In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix MA-001-00000

Major accidents and disasters

Major accidents and disasters risk screening

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Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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1 Introduction

1.1.1 This report is an appendix to the major accidents and disasters assessment for the Proposed Scheme.

1.1.2 This appendix should be read in conjunction with Volume 3, Route-wide effects, Section 11. Following on from the summary presented in Volume 3, detail on the legislation pertinent to the assessment and surrounding the design, management, operation, and maintenance of the Proposed Scheme is provided in Section 2.

1.1.3 In addition, data on external sources of hazard, pertinent to the Proposed Scheme, are set out in Background Information and Data (BID)[1] (see BID MA-002-00000).

1.1.4 The process undertaken for this major accidents and disasters environmental risk review is set out in the Scope and Methodology Report[2] (SMR) and gave rise to the risk events set out in Volume 3, Route-wide effects, Section 11.

1.1.5 A screening exercise of all identified project risks from the source documents listed in Section 3 of this document was first undertaken to determine if they had the potential to give rise to an impact which meets the definition of a significant adverse effect to an environmental receptor[3], including members of the public. The risks that remained screened in were then grouped into high level 'risk events' which have the same potential consequence. For example, all hazard sources and pathways that could lead to a train derailment are combined into a single risk event, since it is the derailment of the train that has the potential to cause harm to an environmental receptor, regardless of the cause.

1.1.6 In order to identify whether a risk event has the potential to be a major accident and/or disaster, which also has the potential to have a significant adverse effect on an environmental receptor, three components need to be present: a source, a pathway (between source and receptor) and a receptor. Risk events which do not have all three components have been screened out from the assessment.

1.1.7 Table 2 sets out these grouped risk events with the identified hazard sources and pathways, and describes the reasonable worst consequence if the event did occur in relation to environmental receptors.

1.1.8 Table 2 also summarises the mitigation which is currently embedded within the Proposed Scheme, through legislation, standards, policy, and other measures, and reaches a conclusion as to whether each risk event can be considered to be managed 'as low as reasonably practicable' (ALARP).

[1] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data, External sources of hazard,* BID MA-002-00000. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-machester-environmental-statement.

[2] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

[3] Receptors include: members of the public and local communities; infrastructure and the built environment; the natural environment, including ecosystems, land and soil quality, air quality, surface and groundwater resources and landscape; and the historic environment, including archaeology and built heritage.

2 Legal and regulatory framework

2.1.1 Linking with Volume 3 Route-wide effects, Section 11, further details on the UK legislation and EU regulations the Proposed Scheme must comply with in relation to its design, management, operation, and maintenance are outlined below. These measures set out the requirements, duties, and in some cases establishes the mechanisms for identifying, assessing, and mitigating risks associated with major accidents and disasters associated with the Proposed Scheme:

- Civil Contingencies Act 2004[4] provides a framework for emergency preparedness and response procedures throughout the UK. Roles and responsibilities are set out for those involved in emergency preparation and response to events that threaten serious damage to human welfare or to the environment. Network Rail, and the operating companies, sit as Category 2 responders. The Act requires Category 2 responders to co-operate and share information with Category 1 responders (e.g. emergency services and local authorities) to inform multi-agency planning frameworks;
- Construction (Design and Management) (CDM) Regulations 2015[5]. These regulations place specific duties on clients, designers, and contractors, so that health and safety is considered throughout the life of a construction project from its inception to its subsequent final demolition and removal. Under CDM regulations, designers must avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure; reducing risks from any remaining hazard; and giving collective safety measures priority over individual measures;
- Control of Asbestos Regulations 2012[6]. These regulations set out requirements and duties for working with asbestos;
- Control of Major Accident Hazards (COMAH) Regulations 2015[7]. COMAH aims to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment. COMAH treats risks to the environment as seriously as those to people;
- Control of Substances Hazardous to Health Regulations 2002[8] (COSHH). COSHH Regulations place requirements on employers to assess and manage health risks

[4] *Civil Contingencies Act 2004* (c.36). London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/ukpga/2004/36/contents.

[5] *The Construction (Design and Management) Regulations 2015, No. 51*. London, Her Majesty's Stationary Office. Available online at: http://www.legislation.gov.uk/uksi/2015/51/pdfs/uksi_20150051_en.pdf.

[6] *The Control of Asbestos Regulations 2012, No. 632.* London, Her Majesty's Stationary Office. Available online at: http://www.legislation.gov.uk/uksi/2012/632/contents/made.

[7] *The Control of Major Accident Hazards Regulations 2015, No. 483.* London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/2015/483/contents/made.

[8] *The Control of Substances Hazardous to Health Regulations 2002, No. 2677.* London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/2002/2677/contents/made.

associated with hazardous substances, maintain and monitor control measures and plan for emergencies;

- Health and Safety at Work etc. Act 1974[9] (HSWA). This legislation places general duties on employers, people in control of premises, manufacturers and employees. Health and safety regulations made under this Act contain more detailed provisions. The Act provides the framework for the regulation of industrial health and safety in the UK. The overriding principle is that foreseeable risks to persons shall be reduced so far as is reasonably practicable and that adequate evidence shall be produced to demonstrate that this has been done;
- Pipeline Safety Regulations 1996[10]. These regulations define a range of general duties applicable to all pipelines, and additional duties for major accident hazard pipelines which transport products defined as dangerous fluids;
- Planning (Hazardous Substances) Regulations 2015[11]. These regulations set out hazardous substances and controlled quantities, and hazardous substances consent and enforcement procedures;
- Railway Group Standards[12]. All activities relating to the conventional rail network must comply with these standards. The Railway Group Standards set out National Technical Rules and National Safety Rules for the Great Britain mainline railway. Compliance with the National Technical Rules and National Safety Rules is required under the Railways (Interoperability) Regulations 2011[13] (as amended) (RIR);
- The Management of Health and Safety at Work Regulations 1999[14]. These regulations generally make more explicit what employers are required to do to manage health and safety under the HSWA;
- The Rail Safety (Amendment etc.) (EU Exit) Regulations 2019[15] implementing Commission Implementing Regulation (EU) No 402/2013. EU Regulation 402/2013 on the Common

[9] *Health and Safety at Work etc. Act 1974* (c.37). London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/ukpga/1974/37/contents/enacted.

[10] *The Pipelines Safety Regulations 1996, No. 825.* London, Her Majesty's Stationary Office. Available online at: http://www.legislation.gov.uk/uksi/1996/825/contents/made.

[11] *The Planning (Hazardous Substances) Regulations 2015, No. 627.* London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/2015/627/contents/made.

[12] Rail Safety and Standards Board, Rail Industry Standards. Available online at: https://www.rssb.co.uk/standards-and-the-rail-industry.

[13] *The Railways (Interoperability) Regulations 2011, No. 3066*. London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/2011/3066/contents/made.

[14] *The Management of Health and Safety at Work Regulations 1999, No. 3242*. London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/1999/3242/contents/made.

[15] *The Rail Safety (Amendment etc.) (EU Exit) Regulations 2019, No. 837*. London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/2019/837/contents/made.

Safety Method on Risk Evaluation and Assessment[16] (CSM-RA) describes the methods required to be used to assess compliance with safety levels and safety requirements;

- The Railways (Interoperability) Regulations 2011 (as amended) (RIR). These regulations implement the EU Railway Interoperability Directive 2008/57/EC[17], which has the purpose of establishing common operational standards and practices across European railways, including adoption of the CSM-RA; and
- The Railways and Other Guided Transport Systems (Safety) Regulations 2006[18] (as amended) (ROGS). ROGS place a duty on Railway Undertakings (RU) and Infrastructure Managers (IMs) to:
  - develop safety management systems (SMS) that must meet certain requirements;
  - have a safety certificate (for RUs) or a safety authorisation (for IMs);
  - show that they have procedures in place to introduce new or altered vehicles or infrastructure safely;
  - carry out risk assessments and put in place the safety measures they have identified as necessary to make sure that the transport system is run safely; and
  - work together to make sure the transport system is run safely (ROGS regulation 22).

[16] Official Journal of the European Union (2013), *Commission Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009*. Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R0402.

