accommodation
- Construction traffic route
- Existing public right of way
- Temporary highway diversion / realignment
- Major utility works
- Existing buildings
- Existing woodland
- Existing inland water
- Existing watercourse
- Rail alignment
- 5m contours

P209(1)

Petitioner

Davenham Parish Council

Sheet 1 of 2

Petition number

HS2-012

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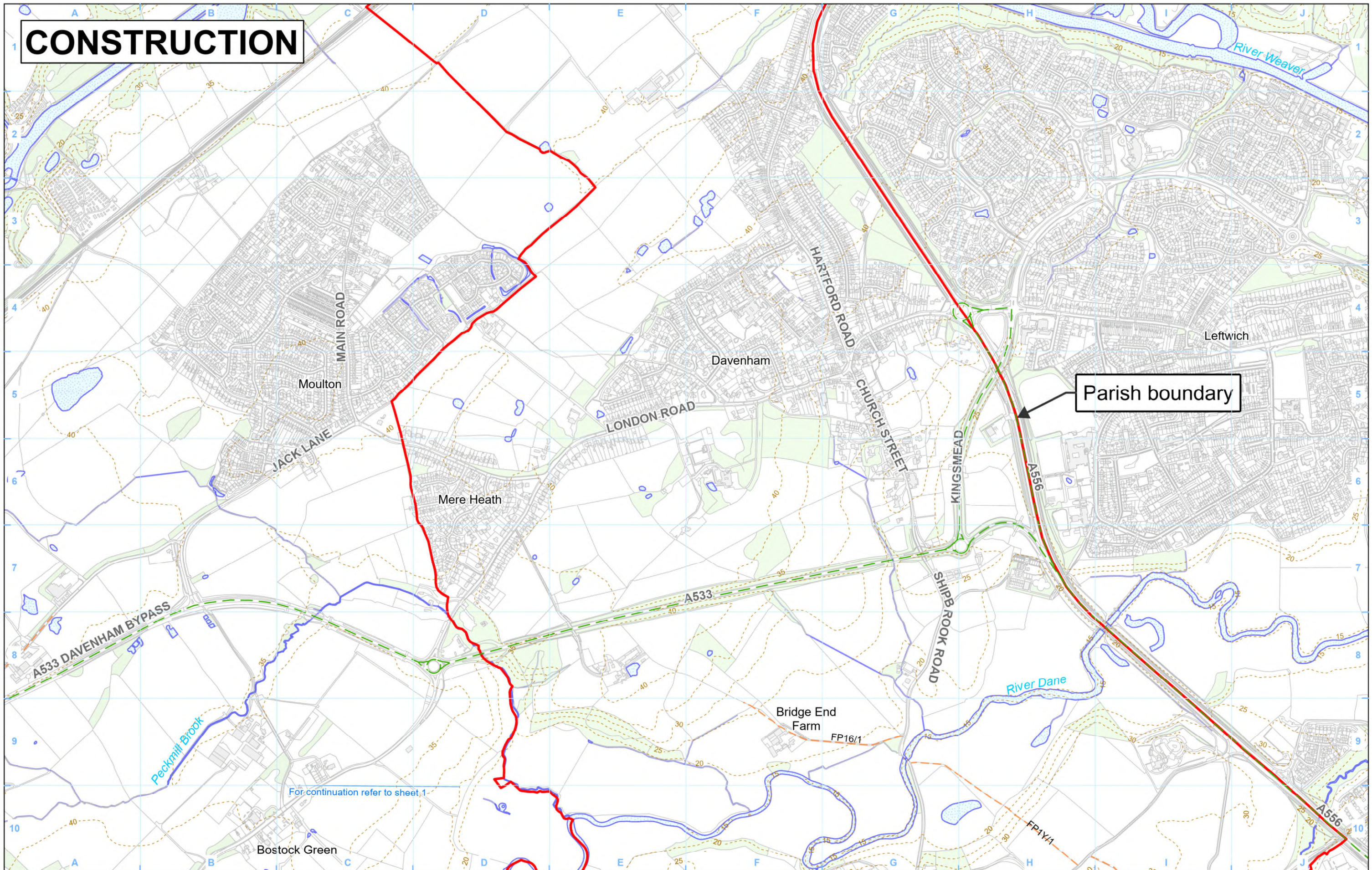
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Date: 18/04/2023

CONSTRUCTION



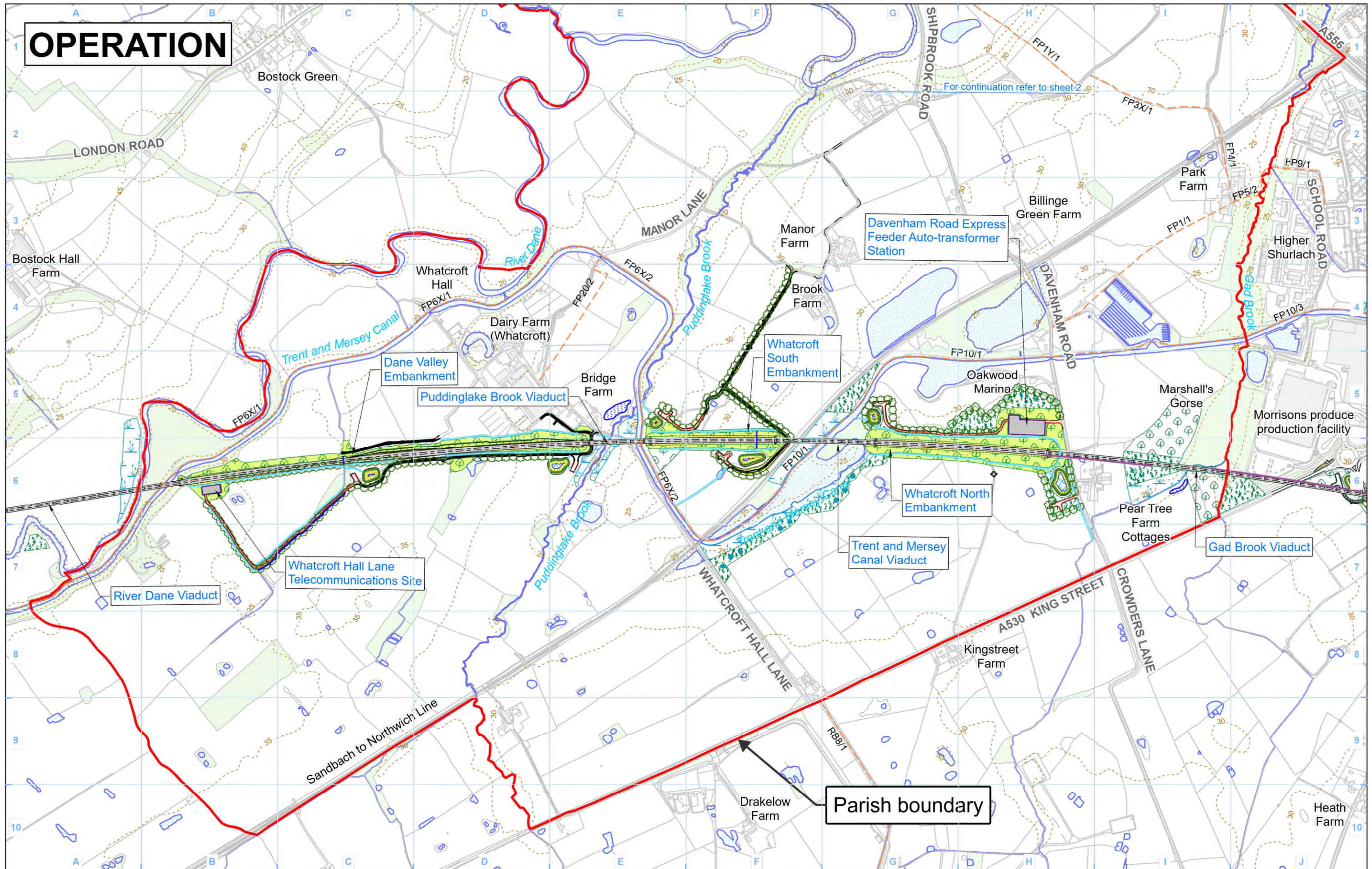
Parish boundary

- Legend**
- | | | |
|--|------------------------------|-----------------------|
| Indicative extents of Petitioner(s) land interests | Existing public right of way | Existing inland water |
| Construction traffic route | Existing buildings | Existing watercourse |
| | Existing woodland | 5m contours |

P209(2)

Petitioner Davenham Parish Council Sheet 2 of 2		 HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.
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OPERATION



Legend			
Indicative extents of Petitioner(s) land interests	Grassland habitat creation	Watercourse diversion	Existing inland water
Railway Systems Site	Wetland habitat creation	Engineering earthworks	Existing watercourse
Ecological mitigation pond (Indicative only)	Woodland habitat creation	Landscape earthworks	HS2 access
Balancing pond	Landscape mitigation planting (scrub / woodland)	Rail alignment formation	Noise fence barrier
Potential floodplain storage	Hedgerow	Existing public right of way	Rail alignment
	New ditches	Existing woodland	5m contours
		Existing buildings	

P210(1)

Petitioner
Davenham Parish Council

Petition number
HS2-012

HS2

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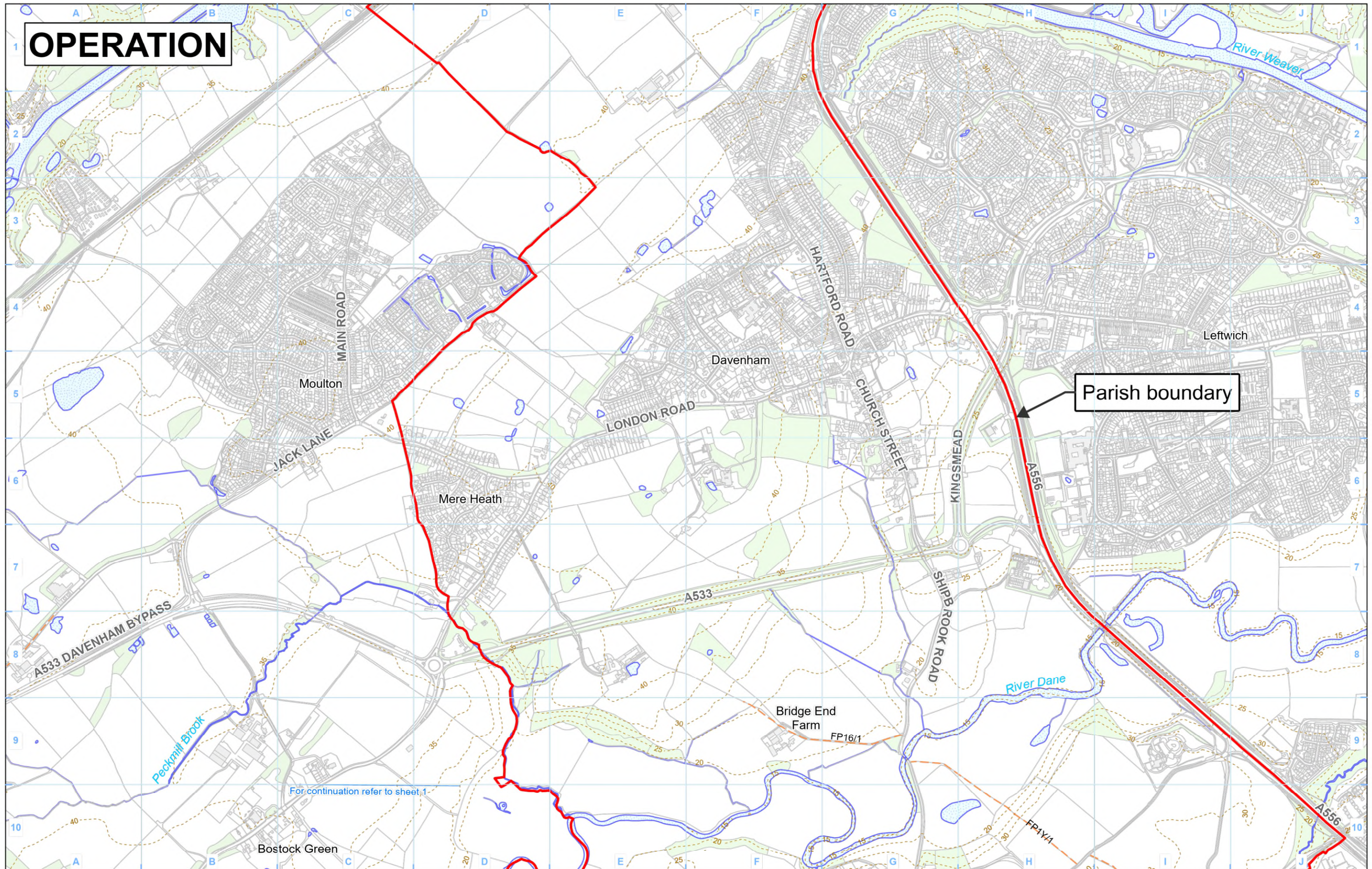
Doc Number: 2PT24-MWJ-PT-MAP-M000-001261-HS2-012

Date: 11/10/2022

Scale at A3: 1:10,000

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Metres

OPERATION



Parish boundary

- Legend**
- Indicative extents of Petitioner(s) land interests
 - Existing buildings
 - Existing inland water
 - Existing public right of way
 - Existing watercourse
 - Existing woodland
 - 5m contours

P210(2)

Petitioner	Davenham Parish Council
Petition number	HS2-012



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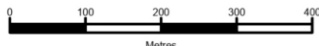
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Doc Number: 2PT24-MWJ-PT-MAP-M000-001262-HS2-012



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0 100 200 300 400 Metres

Date: 11/10/2022

Ms Elaine Hamlett
Davenham Parish Council
28 Mount Pleasant Road
Northwich
Cheshire
CW9 8JG

Sent by email to: clerk@davenhampc.org.uk

5 April 2023

Dear Ms Hamlett,

HIGH SPEED RAIL (CREWE – MANCHESTER) BILL – HOUSE OF COMMONS SELECT COMMITTEE: PETITION HS2- P2B – 012 – DAVENHAM PARISH COUNCIL

I am writing to you in my capacity as Director of Hybrid Bill Delivery at HS2 Ltd, which is acting on behalf of the Promoter of the High Speed Rail (Crewe-Manchester) Bill (the Bill) currently before Parliament.

I understand that you have concerns about the impact of HS2 Phase 2b (known as the Proposed Scheme) and have submitted a petition on that basis against the Bill in the House of Commons.

I am advised that HS2 representatives met a Parish Council representative on 19 October 2022 to discuss your petition. A Promoter's Response Document was then sent to you on 15 February 2023 setting out our position in relation to the issues you raised in your petition.

I understand that it is your intention to raise the following issues before the Select Committee, and our final position is as set out below.

Ground conditions

As you will be aware, further to the Promoter's response on ground conditions set out in pages 4 to 8 of the Promoter's Response Document regarding your petition, a report has been published on 3 March 2023 which provides a review of the ground conditions, the associated risks, and the mitigation measures for the Crewe-Manchester Proposed Scheme. This report

titled "Crewe to Manchester - Understanding the Ground Risk across the Cheshire Plain" can be viewed from the following link:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1140192/Understanding_the_Ground_Risk_across_the_Cheshire_Plain.pdf

Section 4 of this report sets out how the Proposed Scheme will be constructed and operated to take account of ground conditions. Section 5 explains how information has been gathered, through ground investigations, consultation and engagement, to support the development of the Proposed Scheme.

Environmental mitigation

The Promoter's response remains broadly as set out in pages 9 and 18 of the Promoter's Response Document regarding your petition against the Bill. I am advised that during the 19 October meeting, HS2 colleagues explained a number of environmental policies and frameworks as set out in HS2 Phase 2b Western Leg Information Papers E12: Operational noise and vibration monitoring framework, E13: Control of construction noise and vibration and D1: Design. Links to these information papers, as well as C11: The Community and Environment Fund and Business and Local Economy Fund, were shared in a follow up email to the Parish Council.

I would also like to clarify an error in the Promoter's Response Document. On pages 14 to 16 under the heading 'Landscape and visual', paragraphs 26, 27 and 32 refer to viewpoint "310-02-007: View south-east from the Trent and Mersey Canal, Oakwood Marina". This should have been stated as viewpoint "310-03-007: View south-east from the Trent and Mersey Canal, Oakwood Marina". The reported effects in the Promoter's Response Document are unchanged. We apologise for this typographical error.

Resurfacing of roads and general highways maintenance

The Promoter's response on resurfacing of existing roads remains as set out in paragraphs 30 to 34 on page 25 of the Promoter's Response Document regarding your petition against the Bill and in the 19 October meeting.

Furthermore, with reference to your request about highways maintenance measures as set out in paragraph 3A of your petition, please refer to Schedule 5 of Part 3 (Construction and maintenance of highways) of the High Speed Rail (Crewe-Manchester) Bill in respect of new or altered highways within your Parish. Schedule 5 deals with highways as they relate to the works authorised by the Act.

Paragraphs 17(2) and 17(3) of Schedule 5 provide that, unless otherwise agreed, the nominated undertaker is responsible for maintaining a new or altered highway for 12 months from either the date of practical completion of the work, or the date it opens for use by the

public (whichever is later). After that date, the duty to maintain falls to the highway authority, which in this instance would be Cheshire West and Chester Council.

Access routes

I am advised that this matter was discussed at the meeting on 19 October 2022 between the Parish Council and HS2 representatives, where my colleagues explained the position as set out in pages 19 and 26 of the Promoter's Response Document that was sent to you on 15 February 2023.

I have written to you separately in a letter dated 5 April 2023 to provide assurances to Davenham Parish Council in respect of limiting HS2 construction traffic from using Hartford Road and Church Street in the Parish of Davenham and funding for a Welcome to Davenham sign on the Church Street approach to the village of Davenham. These assurances are as set out below:

In these assurances:

"Additional Provision 1" means the High Speed Rail (Crewe – Manchester) Bill Additional Provision which was deposited in the House of Commons on 6 July 2022;

"the Authorised Works" means the works authorised by the Bill;

"Bill" means the High Speed Rail (Crewe- Manchester) Bill as deposited in the House of Lords on 24 January 2022 and as amended by Additional Provision 1 and the expression "the Bill" shall be taken for the purposes of these assurances to include (unless the context otherwise requires) the form of the Bill as enacted;

"Local Highway Authority" means Cheshire West and Chester Council;

"HS2 construction traffic" means any HS2 construction vehicles excluding private construction worker vehicles or vehicles used to transport HS2 workers to and from construction sites;

"nominated undertaker" refers to the body or bodies appointed by the Secretary of State to exercise the powers conferred by the Bill to construct and maintain the Proposed Scheme. The nominated undertaker may be HS2 Ltd, or it may be another body or bodies appointed to oversee the construction and operation of the Proposed Scheme;

"the Petitioner" means Davenham Parish Council;

"Proposed Scheme" means Phase 2b of HS2 as defined further in the Bill;

"Royal Assent" means the date when Royal Assent is given to the Bill;

“the Secretary of State” means the Secretary of State for Transport or any successor Secretary of State or Minister holding the Transport portfolio; and

“the Specified Roads” means Hartford Road and Church Street in the Parish Davenham, the start and end points of the limitation of use for HS2 construction traffic are to be agreed between the Petitioner and nominated undertaker.

1. HS2 Construction Traffic

1.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to limit, so far as reasonably practicable, its use of the Specified Roads by HS2 construction traffic during the construction of the Authorised Works.

1.2 Paragraph 1.1 shall not apply in the event that there is an emergency, or other unforeseen need for works, that reasonably requires the use of the Specified Roads by HS2 construction traffic.

2. Funding of ‘Welcome to Davenham’ sign

2.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to fund a ‘Welcome to Davenham’ sign in Davenham village subject to the conditions at paragraph 2.2.

2.2 The conditions referred to in paragraph 2.1 are that:

2.2.1 the Petitioner obtains the prior consent of the Local Highway Authority to the terms of this assurance;

2.2.2 the Petitioner is responsible for agreeing the form of and preferred location for the sign with the Local Highway Authority;

2.2.3 the nominated undertaker will, provide funding up to a maximum of £6,500, for the purchase and installation of a ‘Welcome to Davenham’ sign on the Church Street approach to the village of Davenham subject to Local Highway Authority consent being obtained; and

2.2.4 the Local Highway Authority are responsible for the procurement, purchase, installation and maintenance of the sign.

Impact on village during construction

I understand that this matter was also discussed at the meeting on 19 October 2022 between the Parish Council and HS2 representatives, and the Promoter’s position remains as set out in pages 27 and 28 of the Promoter’s Response Document that was sent to you on 15 February 2023. The Promoter remains in ongoing active discussions with Cheshire West and Chester Council, the local highway authority.

The Community and Environment Fund and Business Funds will be available to local

communities and businesses that are disrupted along the route of the Proposed Scheme following Royal Assent of the Phase 2b Bill. These Funds would be independently managed by a Grant Management Body, as for the Phase One and Phase 2a. More information can be found at <https://hs2funds.org.uk> and in the HS2 Phase 2b Information Paper C11: The Community and Environment Fund and Business and Local Economy Fund.

I hope that the information set out above and through our earlier correspondence and discussion with you gives the Parish Council the reassurance you were seeking in response to the issues raised in your petition.

For any further queries please don't hesitate to contact Kirsty Clarke, Petition Manager, on 07826 886543 or kirsty.clarke@hs2.org.uk.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Lucy Lagerweij', with a stylized, flowing script.

Lucy Lagerweij

Director, Hybrid Bill Delivery
High Speed Two (HS2) Limited

Ms Elaine Hamlett
Davenham Parish Council
28 Mount Pleasant Road
Northwich
Cheshire
CW9 8JG

By email to: clerk@davenhampc.org.uk

5 April 2023

Dear Ms Hamlett,

HIGH SPEED RAIL (CREWE – MANCHESTER) BILL – HOUSE OF COMMONS SELECT COMMITTEE: PETITION HS2- P2B – 012 – DAVENHAM PARISH COUNCIL

I am writing to you in my capacity as the Director of Hybrid Bill Delivery at HS2 Ltd, which is acting on behalf of the Promoter of the High Speed Rail (Crewe - Manchester) Bill ('the Bill') currently before Parliament.

Further to the Promoters Response Document sent to you on 14 February 2023 which set out the Promoter's position on the issues raised Davenham Parish Council's petition against the Bill in the House of Commons which we understand you will be raising before the Select Committee, I am writing to you, on behalf of the Secretary of State for Transport, to offer Davenham Parish Council the following assurances:

In these assurances:

"Additional Provision 1" means the High Speed Rail (Crewe – Manchester) Bill Additional Provision which was deposited in the House of Commons on 6 July 2022;

"the Authorised Works" means the works authorised by the Bill;

"Bill" means the High Speed Rail (Crewe- Manchester) Bill as deposited in the House of Lords on 24 January 2022 and as amended by Additional Provision 1 and the expression "the Bill" shall be taken for the purposes of these assurances to include (unless the context otherwise requires) the form of the Bill as enacted;

"Local Highway Authority" means Cheshire West and Chester Council;

“HS2 construction traffic” means any HS2 construction vehicles excluding private construction worker vehicles or vehicles used to transport HS2 workers to and from construction sites;

“nominated undertaker” refers to the body or bodies appointed by the Secretary of State to exercise the powers conferred by the Bill to construct and maintain the Proposed Scheme. The nominated undertaker may be HS2 Ltd, or it may be another body or bodies appointed to oversee the construction and operation of the Proposed Scheme;

“the Petitioner” means Davenham Parish Council;

“Proposed Scheme” means Phase 2b of HS2 as defined further in the Bill;

“Royal Assent” means the date when Royal Assent is given to the Bill;

“the Secretary of State” means the Secretary of State for Transport or any successor Secretary of State or Minister holding the Transport portfolio; and

“the Specified Roads” means Hartford Road and Church Street in the Parish Davenham, the start and end points of the limitation of use for HS2 construction traffic are to be agreed between the Petitioner and nominated undertaker.

1. HS2 Construction Traffic

1.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to limit, so far as reasonably practicable, its use of the Specified Roads by HS2 construction traffic during the construction of the Authorised Works.

1.2 Paragraph 1.1 shall not apply in the event that there is an emergency, or other unforeseen need for works, that reasonably requires the use of the Specified Roads by HS2 construction traffic.

2. Funding of ‘Welcome to Davenham’ sign

2.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to fund a ‘Welcome to Davenham’ sign in Davenham village subject to the conditions at paragraph 2.2.

2.2 The conditions referred to in paragraph 2.1 are that:

2.2.1 the Petitioner obtains the prior consent of the Local Highway Authority to the terms of this assurance;

2.2.2 the Petitioner is responsible for agreeing the form of and preferred location for the sign with the Local Highway Authority;

2.2.3 the nominated undertaker will, provide funding up to a maximum of £6,500, for the purchase and installation of a 'Welcome to Davenham' sign on the Church Street approach to the village of Davenham subject to Local Highway Authority consent being obtained; and

2.2.4 the Local Highway Authority are responsible for the procurement, purchase, installation and maintenance of the sign.

If accepted, these assurances will be included in the Register of Undertakings and Assurances, which is held by the Department for Transport. Drafts of the Register will be published regularly during the passage of the Bill and it will be finalised after Royal Assent. A nominated undertaker will be contractually obliged to comply with all relevant undertakings and assurances set out in the Register. The assurance process is set out in Annex A.

If you have any further queries please don't hesitate to contact Kirsty Clarke, Petition Manager, on 07826886543 or kirsty.clarke@hs2.org.uk.

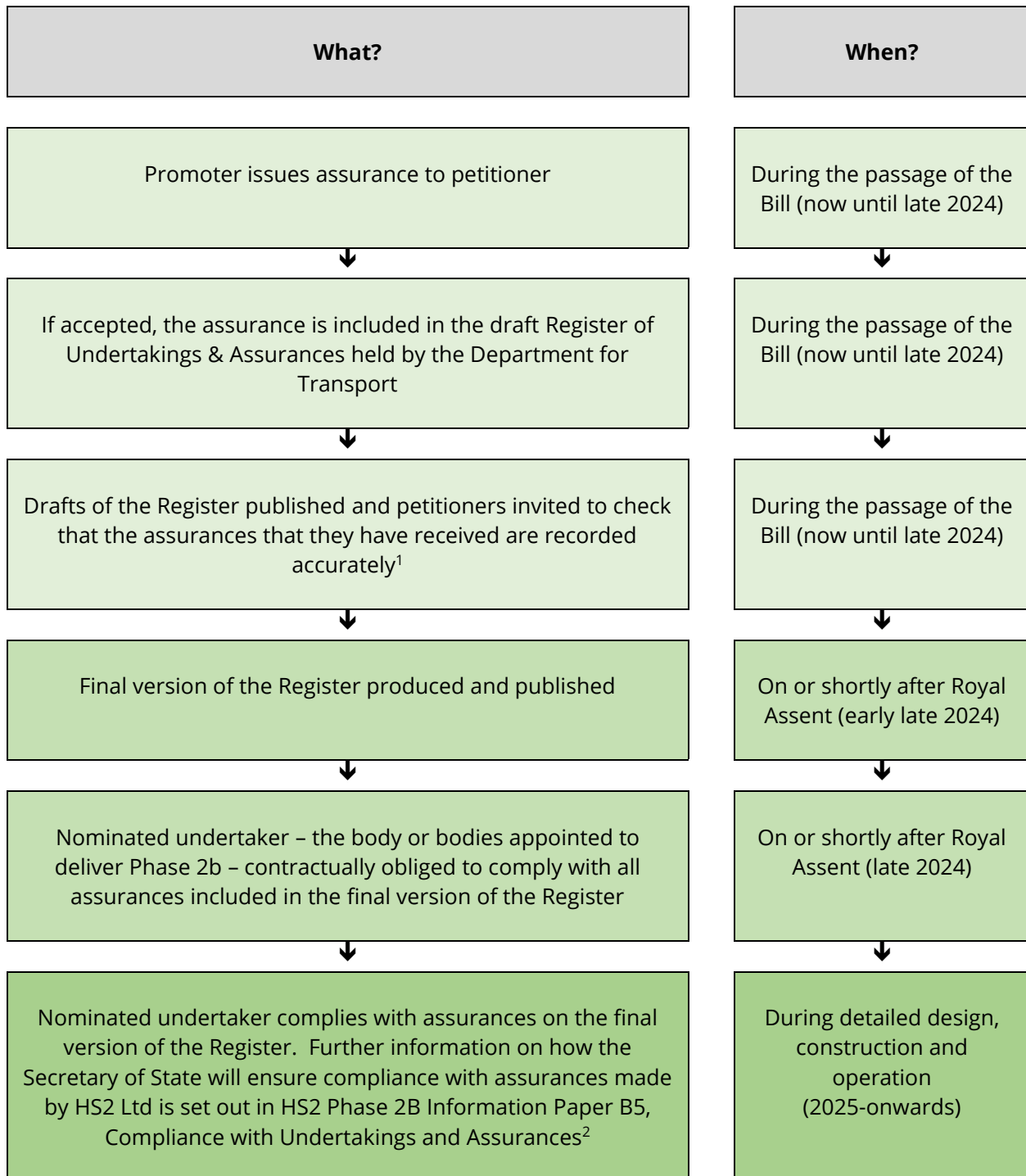
Yours sincerely

A handwritten signature in black ink, appearing to read 'Lucy Lagerweij', with a stylized, cursive script.

Lucy Lagerweij
Director, Hybrid Bill Delivery
High Speed Two (HS2) Limited

Annex A

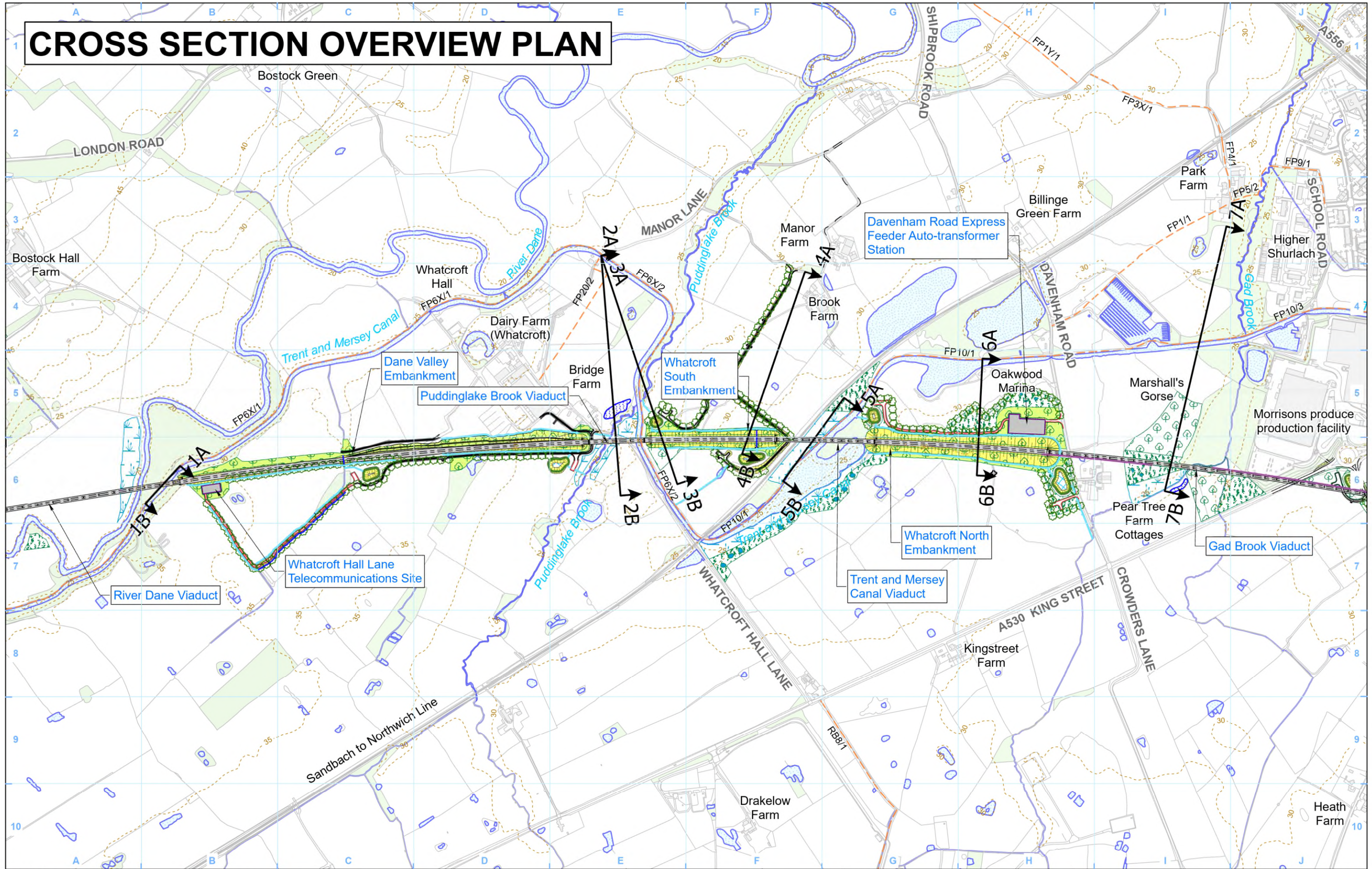
ASSURANCES: STEPS AND TIMING



¹ The latest draft of the Register can be found at <https://www.gov.uk/government/publications/hs2-phase-2b-crewe-manchester-register-of-undertakings-and-assurances>

² A copy can be found at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1048801/B5_Compliance_with_undertakings_and_assurances_v1.pdf

CROSS SECTION OVERVIEW PLAN



Legend

- Railway Systems Site
- Ecological mitigation pond (Indicative only)
- Balancing pond
- Replacement floodplain storage area
- Grassland habitat creation
- Wetland habitat creation
- Woodland habitat creation
- Landscape mitigation planting (scrub / woodland)
- Hedgerow
- Watercourse diversion
- Engineering earthworks
- Landscape earthworks
- Rail alignment formation
- Existing public right of way
- Existing woodland
- Existing buildings
- Existing inland water
- Existing watercourse
- HS2 access
- Noise fence barrier
- 5m contours

P213

Petitioner

Davenham Parish Council

Petition number

HS2-012

For section refer to

2PT24-MWJ-PT-DSE-M000-001231-HS2-012 to
2PT24-MWJ-PT-DSE-M000-001237-HS2-012

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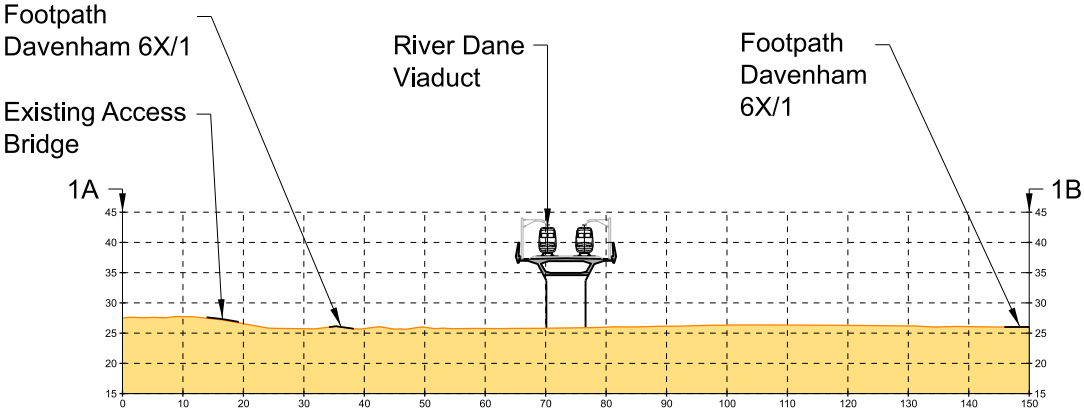
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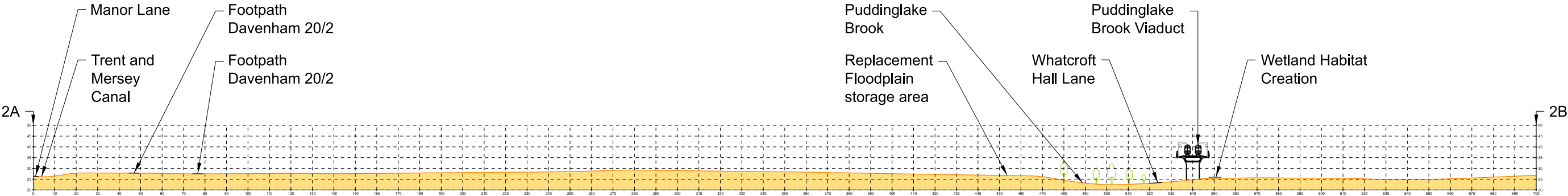
Date: 19/04/2023

CROSS SECTION/S



SECTION 1A-1B
SCALE 1:1250

For Plan refer to 2PT24-MWJ-PT-MAP-M000-001231-HS2-012



SECTION 2A-2B
SCALE 1:2000

For Plan refer to 2PT24-MWJ-PT-MAP-M000-001231-HS2-012

Work-in-progress

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P214(1)

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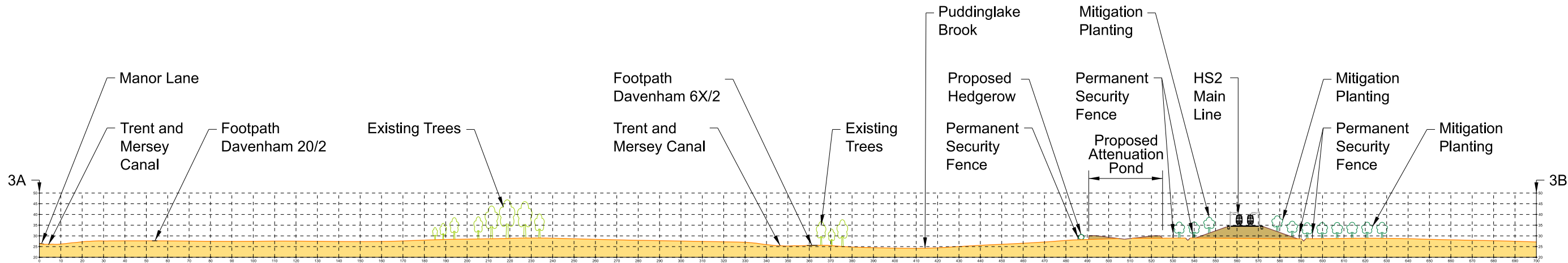
- Legends/Notes:
- Existing ground
 - Proposed HS2 earthworks
 - Existing surface
 - Existing Trees
 - Wetland Habitat Creation