[17] Official Journal of the European Union (2008), *Directive of the European Parliament and of the Council on the Interoperability of the Rail System in the Community*. Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0057.

[18] *The Railways and Other Guided Transport Systems (Safety) Regulations 2006, No. 599*. London, Her Majesty's Stationary Office. Available online at: https://www.legislation.gov.uk/uksi/2006/599/contents/made.

3 Identification of project risks

3.1.1 The following sources of information, current at the time of producing this appendix, have been reviewed to inform the environmental risk screening:

- Phase 2b Construction, Design and Management (CDM) risk registers[19] (live working documents);
- HS2 Ltd's System Safety Hazard Record[20] (live working document); and
- Background Information and Data report BID MA-002-00000[1], which presents external sources of hazard that interact with the Proposed Scheme.

3.1.2 A review of traffic-related effects as reported in the Transport Assessment (see Volume 5, Appendices: TR-001, TR-002, TR-003 and TR-005[21]) has also been undertaken, in relation to Major hazard sites identified by the Health and Safety Executive (HSE) where the consultation zone interacts with land required for the Proposed Scheme as presented in BID MA-002-00000. Table 1 presents a summary of traffic-related effects, such as delays or re-routing, which correlate with roads used as emergency response routes to these sites. Where (2038 or 2046) are referred to in the table, this relates to operational traffic assessment years.

Table 1: Traffic-related effects in relation to emergency response routes to Major hazard sites

Site name	Effect type	Phase	Traffic effect(s) reported
Air Products PLC	Traffic congestion	Construction	Minor Beneficial - temporary effect on A532 Vernon Way/A532 Earle Street/A5019 Vernon Way/Earle Street. Major Adverse - temporary effect on A532 Earle Street/A532 Manchester Bridge/William Street/Grand Junction Way (A532 Earle Street Roundabout). Moderate Adverse - temporary effect on A534/A534 Crewe Green Road/A5020 University Way/B5077 Crewe Road/Sydney Road. Minor Adverse - temporary effect on A532 Vernon Way/A532 Earle Street/A5019 Vernon Way/Earle Street.
BRITISH SALT LTD	Traffic congestion	Construction	Major Adverse - temporary effect on A54 St Michaels Way/A54 Kinderton Street/A533 Leadsmithy Street. Major Adverse - temporary effect on A54 Chester Road/A530 Croxton Lane. Major Adverse - temporary effect on A54 Chester Road/A530 Newton Bank. Major Adverse - temporary effect on A54 Chester Road/A530 St. Michael's Way/A530 Nantwich Road.

[19] MWJV CDM Risk Register dated 28 May 2021, version P16, WSP CDM Risk Register dated 16 March 2020, version P05.

[20] High Speed Two Ltd (2021), *System Safety Hazard Record Phase 2b Western Leg, version P01*.

[21] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data, Transport Assessment policy and data,* BID TR-004-00001. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-machester-environmental-statement.

Site name	Effect type	Phase	Traffic effect(s) reported
			Major Adverse - temporary effect on A54 Middlewich Road/Clive Lane/Road One. Moderate Adverse - temporary effect on A533 London Road/Moss Lane. Moderate Adverse - temporary effect on A533 London Road/B5079 Station Road. Minor Adverse - temporary effect on A533 Booth Lane/Cledford Lane/Cross Lane.
BRITISH SALT LTD	Traffic congestion	Operation	Moderate Adverse - permanent effect on A54 Middlewich Road/Clive Lane/Road One (2038 and 2046). Minor Adverse - permanent effect on A54 Chester Road/A530 St. Michael's Way/A530 Nantwich Road (2046). Minor Adverse - permanent effect on A54 St Michaels Way/A54 Kinderton Street/A533 Leadsmithy Street (2046).
Hole House Farm	Traffic Congestion	Construction	Major Adverse - temporary effect on Warmingham Road/Groby Road. Major Adverse - temporary effect on Warmingham Road/Hall Lane. Major Adverse - temporary effect on Remer Street/Groby Road/Sydney Road/Elm Drive/Maw Green Road (proposed layout). Moderate Adverse - temporary effect on A533 London Road/Moss Lane. Moderate Adverse - temporary effect on A533 London Road/B5079 Station Road. Moderate Adverse - temporary effect on A534 / Crewe Road. Moderate Adverse - temporary effect on Warmingham Road/Waldrons Lane. Moderate Adverse - temporary effect on Forge Mill Lane/Dragons Lane/ Tetton Lane/White Hall Lane. Moderate Adverse - temporary effect on B5076 Middlewich Street/B5076 North Street/Broad Street/Stoneley Road. Minor Adverse - temporary effect on A534 / A533 Old Mill Road. Minor Adverse - temporary effect on Badger Ave/Broad Street. Minor Adverse - temporary effect on Broad Street/Davenport Street/McLaren Street. Minor Adverse - temporary effect on B5076 Bradfield Road/B5076 North Street/Broughton Road.
Hole House Farm	Traffic-related severance	Construction	Major adverse - temporary effect on Elm Drive (between Lime Tree Avenue and Remer Street). Major adverse - temporary effect on Sydney Road (between Hungerford Road and Shakespeare Drive). Major adverse - temporary effect on Groby Road (between Remer Street and Stoneley Road). Moderate adverse - temporary effect on Lansdowne Road (between Coleridge Way and Pelican Close).
Henkel Ltd	Traffic Congestion	Construction	Major Adverse - temporary effect on A5018 Wharton Road/B5355 Wharton Road/A5018 Wharton Park Road/Collingtree Avenue. Major Adverse - temporary effect on A54 Middlewich Road/Clive Lane/Road One.

Site name	Effect type	Phase	Traffic effect(s) reported
			Moderate Adverse - temporary effect on A533 Bostock Road/Road One/A5018 Bostock Road/A533 Davenham Road.
Henkel Ltd	Traffic Congestion	Operation	Moderate Adverse - permanent effect on A54 Middlewich Road/Clive Lane/Road One (2038 and 2046). Moderate Adverse - permanent effect on A533 Bostock Road/Road One/A5018 Bostock Road/A533 Davenham Road (2046).
Holford Brine Field	Traffic Congestion	Construction	Minor Beneficial - temporary effect on A556 Shurlach Road/A533 Davenham Bypass. Minor Beneficial - temporary effect on A533 Davenham Bypass/Jack Lane. Major Adverse - temporary effect on A5018 Wharton Road/B5355 Wharton Road/A5018 Wharton Park Road/Collingtree Avenue. Major Adverse - temporary effect on A54 St Michaels Way/A54 Kinderton Street/A533 Leadsmithy Street. Major Adverse - temporary effect on A556 Chester Road/Shurlach Lane. Major Adverse - temporary effect on A533 Davenham Bypass/Jack Lane. Major Adverse - temporary effect on A556 Chester Road/A530 King Street. Major Adverse - temporary effect on A54 Chester Road/A530 Croxton Lane. Major Adverse - temporary effect on A54 Chester Road/A530 Newton Bank. Major Adverse - temporary effect on A54 Chester Road/A530 St. Michael's Way/A530 Nantwich Road. Major Adverse - temporary effect on A54 Holmes Chapel Road/Pochin Way/Centurion Way. Major Adverse - temporary effect on A54 Middlewich Road/Clive Lane/Road One. Moderate Adverse - temporary effect on A533 Bostock Road/Road One/A5018 Bostock Road/A533 Davenham Road. Moderate Adverse - temporary effect on A534/Congleton Road. Minor Adverse - temporary effect on A556 Chester Road/A556 Chester Road/A533 London Road/London Road. Minor Adverse - temporary effect on M6 Junction 17/A534 Congleton Road. Minor Adverse - temporary effect on A556 Shurlach Road/A533 Davenham Bypass.
Holford Brine Field	Traffic Congestion	Operation	Moderate Adverse - permanent effect on A556 Chester Road/Shurlach Lane (2038 and 2046). Moderate Adverse - permanent effect on A54 Middlewich Road/Clive Lane/Road One (2038 and 2046). Moderate Adverse - permanent effect on A533 Bostock Road/Road One/A5018 Bostock Road/A533 Davenham Road (2046). Minor Adverse - permanent effect on A54 Chester Road/A530 St. Michael's Way/A530 Nantwich Road (2046). Minor Adverse - permanent effect on A54 St Michaels Way/A54 Kinderton Street/A533 Leadsmithy Street (2046).