HS2

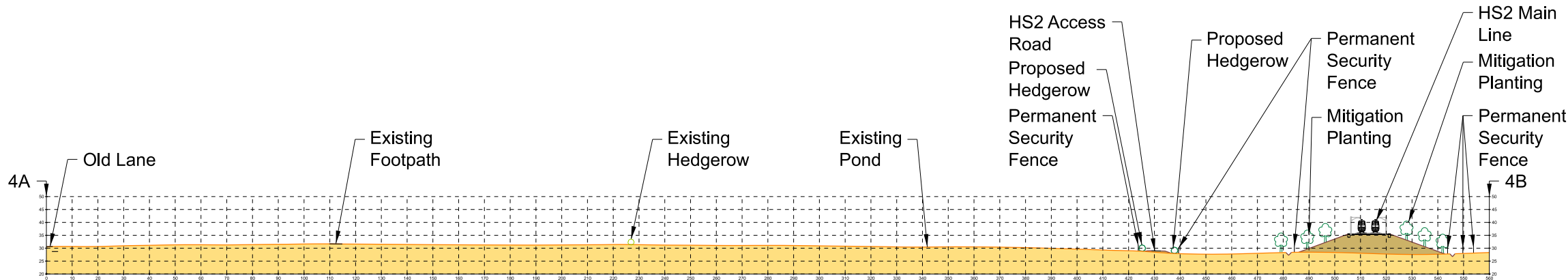
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Birmingham, B4 6GA

Zone	Manchester Leg Whole		Project/Contract	
			2DE01 Hybrid Bill Additional Provision 1 AP1	
Design Stage	Designs for Petition		Discipline/Function	
			Petitions	
Drawing Title	Davenham Parish Council		Creator/Originator	
	HS2-012		MW JV (Mott MacDonald and WSP Joint Venture)	
	Sh.01 (SECTION 1A-1B & 2A-2B)		Date	2023/04/03
			Scale	AS SHOWN
			Size	A3
			Drawing No.	2PT24-MWJ-PT-DSE-M000-001231-HS2-012
			Rev.	P02

CROSS SECTION/S



SECTION 3A-3B
SCALE 1:2000
For Plan refer to 2PT24-MWJ-PT-MAP-M000-001231-HS2-012



SECTION 4A-4B
SCALE 1:2000
For Plan refer to 2PT24-MWJ-PT-MAP-M000-001231-HS2-012

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P214(2)

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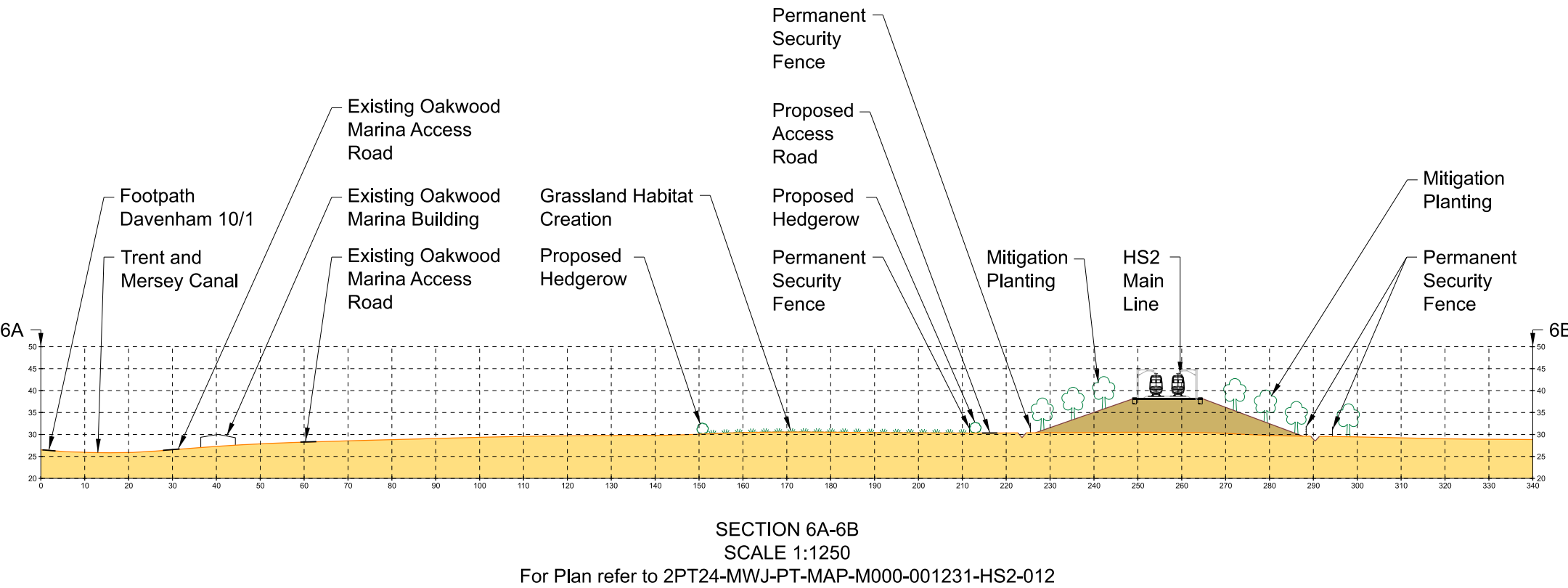
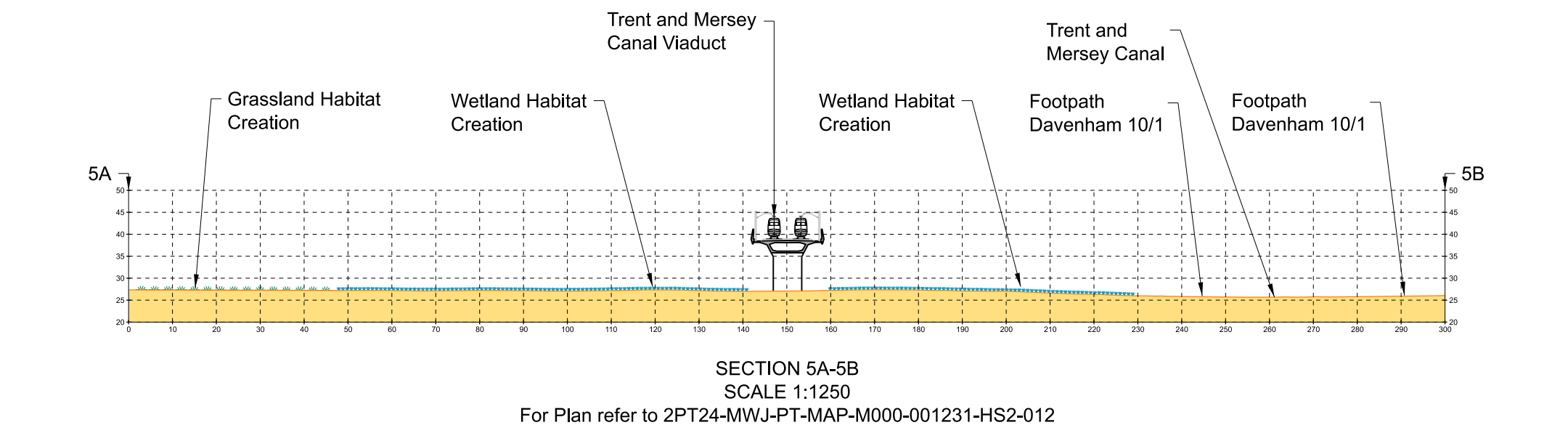
- Legends/Notes:
- Existing ground
 - Proposed HS2 earthworks
 - Designed surface level
 - Existing surface
 - Mitigation Planting (Assumed Height at Year 15 of Operation)
 - Existing Trees
 - Proposed Hedgerow Planting

HS2

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Zone	Manchester Leg Whole			Project/Contract	
				2DE01 Hybrid Bill Additional Provision 1 AP1	
Design Stage	Designs for Petition			Discipline/Function	
				Petitions	
Drawing Title	Davenham Parish Council			Creator/Originator	
	HS2-012			MW JV (Mott MacDonald and WSP Joint Venture)	
	Sh.02 (SECTION 3A-3B & 4A-4B)			Date	2023/04/03
				Scale	AS SHOWN
				Size	A3
				Drawing No.	2PT24-MWJ-PT-DSE-M000-001232-HS2-012
				Rev.	P02

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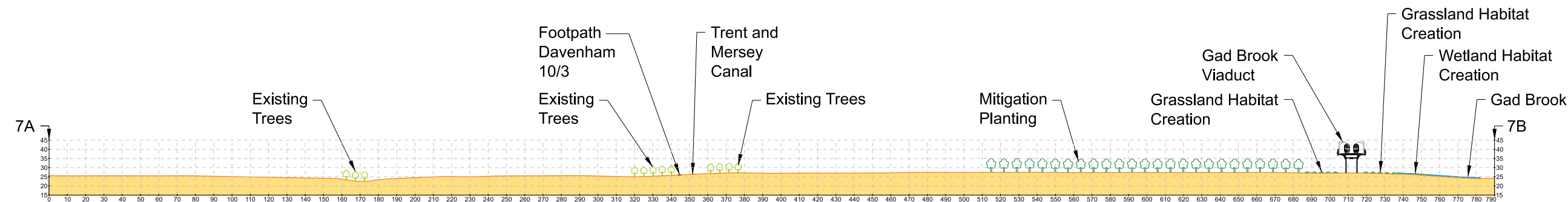
- Legends/Notes:
- Existing ground
 - Proposed HS2 earthworks
 - Existing surface
 - Designed surface level
 - Proposed Hedgerow Planting
 - Mitigation planting (Assumed Height at Year 15 of Operation)
 - Wetland Habitat Creation
 - Grassland Habitat Creation

HS2

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Zone	Manchester Leg Whole		Project/Contract	
			2DE01 Hybrid Bill Additional Provision 1 AP1	
Design Stage	Designs for Petition		Discipline/Function	
			Petitions	
Drawing Title	Davenham Parish Council		Creator/Originator	
	HS2-012		MW JV (Mott MacDonald and WSP Joint Venture)	
	Sh.03 (SECTION 5A-5B & 6A-6B)		Date	2023/04/03
			Scale	AS SHOWN
			Size	A3
			Drawing No.	2PT24-MWJ-PT-DSE-M000-001233-HS2-012
			Rev.	P02

CROSS SECTION/S



SECTION 7A-7B
SCALE 1:2500
For Plan refer to 2PT24-MWJ-PT-MAP-M000-001231-HS2-012

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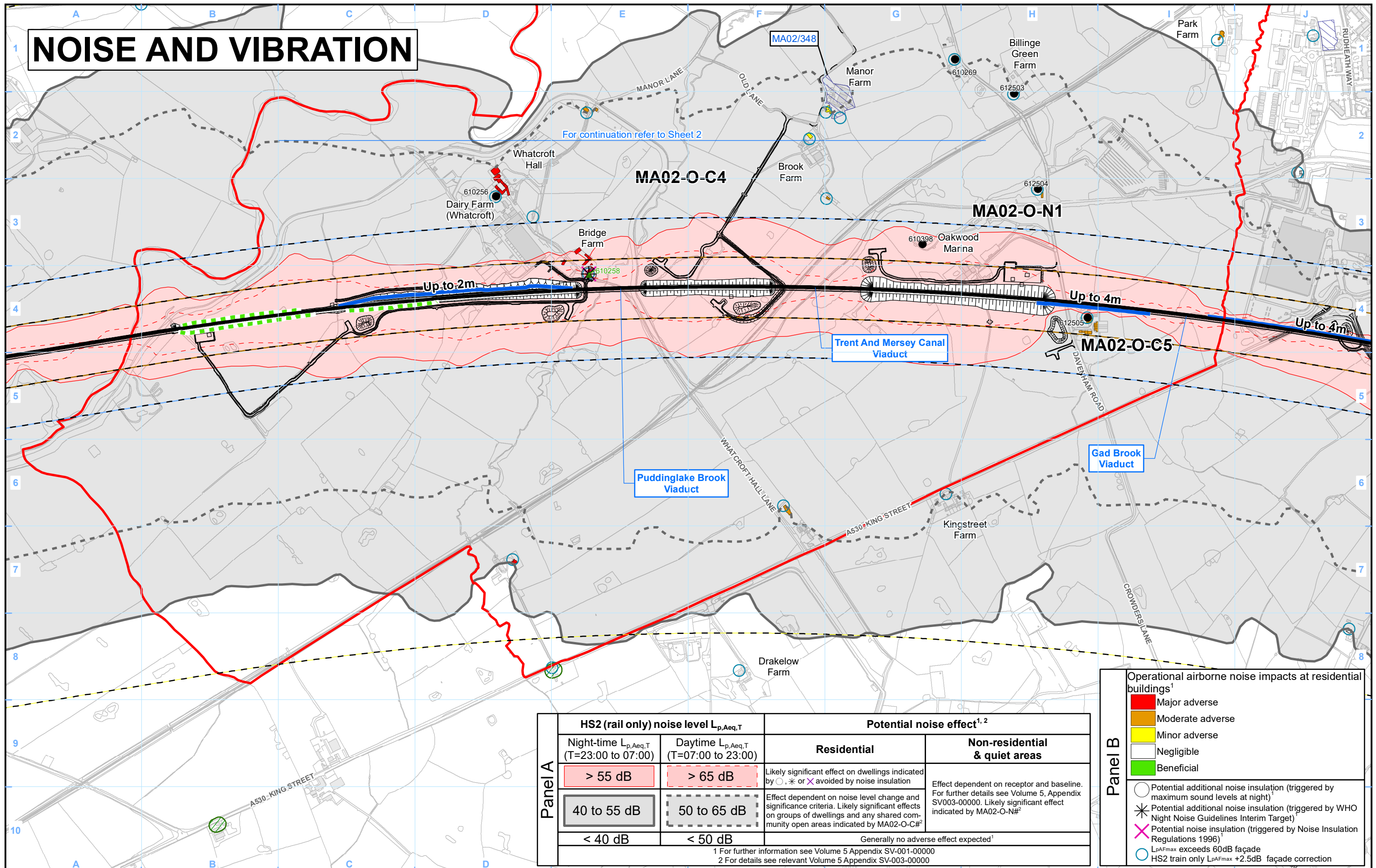
- Legends/Notes:
- Existing ground
 - Existing surface
 - Mitigation Planting (Assumed Height at Year 15 of Operation)
 - Existing Trees
 - Wetland Habitat Creation
 - Grassland Habitat Creation

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Zone	Manchester Leg Whole		Project/Contract		
			2DE01 Hybrid Bill Additional Provision 1 AP1		
Design Stage	Designs for Petition		Discipline/Function		
			Petitions		
Drawing Title	Davenham Parish Council		Creator/Originator		
			MW JV (Mott MacDonald and WSP Joint Venture)		
	HS2-012		Date	Scale	Size
			2023/04/03	AS SHOWN	A3
Sh.04 (SECTION 7A-7B)		Drawing No.		Rev.	
		2PT24-MWJ-PT-DSE-M000-001234-HS2-012		P02	

NOISE AND VIBRATION



Panel A	HS2 (rail only) noise level $L_{p,Aeq,T}$		Potential noise effect ^{1, 2}		
	Night-time $L_{p,Aeq,T}$ (T=23:00 to 07:00)	Daytime $L_{p,Aeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas	
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV003-00000. Likely significant effect indicated by MA02-O-N# ²	
	40 to 55 dB	50 to 65 dB	Effect dependent on noise level change and significance criteria. Likely significant effects on groups of dwellings and any shared community open areas indicated by MA02-O-C# ²		
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹		
	1 For further information see Volume 5 Appendix SV-001-00000 2 For details see relevant Volume 5 Appendix SV-003-00000				

Panel B

Operational airborne noise impacts at residential buildings¹

Major adverse

Moderate adverse

Minor adverse

Negligible

Beneficial

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹

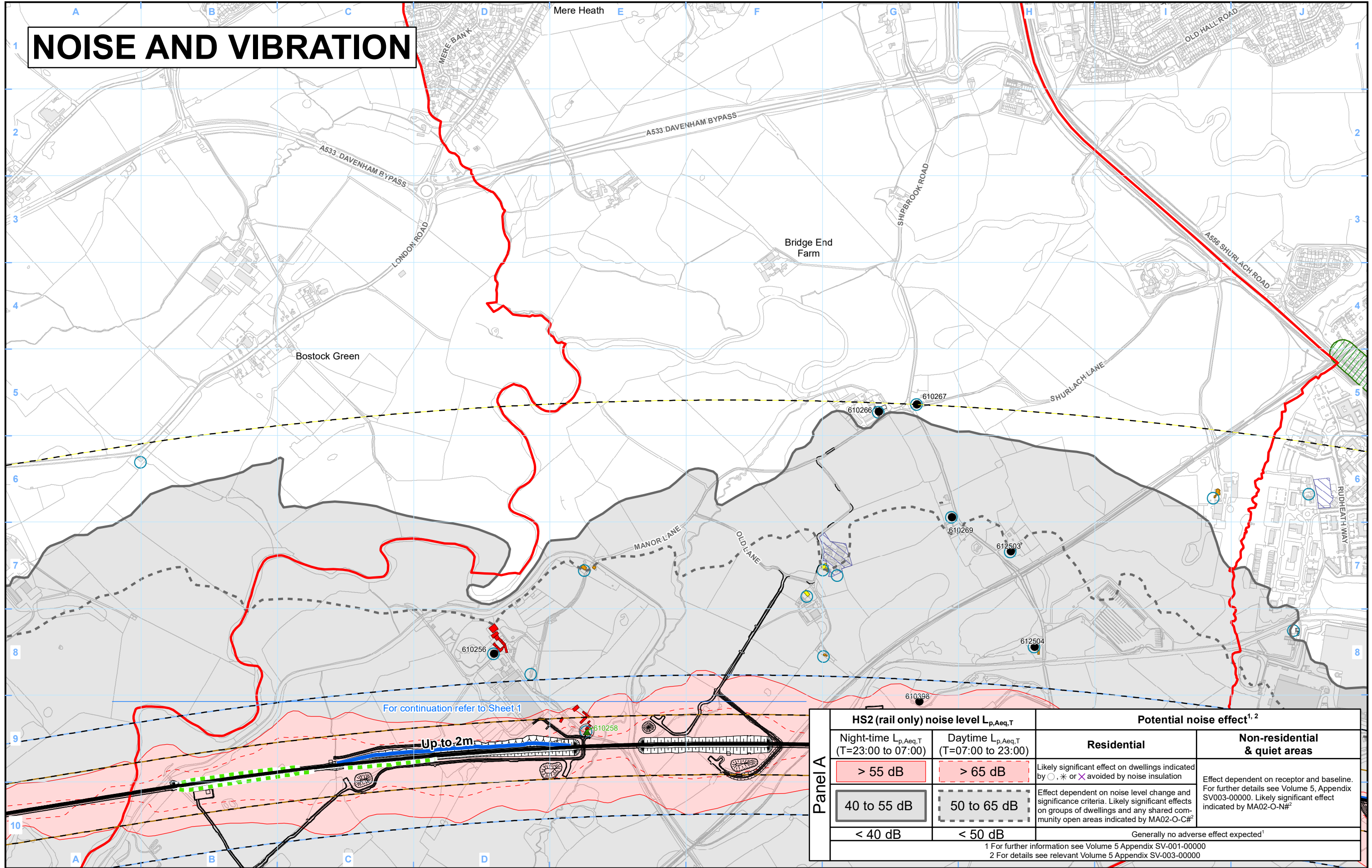
✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)

✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

○ L_{pAFmax} exceeds 60dB façade

○ HS2 train only $L_{pAFmax} +2.5dB$ façade correction

NOISE AND VIBRATION



Legend - General features

- Route in bored tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Indicative extents of Petitioner(s) land interests

P215(2)

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Noise related features

Envisaged mitigation to avoid / reduce significant noise effects:

- Landscaping and/or fence barriers (labelled with total noise barrier height above rail)
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Noise Important Areas defined in national noise action plans (Defra 2014)

- Committed developments - SV Only
- Airborne noise study area
- Ground-borne noise or vibration impact at residential buildings

- Ground-borne noise & vibration study area (residential and non-residential)
- Ground-borne noise & vibration study area (highly sensitive non-residential)
- Airborne noise assessment location

Panel A	HS2 (rail only) noise level $L_{p,Aeq,T}$		Potential noise effect ^{1, 2}	
	Night-time $L_{p,Aeq,T}$ (T=23:00 to 07:00)	Daytime $L_{p,Aeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV003-00000. Likely significant effect indicated by MA02-O-N# ²
	40 to 55 dB	50 to 65 dB	Effect dependent on noise level change and significance criteria. Likely significant effects on groups of dwellings and any shared community open areas indicated by MA02-O-C# ²	
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
	1 For further information see Volume 5 Appendix SV-001-00000 2 For details see relevant Volume 5 Appendix SV-003-00000			

Map Number: SV-02

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects
Petition HS2-012
Davenham Parish Council

Community Area MA02:
Wimboldsley to Lostock Gralam

HS2

Registered in England. Registration number 06791686.
Registered office: Two Snowhill, Snow Hill Queensway, Birmingham B4 6GA.

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: 2PT24-MWJ-PT-MAP-M000-001222-HS2-012 Date: 18/04/23

Noise Levels

HS2

Detailed Noise and Vibration Tables: Results from the Main ES

Table 1: Baseline sound levels

Assessment location		Baseline sound levels (dB)						
Ref	Area represented	For construction sound assessment (2025)			For operational sound assessment (2038)			
		Day L _{pAeq}	Evening / weekend L _{pAeq}	Night-time L _{pAeq}	Daytime L _{pAeq,16hr}	Night-time L _{pAeq,8hr}	Arithmetic average L _{pAFmax,5min}	Highest night-time L _{pAFmax,5min}
610256	Whatcroft Hall Lane, Whatcroft	46	41	40	45	40	46	70
610258	Whatcroft Hall Lane, Whatcroft	46	41	40	45	40	46	70
610266	Shipbrook Hill Farm, Davenham Road, Whatcroft	45	41	38	48	41	46	55
610267	Shipbrook Hill Farm, Davenham Road, Whatcroft	59	55	52	65	59	64	69
610269	Yew Tree Farm, Davenham Road, Whatford	59	55	52	61	54	59	64
610398	Oakwood Marina (Lower Sensitivity Offices), Davenham Road, Rudheath	47	44	42	47	42	48	69
612503	Billinge Green Barn, Davenham Road, Billenge Green	55	51	47	56	49	54	74
612504	Little Grebe Cottage, Davenham Road, Billenge Green	51	46	43	52	45	50	65
612505	Pear Tree Farm cottages, Davenham Road, Billenge Green	53	47	46	52	46	53	71

Table 2: Construction airborne sound, noise impacts and significant effects at residential receptors

Assessment location		Impact criteria				Significance criteria ¹					Significant effect ²
Ref	Area represented	Typical/highest monthly outdoor L _{pAeq} dB at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of properties represented	Existing environment	Impact duration (months)	Mitigation effect	
		Day 07:00 – 19:00	Evening 19:00 – 23:00	Night 23:00 – 07:00							
610256	Whatcroft Hall Lane, Whatcroft	51/57[A]	-/-[A]	-/-[B]	Day: Highway works	NA	9	-	-	-	
610258	Whatcroft Hall Lane, Whatcroft	79/83[A]	33/39[A]	33/39[B]	Day: Highway works Evening: Highway works Night: Highway works	S	3	-	D21	NI	~
610266	Shipbrook Hill Farm, Davenham Road, Whatcroft	50/53[A]	-/-[A]	-/-[A]	Day: Highway works	NA	1	-	-	-	

¹ **NA** – no adverse effect, **A** – adverse effect, **S** – significant adverse effect, **H** – high existing ambient noise levels, **D#** – duration of impact during the day, impact, **NI** – qualifies for noise insulation

² ~ - when considered under the significance criteria set out, these adverse effects are not considered to be significant on a community basis. **MA02-C-C#** - significant residential community effect as a result of noise

P215(3)

Noise Levels

HS2

Assessment location		Impact criteria				Significance criteria ¹					Significant effect ²
Ref	Area represented	Typical/highest monthly outdoor L _{pAeq} dB at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of properties represented	Existing environment	Impact duration (months)	Mitigation effect	
		Day 07:00 – 19:00	Evening 19:00 – 23:00	Night 23:00 – 07:00							
610267	Shipbrook Hill Farm, Davenham Road, Whatcroft	49/53[A]	-/-[C]	-/-[C]	Day: Highway works	NA	1	H	-	-	
610269	Yew Tree Farm, Davenham Road, Whatford	52/56[A]	-/-[C]	-/-[C]	Day: Highway works	NA	1	H	-	-	
612503	Billinge Green Barn, Davenham Road, Billinge Green	53/57[A]	-/-[B]	-/-[C]	Day: Highway works	NA	1	-	-	-	
612504	Little Grebe Cottage, Davenham Road, Billinge Green	56/62[A]	-/-[A]	-/-[B]	Day: Highway works	NA	1	-	-	-	
612505	Pear Tree Farm cottages, Davenham Road, Billinge Green	63/69[A]	-/-[A]	-/-[C]	Day: Viaduct construction	A	10	-	D2	-	MA02-C-C2

Table 3: Construction airborne sound, noise impacts and significant effects at non-residential receptors

Assessment location		Impact criteria					Significance criteria ³				Significant effect
Ref	Area represented	Typical/highest monthly outdoor L _{pAeq} dB at the façade		Change during month with highest noise level		Construction activity resulting in highest forecast noise levels	Number of properties represented	Type of receptor	Existing environment	Impact duration (months)	
		Day 07:00 – 19:00	Night 23:00 – 07:00	Day 07:00 – 19:00	Night 23:00 – 07:00						
610398	Oakwood Marina (Lower Sensitivity Offices), Davenham Road, Rudheath	57/62	-/-	12	-	Day: Highway works	1	A4	-	-	

Table 4: Construction vibration impacts and significant effects at residential and non-residential receptors

Assessment location		Impact criteria				Significance criteria				Significant effect
Ref	Area represented	Peak particle velocity (PPV) mm/s on foundation	Typical/highest monthly indoor vibration dose value (VDV) m/s ^{1.75}		Construction activity resulting in highest forecast vibration	Type of effect	Number of properties represented	Type of receptor	Impact duration (months)	
			Day 07:00 – 23:00	Night 23:00 – 07:00						
610258	Whatcroft Hall Lane, Whatcroft	0.9	0.16/0.64	-/-	Finishing works (vibratory roller)	A	3	R	D1	~
612505	Pear Tree Farm cottages, Davenham Road, Billenge Green	0.5	0.12/0.20	-/-	Finishing works (vibratory roller)	NA	10	R		

Noise Levels

HS2

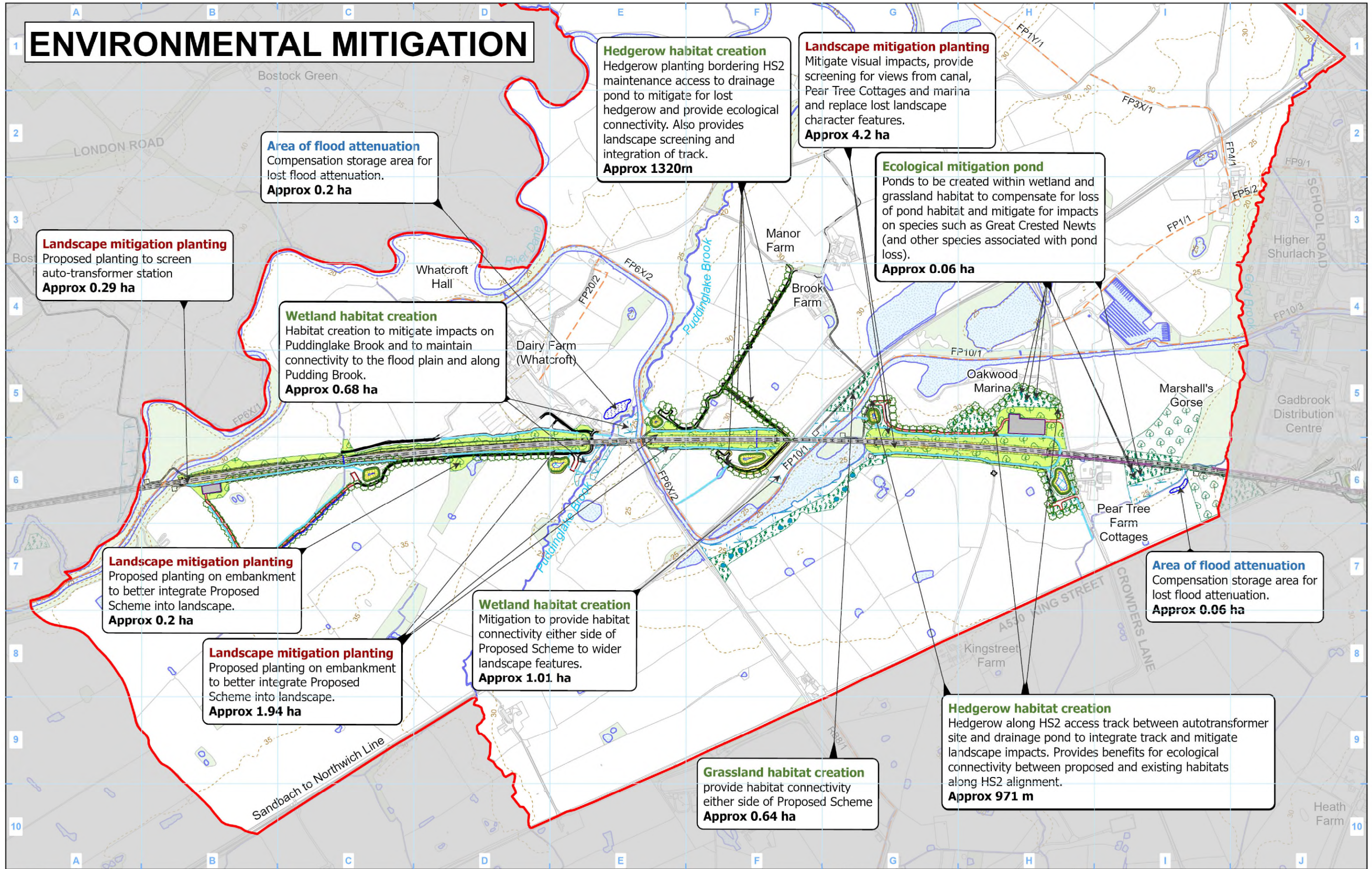
Table 5: Operational airborne sound, noise impacts and significant effects at residential and non-residential receptors

Assessment location		Impact criteria										Significance criteria ⁴					Significant effect ⁵
Ref	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed Scheme (opening year baseline + year 15 traffic)		Change		Type of effect	Number of impacts represented	Type of receptor	Existing environment	Mitigation effect	
		Day	Night	Max	Day	Night	Max	Day	Night	Day	Night						
610256	Whatcroft Hall Lane, Whatcroft	54	48	69/--	45	40	46	55	49	10	9	A	9	R	-	-	MA02-O-C4
610258	Whatcroft Hall Lane, Whatcroft	67	61	89/--	45	40	46	67	61	22	21	S	3	R	-	NI	MA02-O-C4
610266	Shipbrook Hill Farm, Davenham Road, Whatcroft	46	40	60/--	48	41	46	50	44	2	2	A	1	R	-	-	
610267	Shipbrook Hill Farm, Davenham Road, Whatcroft	45	40	61/--	65	59	64	65	59	0	0	A	1	R	H	-	
610269	Yew Tree Farm, Davenham Road, Whatford	50	44	65/--	61	54	59	61	54	0	0	A	1	R	-	-	
612503	Billinge Green Barn, Davenham Road, Billenge Green	52	46	67/--	56	49	54	57	50	1	1	A	1	R	-	-	
612504	Little Grebe Cottage, Davenham Road, Billenge Green	57	51	74/--	52	45	50	58	52	6	7	A	1	R	-	-	~
612505	Davenham Road, Billenge Green	57	51	75/--	52	46	53	58	52	6	6	A	10	R	-	-	MA02-O-C5
610398	Oakwood Marina (Lower Sensitivity Offices), Davenham Road, Rudheath	59	54	75/--	47	42	48	60	54	13	12	B	1	A4	-	-	MA02-O-N1

Table 6: Operational vibration impacts and significant effects at residential and non-residential receptors

Assessment location		Impact criteria			Significance criteria			Significant effect
Ref	Area represented	Ground-borne sound level dB L _{pA} S _{max}	VDV m/s ^{1.75}	VDV m/s ^{1.75}	Number of impacts represented	Type of effect	Type of receptor	
			Day 07:00 – 23:00	Night 23:00 – 07:00				
610258	Whatcroft Hall Lane, Whatcroft	-	0.27	0.16	3	A	R	~

⁴ B – further detail set out in Appendix SV001-00000



ENVIRONMENTAL MITIGATION

Hedgerow habitat creation
Hedgerow planting bordering HS2 maintenance access to drainage pond to mitigate for lost hedgerow and provide ecological connectivity. Also provides landscape screening and integration of track.
Approx 1320m

Landscape mitigation planting
Mitigate visual impacts, provide screening for views from canal, Pear Tree Cottages and marina and replace lost landscape character features.
Approx 4.2 ha

Ecological mitigation pond
Ponds to be created within wetland and grassland habitat to compensate for loss of pond habitat and mitigate for impacts on species such as Great Crested Newts (and other species associated with pond loss).
Approx 0.06 ha

Area of flood attenuation
Compensation storage area for lost flood attenuation.
Approx 0.2 ha

Landscape mitigation planting
Proposed planting to screen auto-transformer station
Approx 0.29 ha

Wetland habitat creation
Habitat creation to mitigate impacts on Puddinglake Brook and to maintain connectivity to the flood plain and along Pudding Brook.
Approx 0.68 ha

Landscape mitigation planting
Proposed planting on embankment to better integrate Proposed Scheme into landscape.
Approx 0.2 ha

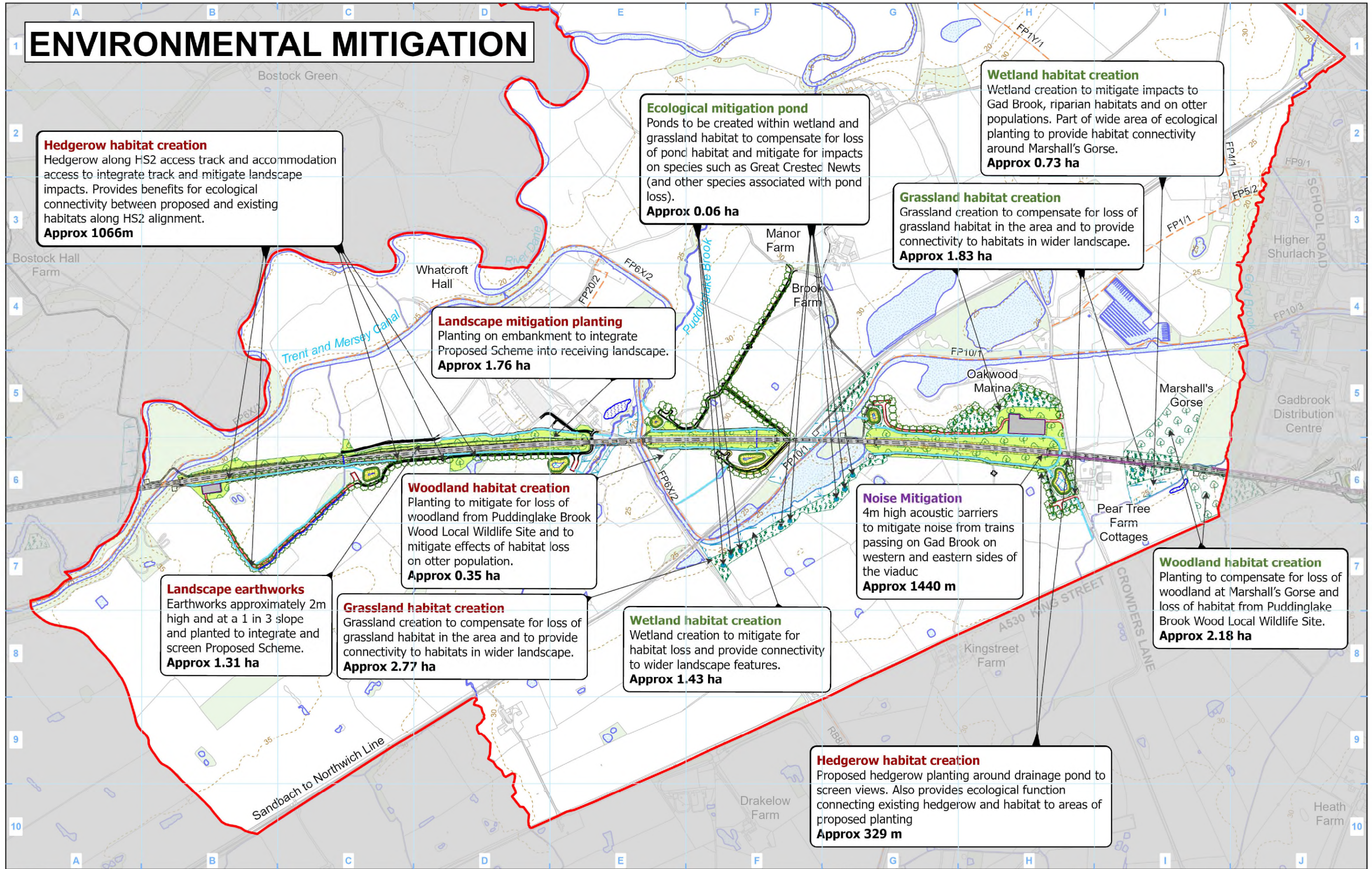
Landscape mitigation planting
Proposed planting on embankment to better integrate Proposed Scheme into landscape.
Approx 1.94 ha

Wetland habitat creation
Mitigation to provide habitat connectivity either side of Proposed Scheme to wider landscape features.
Approx 1.01 ha

Area of flood attenuation
Compensation storage area for lost flood attenuation.
Approx 0.06 ha

Grassland habitat creation
provide habitat connectivity either side of Proposed Scheme
Approx 0.64 ha

Hedgerow habitat creation
Hedgerow along HS2 access track between autotransformer site and drainage pond to integrate track and mitigate landscape impacts. Provides benefits for ecological connectivity between proposed and existing habitats along HS2 alignment.
Approx 971 m



ENVIRONMENTAL MITIGATION

Hedgerow habitat creation

Hedgerow along HS2 access track and accommodation access to integrate track and mitigate landscape impacts. Provides benefits for ecological connectivity between proposed and existing habitats along HS2 alignment.

Approx 1066m

Ecological mitigation pond

Ponds to be created within wetland and grassland habitat to compensate for loss of pond habitat and mitigate for impacts on species such as Great Crested Newts (and other species associated with pond loss).

Approx 0.06 ha

Wetland habitat creation

Wetland creation to mitigate impacts to Gad Brook, riparian habitats and on otter populations. Part of wide area of ecological planting to provide habitat connectivity around Marshall's Gorse.

Approx 0.73 ha

Grassland habitat creation

Grassland creation to compensate for loss of grassland habitat in the area and to provide connectivity to habitats in wider landscape.

Approx 1.83 ha

Landscape mitigation planting

Planting on embankment to integrate Proposed Scheme into receiving landscape.

Approx 1.76 ha

Woodland habitat creation

Planting to mitigate for loss of woodland from Puddinglake Brook Wood Local Wildlife Site and to mitigate effects of habitat loss on otter population.

Approx 0.35 ha

Landscape earthworks

Earthworks approximately 2m high and at a 1 in 3 slope and planted to integrate and screen Proposed Scheme.

Approx 1.31 ha

Grassland habitat creation

Grassland creation to compensate for loss of grassland habitat in the area and to provide connectivity to habitats in wider landscape.

Approx 2.77 ha

Wetland habitat creation

Wetland creation to mitigate for habitat loss and provide connectivity to wider landscape features.

Approx 1.43 ha

Noise Mitigation

4m high acoustic barriers to mitigate noise from trains passing on Gad Brook on western and eastern sides of the viaduc

Approx 1440 m

Woodland habitat creation

Planting to compensate for loss of woodland at Marshall's Gorse and loss of habitat from Puddinglake Brook Wood Local Wildlife Site.

Approx 2.18 ha

Hedgerow habitat creation

Proposed hedgerow planting around drainage pond to screen views. Also provides ecological function connecting existing hedgerow and habitat to areas of proposed planting

Approx 329 m

Legend

- | | | | |
|--|--|------------------------------|-----------------------|
| Indicative extents of Petitioner(s) land interests | Grassland habitat creation | Watercourse diversion | Existing buildings |
| Railway Systems Site | Wetland habitat creation | Landscape earthworks | Existing inland water |
| Ecological mitigation pond (Indicative only) | Woodland habitat creation | Engineering earthworks | Existing watercourse |
| Balancing pond | Landscape mitigation planting (scrub / woodland) | Rail alignment formation | HS2 access |
| Potential floodplain storage | Hedgerow | Existing public right of way | Noise fence barrier |
| | New ditches | Existing woodland | 5m contours |

P216(2)

Petitioner
Davenham Parish Council
Sheet 2 of 2

Petition number
HS2-012

HS2

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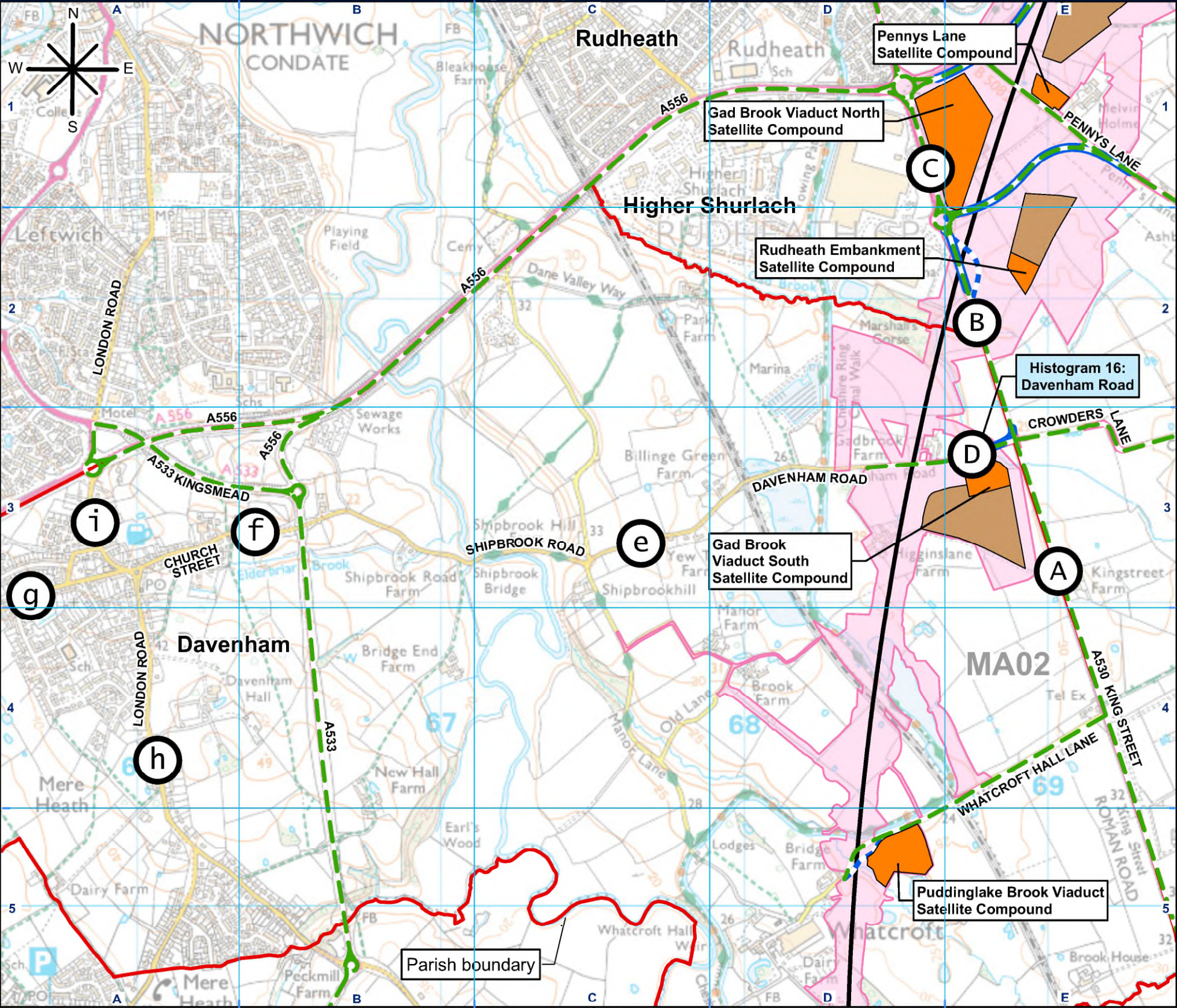
Date: 18/04/2023

Scale at A3: 1:10,000



EXHIBIT TYPE:
Traffic and Transport Bespoke Exhibit - Average Daily Weekday Traffic Flows in Peak Month

The AP1 Revised Scheme



Location	2030 Future Baseline			Peak HS2 Construction Traffic		2030 with HS2 Traffic and Diversionary Effects			Net change in all vehicles	
	All vehicles	HGVs	HGVs as a % of all vehicles	All vehicles	HGVs	All vehicles	HGVs	HGVs as a % of all vehicles		
ROADS ON HS2 CONSTRUCTION TRAFFIC ROUTES										
A	A530 King Street - between Whatcroft Hall Lane and Davenham Road									
	NB	11,199	154	1%	527	236	11,882	387	3%	+683
	SB	10,620	141	1%	1,085	236	11,368	373	3%	+748
B	A530 King Street - between Davenham Road and Gadbrook Distribution Centre Access									
	NB	9,536	156	2%	292	23	9,515	177	2%	-21
	SB	8,949	141	2%	948	39	11,947	178	1%	+2,998
C	A530 King Street - between Gadbrook Distribution Centre Access and A556 Shurlach Road									
	NB	9,560	152	2%	637	133	13,814	330	2%	+4,254
	SB	9,069	151	2%	1,179	133	16,309	301	2%	+7,240
D	Davenham Road - between Gad Brook Viaduct South Compound and A530 King Street									
	EB	2,895	0	0%	205	146	2,518	146	6%	-377
	WB	2,699	0	0%	275	146	3,591	146	4%	+892
ROADS NOT ON HS2 CONSTRUCTION TRAFFIC ROUTES										
e	Davenham Road - between Shipbrook Road and Gad Brook Viaduct South Compound									
	EB	2,895	0	0%	27	0	2,339	0	0%	-556
	WB	2,699	0	0%	96	0	3,413	0	0%	+714
f	Church Street - between London Road and Shipbrook Road									
	EB	3,691	3	<1%	24	0	3,527	3	<1%	-164
	WB	3,045	14	<1%	88	0	3,452	14	<1%	+407
g	Hartford Road - between Mount Pleasant Road and Green Lane									
	EB	487	13	3%	0	0	488	13	3%	+1
	WB	2,373	7	<1%	40	0	2,481	7	<1%	+108
h	London Road - between Jack Lane and Fountain Lane									
	NB	6,832	247	4%	29	0	7,405	248	3%	+573
	SB	3,564	69	2%	12	0	3,656	68	2%	+92
i	London Road - between Green Lane and A556									
	NB	8,933	236	3%	61	0	9,323	219	2%	+390
	SB	6,154	65	1%	21	0	5,880	64	1%	-274

Note: NB - Northbound; SB - Southbound; EB - Eastbound; WB - Westbound

- Indicative extent of Petitioner(s) land interests

HS2 Phase 2b route alignment (on surface)

Land potentially required during construction

P217(1) construction compound

temporary material stockpile
- Permanent highway infrastructure used as a HS2 construction traffic route

Permanent highway infrastructure (new/realignment/diversion)

Temporary highway infrastructure (realignment/diversion)

HS2 construction traffic route

Notes:

1. In the link flow table, HS2 construction traffic represents the overall peak on each road for each scenario shown. This may occur at different times for each road.

2. The impacts of the AP1 revised scheme may cause some non-HS2 traffic to divert onto other routes during the construction period. As a result of these diversionary impacts, the 'With HS2' traffic flows in the link flow table do not generally equal the sum of the Future Baseline and Peak HS2 Construction traffic flows.

3. The traffic flow data in the link flow table is based on the period during construction when there is the greatest level of change in traffic flows on each road as a result of the scheme. In some locations, this may not coincide with the overall peak in HS2 construction traffic flow.

Scale at A3: 1:15,000

0 100 200 300 400 500

Metres

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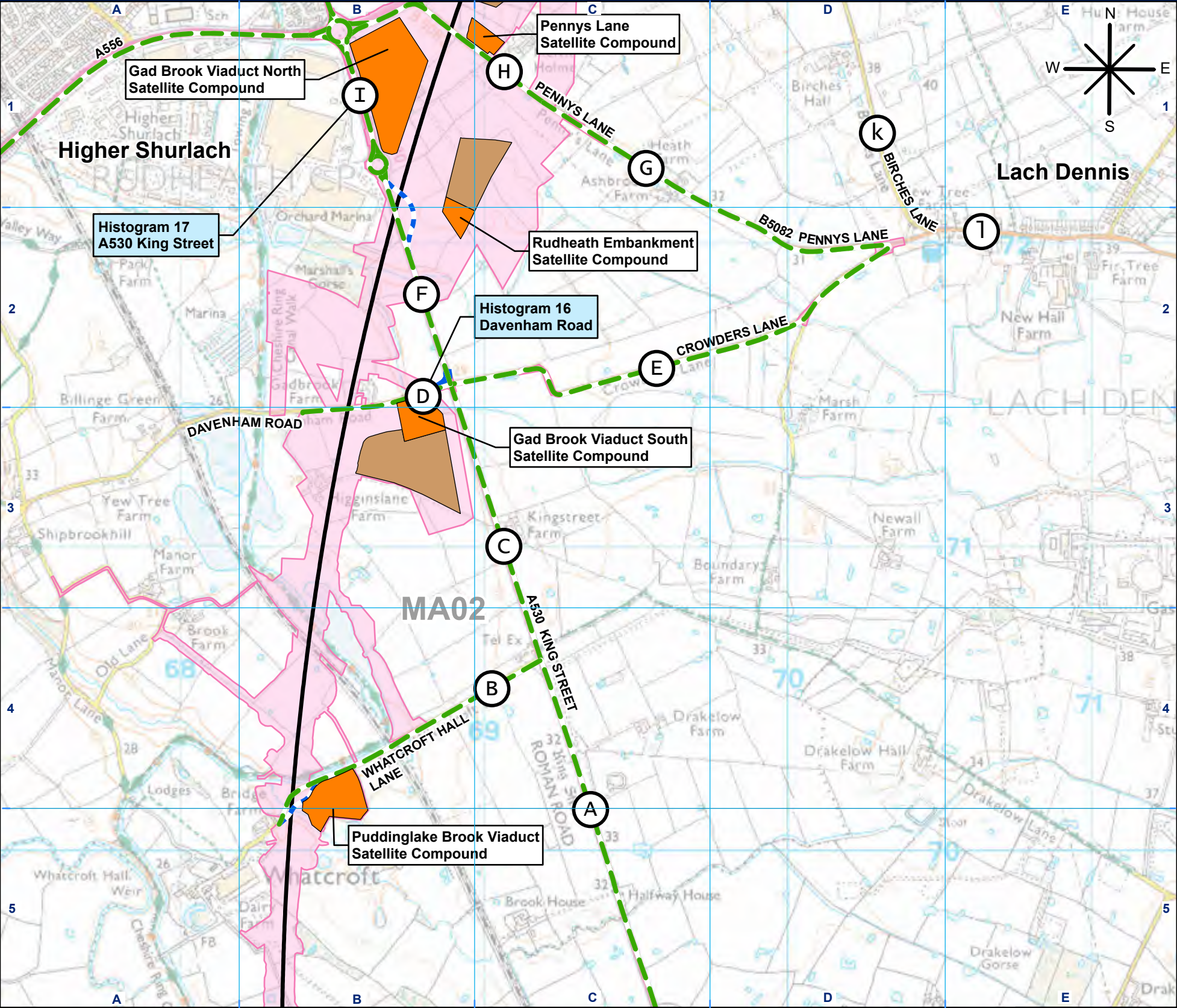
Doc Number: 2PT24-MWJ-PT-MAP-M000-000872-HS2-012-P01

Date: 17/04/23

Traffic Flow Map 4a: Rudheath before Pennys Lane diversion
Average Daily Weekday Traffic Flows in Peak Month



The AP1 Revised Scheme



Location		2030 Future Baseline			Peak HS2 Construction Traffic		2030 with HS2 Traffic and Diversionary Effects			Net change in all vehicles
		All vehicles	HGVs	HGVs as a % of all vehicles	All vehicles	HGVs	All vehicles	HGVs	HGVs as a % of all vehicles	
ROADS ON HS2 CONSTRUCTION TRAFFIC ROUTES										
A	A530 King Street (between A530 Croxton Lane and Whatcroft Hall Lane)									
	NB	11,398	464	4%	795	257	11,897	565	5%	+499
	SB	8,874	163	2%	863	257	7,880	348	4%	-994
B	Whatcroft Hall Lane (between A530 and Puddinglake Brook Viaduct Compound)									
	EB	115	9	8%	400	77	515	86	17%	+400
	WB	101	9	9%	397	77	498	86	17%	+397
C	A530 King Street (between Whatcroft Hall Lane and Davenham Road)									
	NB	11,199	154	1%	527	236	11,882	387	3%	+683
	SB	10,620	141	1%	1,085	236	11,368	373	3%	+748
D	Davenham Road (between Gad Brook Viaduct South Compound and A530 King Street)									
	EB	2,895	0	0%	205	146	2,518	146	6%	-377
	WB	2,699	0	0%	275	146	3,591	146	4%	+892
E	Crowders Lane (between B5082 Pennys Lane and A530 King Street)									
	EB	1,434	0	0%	40	3	3,273	4	<1%	+1,839
	WB	1,288	3	<1%	27	10	1,863	13	<1%	+574
F	A530 King Street (between Davenham Road and Gadbrook Distribution Centre Access)									
	NB	9,536	156	2%	292	23	9,515	177	2%	-21
	SB	8,949	141	2%	948	39	11,947	178	1%	+2,998
G	B5082 Pennys Lane (between A556 Shurlach Road and Crowders Lane)									
	EB	3,428	16	<1%	48	10	2,880	26	<1%	-548
	WB	3,232	50	2%	54	16	2,633	65	2%	-598
H	B5082 Pennys Lane (between Crowders Lane and Pennys Lane Compound)									
	EB	3,428	16	<1%	48	10	2,880	26	<1%	-548
	WB	3,232	50	2%	54	16	2,633	65	2%	-598
I	A530 King Street (between Gadbrook Distribution Centre Access and A556 Shurlach Road)									
	NB	9,560	152	2%	500	236	9,759	385	4%	+198
	SB	9,069	151	2%	1,021	237	12,189	384	3%	+3,119
ROADS NOT ON HS2 CONSTRUCTION TRAFFIC ROUTES										
K	Birches Lane (between A556 Shurlach Road and B5082 Holmes Chapel Road)									
	NB	1,022	0	0%	5	0	1,382	0	0%	+360
	SB	2,224	25	1%	39	0	2,366	25	1%	+142
1	B5082 Holmes Chapel Road (between Common Lane and Birches Lane)									
	EB	7,087	41	<1%	165	0	8,460	44	<1%	+1,373
	WB	5,542	52	<1%	86	0	5,777	52	<1%	+235

Note: NB - Northbound; SB - Southbound; EB - Eastbound; WB - Westbound

- HS2 Phase 2b route alignment (on surface)

— Land potentially required during construction

— Satellite construction compound

— Temporary material stockpile

— P217(2) construction traffic route
- Permanent highway infrastructure (new/realignment/diversion)

— Temporary highway infrastructure (realignment/diversion)

— Permanent highway infrastructure used as a HS2 construction traffic route

- Notes:
- HS2 construction traffic represents the overall peak on each road for each scenario shown. This may occur at different times for each road.
 - The impacts of the AP1 Revised Scheme may cause some non-HS2 traffic to divert onto other routes during the construction period. As a result of these diversionary impacts, the 'With HS2' traffic flows do not generally equal the sum of the Future Baseline and Peak HS2 Construction traffic flows.
 - The traffic data on this exhibit is based on the period during construction when there is the greatest level of change in traffic flows on each road as a result of the scheme. In some locations, this may not coincide with the overall peak in HS2 construction traffic flow.
 - The lettering of locations on this exhibit is not continuous because some locations are on diverted or realigned roads that are not shown on this map.

Scale at A3: 1:15,000

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Metres

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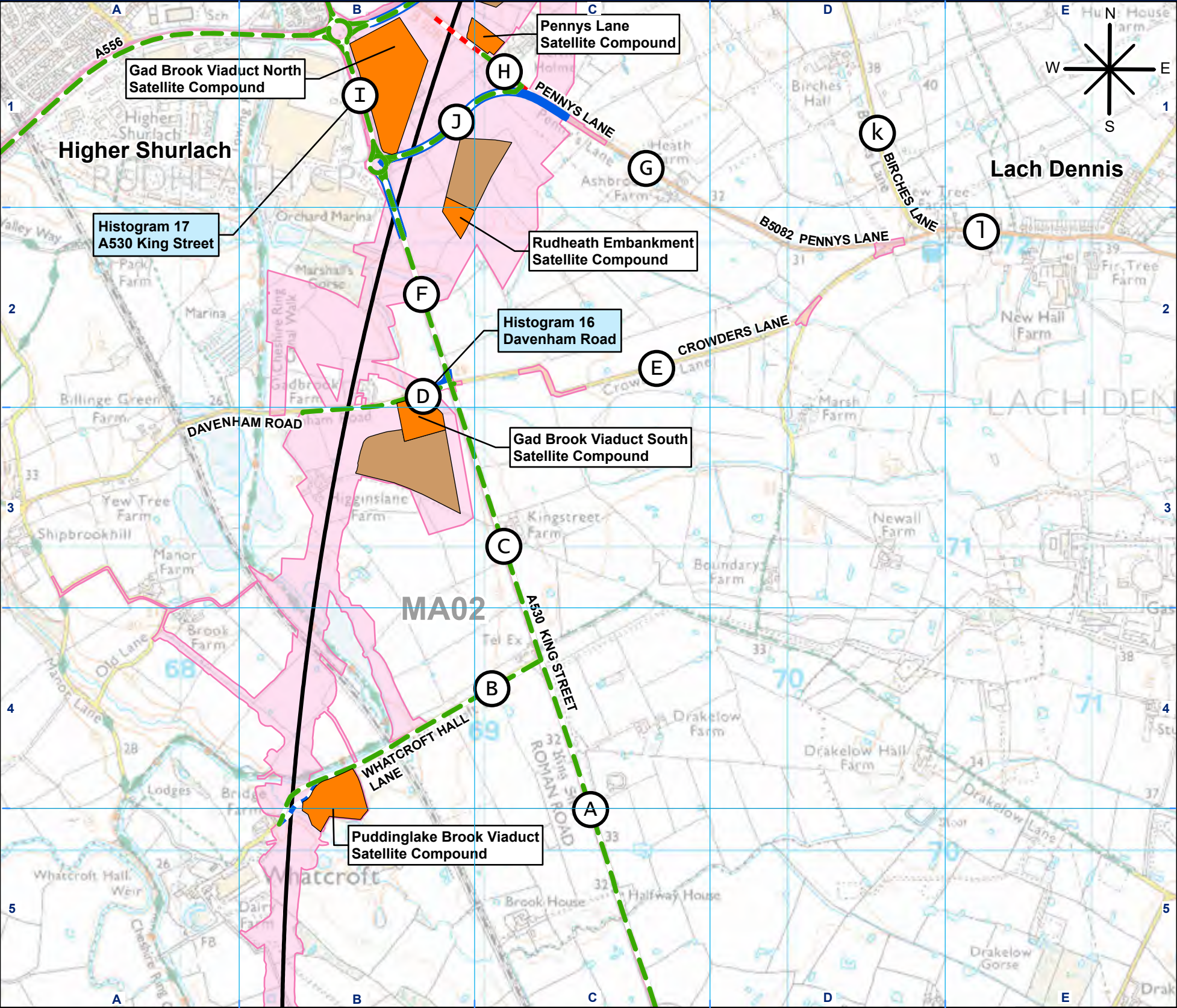
Doc Number: 2PT24-MWJ-PT-MAP-M000-004216-P03

Date: 06/02/23

Traffic Flow Map 4b: Rudheath with Pennys Lane diversion
Average Daily Weekday Traffic Flows in Peak Month



The AP1 Revised Scheme



Location		2030 Future Baseline			Peak HS2 Construction Traffic		2030 with HS2 Traffic and Diversionary Effects			Net change in all vehicles
		All vehicles	HGVs	HGVs as a % of all vehicles	All vehicles	HGVs	All vehicles	HGVs	HGVs as a % of all vehicles	
ROADS ON HS2 CONSTRUCTION TRAFFIC ROUTES										
A	A530 King Street (between A530 Croxton Lane and Whatcroft Hall Lane)									
	NB	11,398	464	4%	595	79	11,998	465	4%	+600
	SB	8,874	163	2%	613	79	8,005	234	3%	-868
B	Whatcroft Hall Lane (between A530 and Puddinglake Brook Viaduct Compound)									
	EB	115	9	7%	143	49	258	58	22%	+143
	WB	101	9	9%	143	49	244	58	24%	+143
C	A530 King Street (between Whatcroft Hall Lane and Davenham Road)									
	NB	11,199	154	1%	184	51	10,752	182	2%	-447
	SB	10,620	141	1%	674	51	11,274	185	2%	+654
D	Davenham Road (between Shurlach Lane and A530 King Street)									
	EB	2,895	0	0%	205	50	2,514	50	2%	-381
	WB	2,699	0	0%	245	50	2,850	50	2%	+151
E	Crowders Lane (between B5082 Pennys Lane and A530 King Street)									
	EB	1,434	0	0%	35	0	677	0	0%	-757
	WB	1,288	3	<1%	22	0	1,010	0	0%	-278
F	A530 King Street (between Davenham Road and Gadbrook Distribution Centre Access)									
	NB	9,536	156	2%	220	32	9,045	162	2%	-491
	SB	8,949	141	2%	761	32	9,752	167	2%	+803
G	B5082 Pennys Lane (between B5082 Pennys Lane diversion and Crowders Lane)									
	EB	3,428	16	<1%	69	0	5,628	23	<1%	+2,200
	WB	3,232	50	2%	72	0	3,939	71	2%	+708
H	B5082 Pennys Lane (north of Pennys Lane diversion)									
	EB	3,428	16	<1%	148	81	HS2 and Local Access only			
	WB	3,232	50	2%	143	81	HS2 and Local Access only			
I	A530 King Street (between Gadbrook Distribution Centre Access and A556 Shurlach Road)									
	NB	9,560	152	2%	637	133	13,814	330	2%	+4,254
	SB	9,069	151	2%	1,179	133	16,309	301	2%	+7,240
J	B5082 Pennys Lane diversion (between Pennys Lane and A530)									
	EB	-	-	-	103	81	3,867	152	4%	-
	WB	-	-	-	106	81	5,570	104	2%	-
ROADS NOT ON HS2 CONSTRUCTION TRAFFIC ROUTES										
K	Birches Lane diversion (between A556 Shurlach Road and B5082 Holmes Chapel Road)									
	NB	1,022	0	0%	14	0	1,576	0	0%	+554
	SB	2,224	25	1%	29	0	2,021	23	1%	-204
1	B5082 Holmes Chapel Road (between B5081 Byley Lane and Birches Lane)									
	EB	7,087	41	<1%	134	0	8,325	46	<1%	+1,237
	WB	5,542	52	<1%	107	0	6,524	72	1%	+982

Note: NB - Northbound; SB - Southbound; EB - Eastbound; WB - Westbound

- HS2 Phase 2b route alignment (on surface)

— Land potentially required during construction

— Satellite construction compound

— Temporary material stockpile

— P217(3) construction traffic route
- Permanent highway infrastructure (new/realignment/diversion)

— Temporary highway infrastructure (realignment/diversion)

— Permanent highway infrastructure used as a HS2 construction traffic route

— Highway closure

- Notes:
- HS2 construction traffic represents the overall peak on each road for each scenario shown. This may occur at different times for each road.
 - The impacts of the AP1 Revised Scheme may cause some non-HS2 traffic to divert onto other routes during the construction period. As a result of these diversionary impacts, the 'With HS2' traffic flows do not generally equal the sum of the Future Baseline and Peak HS2 Construction traffic flows.
 - The traffic data on this exhibit is based on the period during construction when there is the greatest level of change in traffic flows on each road as a result of the scheme. In some locations, this may not coincide with the overall peak in HS2 construction traffic flow.

Scale at A3: 1:15,000

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Metres

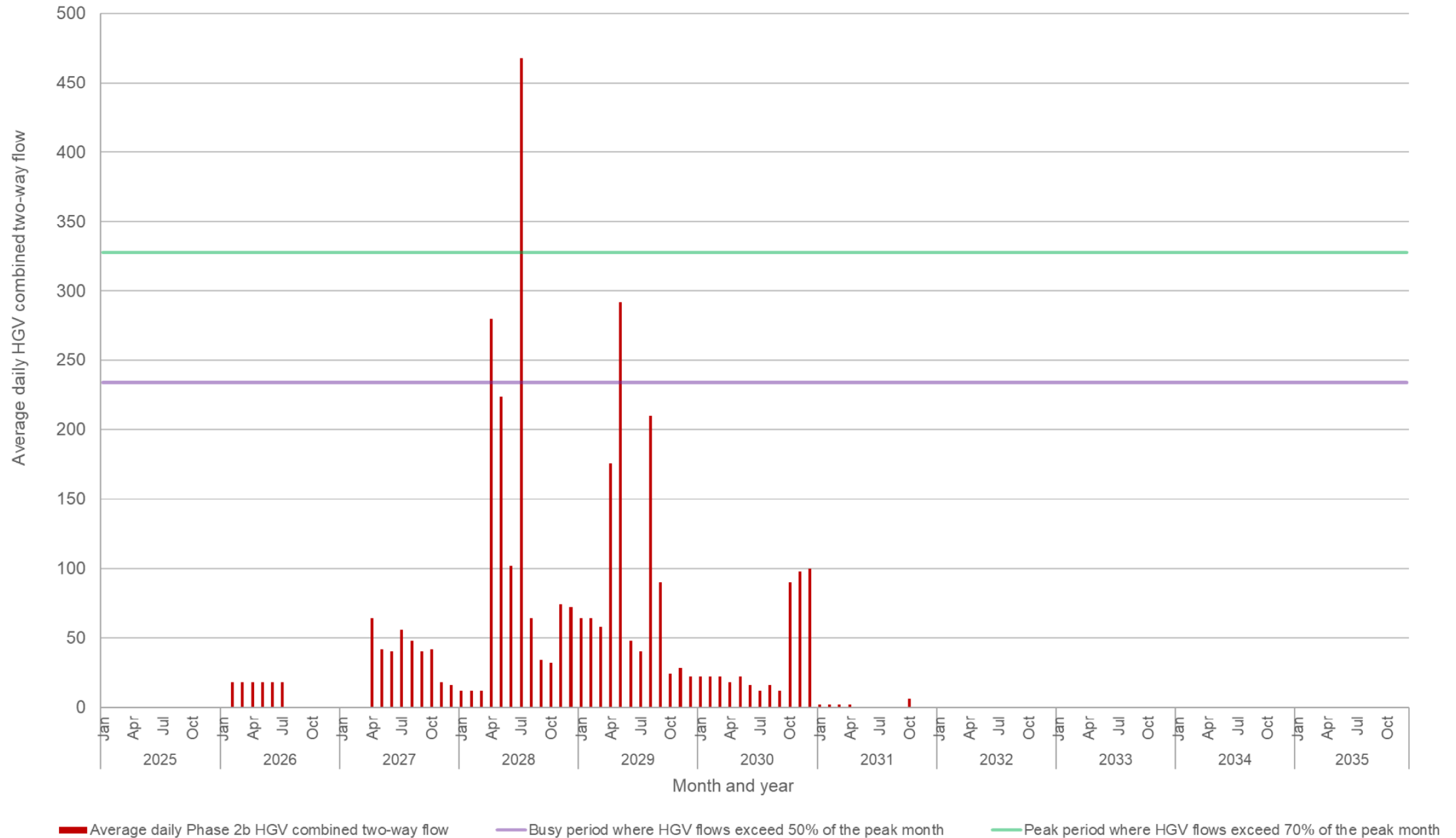
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Date: 06/02/23



High Speed Rail (Crewe - Manchester) Bill

Schedule 5 — Highways

Part 3 — Construction and maintenance of highways

Maintenance

17 (1) Sub-paragraph (2) applies where under this Act the nominated undertaker— (a) provides a new highway, or (b) alters a highway, otherwise than by carrying out street works within the meaning of Part 3 of the New Roads and Street Works Act 1991.

(2) The new or altered highway must be maintained by and at the expense of the nominated undertaker for a period of 12 months from— (a) the date of practical completion, or (b) if later, the date on which it is first open for public use; and after the end of that period must be maintained by and at the expense of the highway authority.

(3) Sub-paragraph (2) is subject to— (a) any agreement between the nominated undertaker and the highway authority as to alternative arrangements relating to the maintenance of the highway, and (b) sub-paragraph (4), in respect of a period for which the nominated undertaker is under a duty to maintain the highway.

Viewpoint 310-02-005: view south-east from Brook Farm, Old Lane

This viewpoint is representative of views experienced by residents of Manor Farm, Brook Farm and Brook Farm Cottage.

Winter view (baseline)

Date taken: 20/03/2019 (stitched panorama)



Summer view (baseline)

Date taken: 21/08/2018 (stitched panorama)



Camera:	Nikon D3200 SLR 50mm (equivalent) focal length	
Approximate GPS co-ordinates ref.	367956, 370755	
Value of the viewpoint:	This viewpoint has a medium value, its composition being characterised by the combination of hedgerows, trees and blocks of woodland commonly occurring throughout the Cheshire Plain landscape to the south of Northwich.	Sensitivity of the receptor:
Susceptibility of the receptor to the change arising from the Proposed Scheme:	Residents have a strong interest in their visual environment and are therefore highly susceptible to visual change arising from the construction and operation of the Proposed Scheme.	High

P221



Information Paper E2: Ecology (1)

Appendix A

Table 1: Indicative management, monitoring and maintenance durations for habitats to be created on the Proposed Scheme

Habitat type	Generic duration of monitoring, management and maintenance during establishment	Indicative monitoring intervals during habitat establishment	Comments
Open mosaic habitats on previously developed land	5 years	Annually for 5 years	A standard duration is likely to be applied to all habitats of this type.
Watercourses	5 years	6 months & Years 1, 3 and 5	A standard duration is likely to be applied to all habitats of this type.
Ponds	5 years	6 months & Years 1, 3 and 5	A standard duration is likely to be applied to all habitats of this type.
Grasslands	5-15 years	Years 1, 2, 3, 4, 5 and, 8, 11 and 15.	Areas of grassland with the primary purpose of landscaping are likely to fall under a 5 year regime; Majority of grassland provided as compensation for losses is likely to be subject to a 15-year regime.
Hedgerows	5-10 years	6 months & Years 1, 3, 5, 7 & 10.	Hedgerows provided specifically for ecological purposes (e.g. to provide connectivity between other areas of planting, or those translocated due to their ecological value) may be subject to a regime of up to 10 years; Majority of hedgerows will be subject to a 5-year regime.

Information Paper E2: Ecology (2)

Habitat type	Generic duration of monitoring, management and maintenance during establishment	Indicative monitoring intervals during habitat establishment	Comments
Young heathland/acid grassland	15	6 months & Years 1, 2, 3, 5, 7, 10, 13, 15.	All areas of this habitat affected by the proposed scheme are fragmented lowland heathland; 15 years is considered appropriate, as the aim is to create similar or better habitat than that lost.
Woodland (including screening planting)	10-50 years	6 months & Years 1, 3, 5, 7, 10, 13, 15, 20, 25, 30, 35, 40, 45, 50.	Durations of up to 10 years for areas provided for primary purpose of landscaping; Duration of up to 50 years during establishment for those areas that are created specifically for ecological mitigation/compensation. The 50-year period would be provided for all locations where the translocation of ancient woodland soils is proposed.

Phase 2b Western Leg Information Paper

C11: The Community and Environment Fund and Business and Local Economy Fund

This paper outlines information relating to the Community and Environment Fund and the Business and Local Economy Fund.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper was prepared in relation to the promotion of the High Speed Rail (Crewe - Manchester) Bill. Content will be maintained and updated as considered appropriate during the passage of the Bill.

If you have any queries about this paper or about how it might apply to you, please contact the HS2 Helpdesk in the first instance.

The Helpdesk can be contacted:

by email: HS2enquiries@hs2.org.uk

by phone (24hrs): 08081 434 434
08081 456 472 (minicom)

or by post: High Speed Two (HS2) Limited
2 Snowhill, Queensway
Birmingham
B4 6GA

Version 2
Last updated: 6 July 2022

1 Introduction

- 1.1 High Speed Two (HS2) is the Government's scheme for a new, high speed north-south railway, which is being taken forward in a number of phases. Phase One will connect London with Birmingham and the West Midlands. Phase 2a will extend the route from the West Midlands to Crewe. The Phase 2b Western Leg will connect Crewe to Manchester. As set out in the Integrated Rail Plan, published in November 2021, HS2 East is proposed to deliver a new high speed line from the West Midlands to East Midlands Parkway.
- 1.2 HS2 Ltd is the non-departmental public body responsible for developing and promoting these proposals. The company works under the terms of a Development Agreement entered into with the Secretary of State for Transport.
- 1.3 The construction and operation of Phase One of HS2 is authorised by the High Speed Rail (London – West Midlands) Act 2017 and Phase 2a by the High Speed Rail (West Midlands – Crewe) Act 2021.
- 1.4 In January 2022, the Government introduced a hybrid Bill to Parliament (hereafter referred to as 'the Bill'), to seek powers for the construction and operation of the Phase 2b Western Leg (the Proposed Scheme), which is called the High Speed Rail (Crewe – Manchester) Bill. The Proposed Scheme comprises the Phase 2b Western Leg from Crewe to Manchester and several off-route works. It also facilitates the delivery of Northern Powerhouse Rail by providing the Crewe Northern Connection and junctions and other infrastructure to be used in future schemes.
- 1.5 The work to produce the Bill includes an Equalities Impact Assessment and an Environmental Impact Assessment (EIA), the results of which are reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs), which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed

Scheme. For more information on the EMRs please see Information Paper E1: Control of environmental impacts.

- 1.6 The Secretary of State for Transport is the Promoter of the Bill through Parliament. The Promoter will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill. This body is known as the 'nominated undertaker'. There may be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the EMRs and any commitments provided in the information papers.
- 1.7 These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the Proposed Scheme have been reached.

2 Overview

- 2.1 This information paper provides details of the extension to the Community and Environment Fund (CEF) and the Business and Local Economy Fund (BLEF) for the Proposed Scheme.
- 2.2 These Funds were first announced by the Government in October 2014 for Phase One of the HS2 scheme, which will connect London with Birmingham and the West Midlands.
- 2.3 In July 2017 additional funds were confirmed for Phase 2a which extends the route from the West Midlands to Crewe.

3 Background

- 3.1 An initial £40m (exclusive of administration costs) was made available for these two Funds combined, for Phase One, for disrupted communities and businesses along the line of route from London to Birmingham and the West Midlands.

- 3.2 A further £5m (exclusive of administration costs) was then made available for Phase 2a communities, for those disrupted along the line of route from West Midlands to Crewe.
- 3.3 Additional funding will be made available for disrupted communities and businesses disrupted along the line of route from Crewe to Manchester.
- 3.4 Geographical allocations for the Proposed Scheme Funds will be the subject of a future announcement.
- 3.5 The Funds are independently managed by a Grant Management Body. As was the case for the Phase One and Phase 2a funding, the Phase 2b allocation for communities along the Proposed Scheme will not be available for application or administered by the Grant Management Body until after Royal Assent of the Crewe – Manchester hybrid Bill.
- 3.6 These Funds are provided in addition to the comprehensive mitigation outlined in the High Speed Rail (London – West Midlands) Act 2017, the High Speed Rail (West Midlands – Crewe) Act 2021 and the Crewe – Manchester hybrid Bill and respective Environmental Statements (ES) to address the environmental impacts of Phase One, Phase 2a and the Proposed Scheme. For example, please see Information Paper E2: Ecology, and Information Paper E22: Mitigation of significant community effects on public open space and community facilities.
- 3.7 HS2 Ltd has also committed to wide-ranging measures which will enable local people and businesses to obtain employment and contracts arising from the construction and operation of the Proposed Scheme. This is in line with what was undertaken in Phase One and Phase 2a.

4 The Community and Environment Fund

- 4.1 The objective of the CEF is:

To add benefit over and above committed mitigation and statutory compensation to communities along the route that are demonstrably disrupted by the construction of HS2. These will be principally along the line of route of HS2, but there are a small number of off-route locations

which may also be disrupted e.g. due to relocation of railway facilities, and these will be eligible to apply to the funds.

4.2 There are two types of CEF grant. The first is CEF Local which will fund smaller projects (up to a maximum of £75,000 per project) which will benefit quality of life for individual communities. The second is CEF Strategic which will fund larger projects (from £75,000 up to a maximum of £250,000 per project) that will provide a legacy and benefit multiple communities along the line of route. "Multiple communities" for CEF awards is typically defined as a geography across a city region, county or a number of Local Authority areas.

4.3 Initiatives the CEF may support might include:

- Environmental enhancement or conservation activities that are designed to protect or increase biodiversity (such as tree planting, establishing new wildlife habitats, creating inner city community gardens or planting wildflower meadows);
- Enhancement or replacement of sports and recreational facilities;
- Improved access and enhancements to public open space;
- Provision of enhanced or new community facilities;
- Improved pedestrian, equestrian, or cycle access not provided under statutory services; and
- Refurbishment/re-use of historic buildings and monuments.