Site name	Effect type	Phase	Traffic effect(s) reported
Holford Brine Field	Traffic-related severance	Construction	Major adverse - temporary effect on B5309 Centurion Way (between King Street Industrial Estate and B5309 Centurion Way). Major adverse - temporary effect on B5081 Byley Road (between B5309 Centurion Way and Moss Lane). Major adverse - temporary effect on B5309 King Street (between B5309 Centurion Way and Yatehouse Lane). Moderate adverse - temporary effect on A533 Davenham Bypass (between London Road and A556 Shurlach Road). Moderate adverse - temporary effect on A556 Shurlach Road (between A530 King Street and Birches Lane).
Holford Brine Field	Traffic-related severance	Operation	Moderate beneficial - permanent effect on A556 Shurlach Road (between A530 King Street and Birches Lane) (2038 and 2046). Moderate adverse - permanent effect on A533 Bostock Road (between A5018 Bostock Road and London Road) (2038 and 2046).
Aston Way - Middlewich	Traffic Congestion	Construction	Major Adverse - temporary effect on A54 St Michaels Way/A54 Kinderton Street/A533 Leadsmithy Street. Major Adverse - temporary effect on A54 Chester Road/A530 Croxton Lane. Major Adverse - temporary effect on A54 Chester Road/A530 Newton Bank. Major Adverse - temporary effect on A54 Chester Road/A530 St. Michael's Way/A530 Nantwich Road. Major Adverse - temporary effect on A54 Middlewich Road/Clive Lane/Road One. Minor Adverse - temporary effect on A533 Booth Lane/Cledford Lane/Cross Lane.
Aston Way - Middlewich	Traffic Congestion	Operation	Moderate Adverse - permanent effect on A54 Middlewich Road/Clive Lane/Road One (2038 and 2046). Minor Adverse - permanent effect on A54 Chester Road/A530 St. Michael's Way/A530 Nantwich Road (2046). Minor Adverse - permanent effect on A54 St Michaels Way/A54 Kinderton Street/A533 Leadsmithy Street (2046).
INEOS Chlor Enterprises Ltd.	Traffic Congestion	Construction	Major Adverse - temporary effect on A559 Manchester Road/A559 Hall Lane/Station Road. Major Adverse - temporary effect on A530 Griffiths Road/A559 Manchester Road. Major Adverse - temporary effect on A556 Chester Road/Shurlach Lane. Major Adverse - temporary effect on A556 Chester Road/A530 King Street. Moderate Adverse - temporary effect on A559 Watling Street/Apple Market Street. Minor Adverse - temporary effect on A533 London Road/A533 Kingsmead. Minor Adverse - temporary effect on A556 Chester Road/A556 Chester Road/A533 London Road/London Road.
INEOS Chlor Enterprises Ltd.	Traffic Congestion	Operation	Major Adverse - permanent effect on A559 Manchester Road/A559 Hall Lane/Station Road (2038 and 2046).

Site name	Effect type	Phase	Traffic effect(s) reported
			Major Adverse - permanent effect on A530 Griffiths Road/A559 Manchester Road (2038 and 2046). Moderate Adverse - permanent effect on A556 Chester Road/Shurlach Lane (2038 and 2046).
INEOS Chlor Enterprises Ltd.	Traffic-related severance	Construction	Moderate adverse - temporary effect on Gadbrook Road (between East Avenue and A556 Shurlach Road). Moderate adverse - temporary effect on A556 Shurlach Road (between A530 King Street and Birches Lane). Moderate adverse - temporary effect on Station Road (between School Lane and A559 Manchester Road).
INEOS Chlor Enterprises Ltd.	Traffic-related severance	Operation	Major beneficial - permanent effect on Old Hall Road (between Granville Road and Clifton Drive) (2046). Major beneficial - permanent effect on Old Hall Road (between London Road and Granville Road) (2046). Major beneficial - permanent effect on London Road (between Old Hall Road and Lime Avenue) (2046). Moderate beneficial - permanent effect on A556 Shurlach Road (between A530 King Street and Birches Lane) (2038 and 2046). Moderate beneficial - permanent effect on London Road (between Dunham Road and Old Hall Road) (2046). Major adverse - permanent effect on Station Road (between School Lane and A559 Manchester Road) (2038 and 2046).
King Street Energy (Cheshire) Ltd	Traffic Congestion	Construction	Major Adverse - temporary effect on A556 Chester Road/Shurlach Lane. Major Adverse - temporary effect on A556 Chester Road/A530 King Street. Moderate Adverse - temporary effect on A559 Watling Street/Apple Market Street. Moderate Adverse - temporary effect on A559 Chester Way/B5082 Station Road/B5075 New Warrington Road. Moderate Adverse - temporary effect on A530 Griffiths Road/A530 King Street/B5082 Middlewich Road/Pennys Lane. Minor Adverse - temporary effect on A533 London Road/A533 Kingsmead. Minor Adverse - temporary effect on B5082 Station Road/Manchester Road/B5062 Middlewich Road/Victoria Road. Minor Adverse - temporary effect on A556 Chester Road/A556 Chester Road/A533 London Road/London Road.
King Street Energy (Cheshire) Ltd	Traffic Congestion	Operation	Moderate Adverse - permanent effect on A530 Griffiths Road/A530 King Street/B5082 Middlewich Road/Pennys Lane (2038 and 2046). Moderate Adverse - permanent effect on A556 Chester Road/Shurlach Lane (2038 and 2046).
King Street Energy (Cheshire) Ltd	Traffic-related severance	Construction	Major adverse - temporary effect on A530 King Street (between Gadbrook Distribution Centre Access and A556 Shurlach Road). Moderate adverse - temporary effect on Gadbrook Road (between East Avenue and A556 Shurlach Road).

Site name	Effect type	Phase	Traffic effect(s) reported
King Street Energy (Cheshire) Ltd	Traffic-related severance	Operation	Major beneficial - permanent effect on Old Hall Road (between Granville Road and Clifton Drive) (2046). Major beneficial - permanent effect on Old Hall Road (between London Road and Granville Road) (2046). Major beneficial - permanent effect on London Road (between Old Hall Road and Lime Avenue) (2046). Moderate beneficial - permanent effect on London Road (between Durnham Road and Old Hall Road) (2046). Major adverse - permanent effect on A530 King Street (between Gadbrook Distribution Centre Access and A556 Shurlach Road) (2038 and 2046). Moderate adverse - permanent effect on A530 King Street (between B5082 Middlewich Road and A556 Shurlach Road) (2038 and 2046).

3.2 Review of risks

3.2.1 The objective of this environmental risk review is to determine whether additional mitigation measures may be required to ensure that the identified risks to environmental receptors can be reduced to ALARP. This has been done in consultation with the other environmental topics.

3.2.2 In accordance with the detail outlined in Section 2, and best practice including design standards, 'embedded mitigation' comprises those measures that have not yet been implemented, but will be at the appropriate stage of the Proposed Scheme, i.e. any measures that will be undertaken during detailed design, construction planning, construction, and during the life of the Proposed Scheme.

3.2.3 The necessary risk management and mitigation measures are identified in Table 2. These measures are to be considered as commitments under the hybrid Bill and will be implemented prior to construction and authorisation to place the Proposed Scheme into service by the Regulator.

3.2.4 Where appropriate, the necessary risk management and mitigation measures identified in Table 2 will be undertaken in consultation with relevant statutory stakeholders in Scotland (including for example local authorities, the Scottish Environmental Protection Agency, and Transport Scotland).