4.4 Applications for both CEF Local and CEF Strategic grants for the Proposed Scheme will be invited from community-based voluntary organisations, charitable and not-for-profit bodies, social enterprises, schools and local authorities.

5 The Business and Local Economy Fund

5.1 The objective of the BLEF is:

To add benefit over and above committed mitigation and statutory compensation to support local economies that are demonstrably disrupted by the construction of HS2. These will be principally along the line of route of HS2, but there are a small number of off-route locations which may also be disrupted e.g. due to relocation of railway facilities, and these will be eligible to apply to the funds.

5.2 Applications will be invited for capital or revenue grants from £10,000 up to £250,000. Through this funding, we are looking to fund interventions that will have a positive impact on local economies (this may include a number of small schemes that are brought together in a package of interventions). Grants of between £10,000 and £75,000 will typically be for smaller scale and targeted interventions or pilot/kick-starter schemes. Projects and grants of between £75,001 - £250,000 will be typically be for longer term or larger scale interventions.

5.3 Initiatives BLEF may support might include:

- schemes to improve the local public realm, especially in retail and tourist areas;
- general promotional activity for local economic benefit;
- creating and running events that increase footfall or promote business activity during seasonal periods (for example, farmers markets);
- town/village discount cards to retain spend in local areas and;
- projects that aim to increase tourist visits to an area.

5.4 We will look to local business support organisations, including Local Enterprise Partnerships (LEPs), Chambers of Commerce, Business Improvement Districts (BIDs) and Local Authorities to identify appropriate projects which will help maintain business activity in local communities disrupted by the construction of HS2.

6 Match contributions

6.1 The match contributions for both CEF grants are as follows:

- for CEF (Local) projects up to £75,000;
 - for projects led by community or voluntary sector organisations there is no requirement for match contributions;
 - for local authority led bids, there will be minimum 25% requirement for match contributions; and
- for CEF (Strategic) projects from £75,000 to £250,000;
 - 10% minimum match contribution for all applications.

6.2 Match contributions are not a requirement for applications to BLEF, although we do encourage applicants to include match contributions where possible. In some circumstances, for example if the funds are oversubscribed in an area, projects which have match funding will be prioritised.

6.3 Match contributions do not have to be a purely cash contribution but can also be in kind or a combination of both. In kind funding could include volunteer time, the provision of in house resources such as marketing or the provision of room or facility at a reduced/subsidised rate.

7 Governance and management of the Funds

7.1 The governance and management arrangements for the Funds have been developed following consultation with local authorities, local enterprise partnerships and environmental NGOs.

7.2 The Funds have been designed with all Phases of HS2 in mind. At launch, governance for the Funds will be the same for the Proposed Scheme allocation as it has been for the Phase One and Phase 2a allocations, operating with a Grant Management Body, independent Chair and independent Panel across all Phases.

7.3 The management of the Funds has been outsourced to a Grant Management Body, who were selected through an open and competitive process. This body leads on the promotion of the Funds for Phase One and Phase 2a, and supports bidders and potential bidders in the

development of their applications. They worked with HS2 Ltd and DfT to finalise the detailed eligibility criteria prior to the launch of the Phase One Funds in February 2017. This body undertakes the assessment of bids for Phase One against these criteria and is responsible for making awards under £75,000, and will do the same for the Proposed Scheme. Funds distributed will aim to ensure the greatest public benefit for communities and economic benefit for the business community.

- 7.4 For decisions on grant awards above £75,000, the Grant Management Body receives applications and puts these to the independent Panel, appointed by HS2 Ltd, and will do the same for the Proposed Scheme.
- 7.5 The independent Panel makes recommendations to the Secretary of State on whether applications for all Phases should be accepted. (The final decision on grants for all Phases is made by a senior civil servant in the Department for Transport with delegated authority from the Secretary of State).
- 7.6 The Grant Management Body is also responsible for overseeing the payment of grants and monitoring the progress of successful projects for Phase One, Phase 2a and the Proposed Scheme after Royal Assent of the Crewe – Manchester hybrid Bill.
- 7.7 The independent Panel is made up of four independent people, one representative of HS2 and an independent Chair. The independent Chair and Panel members have experience in delivery of successful community-led environmental projects, a track record in providing advice and support to small and medium size businesses and experience of managing local government or third sector grant programmes along the line of route of all Phases. Panel members serve for a term of three years after which they can serve a further two year term or retire, subject to approval by HS2 Ltd and the Department of Transport.
- 7.8 The Funds operate on a rolling basis with no formal deadlines. The timing of any committed investment will however be linked to the timing of the construction programme as far as possible. The demand for funding may fluctuate and therefore some applications may be paused or deferred

depending on the annual funding allocations available. Priority will be given to the geographical areas experiencing the highest disruption from the construction of HS2, areas that have so far not received any funds at all or received very limited funds from HS2 and high quality bids that meet the Fund criteria. This approach will be applied to Phase One, Phase 2a and the Proposed Scheme.

- 7.9 Potential applicants should be assured that rigorous management of the funding available will ensure that money is available throughout the construction of Phase One, Phase 2a and subsequently the Proposed Scheme, and there will be no advantages of submitting early or disadvantages of submitting them later during the construction period.

8 Eligibility for the Funds

- 8.1 All applicants are required to demonstrate that proposed projects will benefit communities or businesses disrupted by temporary or permanent disturbance, arising from construction works.
- 8.2 Grants will be awarded on the basis of the quality of the projects as opposed to ensuring a parity of distribution of the Funds across all the disrupted communities. However, to ensure the inclusion of projects from disrupted communities across the length of the route, the Grant Management Body will support communities to help encourage and develop bids.
- 8.3 An applicant's project outcomes will have to match the Fund criteria of need, planning, disruption, sustainability/legacy, and applicants that can provide better evidence that their project outcomes will be achieved will score higher. Applicants will have to provide a plan of how the project will be monitored and demonstrate value for money. Applications as partnerships are encouraged, alongside evidence of a wide community consultation on the need for the project.
- 8.4 In the assessment of applications, priority will be given to projects that are based within 1km (0.62 miles) of the high speed rail line and areas

disrupted by construction of the Proposed Scheme. In some circumstances, projects that have match funding may also be prioritised.

8.5 As noted above, match funding contributions will be required for certain types of grants and types of applicants as the Funds aim to leverage other investment into projects. This approach aims to ensure a legacy for the Funds, especially from high value grants. The Funds can be the main contributing funding source towards projects and can also be the first source to be confirmed in an attempt to help applicants secure other funding sources if required. CEF and BLEF grants can be used as match funding against grant applications to other funders for contributions to the same project. Double Funding, i.e the same project is funded twice by the same public funding source, is not, however, allowed.

8.6 The aim of the Funds is to add benefit over and above committed mitigation and statutory compensation to support communities along the route that are demonstrably disrupted by the construction of Phase One, Phase 2a and the Proposed Scheme of HS2. The Funds are not therefore classed as compensation packages for Phase One, Phase 2a or the Proposed Scheme of HS2, and are not a compensation scheme for individuals and stand alone businesses.

9 Timing

9.1 The Phase One funding allocation was launched at Royal Assent of the Phase One Bill in February 2017 and applications were invited from 8th March 2017.

9.2 The Phase 2a funding allocation was launched at Royal Assent of the Phase 2a Bill in February 2021 and applications were invited from 1st April 2021.

9.3 The Proposed Scheme will be open to applications once the funding programme is launched following Royal Assent of the Crewe – Manchester hybrid Bill.

10 More information

- 10.1 More detail on the Bill and related documents can be found at www.gov.uk/hs2-phase2b-crewe-manchester.

Phase 2b Western Leg Information Paper

D1: Design

This paper outlines the design policy for the Proposed Scheme which includes aesthetics and quality.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper was prepared in relation to the promotion of the High Speed Rail (Crewe - Manchester) Bill. Content will be maintained and updated as considered appropriate during the passage of the Bill.

If you have any queries about this paper or about how it might apply to you, please contact the HS2 Helpdesk in the first instance.

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by email: HS2enquiries@hs2.org.uk

by phone (24hrs): 08081 434 434
08081 456 472 (minicom)

or by post: High Speed Two (HS2) Limited
2 Snowhill, Queensway
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1 Introduction

- 1.1 High Speed Two (HS2) is the Government's scheme for a new, high speed north-south railway, which is being taken forward in a number of phases. Phase One will connect London with Birmingham and the West Midlands. Phase 2a will extend the route from the West Midlands to Crewe. The Phase 2b Western Leg will connect Crewe to Manchester. As set out in the Integrated Rail Plan, published in November 2021, HS2 East is proposed to deliver a new high speed line from the West Midlands to East Midlands Parkway.
- 1.2 HS2 Ltd is the non-departmental public body responsible for developing and promoting these proposals. The company works under the terms of a Development Agreement entered into with the Secretary of State for Transport.
- 1.3 The construction and operation of Phase One of HS2 is authorised by the High Speed Rail (London – West Midlands) Act 2017 and Phase 2a by the High Speed Rail (West Midlands – Crewe) Act 2021.
- 1.4 In January 2022, the Government introduced a hybrid Bill to Parliament (hereafter referred to as 'the Bill'), to seek powers for the construction and operation of the Phase 2b Western Leg (the Proposed Scheme), which is called the High Speed Rail (Crewe – Manchester) Bill. The Proposed Scheme comprises the Phase 2b Western Leg from Crewe to Manchester and several off-route works. It also facilitates the delivery of Northern Powerhouse Rail by providing the Crewe Northern Connection and junctions and other infrastructure to be used in future schemes.
- 1.5 The work to produce the Bill includes an Equalities Impact Assessment and an Environmental Impact Assessment (EIA), the results of which are reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs), which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed

Scheme. For more information on the EMRs please see Information Paper E1: Control of environmental impacts.

- 1.6 The Secretary of State for Transport is the Promoter of the Bill through Parliament. The Promoter will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill. This body is known as the 'nominated undertaker'. There may be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the EMRs and any commitments provided in the information papers.
- 1.7 These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the Proposed Scheme have been reached.

2 Overview

- 2.1 This information paper outlines the design policy for the Proposed Scheme which includes aesthetics and quality. The design policy seeks to enable the Promoter and the nominated undertaker to deliver the railway in an efficient and effective manner.
- 2.2 The design of the Proposed Scheme will be developed in line with the HS2 Design Vision, a link to which can be found in the references section at the end of this paper.
- 2.3 The HS2 Design Vision sets out nine principles grouped under the three themes of People, Place and Time. These principles set the common context for all HS2 design decisions and are re-iterated in the Landscape Design Approach, a link to which can be found in the references section at the end of this paper.

- 2.4 In addition, the Secretary of State has established an Independent Design Panel, so as to act as an independent advisor to HS2 in realising the HS2 Design Vision and principles on the project.

3 Design policy

3.1 The Promoter and the nominated undertaker will seek to ensure that:

- the design is safe, efficient, and meets with the requirements of whole life operation and maintenance alongside initial buildability and will integrate with the local setting;
- the design contributes to the Government's pursuit of sustainable development, as set out in the National Planning Policy Framework, which involves seeking positive improvements in the quality of the built, natural and historic environment, as well as in people's quality of life supported by integrated spatial planning and design;
- the design of all visible elements of the built and landscaped environment in both rural and urban have an integrated design that is sympathetic to the local context, environment and social setting and supports naturally engineered systems including flood risk management and biodiversity where possible;
- the design cohesion is achieved through a strong aesthetic ethos and a recognisable architectural language;
- the design is developed through engagement to seek peoples' views and including integration with setting design of the visible buildings and permanent structures;
- the design has a culture of cost awareness and integrates design decision making early to give cost/quality and sustainability decisions which achieve best value for the funders;
- the design innovation is encouraged to generate best value to funders, users and those affected by the railway; and

- the design considers the passenger experience and delivers a consistent design ethos between the various contracts.

4 Promoter's requirements

4.1 The nine principles set out in HS2 Design Vision support the requirements defined by the Promoter to HS2 Ltd. The key requirements are noted below and are not repeated in the design policy:

- to provide an efficient high speed rail network capable of safe construction and operation;
- to limit adverse environmental and visual impacts during design construction and operation;
- to deliver value and maintain budget compliance;
- to develop a sustainable development policy setting out defining principles;
- trains, stations and associated facilities to be fully accessible to all passengers and provide efficient access to other rail networks and other transport modes;
- to engage with local authorities and other stakeholders to identify additional potential regeneration opportunities within area planning frameworks;
- to comply with National Technical Specification Notices (NTSNs) published by the DfT, which define mandatory standards for mainline railways;
- to develop proposals in order to minimise whole life whole system operation, maintenance and renewal costs; and
- to design a railway with world class levels of safety and risk reduced as low as reasonably practicable.

5 Design development and the role of the planning authority

- 5.1 The design of the Proposed Scheme to date provides the level of detail necessary for the purposes of the Bill and the requirements of the EIA in accordance with the Standing Orders of Parliament. The level of detailed design necessary to enable the Proposed Scheme to be constructed has yet to be carried out and, although detailed design development may commence as the Bill progresses through Parliament, it will not be completed until after the Bill has secured Royal Assent. As part of the development of the design following Royal Assent the nominated undertaker will need to apply for approval of the detailed design of a range of elements of the Proposed Scheme from planning authorities along the route, as explained in Information Paper B2: Main provisions of the planning regime.
- 5.2 This will allow planning authorities to ensure that the design of permanent structures fits into the local environment taking into account other relevant considerations.
- 5.3 A planning authority that becomes a qualifying authority under the planning regime will be required to approve plans and specifications for matters such as buildings and road vehicle parks, terracing, cuttings, embankments and other earthworks, fences, walls or other barriers, transformers, telecommunication masts, pedestrian access to the railway line, artificial lighting, waste and spoil disposal and borrow pits. Information Paper B2: The main provisions of the planning regime provides further detail, including on the role of qualifying and non-qualifying authorities.
- 5.4 The planning authority can only refuse to approve (or impose conditions in respect of) the plans and specifications on the grounds specified in the planning regime.
- 5.5 Ongoing engagement with planning authorities is critical to the design development process. It will ensure the detailed design of the Proposed

Scheme has regard to planning authority aspirations and fits within the local environment.

- 5.6 The Phase 2b (Crewe – Manchester) Planning Forum, once established, will consider common designs for certain structures. Discussions between the nominated undertaker and the relevant planning authority will determine the appropriateness of the common designs to the local environment.
- 5.7 The Planning Memorandum, currently in draft, provides the commitment that the nominated undertaker will engage in proportionate forward discussions about prospective requests for approval with the qualifying authority and statutory consultees. Forward discussions will, as relevant, include design development, submission dates and planning committee cycles.

6 Design development and public engagement

- 6.1 The Promoter recognises the importance of public engagement in the design development process. The exact scope and nature of public engagement will depend on the element being designed. For example, the project would expect a higher degree of public engagement on those parts of the railway that have the most significant impact on people.
- 6.2 The Promoter plans to adopt the following approach for public engagement in design development:
- Stations - the nominated undertaker will undertake public engagement for stations designs. While the exact form and nature of such engagement will be developed closer to the time, it is likely to be an open engagement exercise, with local public exhibitions, leaflet drops, interactive on-line materials and related publicity, reflecting the complexities of station design and the importance of their existing and potential contexts.
 - Key design elements - the nominated undertaker will engage the public on the design development of key elements of infrastructure -

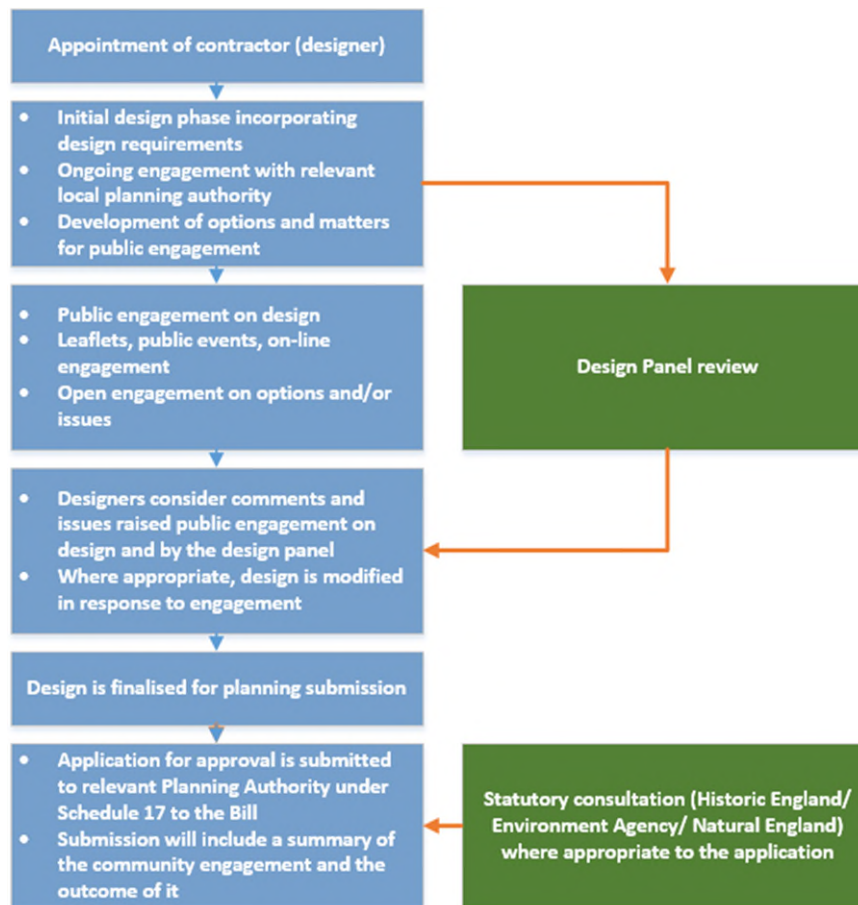
including main viaducts and maintenance buildings in sensitive areas. The engagement exercise is likely to focus on engaging the public in the locality where the infrastructure is located. These key design elements are outlined in Table 1 in Appendix A.

- Common design elements - the nominated undertaker will develop standard or common designs for certain permanent structures associated with the railway (such as road-bridges, foot-bridges, noise barriers). The Promoter will undertake wider public engagement on design development for common design elements, including for example interactive on-line materials, with associated local and route-wide publicity.

7 Design Panel

- 7.1 The HS2 Independent Design Panel has been set up to provide professional expertise and advice, acting as an independent reviewer to HS2 Ltd. It brings together a comprehensive range of design disciplines. The HS2 Independent Design Panel's remit is across all phases of HS2 and includes the Proposed Scheme.
- 7.2 A Chair and pool of panel members covering a wide range of design disciplines is appointed to independently assist the design challenge. The Design Panel will assist HS2 Ltd through advice, and HS2 Ltd will work in partnership with a range of organisations, including planning authorities.
- 7.3 The aim will be to deliver a high standard of design that is also cost-effective, sustainable and meets HS2 environmental policies. Further information on the role of the Design Panel can be found at the link in the references section at the end of this paper.

Figure 1: Example of design development process



8 More information

8.1 More detail on the Bill and related documents can be found at www.gov.uk/hs2-phase2b-crewe-manchester.

Appendix A:

Table 1: Key design elements

	Key design element for engagement
1	Crewe Tunnel North Porous Portal
2	Crewe Rolling Stock Depot
3	Smoker Brook Viaduct
4	River Dane Viaduct
5	Trent and Mersey Canal Viaduct
6	Gad Brook Viaduct
7	Manchester Tunnel South Porous Portal
8	Palatine Road Vent Shaft
9	Birchfield Road Vent Shaft
10	Piccadilly Approach Viaduct & Piccadilly Station Viaduct
11	Wilmslow Road Vent Shaft

References

HS2 Design Vision

<https://www.gov.uk/government/publications/hs2-design-vision>

Landscape Design Approach

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/550791/HS2_Landscape_Design_Approach_July_2016.pdf

HS2 Design Panel

<https://www.gov.uk/government/publications/hs2-design-panel>

HS2 Independent Design: Case Studies

<https://www.gov.uk/government/publications/hs2-design-case-studies>

Phase 2b Western Leg Information Paper

E2: Ecology

This information paper outlines the approaches taken to assessing, mitigating and compensating ecological impacts of the Proposed Scheme.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper was prepared in relation to the promotion of the High Speed Rail (Crewe - Manchester) Bill. Content will be maintained and updated as considered appropriate during the passage of the Bill.

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Version 2
Last updated: 6 July 2022

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Scheme. For more information on the EMRs please see Information Paper E1: Control of environmental impacts.

- 1.6 The Secretary of State for Transport is the Promoter of the Bill through Parliament. The Promoter will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill. This body is known as the 'nominated undertaker'. There may be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the EMRs and any commitments provided in the information papers.
- 1.7 These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the Proposed Scheme have been reached.

2 Overview

- 2.1 This information paper sets out the approaches taken to assessing, mitigating and compensating for the ecological impacts of the Proposed Scheme. It also explains key biodiversity policies of the Promoter and the approach taken to ancient woodland impacts, as well as the long-term management and monitoring commitments in place.

3 Approach to ecological assessment

- 3.1 The design of the Proposed Scheme reflects the 'Mitigation Hierarchy' consistent with National Planning Policy Framework and guidance on Environmental Impact Assessment. This approach is set out below.

Figure 1: The 'Mitigation Hierarchy'



- 3.2 Using the Mitigation Hierarchy, priority is given to avoiding or preventing effects where reasonably practicable; if not, to reducing or abating those effects; and then, if necessary, to offsetting them through repair (restoration or reinstatement) or compensation. Efforts have been made to reduce the duration, scale and extent of the anticipated effects in instances where avoidance has not been reasonably practicable. Appropriate compensation or enhancements have been identified to offset effects that are still anticipated following mitigation.
- 3.3 The approach used by HS2 Ltd for ecological mitigation and compensation is set out in the Scope and Methodology Report addendum (SMR) of the ES (Ecological Principles of Mitigation, Volume 5: Appendix CT-001-002) and explains the factors determining the cases in which these should be applied.
- 3.4 The ecological impact assessment has taken account of guidance published by the Chartered Institute of Ecology and Environmental Management (CIEEM). It considers all ecological receptors which have the potential to be affected by the construction and/or operation of the Proposed Scheme. The assessment includes the consideration of effects arising from habitat loss, fragmentation of sites, severance of ecological networks, noise and visual disturbance, barrier effects to movement of fauna, lighting, changes in water quality and quantity, air pollution, and mortality as a result of collisions with trains. In line with the CIEEM

approach, the evaluation of species receptors has been based on the distribution and status of the species concerned, rather than being based solely on the legal protection afforded to that species.

- 3.5 The spatial scope of the assessment depends on the ecological receptor under consideration and the magnitude and nature of the potential impacts. It has, as a minimum, included areas located within and adjacent to the land required for the construction of the Proposed Scheme.
- 3.6 The assessment has taken account of both desk based and field surveys. Existing biological data for the Proposed Scheme has been obtained from relevant Local Biological Records Centres and from national and local specialist data sources, such as wildlife trusts and ornithological groups. Local biodiversity action plans and ancient woodland inventories have also been consulted.
- 3.7 A wide range of field surveys have been conducted to inform the ES. The survey methodologies used have been based on relevant best practice approaches. The survey methods used are set out in the SMR addendum (Ecological Field Survey Methods and Standards, Volume 5: Appendix CT-001-002) of the ES submitted with the Bill.
- 3.8 A precautionary approach to valuation has been used for instances where baseline information is incomplete, to ensure that all likely impacts of the Proposed Scheme have been identified. The degree of precaution built into the assessment for each receptor reflects the level of confidence in the existing data available.

4 Net gains in biodiversity

- 4.1 The Proposed Scheme has the objective of aiming to deliver a net gain in biodiversity for replaceable habitats. To demonstrate progress towards this objective, habitat losses and gains will be measured using a modified version of the Department for Environment, Food and Rural Affairs' (Defra) biodiversity offsetting metric (the 'HS2 metric'). The HS2 metric was developed from the Defra biodiversity offsetting pilot metric in

consultation with Defra and Natural England to make it appropriate for use on a large linear infrastructure scheme.

- 4.2 The HS2 metric was amended following an independent review by Natural England in late 2016. It was then amended further in 2020 to incorporate functionality of the Defra Biodiversity Metric 2.0 (beta-testing version) that was published in 2018. In 2021, Natural England published Biodiversity Metric 3.0 which supersedes the Defra Biodiversity Metric 2.0. The HS2 metric was amended further to incorporate changes introduced in the Biodiversity Metric 3.0 as far as possible and has been developed in close consultation with Natural England.
- 4.3 It should be noted that the HS2 metric is used as an accounting tool to check that the mitigation and compensation provided through the EIA process is in line with the project objective; it has not been used to inform the level of compensation provision. As the design of the Proposed Scheme is modified or becomes more detailed, it is intended that the biodiversity accounting calculation will be run at appropriate intervals to measure progress towards the biodiversity net gain objective.
- 4.4 While every effort has been made to avoid losses of irreplaceable habitats (such as ancient woodland), there are some instances where due to other design constraints, losses are unavoidable. HS2 Ltd acknowledges that ancient woodland is an irreplaceable habitat and as such, losses as well as associated compensation measures will not be considered within the scope of the biodiversity accounting calculation. A separately produced Ancient Woodland Strategy which outlines the specific measures being taken to compensate for unavoidable losses at each confirmed ancient woodland site can be found on:
www.gov.uk/government/publications/hs2-ancient-woodland-reports
- 4.5 HS2 Ltd is developing a Biodiversity Action Plan for Phase One, Phase 2a and the Phase 2b Crewe to Manchester section of HS2, which will set out mechanisms for the project to achieve its ambition of securing biodiversity gains in line with the HS2 Environmental Policy available at: <https://www.gov.uk/government/publications/hs2-environmental-policy>.

The Biodiversity Action Plan will be developed, taking into account all stakeholder input, and will be published in Autumn 2022.

5 Protected sites

- 5.1 The EIA undertaken for the Proposed Scheme has taken account of internationally, nationally and locally designated sites for wildlife. The Proposed Scheme will not directly affect any internationally designated sites. There are 12 sites of international importance for nature conservation that are relevant to the assessment. Of these 12, an HRA screening process has confirmed that there are no likely significant effects on the integrity of five of the sites. Further studies to inform the HRA and appropriate assessment have concluded that with the inclusion of mitigation measures there will be no adverse effect on the integrity of a further six of the sites. On the information currently available, it has not been possible to rule out such adverse effects on one site, the Rochdale Canal SAC, and on a precautionary basis it is therefore concluded that there may be an adverse effect on the SAC that is significant at the international level. Further assessment will be carried out in accordance with the Conservation of Habitats and Species Regulations 2017 (as amended).
- 5.2 Habitats Regulations Assessment (HRA) screening reports and associated addenda for any international sites considered as part of the assessment are available in the SMR (Ecological Principles of Mitigation, Volume 5: Appendix CT-001-002) of the ES.
- 5.3 Where it has not been possible to rule out all significant effects on an internationally designated site further assessment will be carried out in accordance with the Habitat Regulations.
- 5.4 The Proposed Scheme will affect two nationally designated Sites of Special Scientific Interest (SSSI). These are Sandbach Flashes SSSI and Rochdale Canal SSSI. Compensation to address any residual impact will be incorporated into the Proposed Scheme. Further opportunities to avoid or reduce adverse effects to these sites, will be considered as the design

develops. In addition there are eight Local Nature Reserves (LNRs) that are relevant to the assessment, but none where the impacts will result in a significant adverse effect.

- 5.5 As reported in the ES, 30 non-statutory wildlife sites comprising 28 Local Wildlife Sites (LWS) and two locally designated Sites of Biological Interest (SBI) will be subject to significant adverse effects and/or fragmentation effects. Where a significant adverse effect on the integrity of a non-statutory wildlife site is expected, sufficient compensation will be incorporated into the Proposed Scheme to address effects on the conservation status of the habitats and species for which that non-statutory wildlife site was designated. Effects to individual sites and associated mitigation and/or compensation are described in detail in Section 8 of the Volume 2 Community Area reports within the ES.
- 5.6 HS2 Ltd has carried out a review, as part of the Ancient Woodland Strategy, to identify existing ancient woodlands along the line of route not already listed on the respective ancient woodland inventories (AWI) in England and Scotland. This review found that the Proposed Scheme will result in loss of approximately 5.6ha of ancient woodland across 18 sites, 15 of which were already on the AWI. To seek to partially compensate for the loss of ancient woodland the nominated undertaker will use best practice measures such as re-using the ancient woodland soils where practicable, enhancement of retained woodland and creating new mixed deciduous woodland. However, it is acknowledged that it is not possible to replace ancient woodland. Losses of habitats that are irreplaceable are reported in the ES as permanent adverse effects. Further details can be found in the Ancient Woodland Strategy.
- 5.7 HS2 Ltd recognises that ancient and veteran trees are an irreplaceable resource and their potential loss will result in a permanent adverse effect that is significant at a national level in each case. Where reasonably practicable, measures will be taken to protect and retain ancient and veteran trees within and adjacent to the proposed works area to reduce the number that will be impacted. Where loss is unavoidable, the trees

will be soft felled and sections placed within retained habitats to provide a continued deadwood resource.

- 5.8 HS2 Ltd have considered other irreplaceable habitats, as defined by the National Planning Policy Framework, in addition to ancient woodlands and ancient and veteran trees. No irreplaceable habitats other than those listed above have been identified to be affected by the Proposed Scheme.

6 Protected species

- 6.1 Protected species that may be affected by the Proposed Scheme include, but are not limited to, a number of bat species, barn owl, great crested newt, otter, water vole and badger.
- 6.2 Mitigation and compensation to address effects on legally protected species will, where appropriate, include translocation of species, the provision of replacement habitat and provision of special measures such as ecological underbridges and appropriately designed culverts to facilitate the movement of species across the route.
- 6.3 Formal applications for derogation and mitigation licences for protected species will be made after Royal Assent and are likely to be accompanied by updated baseline surveys.

7 Habitat creation and enhancement

- 7.1 The Proposed Scheme will result in a loss of habitats outside of protected sites including non-ancient woodland, veteran and ancient trees, grassland, wetland and hedgerow. Many of these will qualify as habitats of principal importance (as listed under Section 41 of the Natural Environment and Rural Communities Act 2006).
- 7.2 Where habitats of principal importance (including lowland mixed deciduous woodland, lowland meadow and ponds) will be lost, opportunities to create new compensatory habitat have been explored.

- 7.3 In addition to the creation of new habitats, some existing habitats will be subject to enhancement (where appropriate) as part of the proposed compensation measures.
- 7.4 Habitat creation and enhancement measures will contribute towards the HS2 Green Corridor, being an extensive environmental programme included in the Proposed Scheme to run alongside the railway and create a network of bigger, better-connected, climate-resilient habitats and new green spaces for nature and people. For more information on the HS2 Green Corridor please see Information Paper E28: The Green Corridor.

8 Design techniques

- 8.1 The Proposed Scheme incorporates a wide range of design techniques to mitigate or compensate effects on species and habitats.
- 8.2 The location and design of compensatory habitat creation areas has sought to adhere to the key Lawton Review principles of 'more, bigger, better and joined'. These aim to result in areas of habitat creation which will also enhance and connect habitat parcels within the local area and where possible contribute to local, regional and national conservation strategies. These measures also support climate change requirements by increasing the resilience of ecological networks and allowing species to move more freely in response to changing climatic conditions.
- 8.3 The Proposed Scheme includes a number of design features to facilitate the safe movement of species from one side to the other. This includes stretches of the railway in tunnel and on viaduct, as well as passages underneath or over the line such as underpasses, culverts and ecological underbridges. On roads associated with the Proposed Scheme, measures such as 'hop-overs' may be used to facilitate the safe movement of bats. Hop-overs are where tall vegetation/ trees exist or have been planted either side of a road with the aim of keeping bats flying at height over the road. The need for each will be assessed on a case by case basis during design development.

9 Design development and further approvals

- 9.1 The design of the Proposed Scheme in the Bill is in outline and the EIA is based upon a reasonable worst-case assessment of the impacts. The EMRs will ensure that the impacts of the Proposed Scheme do not exceed those stated in the ES. Following Royal Assent, design development will be undertaken, during which contractors will be required to take reasonable steps to further reduce the impacts assessed in the ES. For example, the ES generally assumes that all hedgerows within the construction boundary will be lost, whereas in practice the nominated undertaker is expected to be able to employ methods to reduce such habitat loss. This is consistent with the Mitigation Hierarchy of seeking to avoid impacts in the first instance.
- 9.2 Further surveys will be undertaken to verify the baseline ecological conditions described in the ES and inform design development work.
- 9.3 Bespoke Ecology Site Management Plans will be prepared at design development stage, which will specify the ecological objectives of each ecological habitat creation area, the measures to be taken to establish, maintain and monitor the habitats and the detailed planting requirements. They will also be prepared for each statutory and non-statutory site of nature conservation importance and ancient woodland directly affected by the construction of the Proposed Scheme.
- 9.4 Further controls are included in the Bill to ensure that the Proposed Scheme includes adequate mitigation of the impacts on ecological receptors.
- 9.5 Schedule 17 of the Bill requires planning authorities along the line of route to approve plans and specifications for building works. Planning authorities may impose conditions on approval on the grounds that the design or external appearance of the building works ought to be modified to preserve a site of nature conservation value. For more information, see Information Paper B2: Main provisions of the planning regime.

- 9.6 Planning authorities are also required to give approval to the bringing of scheduled works into operational use. They will usually consider nature conservation issues as part of the approval process for each work.
- 9.7 When undertaking design development of the ecological measures proposed in the Environmental Statement, the nominated undertaker will be required to do so in accordance with the nominated undertaker's technical requirements.

10 Managing impacts through construction

- 10.1 Impacts on ecological receptors will be managed during the construction phase through Section 9 of the Draft Code of Construction Practice (Draft CoCP). It requires the nominated undertaker to ensure that procedures are implemented to control and limit disturbance to areas of nature conservation interest and protected species in accordance with relevant legislative requirements and accepted industry practice.
- 10.2 Ecological works such as planting and habitat creation for translocated species will be planned early within the construction programme so that new habitats are created and established as soon as reasonably practicable, and to ensure the time between habitat loss and the creation of new habitats is minimised.
- 10.3 The nominated undertaker will define a programme for undertaking ecological surveys prior to and during construction. The surveys will refine the mitigation and control measures required during construction as appropriate and inform appropriate monitoring during construction.
- 10.4 The nominated undertaker will require its contractors to undertake appropriate monitoring of the consequences of construction works on ecological receptors and of the effectiveness of the management measures designed to control ecological effects, associated with works that may affect protected or notable species, statutory designated or non-statutory sites of nature conservation importance.

11 Ensuring outcomes

11.1 The nominated undertaker will ensure compliance with applicable legislation for the protection of areas of nature conservation interest and of protected species. Relevant provisions include, but are not limited to, the following:

- Wildlife and Countryside Act 1981 (as amended);
- The Conservation of Habitats and Species Regulations 2017 (as amended);
- Natural Environment and Rural Communities Act 2006;
- Countryside and Rights of Way Act 2000;
- Weeds Act 1959;
- Protection of Badgers Act 1992;
- Nature Conservation (Scotland) Act 2004; and
- The Wildlife and Natural Environment (Scotland) Act 2011.

11.2 The nominated undertaker will be required to demonstrate that there is sufficient mitigation/compensation through the creation of new habitats and/or provision of special measures such as ecological underbridges to maintain the populations of protected and other notable species affected by the Proposed Scheme.

11.3 In order to satisfy protected species licencing requirements and achieve the Proposed Scheme's objective of seeking to achieve net gains in biodiversity in replaceable habitats, habitats created for mitigation and compensation will need to be managed appropriately. The draft Environmental Memorandum contains a commitment to ensuring appropriate management by the Promoter and the nominated undertaker. For more information, see Information Paper E1: Control of environmental impacts.

- 11.4 HS2 Ltd is committed to monitoring the effectiveness of ecological mitigation and compensation measures for a sufficient period to ensure the objectives of the proposals for nature conservation are achieved. Monitoring may also need to continue beyond the establishment period. The monitoring period for sites used to translocate licensable species will be determined and agreed with Natural England and NatureScot.
- 11.5 An Ecology Review Group comprised of relevant statutory bodies, non-governmental organisations and local authorities will review the outputs of monitoring for habitat creation sites and make recommendations for remedial action where appropriate.
- 11.6 An appropriate management, maintenance and monitoring strategy for ecologically-led habitat creation and enhancement will consist of three interrelated elements:
- Management, maintenance and monitoring approaches, durations and frequencies for the period during the establishment of new habitats and enhancement of existing habitats;
 - Management, maintenance and monitoring prescriptions, durations and frequencies beyond the point when establishment goals have been met (i.e. longer-term commitments); and
 - The mechanism for providing all management, maintenance and monitoring.
- 11.7 For the first of these elements, Natural England have provided advice on appropriate generic durations for the maintenance, management and monitoring during the establishment of ecologically-led habitat creation. Table 1 in Appendix A provides broad generic indications of the likely durations of monitoring, maintenance and management during the establishment period for those habitats affected by the Proposed Scheme.
- 11.8 As there are no published industry standards, the durations quoted draw upon current Defra guidance and professional experience of typical

management durations negotiated with stakeholders for other large-scale projects.

- 11.9 Table 1 in Appendix A sets out the broad habitat categories that are found within the Bill limits. For more information on Bill limits please refer to Information Paper B3: Limits on parliamentary plans. During design development, the design of these areas will be developed. Habitat mosaics will be required to include a number of these types of habitat in many cases. Additional habitat types may be created outside of Bill limits through separate agreement. The likely durations of monitoring, maintenance and management for these habitat types will be discussed with Natural England and NatureScot.
- 11.10 The durations shown in Table 1 in Appendix A will be used as a guide. In exceptional cases (e.g. where there is reason to believe that a habitat will be particularly difficult to create) there may be deviation from the figures provided. In consultation with Natural England, NatureScot and other environmental stakeholders, HS2 Ltd has identified measurable goals (or 'success criteria') for all habitat areas to be created. Monitoring during the establishment of new habitats will track progress towards these goals. The frequency of monitoring will generally decrease with time where establishment towards the agreed objectives is progressing in line with expectations. This principle is shown with indicative times in Table 1 in Appendix A.
- 11.11 The durations shown in Table 1 in Appendix A cover only the management, maintenance and monitoring proposed during the period of establishment. Further discussions are in progress with Defra, Natural England, NatureScot, the Forestry Commission and the Environment Agency regarding an appropriate approach to on-going management, maintenance and monitoring beyond the establishment period.
- 11.12 After an initial period of maintenance, the nominated undertaker will seek to return the majority of land to previous landowners in the first instance and then to other interested parties (such as local wildlife trusts, the Woodland Trust, local authorities), where agreement can be reached that

will ensure the continued objectives of the mitigation are maintained into the future.

11.13 Where agreement cannot be reached, the land will be retained and maintained by the nominated undertaker, at least until a maintenance agreement is put in place with a suitable owner or party.

11.14 For land that is retained by the nominated undertaker, the nominated undertaker will appoint a managing company (or companies) to ensure the adequate maintenance of mitigation.

12 More information

12.1 More detail on the Bill and related documents can be found at www.gov.uk/hs2-phase2b-crewe-manchester.

Appendix A:

Table 1: Indicative management, monitoring and maintenance durations for habitats to be created on the Proposed Scheme

Habitat type	Generic duration of monitoring, management and maintenance during establishment	Indicative monitoring intervals during habitat establishment	Comments
Open mosaic habitats on previously developed land	5 years	Annually for 5 years	A standard duration is likely to be applied to all habitats of this type.
Watercourses	5 years	6 months & Years 1, 3 and 5	A standard duration is likely to be applied to all habitats of this type.
Ponds	5 years	6 months & Years 1, 3 and 5	A standard duration is likely to be applied to all habitats of this type.
Grasslands	5-15 years	Years 1, 2, 3, 4, 5 and, 8, 11 and 15.	Areas of grassland with the primary purpose of landscaping are likely to fall under a 5 year regime; Majority of grassland provided as compensation for losses is likely to be subject to a 15-year regime.
Hedgerows	5-10 years	6 months & Years 1, 3, 5, 7 & 10.	Hedgerows provided specifically for ecological purposes (e.g. to provide connectivity between other areas of planting, or those translocated due to their ecological value) may be subject to a

Habitat type	Generic duration of monitoring, management and maintenance during establishment	Indicative monitoring intervals during habitat establishment	Comments
			regime of up to 10 years; Majority of hedgerows will be subject to a 5-year regime.
Young heathland/acid grassland	15	6 months & Years 1, 2, 3, 5, 7, 10, 13, 15.	All areas of this habitat affected by the proposed scheme are fragmented lowland heathland; 15 years is considered appropriate, as the aim is to create similar or better habitat than that lost.
Woodland (including screening planting)	10-50 years	6 months & Years 1, 3, 5, 7, 10, 13, 15, 20, 25, 30, 35, 40, 45, 50.	Durations of up to 10 years for areas provided for primary purpose of landscaping; Duration of up to 50 years during establishment for those areas that are created specifically for ecological mitigation/compensation. The 50-year period would be provided for all locations where the translocation of ancient woodland soils is proposed.

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<https://www.gov.uk/government/publications/national-planning-policy-framework--2>

Lawton Review:

https://www.researchgate.net/publication/268279426_Making_Space_for_Nature_A_Review_of_England's_Wildlife_Sites_and_Ecological_Network

Ancient Woodland Strategy:

<https://www.gov.uk/government/publications/hs2-ancient-woodland-reports>

The Conservation of Habitats and Species Regulations 2017 (as amended):

<https://www.legislation.gov.uk/uksi/2010/490/contents/made>

Phase 2b Western Leg Information Paper

E9: Control of airborne noise from altered roads and the operational railway

This paper outlines the measures that will be put in place to control airborne noise from altered roads and the operational railway.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper was prepared in relation to the promotion of the High Speed Rail (Crewe - Manchester) Bill. Content will be maintained and updated as considered appropriate during the passage of the Bill.

If you have any queries about this paper or about how it might apply to you, please contact the HS2 Helpdesk in the first instance.

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Version 2
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1 Introduction

- 1.1 High Speed Two (HS2) is the Government's scheme for a new, high speed north-south railway, which is being taken forward in a number of phases. Phase One will connect London with Birmingham and the West Midlands. Phase 2a will extend the route from the West Midlands to Crewe. The Phase 2b Western Leg will connect Crewe to Manchester. As set out in the Integrated Rail Plan, published in November 2021, HS2 East is proposed to deliver a new high speed line from the West Midlands to East Midlands Parkway.
- 1.2 HS2 Ltd is the non-departmental public body responsible for developing and promoting these proposals. The company works under the terms of a Development Agreement entered into with the Secretary of State for Transport.
- 1.3 The construction and operation of Phase One of HS2 is authorised by the High Speed Rail (London – West Midlands) Act 2017 and Phase 2a by the High Speed Rail (West Midlands – Crewe) Act 2021.
- 1.4 In January 2022, the Government introduced a hybrid Bill to Parliament (hereafter referred to as 'the Bill'), to seek powers for the construction and operation of the Phase 2b Western Leg (the Proposed Scheme), which is called the High Speed Rail (Crewe – Manchester) Bill. The Proposed Scheme comprises the Phase 2b Western Leg from Crewe to Manchester and several off-route works. It also facilitates the delivery of Northern Powerhouse Rail by providing the Crewe Northern Connection and junctions and other infrastructure to be used in future schemes.
- 1.5 The work to produce the Bill includes an Equalities Impact Assessment and an Environmental Impact Assessment (EIA), the results of which are reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs), which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed

Scheme. For more information on the EMRs please see Information Paper E1: Control of environmental impacts.

- 1.6 The Secretary of State for Transport is the Promoter of the Bill through Parliament. The Promoter will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill. This body is known as the 'nominated undertaker'. There may be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the EMRs and any commitments provided in the information papers.
- 1.7 These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the Proposed Scheme have been reached.

2 Overview

- 2.1 This information paper describes the application of the aims set out in the Noise Policy Statement for England for airborne noise from the Proposed Scheme and outlines the measures that will be put in place to control the effects of airborne noise that might otherwise arise from altered roads and the operational railway during the operation of the Proposed Scheme.
- 2.2 Airborne noise from altered roads and the operational railway could result in adverse impacts on people nearby.

3 Objectives

- 3.1 The nominated undertaker will take all reasonable steps to design and construct altered roads, and to design, construct, operate and maintain the operational railway so that the combined airborne noise from these sources, predicted in all reasonably foreseeable circumstances, does not

exceed the Lowest Observed Adverse Effect Levels set out in Table 1 of Appendix B.

- 3.2 Where it is not reasonably practicable to achieve this objective, the nominated undertaker will reduce airborne noise from the altered roads and the operational railway as far as is reasonably practicable.
- 3.3 Noise insulation will be offered with the aim that airborne noise from altered roads and the operational railway does not give rise to significant adverse effects on health and quality of life that would otherwise be expected when airborne noise exceeds the Significant Observed Adverse Effect Levels set out in Table 1 of Appendix B. Eligibility for noise insulation is explained in Section 5 below.
- 3.4 Where possible, the nominated undertaker will also contribute to the improvement of health and quality of life through the control of airborne noise.
- 3.5 Effects on health and quality of life are primarily avoided and minimised through the control of airborne noise at residential dwellings. It is recognised that effects can also occur when people are engaged in noise sensitive activities away from their home. To deliver the policy aims, reasonable steps will be taken to control airborne noise from altered roads and the operational railway to the levels set out in Table 2 of Appendix B for noise sensitive non-residential buildings and external amenity spaces.
- 3.6 For detail on the Airborne Noise Policy for altered roads and the operational railway adopted for the Proposed Scheme see Appendix A.

4 Control measures

- 4.1 The likely airborne noise impact from altered roads and the operational railway has been assessed and the findings reported in the ES.
- 4.2 The following measures to control airborne noise from altered roads and the operational railway will be considered in the following order by the nominated undertaker:

- reduce noise generation at source;
- reduce noise propagation through the design, specification, construction and maintenance of noise fence barriers and/or landscape earthworks; and
- reduce the amount of noise entering eligible properties through the offer of noise insulation.

4.3 To ensure that the measures to control airborne noise are reasonable, the nominated undertaker will take account of the set of shared UK principles that underpin the Government's sustainable development strategy.

5 Provision of noise insulation

- 5.1 Noise insulation measures, including ventilation where required, will be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 and the Noise Insulation Regulations 1975 (as amended 1988). Qualification for noise insulation under the Regulations will be identified and noise insulation offered at the time that the Proposed Scheme becomes operational.
- 5.2 In addition, following the general time-window of eligibility described in the Noise Insulation Regulations (Railways and Other Guided Transport Systems) 1996, where airborne noise from the use of new or additional railways authorised by the Bill, altered roads authorised by the Bill or the combined airborne noise from both, is predicted outside a permanent dwelling in all reasonably foreseeable circumstances to exceed the significant observed adverse effect levels set out in Table 1 of Appendix B, the nominated undertaker will offer noise insulation.
- 5.3 Noise and vibration will be monitored during the operation of HS2. Information Paper E12: Operational noise and vibration monitoring framework outlines the framework for monitoring noise and vibration operational railway.

6 More information

- 6.1 More detail on the Bill and related documents can be found at www.gov.uk/hs2-phase2b-crewe-manchester.

Appendix A:

The Proposed Scheme Airborne Noise Policy for altered roads and the operational railway

Note: all sound levels reported in this Appendix are outdoor free-field levels unless otherwise stated

The Noise Policy Statement for England (2010)

1. The aims set out in the Noise Policy Statement for England (NPSE) apply to the design, construction and operation of the Proposed Scheme.

Noise Policy Aims

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- **avoid significant adverse impacts on health and quality of life;**
- **mitigate and minimise adverse impacts on health and quality of life; and**
- **where possible, contribute to the improvement of health and quality of life.**

2. Government's guiding principles of sustainable development include: ensuring a strong, healthy and just society; using sound science responsibly; living within environmental limits; achieving a sustainable economy; and promoting good governance.
3. There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation.
4. The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:
 - NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and

- LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
5. The NPSE extends these to the concept of a significant observed adverse effect level.
- SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.
6. The NPSE notes "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".

[Planning Practice Guidance - Noise \(2019\)](#)

7. Government's Planning Practice Guidance on noise (PPG) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.
8. As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
9. The LOAEL is described in PPG as the level above which "noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life."
10. PPG identifies the SOAEL as the level above which "noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the

noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

HS2 Environmental Policy (2019)

11. The HS2 environmental policy sets out HS2 Ltd's commitment to be an exemplar project. It further states that HS2 Ltd will seek to minimise the impact of HS2 construction and operation on people and the environment including effects from air pollution, flooding and noise & vibration.

LOAELs for operational airborne noise from altered roads and the operational railway

12. Outdoor sound levels of 50 dB $L_{pAeq,day}$ and 40 dB $L_{pAeq,night}$ are considered the LOAELs for operational airborne noise from altered roads and the operational railway.
13. In the WHO Night Noise Guidelines for Europe a level of 40 dB L_{night} outdoors is said to be "equivalent to the LOAEL for night noise".
14. For the daytime level, the information used to support the WHO Guidelines for Community Noise indicate that daytime sound levels of less than 50 dB L_{pAeq} cause little or no serious annoyance in the community.
15. The WHO Guidelines for Community Noise also identify 60 dB L_{pAFMax} outside as the guideline value for sleep disturbance with windows open. For this reason, sound levels of 60 dB L_{pAFMax} at the façade is also considered the LOAEL for operational railway noise at night.
16. In October 2018, the WHO published an update to its Community Noise Guidelines 1999, which are now called the Environmental Noise Guidelines (ENG18). The guidelines do not require any changes to LOAELs presented above.

SOAELs for operational airborne noise from altered roads and the operational railway

17. Sound levels of 65 dB $L_{pAeq,day}$ and 55 dB $L_{pAeq,night}$ are considered the SOAELs for operational airborne noise from altered roads and the operational railway.
18. The daytime SOAEL is consistent with the daytime trigger level in the UK's Noise Insulation (Railways and Other Guided Transport Systems) Regulations. The

WHO Night Noise Guidelines for Europe sets the Interim Target at 55 dB $L_{pAeq,8hr}$ outside dwellings. This noise threshold has been taken to be the night-time SOAEL.

19. HS2 Ltd has considered research findings on adverse effects on nonrestorative sleep which indicate that adverse effects on sleep can be avoided if the maximum noise level inside the bedroom do not exceed 65 dB when more than 20 discreet events occur. For this reason, a sound level of 80 dB L_{pAFMax} at the façade when more than 20 train passbys occur and 85 dB L_{pAFMax} at the façade when 20 or fewer train passbys occur are considered the SOAELs for operational railway noise at night.

[Scottish Government noise policy, planning policy and EIA Regulation](#)

20. Scottish Government (2011) Planning Advice Note (PAN) 1 /2011: Planning and Noise provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. This guidance is consistent with the English policy and guidance outlined above.

Appendix B:

Operational airborne noise impact and effect levels from altered roads and the operational railway

Note: all sound levels reported in this Appendix are outdoor free-field levels unless otherwise stated

Table 1: Noise effect levels for permanent residential buildings

Time of day	Lowest Observed Adverse Effect Level (dB)	Significant Observed Adverse Effect Level (dB)
Day (0700 – 2300)	50 $L_{pAeq, 16hr}$	65 $L_{pAeq, 16hr}$
Night (2300 – 0700)	40 $L_{pAeq, 8hr}$	55 $L_{pAeq, 8hr}$
Night (2300 – 0700)	60 L_{pAFMax} (at the façade, from any nightly noise event)	80 L_{pAFMax} (at the façade, from more than 20 nightly train passbys), or 85 L_{pAFMax} (at the façade, from 20 or fewer nightly train passbys)

Table 2: Noise effect levels for noise sensitive non-residential buildings and external amenity spaces

Examples	Day 0700 - 2300	Night 2300 - 0700
Large and small auditoria; concert halls; sound recording & broadcast studios; and theatres	60 dB L_{pAFMax} or 50 dB $L_{pAeq, 16hr}$	60 dB L_{pAFMax} or 50 dB $L_{pAeq, 8hr}$
Places of meeting for religious worship; courts; cinemas; lecture theatres; museums; and small auditoria or halls	50 dB $L_{pAeq, 16hr}$	n/a
Schools; colleges; hospitals; hotels; and libraries	50 dB $L_{pAeq, 16hr}$	45 dB $L_{pAeq, 8hr}$
Offices and external amenity spaces	55 dB $L_{pAeq, 16hr}$	n/a

The effect levels set out in Tables 1 and 2 do not apply to a development, for the construction of which planning permission is granted after the date of deposit of the Bill.

Appendix C:

Glossary

At the façade - with reference to sound pressure measurement locations: a position 1m from the building.

Decibel (dB) - Between the quietest audible sound and the loudest tolerable sound there is a ten million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audible sound covers a range of approximately 0-140 dB.

External Amenity Spaces - As referred to in the Planning Practice Guidelines – Noise (2019), these are relatively quiet outdoor areas: for sole use by residents as part of the amenity of their dwelling; protected for sole use by a limited group of residents as part of the amenity of their dwelling; or protected as publicly accessible for residents as part of the amenity of their dwelling that are nearby.

dB(A) - The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.

$L_{pAeq,T}$ - An index used internationally to measure and assess environmental sound from sources such as roads and railways. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value.

$L_{pAeq,day}$ - Equivalent weekday sound pressure level between 07:00 and 23:00 hrs

$L_{pAeq,night}$ - Equivalent weekday sound pressure level between 23:00 and 07:00 hrs

L_{pAFmax} - The maximum A-weighted sound pressure level, where F indicates that the level is measured using a sound level meter's fast time weighting. It can be used to represent the "peak" noise level of an event such as a passing train. It is generally used when assessing the likelihood of night-time sleep disturbance.

Outdoor free-field - with reference to sound pressure measurement locations: a position more than 3.5m from all sound-reflecting surfaces other than the ground.

Permanent residential buildings - man-made structures that contain one or more dwelling units with a roof and walls standing more or less permanently in one place.

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Securing the future: delivering UK sustainable development strategy (2005):

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Phase 2b Western Leg Information Paper

E10: Control of ground noise and vibration from the operation of temporary and permanent railways

This paper outlines the measures that will be put in place to control ground-borne noise and vibration from the operation of the Proposed Scheme's temporary and permanent railways.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper was prepared in relation to the promotion of the High Speed Rail (Crewe - Manchester) Bill. Content will be maintained and updated as considered appropriate during the passage of the Bill.

If you have any queries about this paper or about how it might apply to you, please contact the HS2 Helpdesk in the first instance.

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Version 2

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1 Introduction

- 1.1 High Speed Two (HS2) is the Government's scheme for a new, high speed north-south railway, which is being taken forward in a number of phases. Phase One will connect London with Birmingham and the West Midlands. Phase 2a will extend the route from the West Midlands to Crewe. The Phase 2b Western Leg will connect Crewe to Manchester. As set out in the Integrated Rail Plan, published in November 2021, HS2 East is proposed to deliver a new high speed line from the West Midlands to East Midlands Parkway.
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- 1.5 The work to produce the Bill includes an Equalities Impact Assessment and an Environmental Impact Assessment (EIA), the results of which are reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs), which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed

Scheme. For more information on the EMRs please see Information Paper E1: Control of environmental impacts.

- 1.6 The Secretary of State for Transport is the Promoter of the Bill through Parliament. The Promoter will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill. This body is known as the 'nominated undertaker'. There may be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the EMRs and any commitments provided in the information papers.
- 1.7 These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the Proposed Scheme have been reached.

2 Overview

- 2.1 This information paper describes the application of the aims set out in the Noise Policy Statement for England that relate to ground-borne noise and vibration from the operation of both the temporary and permanent railways. It outlines the measures that will be put in place to control the effects of ground-borne noise and vibration that might otherwise arise from the operation of the temporary and permanent railways.
- 2.2 Vibration from the temporary and permanent railways may propagate through the ground to surrounding buildings where it might result in the vibration of floors, walls and ceilings, which could also be heard as a low frequency 'rumbling' sound; the latter is referred to as ground-borne noise.

3 Objectives

- 3.1 The nominated undertaker will design the temporary railways (required for tunnelling activities) and permanent railways such that the level of ground-borne noise and vibration predicted in all reasonably foreseeable circumstances does not exceed the Significant Observed Adverse Effect Levels given in Table 1 in Appendix B.
- 3.2 The nominated undertaker will take all reasonably practicable steps to construct, operate and maintain the temporary and permanent railways so that the design objective stated in paragraph 3.1 is fulfilled.
- 3.3 In addition, the nominated undertaker will take all reasonable steps to design, construct, operate and maintain the temporary and permanent railways such that, in all reasonably foreseeable circumstances, ground-borne noise and vibration does not exceed the Lowest Observed Adverse Effect Levels given in Table 1 in Appendix B.
- 3.4 The nominated undertaker will reduce ground-borne noise and vibration from the temporary and permanent railways as far as is reasonably practicable.
- 3.5 In addition to the effects on people inside residential dwellings, it is recognised that impacts can also occur on people and activities in noise sensitive non-residential locations.
- 3.6 The nominated undertaker will design the temporary and permanent railways so that the level of ground-borne noise and vibration predicted in all reasonably foreseeable circumstances does not exceed the impact levels given in Tables 2 and 3 in Appendix B. The nominated undertaker will take all reasonably practicable steps to construct, operate and maintain the temporary and permanent railways so that this design objective is fulfilled.
- 3.7 For detail on the Operational Ground-borne Noise and Vibration Policy adopted for the Proposed Scheme see Appendix A.

4 Control measures

- 4.1 The likely ground-borne noise and vibration impact of the temporary and permanent railways has been assessed and the findings reported in the Environmental Statement.
- 4.2 Ground-borne noise and vibration from the temporary and permanent railways will be controlled by the design and maintenance of the train and track.
- 4.3 To control ground-borne noise and vibration from the temporary and permanent railways, the nominated undertaker will be required to do the following in relation to the track systems:
- at design stage, predict, through the use of appropriate modelling, the engineering requirements of the track system that will fulfil the objectives;
 - design a standard track form with the objective of meeting as many of those engineering requirements identified in the previous bullet as can reasonably be achieved by such a standard track system;
 - design an enhanced track form for locations where it is predicted that the standard track system will not meet the engineering requirements or to discharge other project commitments and undertakings;
 - translate the engineering requirements into contract specifications for the track systems; and
 - procure, install and maintain the track systems to meet the contract specifications established above.
- 4.4 To ensure that the measures to control ground-borne noise and vibration are reasonable, the nominated undertaker will take account of the set of shared UK principles that underpin the Government's sustainable development strategy.

5 More information

- 5.1 More detail on the Bill and related documents can be found at www.gov.uk/hs2-phase2b-crewe-manchester.

Appendix A:

The Proposed Scheme Ground-borne Noise Policy for altered roads and the operational railway

The Noise Policy Statement for England (2010)

1. The aims set out in the Noise Policy Statement for England (NPSE) apply to the design, construction and operation of the Proposed Scheme.

Noise Policy Aims

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- **avoid significant adverse impacts on health and quality of life;**
- **mitigate and minimise adverse impacts on health and quality of life; and**
- **where possible, contribute to the improvement of health and quality of life.**

2. Government's guiding principles of sustainable development include: ensuring a strong, healthy and just society; using Sound science responsibly; living within environmental limits; achieving a sustainable economy; and promoting good governance.
3. There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation.
4. The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:
 - NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and

- LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
5. The NPSE extends these to the concept of a significant observed adverse effect level.
- SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.
6. The NPSE notes "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".

Planning Practice Guidance - Noise (2019)

7. Government's Planning Practice Guidance on noise (PPG) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.
8. As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
9. The LOAEL is described in PPG as the level above which " noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life."
10. PPG identifies the SOAEL as the level above which " noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the

noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

HS2 Environmental Policy (2019)

11. The HS2 environmental policy sets out HS2 Ltd's commitment to be an exemplar project. It further states that we will seek to minimise the impact of HS2 construction and operation on people and the environment including effects from air pollution, flooding and noise & vibration.

LOAELs for ground-borne noise and vibration

12. An indoor sound level of 35 dB L_{pASMax} , in any habitable room, is considered the LOAEL for ground-borne noise.
13. A low level of annoyance would be expected at ground-borne noise levels at or below 35 dB L_{pASMax} .
14. Vibration (indoors, near the centre of any dwelling room on the ground floor) of 0.2 VDV $m/s^{1.75}$ daytime (0700-2300) and/or 0.1 VDV $m/s^{1.75}$ night time (2300 – 0700) are considered the LOAELs for ground-borne vibration.
15. At these values, the relevant British Standard on human exposure to vibration in buildings suggest a low probability of adverse comment.

SOAELs for ground-borne noise and vibration

16. An indoor sound level of 45 dB L_{pASMax} , in any habitable room, is considered the SOAEL for ground-borne noise.
17. A significant number of people would be expected to be seriously annoyed at or above ground-borne noise levels of 45 dB L_{pASMax} .
18. Vibration (indoors, near the centre of any dwelling room on the ground floor) of 0.8 VDV $m/s^{1.75}$ daytime (0700-2300) and/or 0.4 VDV $m/s^{1.75}$ night time (2300 – 0700) are considered the SOAELs for ground-borne vibration.
19. At these levels, relevant British Standard on human exposure to vibration in buildings suggest that adverse comment is probable.

[Scottish Government noise policy, planning policy and EIA Regulation](#)

20. Scottish Government (2011) Planning Advice Note (PAN) 1 /2011: Planning and Noise provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. This guidance is consistent with the English policy and guidance outlined above.

Appendix B:

Ground-borne noise and vibration impact and effect levels from the operational railway

Table 1: Ground-borne noise and vibration effect levels for permanent residential buildings

Ground-borne noise	Lowest Observed Adverse Effect Level	L_{pASMax} [dB]	35
	Significant Observed Adverse Effect Level	L_{pASMax} [dB]	45
Vibration	Lowest Observed Adverse Effect Level	$VDV_{day}[m/s^{1.75}]$	0.2
		$VDV_{night}[m/s^{1.75}]$	0.1
	Significant Observed Adverse Effect Level	$VDV_{day}[m/s^{1.75}]$	0.8
		$VDV_{night}[m/s^{1.75}]$	0.4

Table 2: Ground-borne noise impact levels for non-residential buildings

Examples	L_{pASMax} [dB]
Large auditoria; and concert halls	25
Sound recording & broadcast studios; theatres, and small auditoria	30
Places of meeting for religious worship; courts; cinemas; lecture theatres; museums; and small auditoria or halls	35
Offices; schools; colleges, hospitals; hotels; and libraries	40

Table 3: Ground-borne vibration impact levels for non-residential buildings

Examples	$VDV_{day}[m/s^{1.75}]$	$VDV_{night}[m/s^{1.75}]$
Hotels; hospital wards; and education dormitories	0.2	0.1
Offices; Schools; and Places of Worship	0.4	n/a
Workshops	0.8	n/a
Vibration sensitive research and manufacturing (e.g. computer chip manufacture); hospitals with vibration sensitive equipment/operations; universities with vibration sensitive research equipment/operations	Risk assessment will be undertaken based on the information currently available for the relevant equipment/process, or where information provided by the building owner or equipment manufacturer.	

The effect levels set out in Tables 1, 2 and 3 do not apply to a development, for the construction of which planning permission is granted after the date of deposit of the HS2 Phase 2b Bill.

Appendix C:

Glossary

Decibel (dB) - Between the quietest audible sound and the loudest tolerable sound there is a ten million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audible sound covers a range of approximately 0-140 dB.

dB(A) - The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.

L_{pASmax} - The maximum A-weighted sound pressure level attained during a given time interval, T (30 seconds, 5 minutes etc) measured using a noise meter's slow (S) time weighting setting. It is used internationally in the measurement and assessment of ground-borne noise from railways.

Permanent railway - the railway infrastructure used to carry operational train services.

Temporary railway - railway laid inside a tunnel to transport material, personnel and equipment to and from the tunnel boring machine (TBM) during the tunnel's construction.

Vibration Dose Value (VDV) - measure used to estimate the probability of adverse comment which might be expected from human beings experiencing vibration in buildings.

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Securing the future: delivering UK sustainable development strategy (2005):

<https://www.gov.uk/government/publications/securing-the-future-delivering-uk-sustainable-development-strategy>

The HS2 environmental policy

<https://www.gov.uk/government/publications/hs2-environmental-policy>

Scottish Government (2011) Planning Advice Note (PAN) 1/2011 Planning and Noise:

<https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2011/03/planning-advice-note-1-2011-planning-noise/documents/0114180-pdf/0114180-pdf/govscot%3Adocument/0114180.pdf>

Whatcroft Hall Lane railway bridge

Whatcroft Hall Lane bridge is a single-track railway underbridge on the Sandbach to Northwich line.

The bridge was constructed in 1868 and has been maintained to continue to support freight traffic to present day.

There is no evidence of ground movement impacting on this bridge since 1983.

In 2020 Network Rail replaced the life expired bridge deck (from 1907) with a new bridge deck to meet modern safety and reliability standards.

Whatcroft Hall Lane railway bridge

Historical record

Built in 1868, the bridge was modified and maintained over its time:

- 1907 - Deck reduced from two to a single line, and girder steel installed in lieu of original cast iron (typical for the period).
- 1953 - Abutment work (adding 8 brick layers) to raise the tracks.
- 2020 - Deck renewal using conventional modern standard design and construction techniques, adding deck lifting capability to account for potential settlement.

Whatcroft Hall Lane railway bridge

Bridge deck renewal - 2020



Whatcroft Hall Lane new bridge from street level – Source : Network Rail – 19 Nov 2020

<https://www.networkrailmediacentre.co.uk/resources/whatcroft-hall-lane-new-bridge-1>

HS2 CREWE TO MANCHESTER

**A Note on Ground Risk across the
Cheshire Plain**

**A Report Prepared by GCG, led by
Professor Lord Robert Mair
CBE FREng FICE FRS**

5th April 2023

HS2

Crewe to Manchester

A Note on Ground Risk across the Cheshire Plain

5th April 2023

1. Introduction

1.1 This Note has been prepared by Professor Lord Robert Mair and Dr Chris Menkiti of Geotechnical Consulting Group (GCG). The purpose of the Note is to comment on the following documents:

- *Briefing Statement: HS2 2B route across the Cheshire Salt District North of Crewe*. Report by Dr Rosalind Todhunter, dated 6 July 2022 (hereinafter referred to as the ‘Todhunter report’)
- *Crewe to Manchester, Understanding the Ground Risk across the Cheshire Plain*. Report by HS2, dated 3rd March 2023 (hereinafter referred to as the ‘HS2 report’)

2. Background

2.1 The proposed HS2 line will cross the Cheshire Plain, an area of relatively flat topography, comprising mainly rural pasture and crop fields. The alignment of the Proposed Scheme crosses the Cheshire Plain in areas of former salt mining and other areas where salt mining is ongoing.

2.2 Throughout this Area of Interest, there are flashes and meres. Flashes are existing water bodies which have formed in depressions in the ground surface resulting from ground settlement, which has been induced by either historic mining collapse or salt dissolution processes. Meres are shallow lakes, likely to have originated at depressions formed from glacial scouring.

2.3 The HS2 Proposed Scheme will be on low embankments and, in some locations, on viaducts and bridge structures. There is a history of ground settlement in the area, arising from historic mining and from salt dissolution processes. The scheme is therefore likely to experience longer term ground settlements in its operational mode. This is addressed later in this Note.

3. Ground conditions and geotechnical risks

3.1 The HS2 report comprehensively describes the geology and ground conditions, including the hydrology (surface water) and hydrogeology (sub-surface groundwater). This information has been gained from detailed desk studies comprising reviews of published data sources, including borehole information held by the British Geological Survey (BGS), and consultations with mining companies operational within the area.

3.2 Geomorphological mapping (i.e. mapping the landforms and their development) has also been undertaken to identify higher priority locations in respect of potential salt dissolution hazard.

Advanced ground investigations, comprising boreholes and cone penetration tests (CPTs) have been undertaken at these targeted locations in 2020 and 2021. Currently, a time history of LiDAR¹ and InSAR² surveys are being studied by HS2 to identify locations of settlement within the alignment corridor.

- 3.3 LiDAR means Light Detection and Ranging and refers to a remote sensing technique that uses pulsed radar to survey a zone of ground.
- 3.4 InSAR stands for Interferometric Synthetic Aperture Radar. It is a satellite-based remote sensing method that can generate high-resolution images using radio and microwaves.
- 3.5 Appendix C of the HS2 report describes both LiDAR and InSAR techniques and associated data already gathered for the proposed alignment by HS2.

4. Further investigations

- 4.1 At this stage of a scheme, it is reasonable not to have undertaken fully comprehensive ground investigations in the form of many more boreholes and CPTs. HS2 is now planning for more ground investigations to further understand the ground conditions. Further supplementary investigations will be essential for the detailed design of the scheme; these will be at a later stage. However, there is sufficient geotechnical information at present on which to base the horizontal and vertical alignment of the Proposed Scheme.
- 4.2 Further investigations informing the detailed design development will also include collection and analysis of LiDAR and InSAR data to obtain information on surface depressions and settlements of the ground in the Area of Interest, as described above. Further comments on the value of LiDAR and InSAR are made in section 7.

5. Potential geotechnical risks

- 5.1 The Todhunter report identifies the complex geological issues in the Area of Interest, highlighting the influence of rock salt dissolution on potential future ground subsidence. Other concerns expressed in the report relate to artesian groundwater pressures in some superficial layers. However, this does not appear to be directly related to salt dissolution; it is a different and more common geotechnical problem associated with the impact of elevated porewater pressures in cohesionless deposits.

¹ From 1998 to present

² From 1995 to 2020

- 5.2 The HS2 report also addresses natural salt dissolution, controlled brine extraction and the potential effects at the ground surface. It notes that, with the cessation of wild brining more than four decades ago, ongoing dissolution along brine runs is expected to be at a slow rate. It also discusses the specific geological conditions leading to collapse at the ground surface, known as ‘sink holes’, noting that there have been no reported instances of sink hole formation arising from salt dissolution across the Area of Interest. This includes a review of data from the Cheshire Brine Compensation Board, for which HS2 report that “The Cheshire Brine Compensation Board stated that in the decade following 2006³ they had received [only] one notice of damage within 1km of the HS2 route” and for this “compensation [was] rejected as [it was] not attributable to salt dissolution”.
- 5.3 The Todhunter report also identifies the need for careful drainage design and this is recognised by HS2. We agree with this.
- 5.4 In summary, we agree with the broad mechanisms of potential salt dissolution hazards identified both in the Todhunter report and the HS2 report, and that there is likely to be future ground subsidence. This must be allowed for in the detailed design of the Proposed Scheme. The Todhunter report refers to “extensive ground instability” in several places. This is potentially misleading, implying that these mechanisms at depth will be manifested at the ground surface as extensive instability in terms of their interaction with the proposed embankments and structures. Whereas long-term surface ground movements that occur can be managed, as discussed in this Note.

6. Proposed scheme response

- 6.1 Although future ground subsidence is to be expected, the HS2 report outlines how this can be safely accommodated by the detailed design of the Proposed Scheme. Bridges and viaducts will be on piled foundations, with the piles taken down to adequate depths; the decks of these structures will be designed to have jacking facilities if there is a need to adjust them in the future.
- 6.2 The Proposed Scheme will be mainly on low embankments, which will probably incorporate geogrid reinforcement; these stiffer embankments will mitigate against effects of ground subsidence, but there may also be a need to adjust the rails to allow for ongoing settlement. The settlement development is likely to be slow and such adjustment is feasible.
- 6.3 A key to the approach outlined in the HS2 report is to mitigate the risk of ongoing settlement (including incipient sinkholes at the ground surface) by firstly adopting engineering solutions, such

³ after cessation of the last known brine operation - the New Cheshire Salt Works, situated in Wincham 2km from the route alignment, which ceased trading in June 2006

as those discussed in paragraphs 6.1 to 6.2 above, and then dealing with any further settlement by means of comprehensive monitoring and appropriate maintenance interventions.

- 6.4 The combination of further ground investigations, risk assessments, use of engineered solutions, detailed monitoring of movements of both the ground and the railway, and a detailed response plan for both anticipated and unexpected ground movement (termed ‘adaptive interventions’ in the HS2 report) will ensure that the Proposed Scheme can be operated safely.

7. Monitoring and surveillance technologies

- 7.1 The HS2 report refers to the use of LiDAR and InSAR for remote sensing of the settlement of the Proposed Scheme. We fully agree with this. Following the tragic train derailment near Carmont (west of Stonehaven), Scotland in August 2020 after a period of intense rainfall, Network Rail appointed Lord Mair to chair a Task Force Review of their management of earthworks (i.e., cuttings and embankments) across the whole Network Rail system. The Review focused on Network Rail’s capability and methodology for the management of railway cuttings and embankments, particularly in the light of climate change. The Task Force report, published in February 2021 (ref[1]), contained a total of 54 recommendations, including the need for significant investment in the updating of monitoring and surveillance methods.

- 7.2 Chapter 10 of the Task Force report focused on the importance of monitoring and surveillance technologies and drew attention to the considerable value of InSAR, using satellite technology. An application of InSAR for railways is shown in Figure 10.5 from the Task Force report (extract below) in which the technology was applied to the entire railway network of the Netherlands, more than 3000 km long, using hundreds of Radarsat-2 acquisitions between 2010 and 2015, leading to the first satellite-based nationwide railway monitoring system. The resulting deformation map for the Netherlands railways is shown in Figure 10.5 (a) of the Network Rail report, and a more detailed “flagging system” risk map is shown in Figure 10.5(b). The risk map, based on the satellite measurements combined with expert judgement, shows areas with < -10 mm/year (indicating a settlement rate exceeding 10mm/year), and those with $> +8$ mm/year (indicating a heave rate exceeding 8mm per year); these are highlighted by the red and blue flags, respectively.

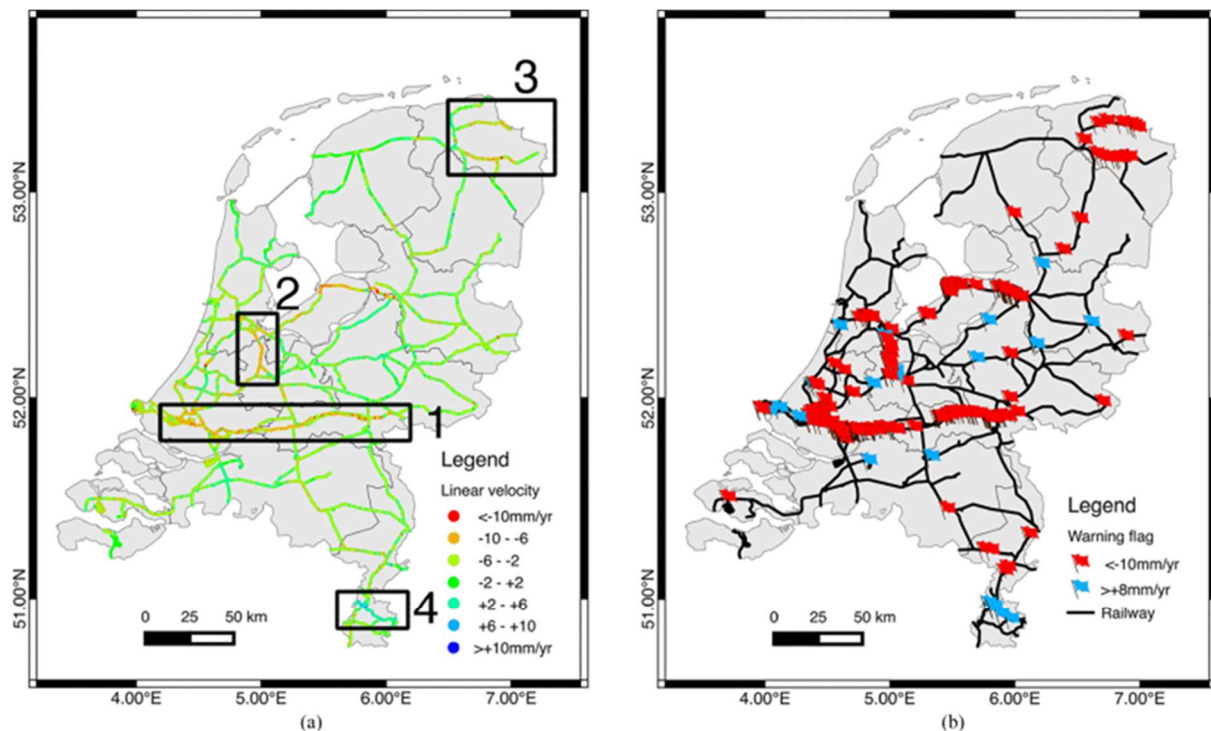


Figure 10.5: (a) Deformation map for Netherlands railway network derived from satellite observations. (b) Risk map, in which the coloured flags indicate the severity of the deformation (negative means settlement, positive means heave). Ling Chang et al (2018)

Extract from ref [1]

7.3 The recent experience for the Netherlands railway network illustrates the potential for InSAR to be used to monitor and control the performance of the HS2 Proposed Scheme. InSAR is clearly a promising technology which is developing rapidly, particularly with rapid developments in AI and machine learning.

7.4 InSAR is also capable of providing warning of impending instability. An example of its potential use for providing warning of bridge foundation scour is illustrated in Figure 10.4 from the Task Force report (see below). On 29th December 2015, following a period of intense rainfall and flooding, the masonry bridge at Tadcaster suffered a partial collapse into the River Wharfe due to scour of its foundations. Figure 10.4 shows subsequent analysis of InSAR data indicating settlement of the bridge being a precursor to failure; measurements several weeks before the failure indicate rapidly increasing settlement, almost certainly caused by earlier flooding and scour. This is a good example of the potential for InSAR technology for providing evidence of settlement as a precursor to subsequent instability and failure. It is highly relevant to providing warning of a possible, although unlikely, development of a sink hole beneath the HS2 Proposed Scheme.