Table 2: Environmental risk review

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
C1	Tunnel collapse	Tunnelling (bored tunnels). Unknown ground conditions at tunnels. Ground settlement reaches the surface resulting in localised subsidence.	Structural damage to and/or collapse of buildings and/or infrastructure.	Managed via CDM - Tunnels designed in accordance with HS2 design standards. Desk study and geotechnical investigation undertaken to highlight specific locations of below ground risk/hazard (for instance gas) and inform tunnel design, construction methods to be used (including tunnelling rates) and the type of tunnel boring machine to be used for the Proposed Scheme. The selected type of tunnel boring machine (Earth Pressure Balance Machine) is expected to limit ground settlement. Risk assessment for overlying structures/properties will be undertaken and monitoring or mitigation incorporated if required, including e.g. use of best practice construction methods with provision of temporary and permanent props. Pre-determined trigger levels at properties will be set. Stakeholder engagement/community consultation will elaborate where works are occurring and what stakeholders can do if they have a grievance. A mechanism will be in place to address any grievances raised.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

[22] All measures to manage and reduce risk of significant adverse effects occurring as a result of the vulnerability of the Proposed Scheme to major accidents and/or disasters are considered to be 'embedded' mitigation measures for the purposes of the assessment.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				All construction sites will have in place appropriate emergency response plans and management controls to prevent emergencies. A Code of Construction Practice (CoCP) and necessary management plans, including local environmental management plans (LEMP) will be in place to control potential environmental impacts of construction works. Design of temporary works to include design for safe lifting operations.		
C2	Ground collapse (including ground instability/ slope failure).	Presence of ground conditions which are susceptible to subsidence e.g. salt/peat/peat mosses. Construction activities adjacent to existing structures/ earthworks. Construction over existing caverns and gas storage Slope instability triggered whilst working on sidelong ground. Construction results in ground	Localised collapse and subsidence of ground at the surface. Network Rail train derails off-track and outside the Proposed Scheme boundary, causing fatality/injury to member(s) of public, and/or damage to buildings and/or infrastructure. Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.). Severe disruption to rail transportation,	Managed via CDM - Desk study and geotechnical investigation undertaken to highlight specific locations susceptible to ground instability and inform the design and construction methods used for the Proposed Scheme. This will include consultation with relevant agencies and owners/operators of caverns and review of their records. The Proposed Scheme will avoid passing through known areas of ground instability as far as reasonably practicable. Carry out modelling and settlement calculations at detailed design to assess impact of Proposed Scheme works on existing infrastructure. Settlement assessment for Proposed Scheme tunnels, retaining walls and earthworks have been completed. Provisions for foundations close to Proposed Scheme viaducts have been included in the construction requirements. Risk assessment for adjacent structures/properties will be undertaken and monitoring or mitigation incorporated if	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		disturbance and/or vibration, causing ground instability.	major accident causing injury/fatality to Network Rail staff, passengers and/or harm to adjacent receptors, spillage of pollutants.	required. Pre-determined trigger levels at properties will be set. Use of best practice/industry standard construction methods/design features appropriate to the context of the site, for instance use of stepped excavations, to reduce risks associated with ground instability. Stakeholder engagement/community consultation will elaborate where works are occurring and what stakeholders can do if they have a grievance. A mechanism will be in place to address any grievances raised. A CoCP and necessary management plans, including LEMP will be in place to control potential environmental impacts of construction works. These will include for instance use of best practicable means for vibration prevention and reduction.		
C3	Offline train derailment/ collision on Network Rail mainline.	Earthworks (including potential for settlement/heave on existing Network Rail earthworks) and construction on/adjacent to existing railway causes a collision/ derailment. Object infringes operating envelope	Collision on Network Rail mainline, or Network Rail train derails off-track and outside the boundary causing fatality/injury to member(s) of public, including secondary impact as a result of structural damage to buildings and/or infrastructure.	Managed via CDM - Risks assessed and managed as part of ongoing design development and construction planning. Consultation will be held with Network Rail and other rail service providers where there is an interface with the construction area of the Proposed Scheme in order to define appropriate risk management. Potential Damage Assessments (PDAs) to be undertaken at detailed design stage. Risk management options may include possessions, appropriate offset/clearance distances between Network Rail and construction areas for the Proposed Scheme, exclusion zones/security fencing, speed restrictions in work areas, lifting plans, utilisation of precast elements to reduce construction times, heave assessments for	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		of Network Rail trains e.g. falling object, errant vehicle, plant/equipment.	Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	cuttings/embankments associated with tunnelling, Road Safety Audit Stage 1 undertaken on temporary alignment. Construction proposed to be top down with temporary diversions and contraflow. Design has considered Highways England future proofing requirements in terms of spatial provision and Errant Vehicle Protection consideration, etc. As stated in the draft CoCP[23], emergency procedures for works on the existing rail network will be produced in accordance with established industry procedures. Undertake settlement plots to determine potential impacts and appropriate design measures.		
C4	Major road traffic incident.	Construction over/adjacent to existing highways/ motorways, resulting in falling object/plant interaction, which causes traffic incident. Construction activity causes visual distraction to road users resulting in traffic incident.	Fatality/injury to motorist(s)/non-motorised user(s) or other member(s) of public. Debris striking traffic/member(s) of public, resulting in fatality/injury.	Managed via CDM - Consultation with Highways England, local authorities and other asset owners will help identify risks. Defining mitigation to control these risks will be undertaken as part of this consultation. Overarching controls outlined in the draft CoCP which states that route-wide, local area and site-specific traffic management measures will be implemented during the construction of the Proposed Scheme on or adjacent to public roads, bridleways, footpaths and other PRoW affected by the Proposed Scheme as necessary. There will be no significant effects on accidents and safety as there are no locations where there are both existing accident clusters and substantial changes in traffic during construction of the Proposed Scheme.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

[23] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		Construction traffic on public roads/adjacent to public rights of way (PRoW) (particularly small local roads) leading to traffic incident. Realignment/diversions of existing road infrastructure/ PRoW during construction leading to traffic incident. Traffic incident results in flying debris. Working on or adjacent to existing railway causes a train derailment leading to traffic incident.		Example construction controls may include traffic management plans, method statements, speed restrictions, closures/diversions, physical barriers/errant vehicle protection, controlled crossings etc in consultation with Highways England/local authorities. The land required for the construction of the Proposed Scheme has been established to provide adequate space for construction plant. Whenever reasonably practicable construction traffic will make use of the main road network, site haul routes and transportation via rail, to minimise the impact on the local road network and local communities. Planning of delivery routes and timing of deliveries will be undertaken. Site haul routes for the transportation of excavated material will be provided along the full length of the route of the Proposed Scheme. Access and egress points to haul routes and construction compounds will be designed to cross public roads at right angles, where possible. New/diverted/realigned roads to be designed in accordance with design codes and in consultation with Highways England and local authorities. All new infrastructure designed would be subject to detailed design and safety audit processes to seek to minimise the risk of accidents. Sight lines will be intrinsic to the design, including safe design of visual screening. Landscape mitigation proposals will avoid impact on 'lines of sight'. Planning of delivery routes and timing of deliveries will be undertaken. Construction time adjacent to live traffic will be minimised by using precast elements where practical.		

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				Stage 1 Road Safety Audit completed with no road safety related issues identified. Further road safety audits to be undertaken at detailed design stage. Risks to public road users assessed and managed in Environmental Impact Assessment (EIA). Further detail is provided in Volume 2, Community Area reports, Section 14 Traffic and Transport.		
C5	Physical damage or contamination of aquifer or water abstraction point.	Construction through existing contaminated sites (including disused landfill) mobilises contaminants in proximity to aquifer/water abstraction point. Construction encounters unknown/known water abstraction point.	Pollution of groundwater/ surface water receptors due to release of contaminants.	Managed via CDM - Risks assessed and managed as part of site selection and construction planning. Desk study and site investigation will continue to inform on the location of contaminated sites and areas of sensitivity (i.e. abstraction points, groundwater protection zones), and feed into risk definition, assessment and construction management. An appropriate design and construction methodology for working within areas of contamination will be determined. Liaison undertaken with utility providers, local authorities and Environment Agency to identify assets and minimise risks to supply. A CoCP and necessary management plans, including LEMP will be in place to control potential environmental impacts of construction works.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.
C6	Spillage or longer-term seepage of pollutants into groundwater	Construction adjacent to/over landfill sites mobilises contaminants.	Pollution of groundwater/ surface water receptors due to release of contaminants.	Managed via CDM - Desk study and geotechnical investigation undertaken to define the surface and groundwater conditions expected along the Proposed Scheme, and potential pathways for contaminants. Additional/targeted site investigations to	No	Mitigation to achieve ALARP will be fully defined as part of the detailed design stage. Further information to be gathered and