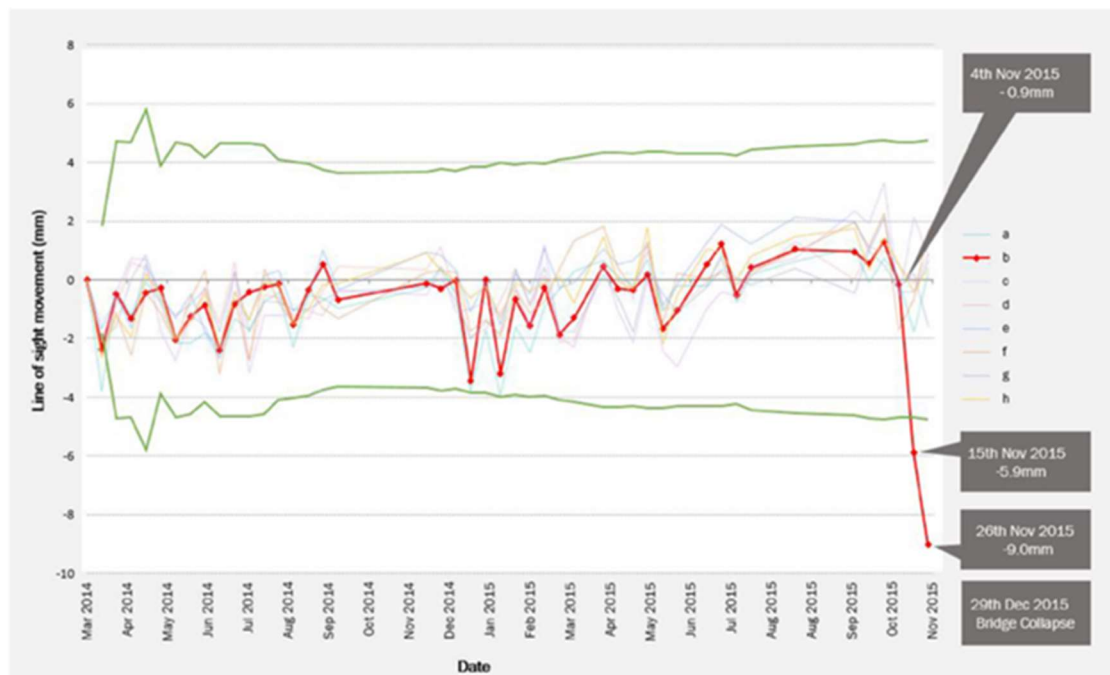


Figure 10.4: Vertical movements of masonry bridge at Tadcaster inferred from InSAR data, indicating rapidly increasing settlement several weeks before bridge failure occurred due to scour of its foundations during flooding of the River Wharfe (Selvakumaran, S et al, 2018)

Extract from ref [1]

7.5 Chapter 10 of the Task Force report also highlights a number of other new technologies for monitoring, including wireless tiltmeter systems recently trialled by Network Rail (see Figure 10.3 below, which has been extracted from the Task Force report). The tiltmeters transmit their measurements through a wireless communications network to a gateway, and thereby are loaded onto the internet. Readings can be taken every five minutes or at even higher frequencies, and alert levels set to give suitable warnings. These are an extremely promising application of innovative sensor development to the management of infrastructure such as the HS2 Proposed Scheme.

7.6 The roles of monitoring and mitigation are recognised in the Todhunter report⁴.

⁴ e.g., Section 4 paragraph 3



Figure 10.3: Wireless tiltmeters around a tunnel portal (Network Rail presentation, 9 October 2020)

Extract of ref [1]

7.7 Distributed fibre optic sensing (DFOS) provides a powerful technique for measurement of deformation and for advance warning of adverse ground movements. Controlled field experiments for early detection of sink hole development have recently been undertaken by HS2, Cambridge University and others (Xu et al, 2022). These were designed to assess the use of a newly developed geogrid for early warning of localised ground movement – see Fig.1 below. The geogrid is integrated with DFOS strain cables during the manufacturing process (referred to as a Sensorgrid). The trial results showed that the Sensorgrid configuration is highly sensitive to strain and can detect very small vertical displacement.

7.8 This innovative technology has considerable relevance to the HS2 Proposed Scheme, in which geogrids are likely to be incorporated in embankments in certain areas.

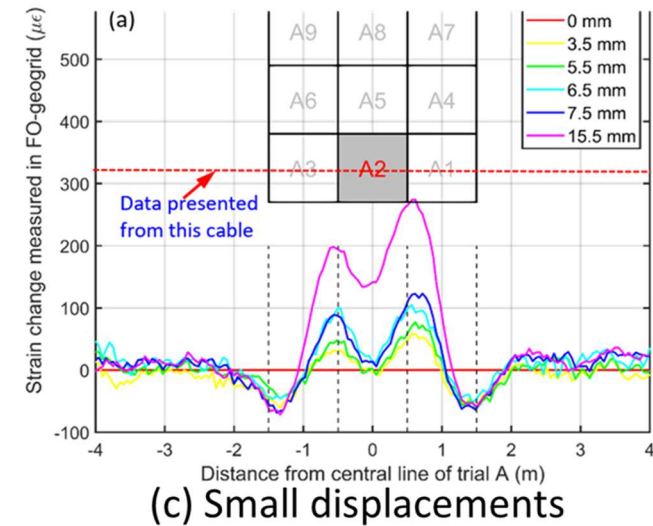
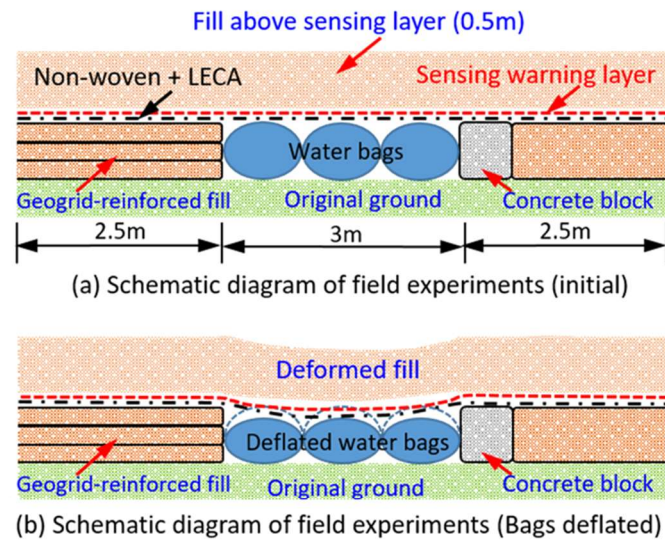


Fig.1 Field simulation of ground movement: (a) Schematic diagram of field experiments at the initial stage; (b) Schematic diagram of field experiments when bags deflated; (c) results for deflation of cell A2, small displacements results, (d) Construction of field experimental setup (after Xu et al, 2022)

8. Conclusions

- 8.1 Since the refined alignment was published in 2016 (ref [2]), additional surveys and studies have been undertaken by HS2 in the Cheshire Plain area, including desk studies of BGS boreholes, data harvesting from salt mine operators, geomorphological mapping and risk categorisation for salt solution landforms, new InSAR and LiDAR surveys, and new ground investigations comprising boreholes and CPTs.
- 8.2 Therefore, it appears, at this stage, that there is sufficient ground investigation information for HS2 to define the vertical and horizontal alignment in the Cheshire Plain area.
- 8.3 Nevertheless, further extensive ground investigation and surveys will be undertaken to fully develop the design and to inform construction planning.
- 8.4 Complex geological mechanisms apply in the Area of Interest, related to the influence of rock salt dissolution. These are well recognised in both the Todhunter report and the HS2 report and we agree that these potential geological hazards are important and applicable. These geological mechanisms will result in ongoing surface settlement that must be accommodated by the HS2 project, both during construction and in the operational life of the railway. The HS2 report discusses many engineering techniques for addressing such challenges.
- 8.5 It is common in infrastructure engineering for structures to be designed to tolerate ground movements. The techniques referenced in the HS2 report are well-established engineering methods that have been successfully used many times. We see no reason why they cannot be successfully used in the Cheshire Plain for the HS2 Proposed Scheme.
- 8.6 Indeed, for the efficient and safe operation of a high speed train, track maintenance with level corrections is a reality, regardless of any underlying time-dependent ground movements.
- 8.7 The ongoing settlements in the Cheshire Plain would be addressed by HS2 by risk categorisation and engineered solutions during design and construction, and in the operational life of the railway by monitoring, surveillance and appropriate maintenance interventions.
- 8.8 There have been significant advances in monitoring and surveillance technologies in recent years, e.g. LiDAR, InSAR, wireless tiltmeters and fibre optic sensing, most of which are being implemented by Network Rail. Adoption of such technologies will be of considerable benefit to the HS2 Proposed Scheme in ensuring safe construction and operation of the railway.
- 8.9 It is noteworthy that the West Coast Main Line railway and other railways have successfully operated in the same area for a long period.

8.10 Based on the information we have reviewed, we see no insurmountable obstacle to the successful construction and operation of the HS2 Proposed Scheme.

8.11 Climate change might promote faster salt solution mechanisms resulting in quicker rates of surface settlement. A climate change resilience assessment was undertaken by HS2 as part of its Environmental Impact Assessment. The result was that “All climate change related risks during operation have been assessed to be ‘low’ or ‘medium’ due to the range of mitigation measures”. We are satisfied that the proposed HS2 construction stage mitigations, as well as the monitoring and surveillance strategies for the operational stage jointly provide resilience to potential climate change impacts.

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Fibre optic instrumented geogrid for ground movement detection

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Abstract

The serviceability of transportation infrastructure, and other civil engineering assets, can be adversely affected by post-construction ground movements. Potential sources of these movements include loss of material from dissolution features, differential movements at earthwork/structure transitions and movements associated with mining legacy features. Post-construction ground movements are mitigated through engineering design, which may be supported through the inclusion of monitoring systems within the earthworks at locations of particular interest.

The number of available methods capable of monitoring sufficiently large areas and providing early warning of the onset/development of ground movement is limited. The incorporation of distributed fibre optic sensing (DFOS) systems into earthworks could provide important information on the commencement, location, origin and magnitude of ground movements in near real-time for critical infrastructure over areas at risk.

HS2 is the new high-speed railway connecting London, Birmingham and the north of England. This paper presents field monitoring trials on the HS2 Phase One route using a newly developed sensing solution consisting of a DFOS instrumented geogrid for ground movement detection. Controlled field tests were first performed on two simulated sinkholes using 3x3m pits in which water-filled bags were placed and covered with stabilised chalk and granular soils, respectively. By deflating the bags in varying sequences, the captured strain signature profiles from the instrumented geogrid were compared with displacement measurements from conventional instrumentation, to assess the instrumented geogrid's sensitivity to millimetre-scale settlements. Robustness and resilience were also evaluated through in-situ durability tests. Finally, as a result of these trials, this technology is being deployed over a 100 m-long, 10 m-wide stretch of the mainline alignment on the HS2 site at Tilehouse Lane Cutting to demonstrate its viability within a live construction environment. During the remaining construction period, continuous monitoring, near real-time data processing and visualisation will offer the opportunity to detect any incipient ground movement below the temporary haul road surface.

Keywords: Distributed fibre optic sensing, Ground movement, Geogrid, Sensorgrid, Early warning

1. Introduction

Nearly all of the UK's critical infrastructure is placed on, or situated in soil. Therefore, ground movement can have a significant social, economical and physical impact on infrastructure provision both at present and in future years. Such ground movements are commonly induced from shallow geohazards like sinkholes, subsidence, landslides, etc., often resulting in both long-term degradation and, ultimately, structural failure of particular assets. Climate change projections suggest that these geohazards, which are themselves often driven by antecedent weather conditions, are likely to increase in magnitude and frequency for certain areas of the UK through the 21st century. Implementing early warning systems by measuring and monitoring spatio-temporal movements may be used as part of a coordinated design and risk management approach to mitigate these increasing risks posed to critical infrastructure (Ast et al. 2001). This was also emphasised by the task force appointed by Network Rail to carry out a review of earthworks management following the fatal train derailment at Carmont, Scotland on 12th August 2020 (Network Rail, 2021).

The number of available methods that are capable of monitoring sufficiently large areas and providing early warning of the onset/development of ground movement, is limited. Conventional instrumentation, such as

borehole extensometers, are often constrained by discretely instrumented ‘measuring points’. Remote sensing technologies like interferometric synthetic aperture radar (InSAR) are commonly used to detect ground surface elevation changes and have proved effective in mapping large-scale ground motions. However, these do not allow for the capture of subsurface deformation, which is often a precursor and early warning of surface ground movement, and their effectiveness in highly vegetated infrastructure corridors is often limited. Distributed fibre optic sensing (DFOS) technology has emerged as a powerful tool for continuous, high temporal and spatial resolution mapping of subsurface ground movement. DFOS enables measurement of temperature, strain, and acoustic energy distributions along the entire length of a fibre optic sensing cable (Kechavarzi et al. 2016; Xu et al. 2021). The incorporation of DFOS cables into the ground could provide significantly improved information on the location and magnitude of subsurface ground movement and subsidence (Möller et al., 2022). To date, this technology has been trialled in some field monitoring campaigns, with DFOS cables embedded in trenches on the ground surface and back-filled by in-situ soil to monitor ground cracks, horizontal displacements and ground settlements. Many have reported that the quality of fibre optic sensing data is highly reliant on the mechanical coupling between fibre optic cables and their surrounding soils, which is dependent on both the cable construction and its installation (Iten et al., 2011; Klar et al. 2014; Zhang et al. 2016; Winters et al. 2020).

This paper reports on controlled field experiments designed to assess the use of a newly developed geogrid, integrated with DFOS strain cables during the manufacturing process (referred to as a Sensorgrid), for early warning of localised ground movement. This innovative Sensorgrid was developed in collaboration between Huesker, the Centre for Smart Infrastructure and Construction (CSIC) at the University of Cambridge and Epsimon Ltd. The performance and practical implications of the new sensing solution were explored through real-world trials simulating the type, scale and rate of ground movement that could be experienced by earthworks assets in areas of unmitigated ground movements.

2. Field-scale controlled experiments

2.1 Experimental setup

Two 3 x 3m voids constructed at the HS2 site at Tilehouse Lane Cutting (TLC) to simulate the ground movement from shallow geohazards and explore the behaviour and response of the Sensorgrid against two different types of overburden fills commonly found and used on the South Portal at TLC: stabilised chalk (trial A) and granular fill (trial B). As illustrated in Figure 1, nine heavy-duty water-filled bags were laid in the base of each, with a maximum inflation height of 0.5m. On one end of the pit, concrete modular blocks were used to form a hard edge, simulating the transition between earthwork and structure (e.g. bridge abutment). At the other end a soft edge was formed by using a geogrid and a non-woven wrap-around on compacted fill (Figures 1(a) and (c)). On one side of the pit, four modular blocks could be removed at the end of the trial to inspect the condition and profile of the Sensorgrid. When all the bags were fully inflated, a layer of non-woven geotextile was placed loosely on top of them to support a lightweight expanded clay aggregate (LECA) fill. This was then followed by the installation of the Sensorgrid, and a 500mm layer of overburden fill above the sensing layer.

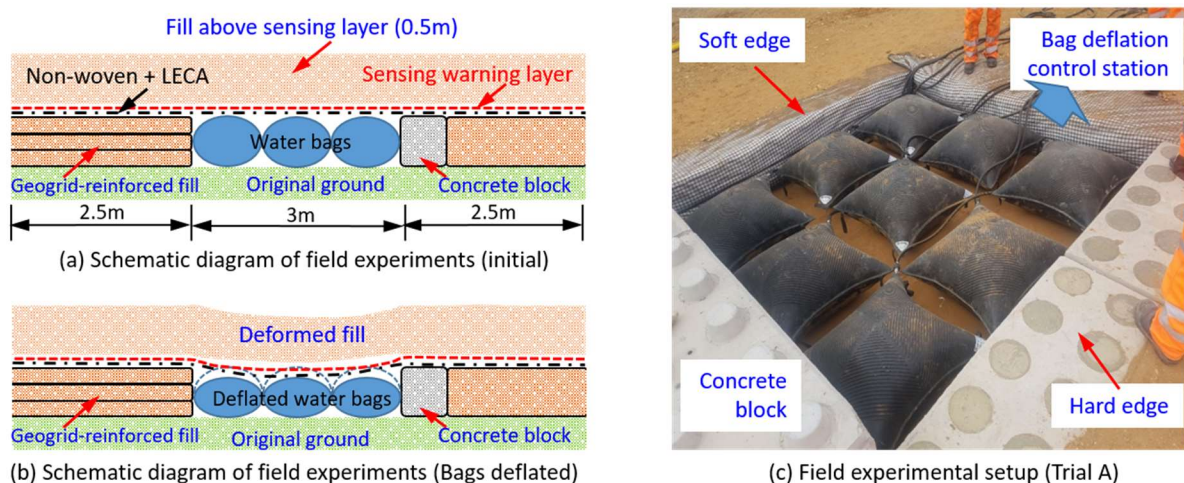


Figure 1: Field simulation of ground movement: (a) Schematic diagram of field experiments at the initial stage; (b) Schematic diagram of field experiments when bags deflated; (c) Field experimental setup (Trial A).

2.2 Field instrumentation

The strain fibre optic (FO) cable integrated into the Sensorgrid used in these two trials was 2.5 mm in diameter and consisted of single-mode optical fibre with a 0.9mm Hytrel coating embedded in an elastic 2.5 mm polyurethane outer sheath. It was knitted into a geogrid by Huesker by substituting it for yarns of similar size. The Sensorgrid used in these two trials was 0.5m wide and carried three individual FO cables, a central fibre, a redundant fibre positioned next to it and an offset fibre.

Prior to the trials, the performance of the Sensorgrid was evaluated through extensive testing at CSIC. In particular, the strain transfer function was evaluated using a bespoke universal testing machine to carry out tensile tests (Figure 2(a)). As illustrated by one of the test results presented in Figure 2(b), the strain transfer function of this very elastic cable showed good linearity, no hysteresis, good repeatability to high strains and high sensitivity (high strain coefficient or gauge factor, which is the slope of the linear relationships shown).

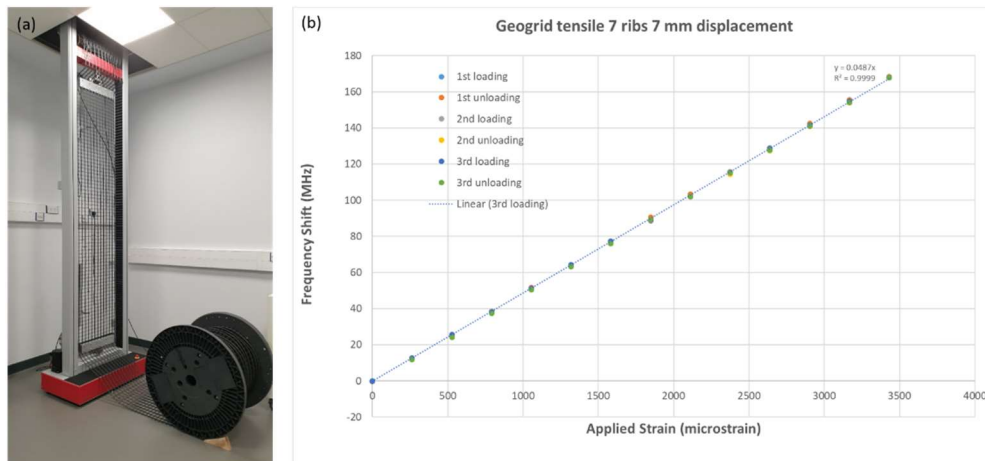


Figure 2: Laboratory tensile tests on the Sensorgrid: (a) Tensile test at CSIC; (b) Testing results.

Figure 3 shows an overview of the field instrumentation set-up. The grid was positioned on top of the bags in a way that the offset fibre was running over the middle of each bag, as illustrated in Figures 3(a) and (b). The anchored length of Sensorgrid was 2.5m on either sides of the pit.

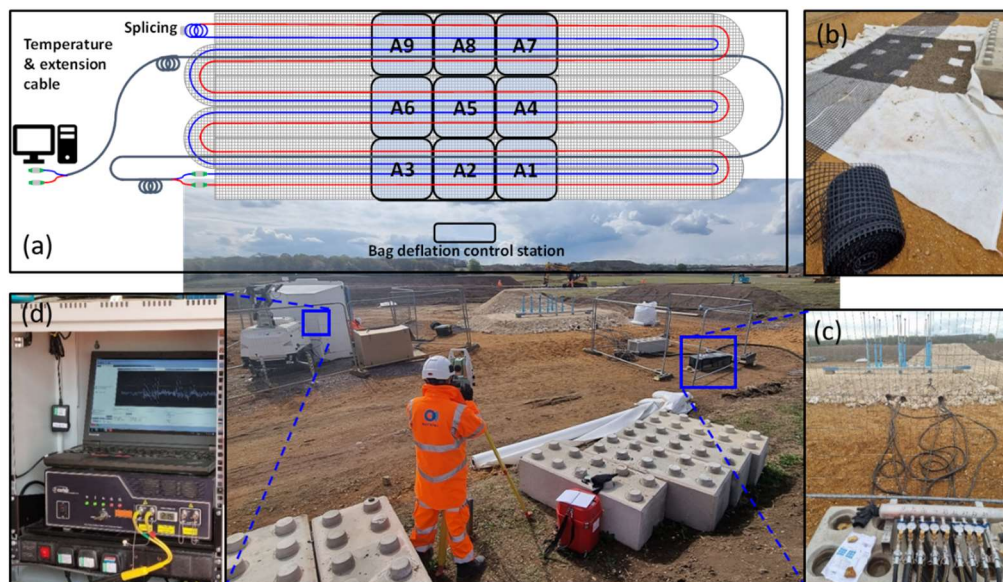


Figure 3: Field experimental setup at trial A: (a) Sensorgrid layout; (b) Sensorgrid installation; (c) Water bag control station; (d) Fibre optic sensing analyser operating in real-time.

A conventional total station monitoring system was employed to capture the displacement on the crown of each bag, created by deflation, as well as the resulting displacement experienced by the Sensorgrid. One circular metallic plate was sitting on the centre of each bag and a second plate was sitting on top of the Sensorgrid above the bags. These two plates were connected to rods and tubes that extended over the overburden fill. Prisms

were attached to the rods and tubes and monitored using a total station, as shown in Figure 3. This allowed the movement of the bags (void) and the geogrid to be recorded in real-time, with an accuracy of $\pm 1\text{mm}$.

To simulate ground movement, water was released from the bags through a control station (as pictured in Figure 2(c)), causing the fill above to move downwards and strain the mesh, which in turn caused a change in the characteristics of the spectrum of the back-scattered light pulsing through the FO sensing cable captured in real-time by a Brillouin Optical Time Domain Analysis (BOTDA) analyser (OZ Optics Ltd, Canada) (Figure 2(d)). After full completion of testing on trial A, the overburden fill, the monitoring tubes and the Sensorgrid were removed to recover the bags from the pit and reuse them for trial B.

3. Results and Observations

3.1 Early warning strain signatures

The strain signature profiles measured in the Sensorgrid at the very early stage of sinkhole formation are illustrated in Figure 4. These represent a change in strain with respect to a baseline measurement taken following the installation and prior to starting the tests. By convention, positive strain change corresponds to an increase in tension while negative strain change represents compression or loss of tension. The strain profiles shown are those obtained with the FO cable centred on the water bags in the row with red numbering, as indicated in the schematic inset in the figures. The grey shading illustrates the bags that have been (grey numbering) or are being (red numbering) deflated at the time of the measurement.

In both trials A and B, the Sensorgrid was sensitive to millimetre scale subsurface vertical settlement (not necessarily the ground surface settlement) over the relatively small spatial scale of 1m (deflated bag width). The strain generated was several times higher than the system's measurement resolution. At this early stage, the strain profile in Trial A exhibited a double-peak shape associated with the central dip across the A2 section and negative strain at the edge of the trial area. The strain profile is wider than that of the deflated water bag as the deformation across A2 generated axial strain in the grid. For Trial B, the strain profile displays a different pattern with a negative strain change in the centre line of the fibre optic trial pit B9, as shown in Figure 4 (b). This artefact is due to the different construction procedures used in Trial B where the soil over the water bags was compacted. This compaction forced the geogrid down in the dips in between the bags, creating tension in the FO cable over the centre of the curved bags. As the bags were deflated this tension was released, resulting in a negative strain change (loss of tension). This would not happen in a site installation when the geogrid is installed over a flat surface. Nevertheless, both trials demonstrate the sensitivity and effectiveness of the Sensorgrid system in detecting relatively small movements over a small spatial scale.

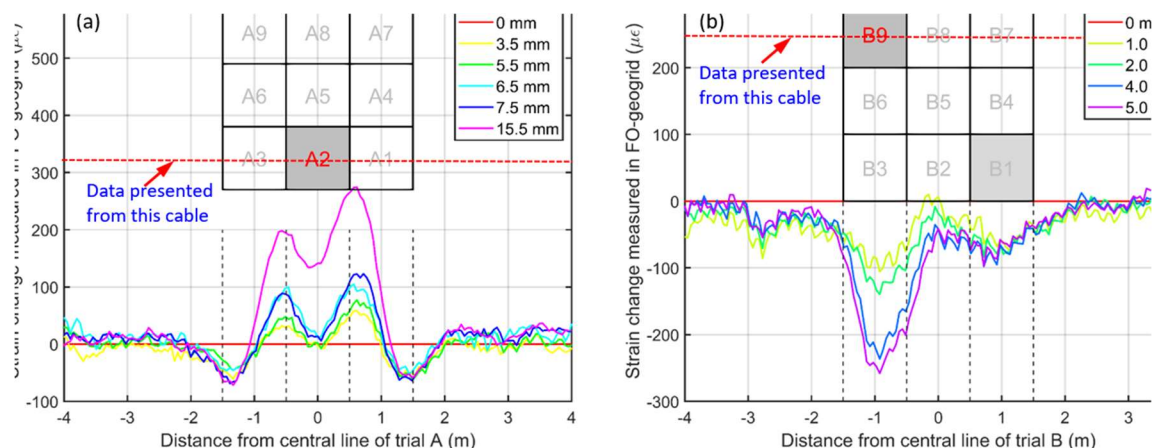


Figure 4: Early warning strain signature profiles: (a) Trial A - deflation of bag A2; (b) Trial B - deflation of bag B9 (following the deflation of B1).

3.2 Strain signatures at large ground deformations

The evolution of the measured strain profiles as sinkholes propagate was investigated by deflating bags in sequence. As displayed in Figure 5(a), the strain profile gradually became wider as the single bag A2 was deflated; i.e. the positive peaks remained around the edges of A2 but strain propagated up to about 1m into the anchorage length on both sides of the trial pit. Similar behaviour was observed in trial B, as shown in Figure 5(b). The

propagation of strain, as the bags were deflated, can also be visualised using contour plots, as highlighted in Figure 5(c) and (d). This type of two-dimensional plot on a larger scale installation is essential to allow for rapidly pinpointing the location of problem areas. Following completion of each trial, the lateral modular blocks were removed for inspection, as shown in Figure 6.

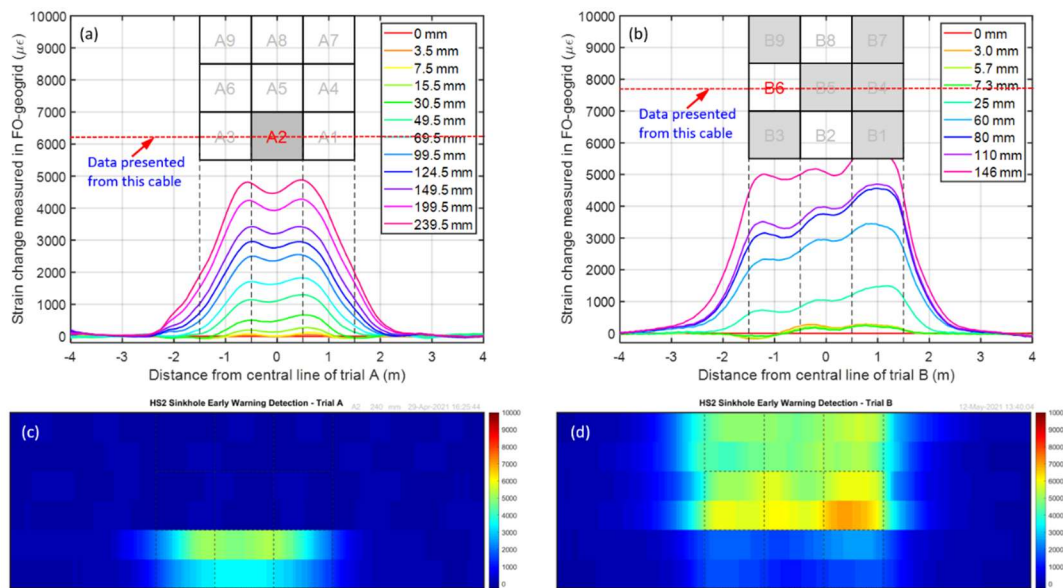


Figure 5: Strain profiles at large ground deformations: (a) Trial A – deflation of bag A2; (b) Trial B - deflation of bag B6 (following the deflation of B1, B9, B3, B7, B5, B4 and B6 in sequence); (c) Strain contour at trial A deflating A2 to 239.5mm; (d) Strain contour at trial B deflating B6 to 146mm.

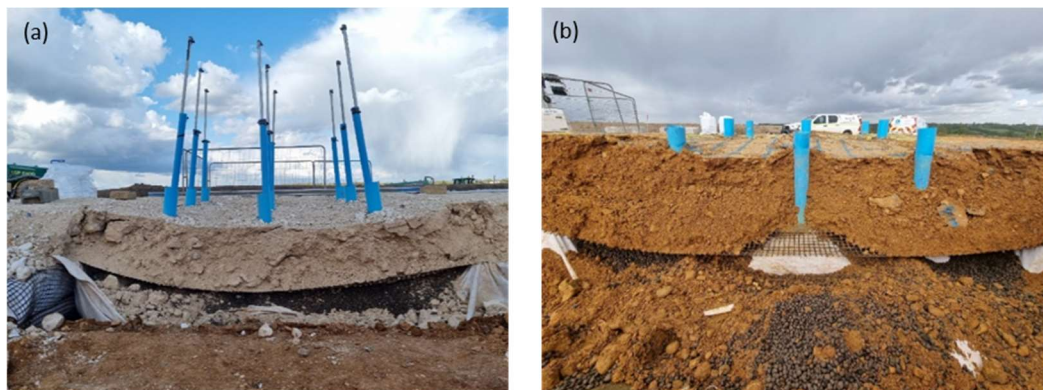


Figure 6: Deformed profiles of Sensorgrid after all bags were fully deflated: (a) Trial A; (b) Trial B.

During the trials, a FO temperature cable was installed above the Sensorgrid to assess potential temperature effects. The largest temperature changes occurred on 29 April 2021 due to sun exposure, with rapid changes and an increase of almost 25°C, which was picked up by part of the cable located outside of the soil. However, in the cable covered by the soil in the trial pit, the changes were not significant and in the order of the precision of the analyser (i.e. ± 1 °C).

4. In-situ durability assessment

Separate tests were conducted in order to assess the robustness of the Sensorgrid used in these preliminary trials, where no significant problems had occurred, under more realistic field conditions representative of the temporary haul road and final pavement construction process at TLC. Two separate Sensorgrid circuits were laid on the ground in a single loop over a length of approximately 50m in order to apply four different treatments: (1) T1 with one protection layer of non-woven geotextile (NW20) above and below the Sensorgrid, (2) T2 with two layers of NW20 above and below the Sensorgrid, (3) T3 with three layers of NW20 above and below the Sensorgrid; (4) T4 with three layers of NW20 above and two layers of NW20 below the Sensorgrid; The non-woven geotextile (NW20) used here had a weight of 235 grams/m², and was the same product used to cover the

water bags in the trial areas. After placing the Sensorgrid and NW20 protections, a series of construction activities were carried out, including placement and levelling of a stabilised chalk fill over the Sensorgrid, and compaction of that fill with eight passes of a 20-tonne vibratory roller. For all treatments, both strain and optical power were measured with a Neubrex NBX-5000 Brillouin Optical Time Domain Reflectometry (BOTDR) analyser all along the FO cables integrated in the Sensorgrid. The data showed that, whereas acceptable localised losses were generated during soil placement, soil levelling and soil compaction resulted in significant losses at several locations along the optical fibres. These were likely due to excessive localised bending in the fibres generated by sharp aggregates, but as the losses are cumulative they eventually exceeded the optical budget available (dynamic range of the analyser), leading to erroneous strain data.

Since the manufacturing of the Sensorgrid by Huesker is realised through a knitting process, different grid designs can be achieved by using FO strain cables of different sizes and stiffness and therefore robustness. As such, a stiffer Sensorgrid (Fortrac® R 220/100-30 GSGTA) was produced with a much more robust cable for the larger scale ground movement monitoring scheme deployed at TLC, as described below.

5. Large-scale trial of ground movement monitoring at Tilehouse Lane Cutting

TLC is approximately 710m long in total and up to 11m deep, and it connects the North Approach Embankment and Colne Valley Viaduct to the south-east with the West Hyde embankment and the 10.6 mile-long twin-bore Chiltern Tunnel passing under the M25 to the north-west, as indicated in Figure 7. The ground investigation (48 CPTs) and cutting excavation has revealed dissolution features ranging from 0.5 to 2m in diameter to be present along the cutting (Figure 7(a)). The condition of the infill material varies, and voids are occasionally present. Engineered mitigation has been constructed at these locations and a geogrid-reinforced mattress will also be installed over the area. This has provided the opportunity to prove the viability of the technology in a live construction environment and 5m-wide Sensorgrid with FO strain sensing cables at a 0.5m spacing is being deployed to monitor potential ground movement beneath a 100m-long, 10m-wide stretch of the mainline alignment on the HS2 site at TLC.

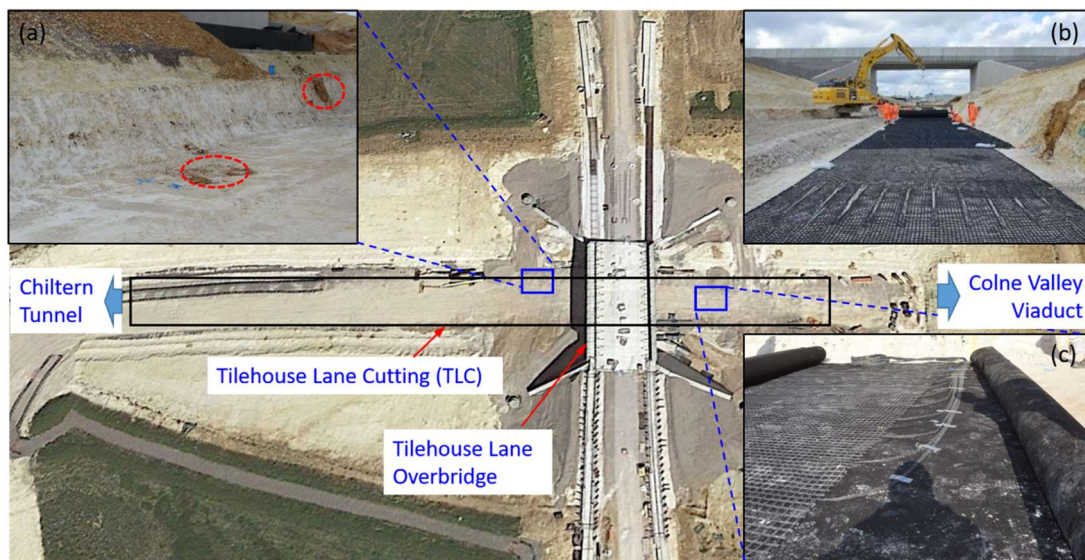


Figure 7: Large-scale monitoring of ground movement at Tilehouse Lane Cutting (TLC): (a) Solution features at TLC (as circled); (b) Field deployment of Sensorgrid; (c) Sensorgrid in-situ.

To protect against construction damage, the Sensorgrid is sandwiched between layers of Non-woven geotextile (HPS14) (Figure 7 (b) and (c)). Above this is a layer of geogrid Fortrac 600 MDT forming the base of the reinforced mattress, overlain by chalk mixed with 2% cement. Strain will be monitored continuously along the Sensorgrid for two years during the construction of HS2. This represents 10,000 monitoring points over 1000m². Temperature cables are also being embedded with the Sensorgrid to assess any (unexpected) temperature effect. The data acquired from the FO cables will be automatically processed and displayed in real-time on a web-based visualisation dashboard developed by Epsimon Ltd. This will enable the project engineers to detect any incipient ground movement, enabling them to take timely preventative action if necessary.

6. Conclusions

Controlled field experiments were performed to explore the performance of a newly developed DFOS instrumented geogrid (Sensorgrid) for ground movement detection. Water-filled bags were placed in the ground and deflated in a pre-determined sequences to replicate vertical ground movements which demonstrated the sensitivity and effectiveness of the Sensorgrid system as an early warning detection solution for local ground movements beneath earthworks. The Sensorgrid sensing system is sensitive to millimetre scale vertical settlement at depth. It is also sensitive to settlement at the sub-metre spatial scale. For large ground movements, the Sensorgrid is likely to experience large strains but, in the trials, these did not exceed the capacity of the system (both in terms of tensile strength and measurement range/limit).

As shown by the trial results, the current Sensorgrid configuration is highly sensitive to strain and can detect very small vertical displacement. Its low stiffness is likely to lead to good strain transfer in soils, which also makes it ideal for application where horizontal movement and axial strain occurs, such as for slope movements and embankment retaining walls. For applications in harsh construction environments, the Sensorgrid design is highly configurable and it can be integrated with more robust strain cables as required.

Developing a capability for early detection of ground movement which leads to appropriate preventative or precautionary measures could prove a valuable tool for the maintenance of infrastructure earthworks. These technologies may become more valuable in future because of the increasing frequency of extreme weather events and their potentially adverse impact on ground conditions and earthwork assets.

Acknowledgements

The authors are grateful to HS2 Innovation for funding and supporting this work. They are thankful to Roadbridge Ltd, SOCOTEC UK Ltd and Mr Kyriakos Kaskiris (formerly at Jacobs UK Ltd) for their support with field construction and Sensorgrid deployment. The authors would also like to thank CSIC (EPSRC (EP/N021614/1) and Innovate UK (920035)) for supporting this research.

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Ground conditions

Promoter's response

On 3rd March 2023 the Promoter published a report entitled "Crewe to Manchester - Understanding the Ground Risk across the Cheshire Plain".

The March Report can be viewed at the following link: [HS2 Phase 2b Select Committee: Crewe to Manchester - Understanding the Ground Risk across the Cheshire Plain - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/115444/HS2_Phase_2b_Select_Committee_Crewe_to_Manchester_-_Understanding_the_Ground_Risk_across_the_Cheshire_Plain.pdf)

The March Report provides a review of the ground conditions, the associated risks, and the mitigation measures for the Crewe to Manchester Proposed Scheme.

HS2

Crewe to Manchester

Understanding the Ground Risk across the Cheshire Plain

3rd March 2023

Overview of the March Report

Ground conditions

The alignment of the Proposed Scheme passes across the Cheshire Plain in areas of former salt mining and other areas where salt mining is ongoing. The March Report addresses geological concerns in this area and sets out:

- HS2 Ltd's understanding and interpretation of the existing ground conditions;
- How the route alignment and developed design has taken account of those ground conditions; and
- How HS2 Ltd plans to gather further information, develop the design, construct, and operate the Proposed Scheme.

Based on interpretation of information obtained to date and the derived engineering approach, HS2 Ltd, in conjunction with its designers and technical advisors, considers that the route alignment is appropriate for the intended purpose, and that geological challenges can be both managed and mitigated during detailed design and construction so as to provide a safe operational railway.

Conclusion of the March Report

Ground conditions

The scale of the ground related challenges and their solutions are commensurate with the purpose of the Proposed Scheme as key national infrastructure, and comparable to the scale of other ground related challenges that can be encountered in the operation of other high-speed railways.

The Proposed Scheme has been designed with sufficient inbuilt resilience, along with practical measures for routine maintenance and adaptive design, which can be put in place in achievable timeframes, to mitigate against climate change during operation.

Route Alignment

Ground conditions

The Proposed Scheme was selected to minimise the risks posed by ground conditions in the Cheshire plain. In particular, the route selected:

- Avoids major areas of former high subsidence as marked by flashes, with the one exception of Billinge Flash;
- Avoids a line of Meres that broadly align southeast of Rostherne Mere;
- Avoids areas of ground subsidence such as those which the Cheshire Brine Compensation Board defines as requiring statutory consultation in relation to any new development;
- Does not pass within 2 km of any known former locations of historical wild brine well pumping sites, with one possible exception, a suspected brine well in the vicinity of Clive Green Lane;
- Avoids clusters of subsidence features as historically mapped by BGS;
- Avoids historical and controlled salt mines, whether remediated or not, with the exception of Winsford Rock Salt mine; and
- Avoids existing brining extraction and gas storage caverns, passing just west and northwest of Warmingham and Holford brinefields respectively.

It is not possible to select a route which avoids entirely all possible sources of risk posed by the ground conditions.

Design response

General risk mitigation by design

The Proposed Scheme has been designed to account for the risks posed by ground conditions in the Cheshire plain as outlined below.

Adapted precautionary mitigation measures are proposed against the risk of subsidence, which are typical for the construction of infrastructure in these types of ground condition, or for high-speed rail systems in general including:

- The viaducts will be supported by piers on piled foundations because of the potentially relatively low strength of the near-surface soils. The piles can be lengthened into more stable ground.
- Surface rainwater run-off from embankments, and viaducts to be collected by lined drainage systems and held temporarily in lined balancing ponds, before discharge to river courses. Rainwater not concentrated and not percolating through the ground to give rise to the risk of salt dissolution.
- The track forms can have built in design features to allow for corrections of vertical rail geometry in operation.
- Differential settlements arising from the ground can be addressed through the design and routine maintenance aspects of the track form.

Design response

General risk mitigation by design of vertical horizontal and vertical alignment

The selection of structural infrastructure including viaducts and bridges is driven by the need to cross over existing natural features such as rivers and existing major infrastructure. The viaducts are sufficiently high so as to provide necessary headroom. This infrastructure will be designed to account for the risks posed by ground conditions.

Where the Proposed Scheme continues north and has passed beyond the area of wet rockhead, long cuttings can be incorporated without risk of salt dissolution. At Hoo Green Lane and Rostherne the design has lowered the alignment to pass under the A556 and M56.

Design response

Site Specific Risk Mitigation Design

Solutions are proposed at Clive Green Lane and Billinge Flash. The final choice of mitigation solution will be based on interpretation of further ground investigation.

Winsford Rock Salt mine - viaduct structures and embankment are proposed. The piles of the viaduct structures will not reach the wet rockhead level, nor any of the salt layers. The mine is not materially impacted by the Proposed Scheme.

Construction Stage Response

The draft CoCP references measures to be implemented which include undertaking ground investigation, risk assessments, monitoring of ground movement, groundwater and ground gas.

Ground movement will be monitored using a master network of positional and level datums which would be tied into national level bedrock datums. INSAR and LiDAR surveys would be used during the construction stage to monitor ground movements in direct response to construction stage activities.

Operational Stage Response

Risk mitigating measures by adaptive interventions

Operation and maintenance of the railway will make use of digital information and monitoring techniques to detect:

- ground movements from the legacy effects of former salt brining activity
- salt dissolution from climate change impacts.

Due to the transient nature of ground surface settlements, the operational safety of the railway will need solutions which are able to make corrections for settlements which are outside of expectation.

Adaptive measures can include provisions for track raising, OCS raising, bridge deck raising, and interventions to the foundations, and future 'new technology' that will occur during the 120 year lifetime of the railway.

The monitoring data will allow early decisions on the application of the adaptive design elements accommodated for, or built into the infrastructure, and hence avoid unnecessary interruptions to operations.

Ground investigation works

Ground conditions

Under the process of desktop study, a significant amount of data gathering has been undertaken to inform the Proposed Scheme design with specific reference to the geology, hydrogeology and ground conditions.

HS2 Ltd has carried out detailed reviews of published data sources and a series of consultations with mining companies operational within the area so as to establish the ground conditions in the area.

Subsequently, advanced ground investigations were undertaken at targeted locations in 2020 and 2021. The data from these investigations has been used to reinforce the understanding from the desktop study, refine risk assessments, and will contribute to informing the detailed design development.

Further ground investigations will be carried out as the Proposed Scheme is taken forward.

Alternative alignment following the M6

Ground conditions

The proposed route via Crewe with a connection with the WCML near Crewe provides greater strategic benefit including connectivity to northwest England (including Chester, Liverpool and Warrington) and north Wales. This route also performs more favourably from a sustainability perspective compared with the other alternative routes including the M6 corridor, as it will require fewer demolitions and will be further away from a number of settlements across the Cheshire plain.

Routes following the M6 corridor would have similar impacts and geological challenges associated with passing over the Cheshire plain but would require a less favourable location for the junction of the HS2 WCML connection and the HS2 Manchester spur.

The decision to serve Crewe was confirmed by the Secretary of State in 2015. Neither of the alternative corridors (via the M6 or Airport) would serve Crewe.

Ms Elaine Hamlett
Davenham Parish Council
28 Mount Pleasant Road
Northwich
Cheshire
CW9 8JG

By email to: clerk@davenhampc.org.uk

19 April 2023

Dear Ms Hamlett,

HIGH SPEED RAIL (CREWE – MANCHESTER) BILL – HOUSE OF COMMONS SELECT COMMITTEE: PETITION HS2- P2B – 012 – DAVENHAM PARISH COUNCIL

I am writing to you in my capacity as the Director of Hybrid Bill Delivery at HS2 Ltd, which is acting on behalf of the Promoter of the High Speed Rail (Crewe - Manchester) Bill ('the Bill') currently before Parliament.

Further to my letter to you on 5 April 2023 with assurances to the Parish Council in relation to HS2 Construction Traffic and funding of 'a Welcome to Davenham' sign I am writing to you, on behalf of the Secretary of State for Transport, to offer Davenham Parish Council the following assurances:

In these assurances:

"Additional Provision 1" means the High Speed Rail (Crewe – Manchester) Bill Additional Provision which was deposited in the House of Commons on 6 July 2022;

"Bill" means the High Speed Rail (Crewe - Manchester) Bill as deposited in the House of Lords on 24 January 2022 and as amended by Additional Provision 1 and the expression "the Bill" shall be taken for the purposes of these assurances to include (unless the context otherwise requires) the form of the Bill as enacted;

"immediate area" means the land shown indicatively edged red on the attached Plan 1;

"nominated undertaker" refers to the body or bodies appointed by the Secretary of State to exercise the powers conferred by the Bill to construct and maintain the Proposed Scheme.

The nominated undertaker may be HS2 Ltd, or it may be another body or bodies appointed to oversee the construction and operation of the Proposed Scheme;

“Petitioner” means Davenham Parish Council of 28 Mount Pleasant Road, Northwich, CW9 8JG;

“Plan 1” means the plan attached to this assurance and labelled Plan 1

“Promoter” means the Secretary of State for Transport (or any successor Secretary of State or Minister holding the Transport portfolio) in his capacity as Promoter of the Bill and includes, so far as relevant, any nominated undertaker exercising any powers or functions under the Bill once enacted; and

“Proposed Scheme” means Phase 2b (Crewe - Manchester) of High Speed 2 as defined further in the Bill;

“Royal Assent” means the date when Royal Assent is given to the Bill; and

“the Secretary of State” means the Secretary of State for Transport or any successor Secretary of State or Minister holding the Transport portfolio; and

“Works” means works to be authorised under the Bill for the purposes of constructing the Proposed Scheme.

1. Provision of information

The Promoter would like to draw the Petitioner’s attention to the provisions included in the draft Code of Construction Practice in relation to engagement and notice of works, in particular section 5.1.4, and in addition is offering the following assurance:

1.1 The Promoter will keep the Petitioner informed of the progress of the Bill and of likely target dates for construction of the Proposed Scheme in the immediate area.

2. Route- wide Traffic Management Plan

2.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker prior to the commencement of the Works, to produce a route-wide traffic management plan (RTMP) in consultation with the relevant local highway and traffic authorities, the emergency services and any other relevant key stakeholders. The RTMP would include a HS2 construction vehicle route-signing strategy.

3. Site- specific Traffic Management

3.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to produce site-specific traffic management measures to include road traffic management layouts, signage and works necessary to facilitate site access for HS2

construction traffic, which will be subject to consultation with the relevant local highway authority.

4. Cycle Access

4.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker, where reasonably practicable, to maintain cycle access in the Parish of Davenham during construction of the Works. This will include provision of appropriate signage to indicate any re-routed cycle paths.

5. Construction Vehicles

5.1 Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to put measures in place to ensure damage to highways in the Parish of Davenham caused by HS2 construction vehicles is kept to a minimum and any damage to grass verges is reasonably repaired and reinstated.

If accepted, these assurances will be included in the Register of Undertakings and Assurances, which is held by the Department for Transport. Drafts of the Register will be published regularly during the passage of the Bill and it will be finalised after Royal Assent. A nominated undertaker will be contractually obliged to comply with all relevant undertakings and assurances set out in the Register. The assurance process is set out in Annex A.

If you have any further queries please don't hesitate to contact Kirsty Clarke, Petition Manager, on 07826886543 or kirsty.clarke@hs2.org.uk.

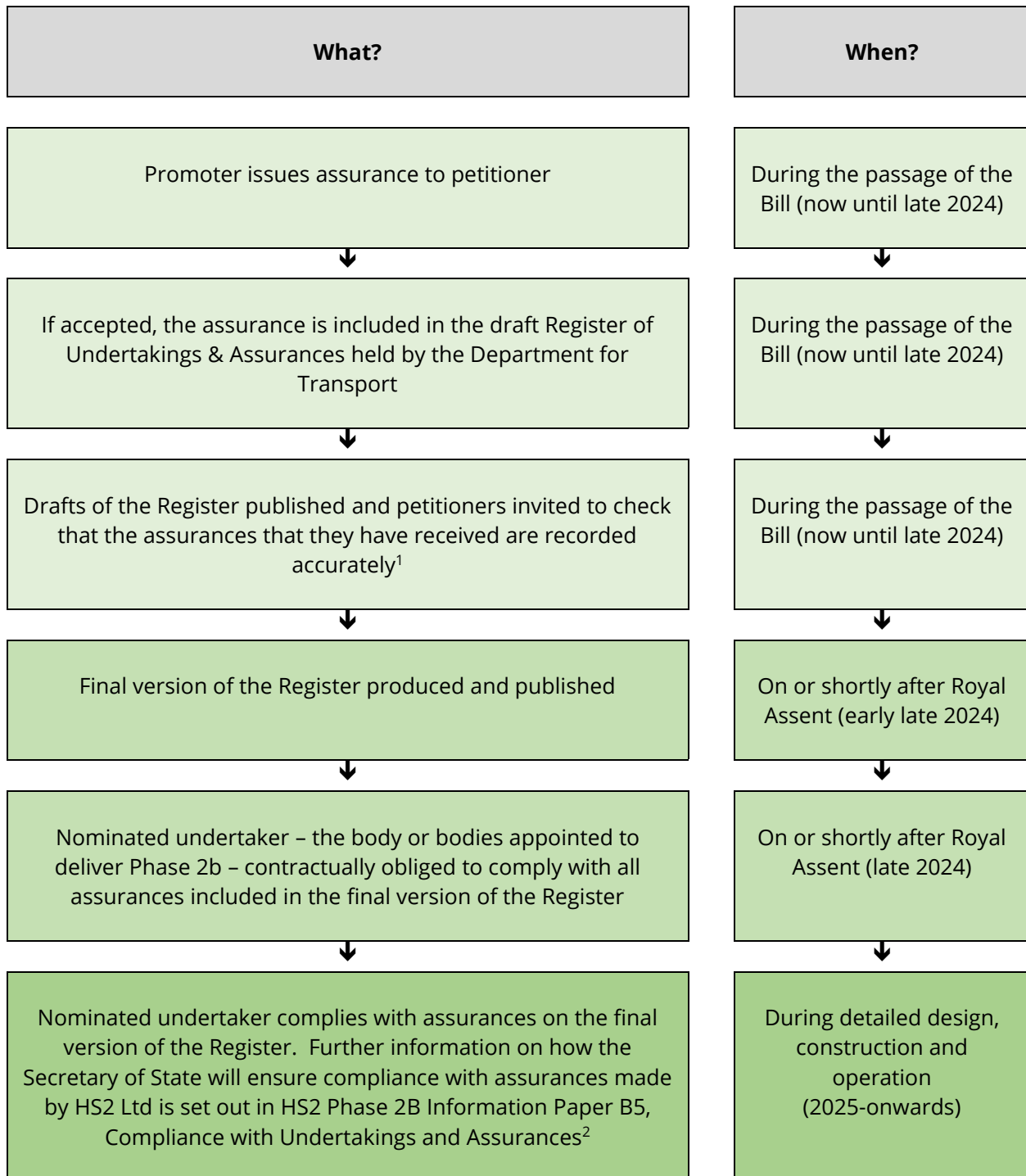
Yours sincerely



Lucy Lagerweij
Director, Hybrid Bill Delivery
High Speed Two (HS2) Limited

Annex A

ASSURANCES: STEPS AND TIMING



¹ The latest draft of the Register can be found at <https://www.gov.uk/government/publications/hs2-phase-2b-crewe-manchester-register-of-undertakings-and-assurances>

² A copy can be found at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1048801/B5_Compliance_with_undertakings_and_assurances_v1.pdf

Plan 1

The map displays the Davenham area in Cheshire, featuring the River Dane and River Weaver. Key locations include Hartford, Kingsmead, Leftwich, Davenham, Mere Heath, Moulton, Bostock Green, and Meadowbank. The map is overlaid with a grid labeled A-J horizontally and 1-10 vertically. A red line highlights a specific route or boundary, and a green line highlights another. A black box in the top left corner contains the text 'Plan 1'.



P232(5)

Ms Elaine Hamlett
Davenham Parish Council
28 Mount Pleasant Road
Northwich
Cheshire
CW9 8JG

By email to: clerk@davenhampc.org.uk

21 April 2023

Dear Ms Hamlett,

HIGH SPEED RAIL (CREWE – MANCHESTER) BILL – HOUSE OF COMMONS SELECT COMMITTEE: PETITION HS2- P2B – 012 – DAVENHAM PARISH COUNCIL

I am writing to you in my capacity as the Director of Hybrid Bill Delivery at HS2 Ltd, which is acting on behalf of the Promoter of the High Speed Rail (Crewe - Manchester) Bill ('the Bill') currently before Parliament, further to my letter dated 5 April 2023. In that letter I offered Davenham Parish Council, on behalf of the Secretary of State for Transport, assurances relating to:

1. HS2 Construction Traffic ("Assurance 1"); and
2. Funding of 'Welcome to Davenham' sign ("Assurance 2").

Thank you for your response dated 7 April 2023, in which you accepted the Assurance 2 in relation to the signage. I understand from that response that Davenham Parish Council continues to have concerns regarding the impact of HS2 construction traffic on the local road network.

I am advised that you met HS2 colleagues earlier today and that you discussed an amendment to that assurance, to be followed up in writing following the meeting. Accordingly, I am writing to you, on behalf of the Secretary of State for Transport, to offer Davenham Parish Council the following amended assurance, which will, if accepted, replace Assurance 1 in my letter dated 5 April 2023:

In these assurances:

“Additional Provision 1” means the High Speed Rail (Crewe – Manchester) Bill Additional Provision which was deposited in the House of Commons on 6 July 2022;

“Assurance 1” means the assurance relating to ‘HS2 Construction Traffic’ set out in the letter to the Petitioner from HS2 dated 5 April 2023;

“the Authorised Works” means the works authorised by the Bill;

“Bill” means the High Speed Rail (Crewe – Manchester) Bill as deposited in the House of Lords on 24 January 2022 and as amended by Additional Provision 1 and the expression “the Bill shall be taken for the purposes of these assurances to include (unless the context otherwise requires) the form of the Bill as enacted”;

“Heavy Goods Vehicles (HGVs)” means motor vehicles weighing in excess of 3.5 tonnes and used to transport construction materials;

“HS2 Construction Traffic” means HGVs used for the purposes of the Authorised Works;

“nominated undertaker” refers to the body or bodies appointed by the Secretary of State to exercise the powers conferred by the Bill to construct and maintain the Proposed Scheme. The nominated undertaker may be HS2 Ltd, or it may be another body or bodies appointed to oversee the construction and operation of the Proposed Scheme;

“the Petitioner” means Davenham Parish Council;

“Proposed Scheme” means Phase 2b (Crewe- Manchester) of High Speed 2 as defined further in the Bill;

“Royal Assent” means the date when Royal Assent is given to the Bill;

“the Secretary of State” means the Secretary of State for Transport or any successor Secretary of State or Minister holding the Transport portfolio; and

“the Specified Roads” means such lengths of Hartford Road, London Road and Church Street in the Parish of Davenham as are to be agreed between the Petitioner and the nominated undertaker and in relation to London Road means the points between the A556 Chester Road (coordinates: Easting: 365852, Northing: 371408) and the A533 Davenham Bypass (coordinates: Easting: 366673, Northing: 369808).

HS2 Construction Traffic

1. Subject to the Bill receiving Royal Assent, the Secretary of State will require the nominated undertaker to limit, so far as reasonably practicable, its use of the

Specified Roads by HS2 construction traffic during the construction of the Authorised Works.

2. Paragraph 1 shall not apply in the event that there is an emergency, [or other unforeseen need for works,] that reasonably requires the use of the Specified Roads by HS2 construction traffic.
3. The commitments contained in these assurances apply in relation to the exercise of the powers of the Bill as amended by Additional Provision 1 and are without prejudice to the exercise of powers under any further Additional Provision.

The commitments contained in these assurances replace Assurance 1 set out in the letter dated 5 April 2023.

If accepted, this assurance will be included in the Register of Undertakings and Assurances, which is held by the Department for Transport. Drafts of the Register will be published regularly during the passage of the Bill and it will be finalised after Royal Assent. A nominated undertaker will be contractually obliged to comply with all relevant undertakings and assurances set out in the Register. The assurance process is set out in Annex A.

If you have any further queries please don't hesitate to contact Kirsty Clarke, Petition Manager, on 07826886543 or kirsty.clarke@hs2.org.uk.

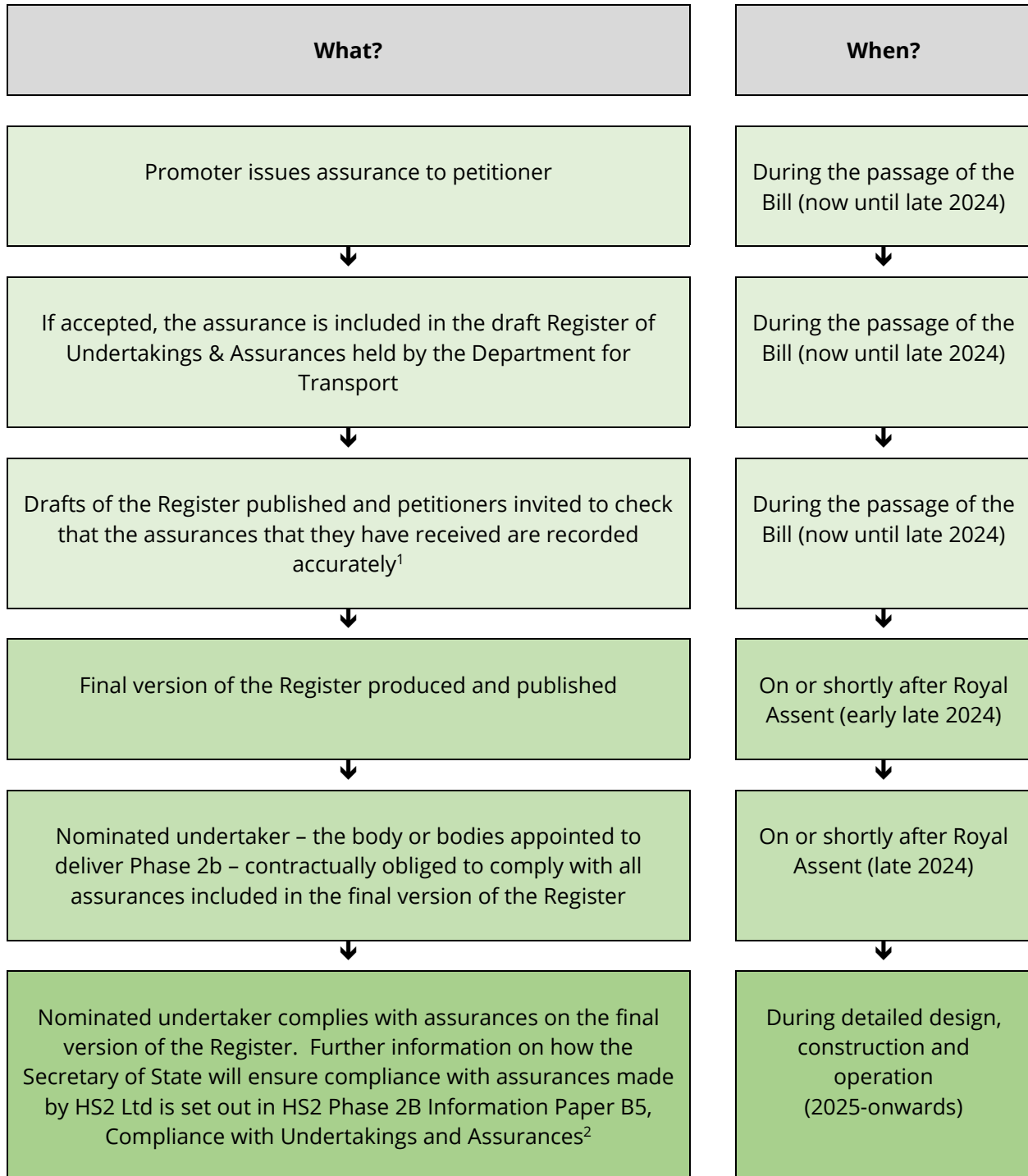
Yours sincerely



Lucy Lagerweij
Director, Hybrid Bill Delivery
High Speed Two (HS2) Limited

Annex A

ASSURANCES: STEPS AND TIMING



¹ The latest draft of the Register can be found at <https://www.gov.uk/government/publications/hs2-phase-2b-crewe-manchester-register-of-undertakings-and-assurances>

² A copy can be found at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1048801/B5_Compliance_with_undertakings_and_assurances_v1.pdf

House of Commons

High Speed Rail (Crewe - Manchester) Bill

1. Petitioner information

In the box below, give the name and address of each individual, business or organisation submitting the petition.

Mrs Elaine Hamlett,
Clerk to the Davenham Parish Council
28 Mount Pleasant Road
Davenham
Northwich
Cheshire
CW9 8JG

In the box below, give a description of the petitioners. For example, "We are the owners/tenants of the addresses above"; "My company has offices at the address above"; "Our organisation represents the interests of..."; "We are the parish council of..."

Davenham Parish Council
Davenham
Northwich
Cheshire, CW9 8JG

2. Objections to the Bill

In the box below, write your objections to the Bill and why your property or other interests are **directly and specially affected**. Please number each paragraph.

Only objections outlined in this petition can be presented when giving evidence to the Committee. You will not be entitled to be heard by the Committee on new matters not included in your written petition.

RISK 1.

High risk of subsidence to the bank and rail track due to the geographical structure of the Brine fields in the immediate area.

RISK 2.

Impact of potential infrastructure (embankments/viaducts) on attractiveness of surrounding area (Whatcroft /Davenham)

- Impact in attractiveness to live in these areas
- Impact on property values, residential & business

RISK 3.

Severe disruption to access routes caused by diversions, re-routing and volume of users bypassing Robert's Bakery roundabout satellite site via Davenham (A556 / Hartford Road, A556 / London Road, and Church Street / London Road) resulting in significant safety concerns.

The route via Church Street/ Shipbrook Road, Davenham Road, Whatcroft to Goostrey and Macclesfield is used very intensively by cyclists. When construction closes this route, users will be forced to take the A556 or divert via Middlewich. Both of these options will significantly increase the dangers for cyclists

RISK 4.

Impact to desirability and character of the village and reputational harm during construction and operation as well as significant and continued upheaval to residents and businesses.

What do you want to be done in response?

In the box below, tell us what you think should be done in response to your objections to the Bill. You do not have to complete this box if you do not want to.

You can include this information in your response to section 3 'Objections to the Bill' if you prefer. Please number each paragraph.

Recommended mitigation for RISK 1

- A. **GROUND CONDITIONS** - To pay for and install noise and vibration monitoring systems at the embankments and viaducts within the parish boundaries before any new trains run on the new track and /or when used, should be monitored to ensure thresholds are not breached. If a breach occurs immediate discussion should be initiated with the Parish Council and immediate action taken to reduce the speed throughout the parish until which time it is appropriately mitigated
- B. **ONGOING MAINTENANCE MEASURES** - The cost of providing, monitoring and maintaining any mitigation measures needs to be fully funded from HS2 Ltd. on an ongoing basis.
To pay for and reinforce current bridges now to mitigate against future ground movement which could be otherwise catastrophic (e.g. Whatcroft Lane Rail Bridge)

Recommended mitigation for RISK 2

- A. **ECOLOGY & BIODIVERSITY** - We wish to see an up to date HS2 report on the construction of the viaducts across the our Parish that documents the known impacts on the ecology & biodiversity within this area and the plans to establish new habitats for species misplaced, lost during construction
- B. **LANDSCAPE & VISUAL** **Pre-Construction:** Implement a landscaping design sympathetic to the surrounding environment with planting of mature trees /and shrubs to immediately reduce visual impact (screening) carbon emissions and to benefit reduction in noise levels. We ask that replanting continues up to the highest point on Manor Lane.**Post-Construction:** Efforts to screen the viaduct and reduce noise pollution must be sustainable post construction with funds set aside for maintenance. £100k spend over 4 years
- C. **ENVIRONMENTAL HEALTH** - Houses on Davenham Road, Shipbrook Road, Church Street, and London Road should be considered for free double glazing if HS2 noise levels are in excess of acceptable industry norms/standards
- D. **ONGOING MAINTENANCE MEASURES** -The impacts of HS2 on the environment, landscape, highways, environmental health and mental health re the increased noise & emissions post completion remain unknown. We recommend that HS2 Ltd provide CWAC with a significant BAU budget to tackle post HS2 issues including but not limited to local maintenance measures, with this sum being made available to Parish Councils against a set criteria

Recommended mitigation for RISK 3**A. HIGHWAYS:**

To fully fund signage denoting no through access routes for service /construction vehicles and provide the finance required for CWaC / Cheshire Police to carry out enforcement.any funds accrued as a result of fines be ring fenced for community benefit in the locale

To pay for and erect 'Welcome to Davenham' signage at A530 / Davenham Road, A556 / Hartford Road and Church Street / London Road junctions in keeping with existing signage

To pay for and install Vehicle Activated Speed Restriction Signs installed at all key access routes through the village (London Road, Church Street, Hartford Road)

To make good the additional wear & tear of the roads. Pay for the complete resurfacing of Hartford Road, London Road, Church Street, Shipbrook Road & Davenham Road

To pay for the design and implementation of a designated footpath and cycle lane along Shipbrook Road & Davenham Road during the construction period and having CWAC adopt these for future use

Recommended mitigation for RISK 4**A. COMMUNITY DRIVEN:**

The likelihood of London Road being used as a rabbit run for traffic is extremely high. This will bring congestion to the village, the knock-on impact of this will be to discourage residents from using the village shops, which could impact their profits & viability. To support our small businesses, we ask that Business rates be reduced by 50% for the duration of the construction and HS2 pay the remaining 50% to Cheshire West & Chester Council

Identification and purchase (including transfer of ownership to Davenham Parish Council) of land that could be used to accommodate community facilities (e.g. village hall, all weather pitch, recreational use etc.)

Funding for local artwork to be designed and implemented within a central village location depicting Davenham community groups helping attract new visitors (£10k)

Funding for annual village event (approx. £10k /year) to prevent Community severance and actively engage and unite local community during construction (anticipated 5 years) and post construction (further 5 years).

February 2023

**HIGH SPEED RAIL (CREWE -
MANCHESTER) BILL**

**HOUSE OF COMMONS
SELECT COMMITTEE**

**Petition No. HS2-P2B-012:
Davenham Parish Council**

Promoter's Response Document

INTRODUCTION

This Promoter's Response Document (PRD) forms the Promoter's response to Petition No. HS2-P2B-012, from Davenham Parish Council.

In this PRD, 'the Promoter' means the Secretary of State and HS2 Ltd acting on their behalf.

The purpose of the PRD is to advise you and the Select Committee of the Promoter's position in relation to the petitioning points raised. It is intended that the PRD will alleviate many of the concerns raised in the petition.

The Table of Contents overleaf lists the page number, petitioning points in the order they appear in the petition, and a summary statement of the issue(s) contained in the petition for quick reference. Other supporting material (e.g., reports, drawings, and photographs) referred to in the response are attached where applicable.

Copies of the HS2 Phase 2b Information Papers referred to in the response can be found at

[HS2 Phase 2b \(Crewe – Manchester\) Information Papers - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614442/HS2_Phase_2b_Crewe_-_Manchester_Information_Papers.pdf).

Department for Transport
High Speed Two (HS2) Limited

BACKGROUND

Davenham Parish Council represents the inhabitants of Davenham Village and Whatcroft within the local authority administrative area of Cheshire West and Chester.

PETITION NO. HS2-P2B-012

DAVENHAM PARISH COUNCIL

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9	2, 2A - 2D	Environmental mitigation
19	3, 3A	Access routes
27	4, 4A	Impact on village during construction

HOUSE OF COMMONS SELECT COMMITTEE

HIGH SPEED RAIL (CREWE - MANCHESTER) BILL

PROMOTER'S RESPONSE TO PETITION OF: Davenham Parish Council

PETITION NO: HS2-P2B-012

PARAGRAPH NO: 1, 1A - 1B

ISSUE RAISED: Ground conditions

PETITION PARAGRAPH: High risk of subsidence to the bank and rail track due to the geographical structure of the Brine fields in the immediate area.

1A. GROUND CONDITIONS - (Request) To pay for and install noise and vibration monitoring systems at the embankments and viaducts within the parish boundaries before any new trains run on the new track and /or when used, should be monitored to ensure thresholds are not breached. If a breach occurs immediate discussion should be initiated with the Parish Council and immediate action taken to reduce the speed throughout the parish until which time it is appropriately mitigated

1B. ONGOING MAINTENANCE MEASURES - The cost of providing, monitoring and maintaining any mitigation measures needs to be fully funded from HS2 Ltd. on an ongoing basis. To pay for and reinforce current bridges now to mitigate against future ground movement which could be otherwise catastrophic (e.g. Whatcroft Lane Rail Bridge)

PROMOTER'S RESPONSE:

Ground conditions

1. HS2 is in consultation with the operators of the Salt Industry infrastructure and discussions are ongoing with the business owners/operators to ensure public safety and their safe continued business operations during constructing and operating the Proposed Scheme.
2. HS2 has undertaken a significant amount of data gathering to inform the design with specific reference to the geology and ground conditions. HS2 has held discussions with relevant agencies that have significant knowledge and information on existing infrastructure assets within the area and captured data on the interaction

between their activities and the ground conditions. These agencies include Network Rail, The Canal and Rivers Trust, the relevant Salt Industry companies and the Cheshire Brine Subsidence Compensation Board. In addition, HS2 has listened to local communities who have knowledge of the local geology and taken note of their observations and opinions.

3. A comprehensive desk study has been compiled for the Phase 2b Western Leg route. Following a review of desk study information, two phases of ground investigations have already been carried out.

4. It is industry practice to undertake Ground Investigation in a phased manner, with each phase building on the next. HS2 has planned a routewide Ground Investigation activity which is proposed to commence in 2023. This proposed routewide Ground Investigation will involve closely spaced exploratory sampling points along the full route from Crewe to Manchester, with more frequent and site-specific exploration at specific locations, where the ground risk may be greater due to the local geological conditions. Future contractors will normally also deploy additional ground investigations in the later stages of design and the early stages of construction to finalise design elements that could be sensitive to ground conditions along the HS2 corridor. This ensures the engineering solutions proposed are verified and the safety of the Proposed Scheme is validated and assured.

5. The Promoter has previously given commitments on the design of the Proposed Scheme in HS2 Phase 2b Western Leg Information Paper D1: Design, in particular the Promoter would highlight Sections 3.1 of this publication, which states:

“The Promoter and the nominated undertaker will seek to ensure that:

- the design is safe, efficient, and meets with the requirements of whole life operation and maintenance alongside initial buildability and will integrate with the local setting;
- the design is developed through engagement to seek peoples' views and including integration with setting design of the visible buildings and permanent structures”

6. HS2 continues to work with its design partners to optimise the Proposed Scheme with respect to engineering design and cost as more information relating to the ground conditions emerges.

Ground noise and vibration

7. As set out in HS2 Phase 2b Western Leg Information Paper E10: Control of Ground-borne Noise and Vibration from the Operation of Temporary and Permanent Railways, the nominated undertaker will design the temporary railways (required for tunnelling activities) and permanent railways such that the level of ground-borne noise and vibration predicted in all reasonably foreseeable circumstances does not exceed the

Significant Observed Adverse Effect Levels given in Table 1 in Appendix B of HS2 Phase 2b Western Leg Information Paper E10.

8. The nominated undertaker would reduce ground-borne noise and vibration from the temporary and permanent railways as far as is reasonably practicable.

9. In addition to the effects on people inside residential dwellings, it is recognised that impacts can also occur on people and activities in noise sensitive non-residential locations.

10. The nominated undertaker would design the temporary and permanent railways so that the level of ground-borne noise and vibration predicted in all reasonably foreseeable circumstances does not exceed the impact levels given in Tables 2 and 3 in Appendix B of Information Paper E10. The nominated undertaker would take all reasonably practicable steps to construct, operate and maintain the temporary and permanent railways so that this design objective is fulfilled.

Control measures – operation

11. For the operational railway, significant ground-borne noise and vibration effects would be reduced or avoided through, for example, the performance specification and design of the rolling stock and infrastructure, especially the track system.

12. The Promoter's policy relating to ground-borne noise and vibration is explained further in HS2 Phase 2b Western Leg Information Paper E10: Control of Ground-borne Noise and Vibration from the Operation of Temporary and Permanent Railways.

13. Volume 1, Section 9 of the main ES sets out the general approach to environmental monitoring during the operation of the Proposed Scheme. Operational noise and vibration monitoring would be carried out at different times during the lifetime of the Proposed Scheme at a combination of carefully selected monitoring locations including: adjacent or attached to moving vehicles, at fixed positions or in the vicinity of individual assets; and locations within the surrounding areas and communities alongside the railway corridor.

14. The expected noise and vibration performance of the Proposed Scheme, operational noise and vibration measurement data, associated asset information, description of corrective actions, results of measured performance compared to expected conditions, and monitoring reports would all be shared with the relevant local authorities at appropriate intervals.

15. To control ground-borne noise and vibration from the temporary and permanent railways, the nominated undertaker would be required to do the following in relation to the track systems:

- at design stage, predict, through the use of appropriate modelling, the engineering requirements of the track system that would fulfil the objectives;

- design a standard track form with the objective of meeting as many of those engineering requirements identified in the previous bullet as could reasonably be achieved by such a standard track system;
- design an enhanced track form for locations where it is predicted that the standard track system would not meet the engineering requirements or to discharge other project commitments and undertakings;
- translate the engineering requirements into contract specifications for the track systems; and
- procure, install and maintain the track systems to meet the contract specifications established above.

16. To ensure that the measures to control ground-borne noise and vibration are reasonable, the nominated undertaker would take account of the set of shared UK principles that underpin the Government's sustainable development strategy.

17. Measures to control noise would be applied in the following order: selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures, the use of less intrusive alarms, local screening of equipment, and perimeter hoarding.

18. If, despite the implementation of best practicable means, the noise exposure were to exceed the criteria defined in the draft Code of Construction Practice (CoCP), noise insulation or ultimately temporary re-housing would be offered in accordance with the noise insulation and temporary re-housing policy set out in HS2 Phase 2b Western Leg Information Paper E13: Control of Construction Noise and Vibration.

19. Contractors would undertake and report such monitoring as necessary to assure and demonstrate compliance with all noise commitments. Monitoring data would be provided regularly to, and be reviewed by, the nominated undertaker. It would also be made available to the local authorities.

20. Contractors would be required to comply with the terms of the draft CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

21. This is explained further in HS2 Phase 2b Western Leg Information Paper D3: Code of Construction Practice and HS2 Phase 2b Western Leg Information Paper E13: Control of Construction Noise and Vibration.

22. In light of the measures set out above, the Promoter does not consider that it is necessary or appropriate to provide additional mitigation in response to the Petitioner's request to install noise and vibration monitoring systems at all the embankments and viaducts within the parish boundaries prior to operation of the Proposed Scheme

Ongoing maintenance measures

23. Representatives of HS2 Ltd and a parish councillor discussed the parish council's concerns regarding future ground movement around the Network Rail asset Whatcroft Hall Lane bridge in a meeting in October 2022.

24. The design of the Proposed Scheme sought to minimise disruption to the conventional rail network during construction. In this case, the Proposed Scheme's security fence would be located at approximately 250m away from Whatcroft Lane Rail Bridge.