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
	or surface water.		Irreversible damage to environmental receptor (watercourse). Contamination and/or loss of drinking water supply.	be undertaken during detailed design to further define risks and inform control measures. Consultation to be undertaken with the Environment Agency, local authorities, landfill owners and operators that might be at risk, to define risk/sensitivities and feed into control measures. Treatment of contamination to be undertaken in accordance with Environment Agency procedures. The draft CoCP sets out pollution prevention measures and measures to reduce potential impacts to water resources. A CoCP and necessary management plans, including LEMP will be in place to control potential environmental impacts of construction works. Risks of leaks and spills addressed in water resources and flood risk sections of the Environmental Statement (ES), Volume 3 and Volume 5. Highways England Water Risk Assessment Tool (HEWRAT) assessment undertaken - highways and route wide operational risk assessment for accidental spillages from trains.		mitigation measures defined in relation to landfill sites in accordance with CDM.
C7	Fire, explosion, release or exposure to harmful gas/ materials.	Construction adjacent to/over sources of ground gas (i.e. former landfill/mine workings/brine caverns/ethylene storage/gas transmission pipelines) which mobilises gas	Fire and/or explosion/release of harmful materials/gas affects neighbouring property (potentially causing damage) and/or injury/fatality to member(s) of the public.	Managed via CDM - Desktop study and site/geotechnical/UXO investigations to identify areas of hazard, such as natural gas transmission pipelines and underground services/utilities. Appropriate construction planning and siting in response to hazards identified. Consultation will be undertaken with appropriate stakeholders to help identify hazards and control measures, including cavern owners/operators, utility providers, Environment Agency etc. Follow industry	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		and/or damages the asset causing fire, explosion, and/or release of harmful gas. Construction strikes unexploded ordnance (UXO) causing an explosion. Construction strikes underground utilities/services causing fire or explosion.		standard protocols to manage hazards where necessary and agree controls via consultation. All major utilities that interface with the Proposed Scheme infrastructure to be diverted away from the Proposed Scheme prior to commencing early works, where possible and appropriate to do so. A CoCP and necessary management plans, including LEMP will be in place to control potential environmental impacts of construction works. The draft CoCP states that all construction sites and associated accommodation and welfare facilities will have in place appropriate plans and management controls to prevent fires. The nominated undertaker's contractors will carry out risk assessments for the possibility of UXO being found within construction areas. An emergency response procedure will be prepared and implemented by the contractors to respond to the discovery of UXO. This will include notifications to the relevant local authorities and emergency services.		
C8	Release of asbestos during demolition of buildings, structures and infrastructure.	Presence of asbestos containing materials in buildings, structures and infrastructure to be demolished or disturbed.	Demolition results in uncontrolled release of asbestos containing material. Short term exposure of members of public to asbestos containing material.	Risk managed via legislation governing the handling and disposal of asbestos containing materials, CDM and resulting construction planning associated with demolition of buildings, structures and infrastructure, and disturbance of land, with potential asbestos containing materials. As stated in the draft CoCP measures relevant to control risks associated with asbestos dust will be implemented. A pre-demolition asbestos survey will be undertaken on all buildings, structures and infrastructure to be	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				demolished or refurbished to identify the presence of any asbestos-containing materials that may be present. Where identified, such materials will be removed by a suitability licensed asbestos removal contractor and managed in accordance with the relevant statutory controls governing its disposal.		
C9	Extreme weather impact (e.g. flood, drought, heat wave, snow, high winds).	Presence of construction results in a worsening of extreme weather impacts.	Irreversible damage to property/ infrastructure. Worsened extreme weather impact leads to fatality/injury to member or members of public. Irreversible damage to environmental receptor.	The draft CoCP includes measures for contractors to manage risks of pollution due to severe weather events, to inform themselves of the potential for severe weather and put in place contingency plans to ensure the resilience of other mitigation required in the draft CoCP in the event of severe weather. The draft CoCP further advises on location of stockpiles considering predominant wind direction relative to sensitive receptors, away from flood zones and sensitive watercourses where practicable, and covered where necessary. Floodplain extent considered in siting of infrastructure/construction works. Hydraulic modelling undertaken to inform design where necessary. Early construction of permanent replacement floodplain storage areas and other temporary measures to reduce flood risk to be implemented where required. Flood risk modelling undertaken and presented in Water resources and flood risk, Flood risk assessment (Volume 5 Appendices WR-005) and shown in the Map Series WR-05 and WR-06. Protection, monitoring and aftercare management of reinstated areas and created habitats, including remedial works as required. Climate change resilience assessment and in-combination climate change impact assessment undertaken. Results	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				and existing/embedded mitigation (resilience measures) presented in Volume 3 Route-wide effects and Volume 5: Appendix CL-002-00000. Resilience measures to be implemented through the design process and/or during the construction and operational stages of the Proposed Scheme address potential climate change impacts identified so that all climate change risks assessed low or medium with no additional resilience measures recommended.		
C10	Collapse/ damage to structures/ infrastructure.	Construction activity results in ground disturbance/ vibration adjacent to existing and under-construction infrastructure (including brine/gas caverns). Tunnelling beneath existing and under construction infrastructure. Collapsed culvert leads to flood impact.	Collapse of structure/infrastructure affects a public area causing fatality/injury to member(s) of public (including vehicle drivers and other road users). Falling debris affecting a public area causing fatality/injury to member(s) of public. Release of harmful contaminants onto land or surface water receptors resulting in irreversible damage to environmental receptor.	Managed via CDM and construction planning/sequencing - Desk study and geotechnical investigation undertaken to highlight specific locations of below ground risk/hazard and inform design and construction methods used for the Proposed Scheme. Design and construction methods includes risk assessment for overlying structures/properties, and below ground assets, with monitoring or mitigation if required. Preliminary Damage Assessments have been undertaken in parallel with settlement analysis. Risks of falling debris or collapse of infrastructure to be managed at detailed design stage. Vehicle access routes cross-checked against data provided by Highways England to identify any crossings with headroom or weight restrictions. Land required for construction of the Proposed Scheme increased around sensitive areas to reduce risk to members of the public. Stakeholder engagement/community consultation will elaborate where works are occurring and what	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
			Tunnelling activity results in structural damage to or collapse of buildings and/or infrastructure.	stakeholders can do if they have a grievance. A mechanism will be in place to address any grievances raised. In particular, it is expected that Notices to Mariners will be issued by Peel Ports to the Masters of vessels using the canal to advise on required minimum air draught clearances from the canal to the viaduct construction. A CoCP and necessary management plans, LEMP will be in place to control potential environmental impacts of construction works. These will include for instance use of best practicable means for vibration prevention and reduction, crane operation and lifting procedures etc.		
C11	Member(s) of public using an existing station that is being modified.	Mismanagement of passenger flow around areas of construction causing interface of member(s) of public with construction activities.	Injury or fatality to member(s) of public.	Managed via CDM - Risks assessed and managed as part of ongoing design development and construction planning. Consultation will be held with Network Rail and other rail service providers where there is an interface with the land required for construction of the Proposed Scheme in order to define appropriate risk management. Construction planning/sequencing and site controls, to be in place. Physical construction barriers/hoarding to separate members of the public and Network Rail staff from construction works. Appropriate construction boundary distances to be used to allow adequate construction working space. A CoCP and necessary management plans, including LEMP will be in place to control potential environmental impacts of construction works, including how community relations	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				will be managed and requirements for traffic management. Stakeholder engagement/community consultation will elaborate where works are occurring and what stakeholders can do if they have a grievance. A mechanism will be in place to address any grievances raised.		
C12	Fatality/injury to member of public i.e. pedestrians, equestrians, Network Rail train occupants and operatives on Network Rail mainline.	Construction activity and traffic above/adjacent to areas members of the public are present, causing items falling from height etc.	Fatality/injury to member(s) of public.	Managed via CDM - Construction planning/sequencing and site controls to be in place. Construction sequencing to be further developed during detailed design. Consultation with Network Rail, other rail service providers/operators, local authorities, utility providers, Hanson and Peel Ports to identify key areas of interface and identification of control measures, for instance use of possessions/closures/diversions, as well as clear signage and routing. Station evacuation strategy, and station fire strategy to identify rendezvous points and through routes. HS2 Ltd's Supply Chain Health and Safety Standard states: 'There are a number of legal agreements in place to facilitate works for the Proposed Scheme whilst protecting the interests of Network Rail. These agreements and Network Rail's standards provide the framework for notifying and planning activities and scopes of work. All members of our supply chain will comply with these agreements. Our supply chain is also expected to cooperate with us, as we will act as the initial contact for all activities planned with Network Rail'.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				Physical construction barriers/hoarding to separate members of the public and Network Rail staff from construction works. Appropriate construction boundary distances to be used to allow adequate construction working space. Network Rail level crossings to be manned during possession of Network Rail lines when operations are affected by the construction of the Proposed Scheme. 1.8m high parapets provided over bridges to reduce likelihood of contact with overhead line equipment (OHLE). A CoCP and necessary management plans, including LEMP will be in place to control potential environmental impacts of construction works, including how community relations will be managed and requirements for traffic management. Stakeholder engagement/community consultation will elaborate where works are occurring and what stakeholders can do if they have a grievance. A mechanism will be in place to address any grievances raised.		
C13	Increased risk associated with neighbouring hazardous facilities.	Construction requires closure /diversion of an emergency response route making routes inaccessible to emergency services to deal	Fatality/injury to member(s) of public Delay to emergency response leading to fatality/injury to member(s) of public. Irreversible damage to environmental receptor (listed	Managed via CDM - Consultation with the Health and Safety Executive, local authorities and utility providers to understand locations of hazardous sites/assets. Information fed into design and definition of required mitigation. Early engagement with emergency services and operators of affected facilities to be undertaken so that emergency response strategies can be revised, if required.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		with incident and/or those evacuating. Construction traffic causes/ exacerbates congestion on emergency response routes causing delays to emergency service response to deal with incident and/or evacuation of a hazardous facility. Accidental construction impact on major hazard assets (such as pipeline), increasing risk of major accident occurring.	building, ecological site, watercourse etc.).	Appropriate diversions/alternative routes and access points to be identified, communicated and agreed with the relevant parties and implemented. All major utilities that interface with the Proposed Scheme infrastructure to be diverted away from the Proposed Scheme prior to commencing early works, where possible and appropriate to do so. Overarching controls outlined in the draft CoCP which states that route-wide, local area and site-specific traffic management measures will be implemented during the construction of the Proposed Scheme on or adjacent to public roads, bridleways, footpaths and other PRoW affected by the Proposed Scheme as necessary.		
C14	Damage to designated environmental receptor.	Construction activity results in damage upon statutory designated or	Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Managed via CDM - So far as is reasonably practicable, the route of the Proposed Scheme avoids existing designated environmental features. The draft CoCP sets out measures to reduce potential impacts to water resources and ecological resources.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		locally important ecological site.		Incident management plans developed and communicated sufficiently early enough to influence construction phase plans regarding locations of evacuation/emergency refuge areas which avoid designated environmental receptors.		
C15	Airport related incident.	Construction activity results in incident affecting airport infrastructure, or approaching/ departing flights. Construction activity results in creation of new bird flight paths and increased risk of bird strike through location/ construction of attenuation ponds, mitigation planting or topsoil stripping.	Aircraft incident results in fatality/injury to member(s) of public. Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Managed via CDM - Consultation throughout development of design with Manchester Airport, to identify key risks and agree appropriate control measures. An aerodrome safeguarding assessment will be undertaken at later design stages. Balancing pond designs, where necessary, will seek to avoid requirement for new, open permanent water features related to the Proposed Scheme. A wildlife hazard impact assessment is being undertaken for Manchester airports in line with CAP772. Once complete, the findings will be shared with each respective airport to identify and agree appropriate actions to minimise any identified risks resulting from the Proposed Scheme. An assessment including obstacle limitation surface of cranes and plant to be used within the land required for construction of the Proposed Scheme will be undertaken at later design stages.	No	Mitigation to achieve ALARP will be fully defined as part of the detailed design stage. The CDM Regulations and the aerodrome safeguarding assessment require the risks associated with the design and construction of the Proposed Scheme to be identified, planned and managed from start to finish. Aerodrome safeguarding assessment, wildlife hazard impact assessment, and assessment of obstacle limitation surface of cranes and plant will be undertaken to inform the detailed