25. The Promoter continues to work closely with Network Rail to co-ordinate interfaces between the Proposed Scheme and Network Rail's existing assets and responsibilities. This will include discussions on potential monitoring and protective measures, defect surveys and repairs of assets.

HOUSE OF COMMONS SELECT COMMITTEE

HIGH SPEED RAIL (CREWE - MANCHESTER) BILL

PROMOTER'S RESPONSE TO PETITION OF: Davenham Parish Council

PETITION NO: HS2-P2B-012

PARAGRAPH NO: 2, 2A - 2D

ISSUE RAISED: Environmental mitigation

PETITION PARAGRAPH: 2. Impact of potential infrastructure (embankments/viaducts) on attractiveness of surrounding area (Whatcroft /Davenham)

- Impact in attractiveness to live in these areas
- Impact on property values, residential & business

Request

2A. ECOLOGY & BIODIVERSITY - We wish to see an up to date HS2 report on the construction of the viaducts across our Parish that documents the known impacts on the ecology & biodiversity within this area and the plans to establish new habitats for species misplaced, lost during construction

2B. LANDSCAPE & VISUAL - Pre-Construction: Implement a landscaping design sympathetic to the surrounding environment with planting of mature trees /and shrubs to immediately reduce visual impact (screening) carbon emissions and to benefit reduction in noise levels. We ask that replanting continues up to the highest point on Manor Lane. Post-Construction: Efforts to screen the viaduct and reduce noise pollution must be sustainable post construction with funds set aside for maintenance. £100k spend over 4 years.

2C. ENVIRONMENTAL HEALTH - Houses on Davenham Road, Shipbrook Road, Church Street, and London Road should be considered for free double glazing if HS2 noise levels are in excess of acceptable industry norms/standards

2D. ONGOING MAINTENANCE MEASURES -The impacts of HS2 on the environment, landscape, highways, environmental health and mental health re the increased noise & emissions post completion remain unknown. We recommend that HS2

Ltd provide CWAC with a significant BAU budget to tackle post HS2 issues including but not limited to local maintenance measures, with this sum being made available to Parish Councils against a set criteria.

PROMOTER'S RESPONSE:

Ecology and biodiversity

1. The ecological impact assessment considers all ecological receptors which have the potential to be affected by the construction and/or operation of the Proposed Scheme. The assessment includes the consideration of effects arising from habitat loss, fragmentation of sites, severance of ecological networks, noise and visual disturbance, barrier effects to movement of fauna, lighting, changes in water quality and quantity, air pollution, and mortality as a result of collisions with trains. In line with the CIEEM approach, the evaluation of species receptors has been based on the distribution and status of the species concerned.
2. The effects of the construction and operation of the Proposed Scheme on ecology and biodiversity in the parish are set out in the HS2 Crewe – Manchester Environmental Statement January 2022 (main ES) Volume 2 report MA02: Wimboldsley to Lostock Gralam. As described in Paragraph 7.4.1, various elements of the Proposed Scheme will contribute towards limiting effects on habitats and species.
3. The assessment assumes implementation of the measures set out within section 9 of the draft CoCP, which would include sensitive construction practices and habitat management plan that would avoid or reduce effects on ecological receptors.

Impacts to designated sites and habitats in Davenham - Woodland

4. Construction of Stanthorne North embankment and the River Dane viaduct would result in the permanent loss of 2ha (10%) of the River Dane, Bostock Local Wildlife Site (LWS), including loss of wet woodland habitat. Habitat loss from this LWS would result in a permanent adverse effect on the structure and function of the site that would be significant at the county/metropolitan level.
5. Construction of River Dane viaduct and Dane Valley embankment would result in the permanent loss of 0.5ha (19%) of Trent and Mersey Canal LWS, including loss of deciduous woodland habitat. Habitat loss from this LWS would result in a permanent adverse effect on the structure and function of the site that would be significant at the county/metropolitan level.
6. Construction of Puddinglake Brook viaduct would result in the permanent loss of 0.6ha (85%) of Puddinglake Brook Wood LWS, including loss of deciduous wet woodland habitat. Habitat loss from this LWS would result in a permanent adverse effect on the structure and function of the site that would be significant at the county/metropolitan level.

7. Construction of Gad Brook viaduct and works associated with the realignment of a gas pipeline and high voltage power line would result in the permanent loss of 2.2ha (45%) of deciduous woodland habitat at Marshall's Gorse. The loss of this woodland would have a permanent adverse effect that would be significant at the district/borough level.

8. Within the Davenham, woodland habitat creation would be undertaken to compensate primarily for adverse effects upon non-ancient woodland at locations including the following:

- 3.6ha in total at two locations within and immediately adjacent to The Willowbeds LWS, which would compensate for the loss of 0.8ha of woodland habitat from the River Dane, Bostock LWS and would enhance ecological connectivity between woodlands in the Bostock area;
- 0.5ha in total at two locations, one to the north-east of Bank Farm, Bostock and the other along the western bank of the Trent and Mersey Canal, which would partly compensate for the loss of woodland habitat from the Trent and Mersey Canal LWS and would enhance ecological connectivity to existing bankside woodland along the Trent and Mersey Canal;
- 2ha in total at four locations between the River Dane and Bostock Hall, which would enhance ecological connectivity between the complex of existing woodlands in this area including Bull's Wood, Oak Clump and Hill Wood. In particular, this would compensate for the loss of woodland habitat from the Trent and Mersey Canal LWS and other small areas of woodland within the area;
- 0.4ha north of Whatcroft Hall Lane to compensate for the loss of 0.3ha of woodland from Puddinglake Brook Wood LWS; and
- 8.9ha in total at three locations, to the south and to the east of Marshall's Gorse, south of Penny's Lane and to the west of Cooke's Lane. These areas would compensate for the loss of 2.2ha of woodland from Marshall's Gorse and 1.3ha of other smaller areas of woodland loss in the vicinity of Rudheath.

9. The target habitat type for woodland planting is lowland mixed deciduous woodland habitat of principal importance. The new areas of woodland habitat would connect and help maintain the integrity of remaining areas of woodland. A temporary adverse effect would be expected until these areas became established, after which these measures would reduce the overall effect on woodland to a level that would not be significant.

Traditional Orchard

10. Construction of the Gad Brook viaduct would result in the permanent loss of 800m² (66%) of Pear Tree Farm LWS including orchard habitat. Habitat loss from this LWS would result in a permanent adverse effect on the structure and function of the site that would be significant at the county/metropolitan level.

11. Where reasonably practicable, measures would be taken to protect as much of the orchard habitat at Pear Tree Farm LWS. For unavoidable loss, the trees within the orchard would be soft-felled and sections placed within retained habitats to provide a continued deadwood resource. The loss of orchard habitat would represent a residual adverse effect that would be significant at the county/metropolitan level.

Reedbed

12. Construction of Trent and Mersey Canal viaduct would result in the permanent loss of 1.1 ha (58%) of Whatcroft Lane Wetlands LWS including reedbed habitat. Habitat loss from this LWS would result in a permanent adverse effect on the structure and function of the site that would be significant at the county/metropolitan level.

13. To address the loss of 0.3ha of reedbed habitat at Whatcroft Lane Wetlands LWS, replacement reedbed habitat would be created within 1.4ha of wetland habitat creation areas immediately to the east of the LWS along the Trent and Mersey Canal and to the south and south-west of the LWS on the opposite bank of the Trent and Mersey Canal between the canal and the Mid-Cheshire Line railway. Once established, it is anticipated that any adverse effect on reedbed habitat would be reduced to a level that would not be significant.

Hedgerows

14. On a precautionary basis, it is assumed that all hedgerows (approximately 5km) within the land required for the construction of the Proposed Scheme in Davenham would be permanently lost and the remaining hedgerow network would be fragmented. This includes the native species rich hedgerows at River Dane, Bostock LWS. This total, however, includes some hedges that would likely be retained, such as those located within land required for habitat creation. The combined loss and severance of hedgerows within the land required for the construction of the Proposed Scheme in Davenham would contribute to permanent adverse effect within the MA02: Wimboldsley to Lostock Gralam community area as a whole that would be significant at the County/Metropolitan level.

15. New hedgerows would be planted as replacement for those lost as a result of the Proposed Scheme. Where practicable the hedgerows within the River Dane, Bostock LWS would be translocated to the nearest suitable habitat creation areas. A total of approximately 4.3km of new hedgerows would be planted in Davenham and the species composition would be characteristic of the surrounding area. This represents a net reduction in hedgerow of approximately 0.7km that would contribute to a deficit of 56.9km after mitigation in the Wimboldsley to Lostock Gralam area as a whole, which is a residual adverse effect that would be significant at the county/metropolitan level.

Waterbodies

16. On a precautionary basis it is assumed that 12 ponds located within the land that would be required for the construction of the Proposed Scheme in Davenham would be permanently lost. The loss of ponds within the land required for the construction of the Proposed Scheme would lead to a permanent adverse effect on the conservation status of water bodies that would be significant, in each case, at up to district/borough level.

17. At least one pond would be created for every pond lost within the land required for the construction of the Proposed Scheme. New ponds would be established in accordance with the Ecological Principles of Mitigation in the HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report. Once established, it is anticipated that any adverse effect on pond habitats would be reduced to a level that is not significant.

Watercourses

18. The Proposed Scheme would cross the following watercourses on viaducts:

- the River Dane would be crossed by the River Dane viaduct;
- the Trent and Mersey Canal would be crossed to the east of Bostock by River Dane viaduct, to the north of Whatcroft by the Puddinglake Brook viaduct and to the south of Billinge Green by Trent and the Mersey Canal viaduct;
- Puddinglake Brook would be crossed by the Puddinglake Brook viaduct; and
- Gad Brook and a tributary of Gad Brook would be crossed by the Gad Brook viaduct.

19. A series of smaller watercourses would also be permanently realigned or culverted, reducing the connectivity of the habitat corridors associated with watercourses. The habitat loss and reduction in connectivity would result in a permanent adverse effect that would be significant at up to district/borough level.

20. For the realignment of any smaller watercourses, the channel would be naturalized where reasonably practicable, with a profile to promote the establishment of marginal vegetation and pools. Development of the vegetation would cause the adverse effect on these watercourses to reduce to a level that would not be significant.

Impacts on species in Davenham – Protected species

21. Protected species that may be affected by the Proposed Scheme include, but are not limited to, a number of bat species, great crested newt, otter, barn owl, water vole, and badger.

22. As outlined in HS2 Phase 2b Western Leg Information Paper E2: Ecology, the nominated undertaker would ensure compliance with the relevant statutory provisions in respect of areas of nature conservation interest and of protected species, including protected bat species. Relevant provisions include (but are not limited to) the

Wildlife and Countryside Act 1981; the Conservation of Habitats and Species Regulations 2017; Countryside and Rights of Way Act 2000; and Protection of Badgers Act 1992. In all locations where significant effects on protected species are identified, details would be discussed with Natural England and NatureScot, and licences would be obtained in compliance with legal requirements (fully supported by the required survey work).

23. Mitigation and compensation to address effects on legally protected species would, where appropriate, include translocation of species, the provision of replacement habitat and provision of special measures such as appropriately sized culverts to facilitate the movement of species across the route. These measures are described in Community Area Reports, in Volume 2, of the Environmental Statement.

Landscape: Route-wide approach to landscape mitigation

24. HS2 Phase 2b Western Leg Information Paper D1: Design, states that: “the design of all visible elements of the built and landscaped environment are sympathetic to their context, environment and social setting”. The approach to the design of the landscape is to create a well-connected landscape, embankments and cuttings shaped to integrate the Proposed Scheme into the character of the surrounding landscape and planting to screen the new railway and associated roads from the neighbouring residences and users of public rights of way.

25. Land has been included in the Bill to mitigate the significant effects identified as far as reasonably practicable. The Promoter does not consider that land is required outside of the current Bill limits, extending up to the highest point on Manor Lane, to mitigate visual impacts over and above that already identified.

Landscape and visual

26. The landscape and visual effects of Dane Valley Embankment, Puddinglake Brook Viaduct, Whatcroft South Embankment, Trent and Mersey Canal Viaduct, Whatcroft North Embankment and the Gad Brook Viaduct have been assessed in the Environmental Statement (main ES) and reported in section 11, Community Area MA02 Report. The following viewpoints have been used within the assessment as being representative of potentially affected viewpoints within the parish of Davenham:

- 309-03-004: View north-west from the Trent and Mersey Canal, Dane Valley;
- 309-03-005: View south-east from the Trent and Mersey Canal, Dane Valley;
- 310-02-001: View south-east from Bridge Farm, Whatcroft Hall Lane;
- 310-03-002: View south-east from the Trent and Mersey Canal, Puddinglake Brook;
- 310-03-003: View west from the Trent and Mersey Canal, alongside Whatcroft Hall Lane;
- 310-03-004: View north-west from the Trent and Mersey Canal, north of Whatcroft;

- 310-02-005: View south-east from Brook Farm, Old Lane;
- 310-02-006: View south-west from Croft Lodge Kennels, Whatcroft Hall Lane;
- 310-02-007: View south-east from the Trent and Mersey Canal, Oakwood Marina;
- 310-02-008: View west from Pear Tree Farm Cottages, Davenham Road; and,
- 310-02-009: View east from Footpath Rudheath 5/2, Park Farm, Rudheath.

27. During construction, the following viewpoints are reported as experiencing significant effects due to views of the railhead and the construction of the Proposed Scheme:

- 309-03-004: View north-west from the Trent and Mersey Canal, Dane Valley;
- 309-03-005: View south-east from the Trent and Mersey Canal, Dane Valley;
- 310-02-001: View south-east from Bridge Farm, Whatcroft Hall Lane;
- 310-03-002: View south-east from the Trent and Mersey Canal, Puddinglake Brook;
- 310-03-003: View west from the Trent and Mersey Canal, alongside Whatcroft Hall Lane;
- 310-03-004: View north-west from the Trent and Mersey Canal, north of Whatcroft;
- 310-02-005: View south-east from Brook Farm, Old Lane;
- 310-02-006: View south-west from Croft Lodge Kennels, Whatcroft Hall Lane;
- 310-02-007: View south-east from the Trent and Mersey Canal, Oakwood Marina;
- 310-02-008: View west from Pear Tree Farm Cottages, Davenham Road; and
- 310-02-009: View east from Footpath Rudheath 5/2, Park Farm, Rudheath.

28. The draft CoCP includes measures to limit landscape and visual impacts during construction. These would include protecting existing trees where possible, use of well-maintained fencing around construction areas and designing lighting to avoid intrusion on adjacent residential properties. This is explained further in HS2 Phase 2b Western Leg Information Paper D3: Code of Construction Practice.

29. The Proposed Scheme design includes the following areas of landscape mitigation in order to reduce the visual effects of the Proposed Scheme on viewpoints within the Parish of Davenham and to assist in integrating the railway infrastructure into the surrounding landscape:

- landscape screen planting located on both sides of the Dane Valley embankment;
- landscape screen planting located on both sides of the Whatcroft South embankment;
- hedgerow habitat creation located to the west of the Whatcroft South embankment; and

- landscape screen planting located on both sides of the Whatcroft North embankment;

30. The Proposed Scheme would be partially screened by existing vegetation in the first year of operation, and therefore the likely significant effect at 310-02-006: View south-west from Croft Lodge Kennels, Whatcroft Hall Lane, is predicted to be removed at this time.

31. By year 15 of operation of the Proposed Scheme, the maturing proposed mitigation planting would partially screen views of the embankments and viaducts described above. Therefore the likely significant effect at 310-02-009: View east from Footpath Rudheath 5/2, Park Farm, Rudheath is predicted to be removed at this time.

32. By year 30 of operation, the proposed mitigation planting is expected to have matured and would serve to partially screen views of the embankments and viaducts, however the following viewpoints are predicted to experience a likely significant residual effect:

- 309-03-004: View north-west from the Trent and Mersey Canal, Dane Valley;
- 309-03-005: View south-east from the Trent and Mersey Canal, Dane Valley;
- 310-02-001: View south-east from Bridge Farm, Whatcroft Hall Lane;
- 310-03-002: View south-east from the Trent and Mersey Canal, Puddinglake Brook;
- 310-03-003: View west from the Trent and Mersey Canal, alongside Whatcroft Hall Lane;
- 310-03-004: View north-west from the Trent and Mersey Canal, north of Whatcroft;
- 310-02-005: View south-east from Brook Farm, Old Lane;
- 310-02-007: View south-east from the Trent and Mersey Canal, Oakwood Marina; and,
- 310-02-008: View west from Pear Tree Farm Cottages, Davenham Road.

33. The Promoter recognises the importance of public engagement in the design development process. The HS2 Phase 2b Western Leg Information Paper D1: Design identifies the Trent and Mersey Canal Viaduct as a key design element for local engagement. The nominated undertaker would therefore engage with local residents on the design development of the Trent and Mersey Canal Viaduct.

Operational noise assessment

34. The Lowest Observed Adverse Effect Levels (LOAELs) set by the Promoter are set out in HS2 Phase 2b Western Leg Information Paper E9: Control of airborne noise from altered roads and the operational railway. The values have been derived with due regard to the World Health Organization's Guidelines for Community Noise. The LOAELs are 50 decibels (dB) for the day (0700-2300), 40 dB for the night (2300-0700)

and 60 dB at the façade (with reference to sound pressure measurement locations: a position 1m from the building) from any nightly noise event (2300-0700).

35. The Promoter would take all reasonable steps to design and construct altered roads, and to design, construct, operate and maintain the railway so that the combined airborne noise from these sources, predicted in all reasonably foreseeable circumstances, does not exceed the LOAELs.

36. Dwellings where the noise level during the operation of the railway would likely exceed the SOAEL have been identified individually through the environmental impact assessment as being likely to experience a significant adverse operational noise effect. This is an indication that noise insulation and ventilation would be offered as a means of avoiding any significant adverse effect on the health and quality of life of those living inside. Qualification for noise insulation would be identified and noise insulation offered at the time, should the Proposed Scheme become operational.

Operational noise impacts

37. The operational sound, noise and vibration assessment of the Proposed Scheme takes into account both the route-wide and localised control measures proposed in MA02 Wimboldsley to Lostock Gralam, Volume 2, of the main ES.

38. The operational assessment of the Proposed Scheme takes into account both the route-wide and localised control measures proposed in the ES as updated by the Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 (AP1) ES. As the design progresses these proposals would continue to be reviewed to ensure that the Promoter's noise and vibration policy commitments are met. These are set out in:

- HS2 Phase 2b Western Leg Information Paper E9: Control of Airborne Noise from altered roads and the operational railway;
- HS2 Phase 2b Western Leg Information Paper E10: Control of Ground-borne Noise and Vibration from the Operation of Temporary and Permanent Railways;
- HS2 Phase 2b Western Leg Information Paper E11: Control of Noise from the Operation of Stationary Systems; and
- HS2 Phase 2b Western Leg Information Paper E12: Operational Noise and Vibration Monitoring Framework.

39. As reported in the main ES Volume 2, MA02, 6.5.7, a group of approximately 10 residential properties at Pear Tree Farm Cottages on Davenham Road would be in close proximity to the route of the Proposed Scheme. The operation of the Proposed Scheme is likely to cause a significant adverse noise effect on these properties during the daytime and night-time due to the running of the trains on Gad Brook viaduct. Where significant effects have been predicted at a property, the nominated undertaker would be required during detailed design to take all possible reasonable steps to avoid those effects.

40. Likely residual significant operational adverse airborne noise effects due to increased noise levels have been identified at residential properties on Davenham Road, identified by MA02-O-C5 on Map SV-05-307. The nominated undertaker would be required to seek reasonably practicable measures to further reduce or avoid these significant adverse operational effects.

41. Dwellings where the noise level during the operation of the railway is predicted to exceed the Significant Observed Adverse Effect Level (SOAEL) have been identified individually through the environmental impact assessment as being likely to experience a significant adverse operational noise effect. This is an indication that noise insulation and ventilation would be offered as a means of avoiding any significant adverse effect on the health and quality of life of those living inside. Qualification for noise insulation would be identified and noise insulation offered at the time that the Proposed Scheme becomes operational. The noise level at properties on Davenham Road, Shipbrook Road, Church Street, and London Road is not predicted to exceed SOAEL and the properties are therefore not anticipated to qualify for noise insulation. Further details, including details on the provision of noise insulation, can be found in HS2 Phase 2b Western Leg Information Paper E9: Control of Airborne Noise.

42. At the majority of individual residences, the proposed mitigation measures are expected to reduce operational noise inside all dwellings, such that it would not reach a level where it will significantly affect residents, and therefore, no likely residual significant effects are identified. Residential properties that qualify for noise insulation are reported in the ES, Volume 2, MA02, Section 13.4.9. This includes some properties within the parish, but not the roads specified in the petition.

43. The Promoter's policy on assessing and controlling the noise and vibration impacts set out in HS2 information Papers E9, E10, E11, E12, E13 represents its interpretation of the Government's Noise Policy Statement for England. Each policy includes noise or vibration effect levels that are used in assessment to determine the appropriate policy action.

44. The Promoter set these levels based on established practice, research results, guidance in national and international standards, guidance from national and international agencies, and independent review by academic, industry and Government employees. They have also been further independently scrutinised during parliamentary proceedings for HS2 Phase One and Phase 2a and are provided as draft route-wide assurances for the Proposed Scheme where they will be subject to further scrutiny during the parliamentary proceedings for Phase 2b.

HOUSE OF COMMONS SELECT COMMITTEE

HIGH SPEED RAIL (CREWE - MANCHESTER) BILL

PROMOTER'S RESPONSE TO PETITION OF: Davenham Parish Council

PETITION NO: HS2-P2B-012

PARAGRAPH NO: 3, 3A

ISSUE RAISED: Access routes

PETITION PARAGRAPH: 3. Severe disruption to access routes caused by diversions, re-routing and volume of users bypassing Robert's Bakery roundabout satellite site via Davenham (A556 / Hartford Road, A556 / London Road, and Church Street / London Road) resulting in significant safety concerns. The route via Church Street/ Shipbrook Road, Davenham Road, Whatcroft to Goostrey and Macclesfield is used very intensively by cyclists. When construction closes this route, users will be forced to take the A556 or divert via Middlewich. Both of these options will significantly increase the dangers for cyclists

Request

3A. HIGHWAYS: To fully fund signage denoting no through access routes for service /construction vehicles and provide the finance required for CWaC / Cheshire Police to carry out enforcement. Any funds accrued as a result of fines be ring fenced for community benefit in the locale.
To pay for and erect 'Welcome to Davenham' signage at A530 / Davenham Road, A556 / Hartford Road and Church Street / London Road junctions in keeping with existing signage.
To pay for and install Vehicle Activated Speed Restriction Signs installed at all key access routes through the village (London Road, Church Street, Hartford Road).
To make good the additional wear & tear of the roads. Pay for the complete resurfacing of Hartford Road, London Road, Church Street, Shipbrook Road & Davenham Road.
To pay for the design and implementation of a designated footpath and cycle lane along Shipbrook Road & Davenham Road during the construction period and having CWAC adopt these for future use.

PROMOTER'S RESPONSE:

Maintaining access -general

1. The nominated undertaker would be required to maintain public access, where reasonably practicable, and appropriate measures would be implemented to ensure the local community, economy and transport networks could continue to operate effectively. Where not reasonably practicable, alternative measures would be identified to maintain continual public access, especially for pedestrians and cyclists, to routes in the vicinity of the construction sites. The impact of road-based construction traffic would be reduced by implementing and monitoring clear controls on vehicle types, hours of site operation, parking and designated routes for large goods vehicles.
2. Further information can be found in the HS2 Phase 2b Western Leg Information Paper D10: Maintaining access to residential and commercial property during construction.

Disruption to access routes due to closures

3. The Promoter understands the Petitioner's concerns in relation to the disruption to access routes caused by diversions and re-routing. As reported in paragraph 14.3.3 in the Transport Assessment Part 3 Addendum for Wimboldsley to Lostock Gralam (MA02) in Volume 5, Appendix TR-003-00002 of the main ES, the construction of the Proposed Scheme would require the temporary closure of a section of Davenham Road where it is crossed by the route of the Proposed Scheme for less than four weeks. During this period, traffic would be diverted via Davenham Road, Shipbrook Road, Church Street, London Road and the A556 Chester Road, increasing journey length for some users by 7.2km. This has been assessed as a major adverse effect for users of Davenham Road as a result of changes in journey times for vehicle occupants.
4. Other than the temporary closure of Davenham Road for up to four weeks, there would be no other temporary or permanent closures or realignments within the vicinity that would result in adverse significant affects as a result of changes in journey times for vehicle occupants.
5. Access would be maintained along A530 King Street and A566 Shurlach Road during the construction of the Proposed Scheme, with the exception of some short term lane closures or road closures at weekends or overnight. The lane and road closures would be expected to occur outside of the weekday peak hours, when the road network is less busy.

Disruption to access due to construction traffic

6. The construction routes in the vicinity of Davenham are the A533 Davenham Bypass, the A556 Shurlach Road and Davenham Road.

7. The A533 Davenham Bypass is a single carriageway road east of Davenham in MA02. Within the Davenham Parish boundary, it runs in an approximate south-north direction between London Road and the A556 Shurlach Road. The A556 Shurlach Road is a dual carriageway on the northern boundary of Davenham Parish which runs in an approximate west-east direction between the A533 Davenham Bypass and A530 King Street.

8. The A533 Davenham Bypass and A556 Shurlach Road are designated as HS2 construction routes. Table 14-5 in the Transport Assessment Part 3 Addendum for Wimboldsley to Lostock Gralam (MA02) in Volume 5, Appendix: TR-003-00002 of the SES1 and AP1 ES summarises the peak daily construction traffic flows associated the AP1 revised scheme. It indicates that the A533 Davenham Bypass and the A556 Shurlach Road would each carry a peak daily two-way combined flow of less than 20 HGVs over an assumed 10-hour working day, which equates to approximately one HGV every 30 minutes on average.

9. Tables 50 and 51 in Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02) of the main ES set out the locations where there are forecast to be significant effects on traffic-related severance for non-motorised users (pedestrians and cyclists) due to changes in all vehicles or total HGVs in the Davenham area. The assessment has been updated for the AP1 revised scheme and is reported in Tables 22 and 23 of Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02) of the SES1 and AP1 ES. There was initially forecast to be a moderate adverse effect on traffic-related severance on the section of the A533 Davenham Bypass between London Road and the A556 Shurlach Road during construction, as set out in the main ES, but this is now reported as no significant adverse effect in the SES1 and AP1 ES.

10. There are no adverse effects on traffic-related severance for non-motorised users identified on the A556 Shurlach Road in the Davenham area reported in the revised SES1 and AP1 ES.

11. Davenham Road is a single carriageway rural road south of Rudheath. It runs in an approximate west-east direction between Shipbrook Road and the A530 King Street.

12. The eastern end of Davenham Road is designated as a HS2 construction route. Table 14-5 in the Transport Assessment Part 3 Addendum for Wimboldsley to Lostock Gralam (MA02) in Volume 5, Appendix: TR-003-00002 of the SES1 and AP1 ES indicates that Davenham Road between Shurlach Lane and the A530 King Street would carry a peak daily two-way combined flow of 468 HGVs over an assumed 10-hour working day, which equates to approximately one HGV every minute on average. The busy period is expected to be three months in duration.

13. Table 51 in Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02) of the main ES sets out a major adverse effect on traffic-related severance for non-motorised users due to changes in total HGVs on the section of Davenham Road

between Shurlach Lane and the A530 King Street during construction. This effect remains unchanged in the SES1 and AP1 ES.

14. The Promoter acknowledges that there would be an impact due to construction traffic on Davenham Road, to the east of Davenham for up to three months, but the likely impact of construction traffic on Davenham Road for the remainder of the HS2 construction period and on the A533 Davenham Bypass and A556 Shurlach Road throughout the HS2 construction period is considered to be low.

Management of construction traffic - general

15. The Promoter recognises that the impacts of construction traffic would likely be a particular concern for residents living or working near the proposed line of route. The draft CoCP has been prepared with the aim of ensuring that the significant adverse effects identified in the ES would be reduced as far as reasonably practicable. The impacts of construction traffic are outlined in the Phase 2b hybrid Bill ES Volume 2, Community Area Reports, Traffic and transport Section. A detailed assessment of traffic and transport impacts within each community area is contained in the Transport Assessment Part 3 Addendum for Wimboldsley to Lostock Gralam (MA02) in Volume 5, Appendix: TR-003-00002 of the main ES.

16. Paragraphs 14.1.1 and 14.1.2. of the draft CoCP detail provisions with regard to traffic management during construction:

“During construction works, the nominated undertaker will require that the impacts from construction traffic on the local community (including all local residents and businesses and their customers, visitors to the area, and users of the surrounding transport network) are minimised by its contractors where reasonably practicable.”

17. HS2 Phase 2b Western Leg Information Paper E3: Management of Traffic During Construction describes the proposed consultation in relation to the management of traffic during construction:

“7.3 During construction, regular local traffic liaison meetings will be arranged with highway authorities, bus operators, taxi and trade representation (as appropriate), and the police - other emergency services will be included, as appropriate. These meetings will provide an opportunity for contractors to present proposals for future works affecting the highway, including methods of construction and proposed programme, and for a review of the associated traffic management requirements. This will allow the highway authorities to carry out their network co-ordination duties.

7.5 The nominated undertaker, as part of the requisite community liaison arrangements, will require contractors to communicate regularly with parties affected by the works. Local residents and businesses will be informed -

appropriately and in advance - of the dates and durations of any closures of roads or public right of way, and will be provided with details of diversion routes at least two weeks in advance or when final details are available. Advance warning signs of road closures will be provided for users of roads and public of rights of way."

Disruption to cyclists caused by the closure of Davenham Road

18. Davenham Road is on route 573 of the national cycle network. The Promoter appreciates the Petitioner's concerns in relation to disruption to cyclists caused by diversions during the construction of the Proposed Scheme and acknowledges that cyclists would be temporarily diverted as a result of the closure of Davenham Road for a period of up to four weeks.

Disruption to cyclists caused by construction and diverted traffic

19. The Promoter has used the Northwich Town Centre strategic traffic model to assess the impacts during construction and operation of the AP1 revised scheme. Four scenarios were assessed during construction, representing four distinct temporal phases. These scenarios include area-wide highway impacts including diverted traffic due to the combination of highway changes and construction traffic. Any diversionary impacts of construction traffic are included in the analysis, although it is acknowledged that the closure of Davenham Road is not included in any of the scenarios as it is scheduled to last less than four weeks.

20. Table 14-7 and 14-8 in the Transport Assessment Part 3 Addendum for Wimboldsley to Lostock Gralam (MA02) in Volume 5, Appendix: TR-003-00002 of the SES1 and AP1 ES set out the traffic flows for the 2030 future baseline and the AP1 revised scheme on the roads most affected by construction for the AM and PM peak hour respectively. These tables replace Table 14-7 and Table 14-8 of the main Transport Assessment. The tables include roads where there is a 10% or more change in traffic for any construction scenario. Traffic flows on all other roads are either unaffected from the future baseline or there would only be small changes in traffic flows (HGV or all vehicles of less than 10%) compared to the future baseline daily flow.

21. Table 14-7 and 14-8 in the Transport Assessment Part 3 Addendum for Wimboldsley to Lostock Gralam (MA02) in Volume 5, Appendix: TR-003-00002 of the SES1 and AP1 ES indicate that the section Davenham Road between Shurlach Lane and the A530 King Street would carry 571 vehicles per hour in the AM peak hour and 350 vehicles per hour in the PM peak hour during the 2030 future baseline.

22. During construction of the AP1 revised scheme, traffic flows on the section of Davenham Road between Shurlach Lane and the A530 King Street are forecast to increase to a maximum of 673 vehicles per hour in the AM peak hour, an increase of 102 vehicles (18%) compared with the 2030 future baseline. In the PM peak hour, traffic flows would increase to a maximum of 386 vehicles per hour, an increase of 36 vehicles (10%) compared with the 2030 future baseline.

23. Hartford Road, Church Street and London Road are not included in Table 14-7 and 14-8 as the flow changes do not meet the threshold to be included in the tables for any of the construction scenarios for these roads i.e. there are only small changes in traffic flows (HGV or all vehicles of less than 10%) compared to the future baseline daily flow.

Access for cyclists during the construction of the Proposed Scheme - general

24. The draft CoCP describes generic measures for the management of traffic (which includes pedestrians, cyclists and equestrians on public rights of way) in paragraph 14.2.2, including that:

“Generic measures, which will apply route-wide, will be discussed in advance with the local highway authorities and any other appropriate authorities. Prior to the commencement of the works, the nominated undertaker will ensure that a Routewide Traffic Management Plan (RTMP) will be produced in consultation with the highway and traffic authorities and the emergency services and other relevant key stakeholders. The RTMP will include, as appropriate... procedures to be followed for the temporary or permanent closure or diversion of roads, PRow or accesses.”

25. Paragraph 14.1.2 of the draft CoCP explains that access for cyclists (and pedestrians and equestrians) would be retained during construction where safe and appropriate to do so.

26. Paragraph 5.1 of HS2 Phase 2b Western Leg Information Paper E3: Management of Traffic During Construction explains that during construction, cycle access would be maintained, wherever appropriate and could include the narrowing or realignment of carriageway cycle lanes, combined footways/cycleways, off-road cycle tracks and bridleways/byways. When re-routing cyclists, signage would be provided to indicate re-routed cycle paths.

27. Further information on potential impacts from local construction and operational impacts of the Proposed Scheme on cyclists is outlined in the main ES Volume 2, Community Area Reports, Traffic and transport Section. A detailed report on traffic and transport impacts within each community area is contained in the Transport Assessment (see Volume 5: Appendices TR-002 and TR-003).

28. Any changes or amendments to the potential impacts on cyclists are reported in the SES1 and AP1 Volume 2 Community Area Reports and SES1 and AP1 Volume 5 Transport Assessments. Further information is also provided in HS2 Phase 2b Western Leg Information Papers E4: Highways and Traffic During Construction – Legislative Provisions, and E29: Active Travel.

Highway signage

29. Any requests for new or modified traffic signs would require the consent and approval of the local highway authority. The Promoter is in dialogue with the local highway authority (Cheshire West and Chester Council) with regard to highway signage at various locations around Davenham and other parishes in the local area.

Resurfacing

30. With regard to the Petitioner's request that specific resurfacing works take place prior to the construction of the Proposed Scheme, the nominated undertaker would work with the highway authority in carrying out a review of local highways intended to be used by its construction traffic. It is envisaged that a representative from the highway authority would work with a representative from the nominated undertaker in a common approach to dealing with matters such as condition surveys in a proportionate manner, the format and scope of which would be discussed with the highway authorities under the auspices of the Highways Sub-group of the Phase 2b Planning Forum.

31. It is in the nominated undertaker's interests in terms of avoiding delay that any necessary highway improvements are carried out well in advance of the relevant construction route coming into use.

32. With regard to wear and tear of roads, paragraph 14.2.2 of the draft CoCP states that the RTMP would include, as appropriate, measures to ensure that the timely maintenance and condition of public roads, cycleways and PRow's do not deteriorate due to use by construction traffic, including monitoring arrangements with local highway authorities.

33. Part 1 of Schedule 32 to the Bill includes a range of protective provisions relating to highways and traffic, including paragraph 14 which requires the nominated undertaker to make good and reinstate, to the reasonable satisfaction of the highway authority, any part of a highway that has been broken up or disturbed.

34. Further information is given in HS2 Phase 2b Western Leg Information Paper E4: Highways and Traffic During Construction – Legislative Provisions.

Designated footpath and cycle lane along Shipbrook Road & Davenham Road

35. The Promoter considers that the rural location and nature of the existing road is not appropriate for permanent fully segregated pedestrian and cycle lane facilities. Therefore, the Promoter does not consider this request to be an appropriate form of mitigation for the Proposed Scheme.

36. There are no plans for HS2 construction traffic to use Shipbrook Road. A section of Davenham Road to the east of the canal crossing and as far as the junction with the

A530 King Street would be used for construction traffic as shown on map CT-05-313. Where there is the potential for a conflict between construction traffic and non-motorised road users, appropriate temporary measures would be developed as part of a local traffic management plan. Any temporary traffic management measures would need to be developed in conjunction with Cheshire West and Chester Council as the local highway authority.

HOUSE OF COMMONS SELECT COMMITTEE

HIGH SPEED RAIL (CREWE - MANCHESTER) BILL

PROMOTER'S RESPONSE TO PETITION OF: Davenham Parish Council

PETITION NO: HS2-P2B-012

PARAGRAPH NO: 4, 4A

ISSUE RAISED: Impact on village during construction

PETITION PARAGRAPH: 4. Impact to desirability and character of the village and reputational harm during construction and operation as well as significant and continued upheaval to residents and businesses.

Request

4A. COMMUNITY DRIVEN: The likelihood of London Road being used as a rabbit run for traffic is extremely high. This will bring congestion to the village, the knock-on impact of this will be to discourage residents from using the village shops, which could impact their profits & viability. To support our small businesses, we ask that Business rates be reduced by 50% for the duration of the construction and HS2 pay the remaining 50% to Cheshire West & Chester Council. Identification and purchase (including transfer of ownership to Davenham Parish Council) of land that could be used to accommodate community facilities (e.g. village hall, all weather pitch, recreational use etc.).

Funding for local artwork to be designed and implemented within a central village location depicting Davenham community groups helping attract new visitors (£10k).
Funding for annual village event (approx. £10k /year) to prevent Community severance and actively engage and unite local community during construction (anticipated 5 years) and post construction (further 5 years).

PROMOTER'S RESPONSE:

London Road through traffic

1. The petition comment regarding the potential use of London Road as a 'rabbit run' is understood by the Promoter to refer to the Petitioner's concern to avoid through traffic using London Road. As indicated in the response to paragraphs 3, 3A of the petition, set out above in this document, the Promoter does not accept that there will be a material change in traffic on London Road but is in ongoing discussions with the local highway authority (Cheshire West and Chester Council) in relation to highway signage.

Community funding

2. The Community and Environment Fund (CEF) and the Business and Local Economy Fund (BLEF) were first announced by the Government for Phase One of HS2 in 2014.

3. On 25 January 2018 it was confirmed that £5m was to be made available for Phase 2A of the Proposed Scheme, bringing the total funding pot to £45m for Phase One and Phase 2A combined. As announced by the HS2 Minister in June 2022, an additional £10m has been made available for communities and businesses disrupted along the line of route from Crewe to Manchester, geographical allocations for the Funds will be the subject of a future announcement by the Minister and the Department for Transport.

4. As was the case for the Phase One and Phase 2a funding, the Phase 2b allocation for communities along the Proposed Scheme will not be available for application or administered by the Grant Management Body until after Royal Assent of the Crewe – Manchester hybrid Bill.

5. The HS2 Phase 2b Western Leg Information Paper C11: The Community and Environment Fund and Business and Local Economy Fund, provides further details of the extension to CEF and BLEF for the Proposed Scheme including the objectives and initiatives each Fund in addition to <https://hs2funds.org.uk>.