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
						design and appropriate mitigation measures.
C16	Release of and/or exposure to harmful materials during excavation.	Presence of buried harmful materials.	Uncontrolled release and exposure of members of the public to harmful material.	Managed via CDM – Consultation with the Environment Agency, local authorities and owners/operators of landfills (including Network Rail) to understand information relating to the landfill locations, nature of the waste deposited and the integrity/construction design of the landfills and associated infrastructure to feed into the detailed design of the Proposed Scheme and definition of required mitigation. Desktop surveys will be undertaken to identify locations where asbestos may be present (e.g. landfills, fly-tipping). Asbestos surveys will be undertaken by specialist surveyors and the removal of any identified asbestos will be undertaken by a licensed contractor. Construction personnel will be aware of the risk of encountering asbestos and appropriate management plans will be in place including, sealing off the work area to the general public and monitoring of asbestos levels in air and dust. Stakeholder engagement/community consultation will elaborate where works are occurring and what stakeholders can do if they have a grievance. A mechanism will be in place to address any grievances raised. As stated within the draft CoCP, 'Wherever reasonably practicable, the nominated undertaker will endeavour to identify recorded locations of carcass burial sites within the construction site and to mitigate risks associated with the existence of any unrecorded sites. This will include	No	Mitigation to achieve ALARP will be fully defined as part of the detailed design stage. Further information to be gathered to inform the detailed design and mitigation measures in relation to landfill sites in accordance with CDM.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				obtaining locations of recorded burial sites from the Animal and Plant Health Agency and the establishment of a protocol for procedures in the event that an unexpected/unrecorded burial site is discovered'.		
OM1A	Train derailment or collision (on HS2 mainline).	Object on the line including unauthorised third-party access, animals, vehicle incursion, falling trees, landslide material or other material causing HS2 train derailment. Bridge strike causing HS2 train derailment. Vandalism/ terrorism incident (including cyber-attacks) causing HS2 train derailment. Failure of safety critical functions and control systems, including that caused by cyber terrorism	Off-track and outside boundary derailment causing severe disruption to rail transportation, major accident causing injury/fatality to Network Rail staff, passengers and adjacent receptors. Severe disruption to rail transportation, major accident resulting in fatality/injury to member(s) of public, to Network Rail staff/passengers and adjacent receptors. Spillage of pollutants resulting in irreversible damage to an environmental receptor. Off-track and outside boundary	Risks identified and managed via CSM-RA - See Volume 3, Route-wide effects, Section 11 which states the measures in place, required by legislation, to manage all train accident risks, in accordance with the CSM-RA. Measures have to be accepted by the regulator to manage risks to be ALARP in order for licence to be granted. Consultation with Network Rail regarding any interface with their network. All interfaces to be defined and all issues addressed/mitigated for. Proposed Scheme to comply with industry design and safety standards, including line side features and vegetation planting/maintenance regimes, and where necessary demonstrate other means of mitigating risk from hazard. Design for clearance, signage, bollards to mitigate bridge strike. All new infrastructure designed would be subject to detailed design and safety audit processes to seek to minimise the risk of derailment. Use of derailment containment measures where reasonably practicable. High integrity of safety critical functions required in reference and detailed design. Any safety critical system must have a Safety-Integrity-Level. Desk study and geotechnical investigation undertaken to highlight specific locations of below ground risk/hazard and inform design and construction methods used for the	No	Mitigation to achieve ALARP will be fully defined as part of the detailed design stage. The rail safety regulations and standards outlined in Section 2 require the risks associated with the operation and maintenance of the Proposed Scheme to be identified, planned and managed. Risks associated with the operation of the wind turbines on the Crewe to Lily Lane leg identified and to be taken into account in the detailed design. Construction of NPR railway over and in close proximity to operational HS2 railway assumes a reasonable worst case

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		leading to train failure, runaway train, rolling stock failure, signal failure, or mismanagement of train services causing HS2 train derailment or collision. Risk of EMI from airport air traffic control equipment and radar causing interference to HS2 signalling and train control systems. Human factors, including driver error, leading to HS2 train travelling at wrong speed, in wrong direction; signalling errors, mismanagement of train services, bright lights from vehicles on access track leads to unsafe decision, and points wrongly	derailment involving maintenance train travelling at low speed, but potentially carrying flammable fuel.	Proposed Scheme, including any further mitigation that may be required. Design to appropriate environmental parameters (wind, water etc.), including climate change. Consider human factors throughout design. Include requirement for provision of adequate barriers/protection in compliance with industry standards at overbridges and parallel roads to protect railway from incursion by objects or vehicles. Limit track gradients in accordance with National Technical Specification Notices (NTSN). Manage vegetation in accordance with NTSN maintenance requirements. Track bed interfaces have been designed to include stiffness strengthening or sub-base improvement under ballast track at approaches to slab track structure. Minimise use of switches and crossings. Use of single, unified and modern signalling system on the Proposed Scheme network. Earthing and bonding at sub-stations and other at-risk locations (lightning risk assessment). Grid supply point and auto-transformer feeder station locations have been moved outside of floodplains and adequate space has been allocated between the Proposed Scheme and the strategic road network for protection measures. Ensure integrity of safety related power systems. Suite of design considerations related to monitoring and control of electrical infrastructure. Monitor electrical infrastructure and manage asset information. Appropriate rolling stock design standards employed, ensuring resilience to object incursion at the Proposed		of derailment of HS2 trains.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		set causing HS2 train derailment or collision. Interfaces with existing railway. Ground collapse/ settlement/ landslide leads to track deformation causing HS2 train derailment. Track defects including due to vandalism, inadequate drainage, and inadequate maintenance and monitoring of settlement causing HS2 train derailment or collision.		Scheme operating speeds. Adequate braking specifications as requirement/design consideration. Real time monitoring and integrated communication for rolling stock. Real time monitoring and integrated communication takes account of speed, headway conditions and performance and safety requirements. Safe system of working to be in place. Staff training for the operation and maintenance of the Proposed Scheme. Sufficient resources to be in place. Operation and maintenance (OandM) manuals to be robust, complete, communicated early and maintained. To ensure these consider cyber-crime and viruses. Good asset information practice and high integrity of configuration control, data links and protocols. Appropriate back up procedures. Integrity of communications and processes. Where appropriate, an increased working area has been provided in the design in order that any future third party works in close proximity to the Proposed Scheme, are minimised. HS2 signalling and train control systems will comply with relevant electromagnetic compatibility (EMC) standards i.e. BS EN 50121 parts 4 and 5. HS2 signalling and train control systems will be designed and installed applying good EMC engineering practice as specified in the HS2 EMC Strategy. Engagement with Manchester Airport Group (MAG) is ongoing to better understand the transmission power and operating frequency of Air Traffic Control (ATC) and radar equipment used. This information will be used to identify		

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				whether additional, specific, design and/or installation measures will be required.		
OM2	Train derailment or collision (on Network Rail mainline).	HS2 interface with the existing railway incorrectly managed/ incompatibility resulting in HS2 train collision or derailment. Driver error in transition from HS2 mainline to Network Rail mainline causing train collision. Flooding of Network Rail mainline causes HS2 train derailment. Presence of overbridges. HS2 trains using conventional network not compatible.	Off-track and outside boundary derailment of a non-HS2 train (including freight), or a HS2 train using the conventional rail network. Severe disruption to rail transportation, major accident causing injury/fatality to Network Rail staff/passengers and adjacent receptors. Spillage of pollutants.	Mitigation measures listed for risk OM1A are relevant. Additionally: Interface with the existing railway is included in the CSM-RA. The Proposed Scheme must comply with Network Rail Standards to be allowed on the conventional network. Compatibility must be ensured. Human factor assessment and processes developed to prevent driver error. HS2's Supply Chain Health and Safety approach states: 'We expect our supply chain to comply with the CSM-RA. This will provide assurance that changes made to Network Rail's infrastructure in support of HS2 are safe to operate and maintain, interoperable and comply with relevant legislation. For the new railway we are required to comply with: • technical specifications of interoperability and relevant notified national technical rules; and • the common safety method on risk assessment and evaluation'.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.
OM3	Major road traffic incident.	Presence of new infrastructure (e.g. new junctions,	Fatality/injury to motorist(s)/non-motorised user(s) or	The traffic and transport sections in the ES, Volumes 2, 3 and 5, describe the baseline environment. Traffic surveys are undertaken for all roads with the potential to be	Yes	Considered to be ALARP if all mitigation

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
		alignments, cuttings etc.) causes driver confusion/error leading to major road traffic incident. HS2 infrastructure or passing HS2 train causes visual distraction to road users leading to major road traffic incident.	other member(s) of public.	affected by the Proposed Scheme supplemented by other available data. The Transport Assessment (Volume 5: TR-001 – TR-003 and TR-005) also considers public transport (buses) and non-motorised users on PRoW and cycle paths. There will be no significant effects on accidents and safety risk as there are no locations where there are both existing accident clusters and substantial changes in traffic due to the operation of the Proposed Scheme. Further detail is provided in traffic and transport section of the ES, Volumes 2, 3 and 5. Stage 1 Road Safety Audit undertaken with no road safety related issues identified. Road realignments and new road alignments designed in accordance with design codes and in consultation with Highways England and local authorities. Junction improvements to be designed for expected traffic flows as required. Barriers to be installed to mitigate glare and visual distraction risk, along with errant vehicle protection to shield view where road and rail are immediately adjacent. Vehicle restraint systems to be installed in accordance with relevant standards. Where necessary, the design has sought to minimise crossings/conflict with the Proposed Scheme, reducing risk of vehicle intrusion. Segregation made for service and private vehicles to the on-site access roads and service areas where practical (e.g. central concourse). Appropriate signage and road markings.		measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
				Risk to public road users addressed via consultation on design with Highways England, and subsequently through design, including seeking to increase distances between merging lanes at adjacent junctions. Engagement with Highways England with regards to the operation of the ventilation shaft to ensure active traffic management is used to inform drivers of the potential hazard. Any smoke from the ventilation shaft will be discharged vertically and away from the M56 motorway. In addition, barriers installed along the corresponding section of M56 motorway will prevent the smoke layer from drifting directly onto the motorway. Landscape mitigation proposals avoid impact on 'lines of sight'. All new infrastructure designed would be subject to detailed design and safety audit processes to seek to minimise the risk of accidents. Stopping distances and sightlines of highways to be checked post-construction and modifications proposed as necessary. Provide sufficient headroom clearance at structures. Overbridge piers to be located with sufficient lateral clearances to carriageway/railway and underbridges to have 5.7m minimum headroom clearance. An operational work force travel plan will be implemented to manage travel demand. Pedestrian routes to stations identified. During maintenance, traffic management to be implemented. Alternate locations for equipment in need of maintenance to be considered away from the strategic road network.		

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OM4	Collapse of structures leading to non-train incident.	Bridge strike by train or other vehicle causing collapse of structures, such as overbridges Inadequate design/poor quality of materials of non-HS2 structures causing structural failure.	Fatality/injury to member(s) of public (pedestrians, cyclists or road users etc.) using crossing or over/under structure. Damage to property/ infrastructure.	Desk study and geotechnical investigation undertaken to highlight specific locations of below ground risk/hazard and inform design of the Proposed Scheme. Impact avoidance or appropriate remedial measures employed to mitigate any ground hazards that cannot be avoided. Structures designed and maintained in accordance with standards. Ensure structures are sited and designed in consideration of environmental conditions including flood risk and climate change (including snow fall). Seismic basis of design will be in place for the Proposed Scheme materials and design to be of sufficient quality for HS2 operating conditions (including monitoring and maintenance). Design for clearance, signage, bollards to mitigate bridge strike. Incident response procedure in place for bridge strike.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.
OM6	Fire and/or explosion, either direct or indirect harm.	Depot activities trigger fire/explosion. Fire in or adjacent to HS2 facilities.	Drift of fire to/from facility (e.g. depot, Ardwick Box Structure) associated with the Proposed Scheme. Damage to property. Irreversible damage to environmental receptor (listed building, ecological site etc.)	The CSM-RA mitigates the risk of fire to be ALARP. The design of the Proposed Scheme has sought to limit works in proximity to below ground hazards that could cause a source of fire/explosion as far as reasonably practicable. Ground investigation, LiDAR and InSAR surveys undertaken, along with installation of instrumentation to monitor ground movements and identification of trigger values and responses to breaches. Tunnels/buildings have been designed to relevant standards so that any system and operational response is coordinated including HS2's fire strategy and provision for	No	Mitigation to achieve ALARP will be fully defined as part of the detailed design stage. Mitigation measures to be defined in accordance with CDM for hazard storage near HS2 alignment - Hole House Farm. Engagement to be undertaken to establish location and

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
			Fatality/injury to member(s) of public.	evacuation/emergency escape passages and emergency refuge areas. Evacuation strategy to be developed. Assessment of ventilation and heating/cooling requirements in tunnels/buildings as a design consideration. Heating, ventilation, and air conditioning equipment to be designed for appropriate environmental conditions. Tunnel vent to be designed for appropriate range of conditions. Design consideration to include detection and inspection for degradation of tunnels. A fire risk assessment must be carried out under legislation, to ensure the safety of the occupants of tunnels and those in the immediate vicinity who are at risk. A fire management strategy will be drawn up during detailed design in line with the NTSN. Fire and emergency response equipment and systems will be in place. Design reviews undertaken with local fire and rescue services in development of fire strategies. The fire safety objectives of the Proposed Scheme include the protection of the environment. Any drainage contaminated by firefighting operations will be discharged into a balancing pond and discharged safely in agreement with the Environment Agency, avoiding sensitive environmental receptors. The point of discharge for the balancing ponds into the wider water environment would be agreed with either the Environment Agency, Lead Local Flood Authority, Internal Drainage Board and any other relevant stakeholders as necessary.		cavern size, extents and conditions proximal to the Proposed Scheme and mitigation measures defined.

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				Ensure adequate isolation of power is available. Trains will be electric (except maintenance), removing the need to carry fuel. Maintenance trains are diesel fuelled, but do not carry other flammable materials. They travel at low speed and do not share track with passenger trains at the same time. The Proposed Scheme shall not carry hazardous (combustible/explosive) freight. However, it is expected that off-route sections associated with the Proposed Scheme will carry freight (which could carry hazardous materials), alongside HS2 services. However, in these instances freight will be carried on Network Rail owned and operated infrastructure, and as such falls under Network Rail's operating licence and safety plans. No significant quantities of fuel etc. will be stored in maintenance depots. Ensure HS2 Ltd is a statutory consultee on neighbouring activities that have the potential to increase the risk of fire and/or explosion. Working with stakeholders in immediately adjacent facilities to ensure a 'joined up' fire strategy, i.e. with Network Rail. Railway systems fire strategy and system design updated to incorporate the section of track that includes Ardwick Box Structure. Tunnel Systems will be designed such that any system and operational response is coordinated.		
OM7	Extreme weather (e.g. flood, drought, heat wave,	Presence of infrastructure associated with the Proposed Scheme	Worsened extreme weather impact leads to fatality/injury to	Rivers and watercourse crossings i.e. viaducts, bridges and culverts are designed to accommodate 1 in 100 (1%) annual probability flood plus climate change for the 2080s as defined by Environment Agency guidance on Flood risk	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

ID	Risk event	Hazard sources and/or pathways	Reasonable worst consequence if event did occur	Embedded mitigation	Is this ALARP with embedded[22] mitigation?	Clarification
	snow, high winds).	leads to alteration of flood patterns. Insufficient storage within existing storage ponds leads to flooding. Flooding of realigned roads in cutting, underpasses or subways. Adverse weather causes failure of HS2 earthworks leading to landslides. Existing flood defence failure leads to flooding.	member(s) of public Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.). Damage to property/ infrastructure. Pollution of groundwater/ surface water.	assessments: climate change allowances. The Proposed Scheme will be protected against flooding from any source during the current 1 in 1,000 (0.1%) annual probability flood, with water levels not rising closer than 1m to the top of rail level. The drainage infrastructure is designed to ensure that no increases in surface water runoff occur from the footprint of the Proposed Scheme, including an allowance for increases in peak rainfall intensity predicted to occur due to climate change for the 2080s. All river, watercourse crossings and drainage infrastructure will be operated and maintained in accordance with the procedures outlined in the Water resources and flood risk, Draft operation and maintenance plan (Volume 5: Appendix WR-007-00000). This plan includes the principle that the drainage system will operate without blocking. The plan will be further developed as the design of the Proposed Scheme advances and specific measures will be incorporated through Drainage Management Plans etc. to address this principle. Infrastructure has been located outside of floodplains, where practicable. The floor level of any ancillary infrastructure located partially within floodplain will be raised. Flood compensation areas identified, and flood defences implemented where necessary. Distances from key infrastructure to watercourses taken into account during design.		

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				Span arrangements balanced against environmental and constructability considerations to minimise the number of piers in the flood zone. Design structures for high winds, including provision of barriers where necessary. Protection, monitoring and aftercare management of reinstated areas and created habitats, including remedial works as required. Climate change resilience assessment and in-combination climate change impact assessment undertaken. Results and existing/embedded mitigation (resilience measures) presented in Volume 3 Route-wide effects and Volume 5: Appendix CL-002-00000. Resilience measures to be implemented through the design process and/or during the construction and operational stages of the Proposed Scheme address potential climate change impacts identified so that all climate change risks assessed low or medium with no additional resilience measures recommended.		
OM13	Fatality/injury to member of public i.e. pedestrians, equestrians, Network Rail staff.	Flooding Object falling from infrastructure or object falling off train (including during high winds) strikes member of the public.	Fatality/injury to member of public.	Proposed Scheme design has taken into consideration extreme weather events, including climate change. The sizing of culverts will be based on modelling and compliant with HS2 standards for design. Documented records detailing HS2 assets on Network Rail infrastructure and vice versa to ensure appropriate planning of maintenance work, including the implementation of safe systems of work.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.
OM14	Fatality/ injury to member(s) of public associated with	Visual obstructions due to the Proposed Scheme on approaches to	Fatality/injury to member(s) of public.	There are no level crossings included as part of the Proposed Scheme design. However, it is expected that off-route sections associated with the Proposed Scheme will pass level crossings. As level crossings exist on Network	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

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	use of level crossings on Network Rail infrastructure.	existing Network Rail level crossings. Increased frequency of use of existing Network Rail level crossings as a result of the Proposed Scheme.		Rail owned and operated infrastructure these will continue to be managed under Network Rail's operating licence and safety plans. Risk Assessments will be undertaken by Network Rail to ensure that risks to level crossing users are minimised.		
OM15	Emergency response impacts on designated environmental receptors.	Incident management plans focus on the safe evacuation of passengers and staff and have the potential to have an adverse effect on local receptors near an incident.	Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Incident management plans developed and communicated sufficiently early enough to influence design regarding locations of evacuation/emergency refuge areas. These should include consideration of the local environment and community. Locations of designated environmental receptors and their conservation status, and any avoidance, funnelling of dispersal, clean up and containment measures etc. should be considered in the plans. Ensure that operational personnel are briefed, and sufficient resources are in place. Relevant stakeholders to be involved in developing and have awareness of incident response plans. Incident management plans are maintained and audited. Integrity of communications and processes in event of incident.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.
OM16	Exposure to live conductor/ arcing.	Working railway corridor electrification hazard/inadvertent contact with live conductor by	Fatality/injury to member(s) of public/Network Rail staff.	Earthing and bonding undertaken in line with relevant industry standards. Earthing and Bonding strategy in place and testing will be carried out. 1.8m high parapets provided over bridges to reduce likelihood of contact with OHLE.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

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		member of public/Network Rail staff.		Supervisory control and data acquisition (SCADA) system. Return Screening Conductor System is installed. Isolation and earthing procedures in place. Provision of a secure barrier/separation between OHLE and members of public. OHLE designed to appropriate parameters, including adverse weather and climate change. OHLE to have sufficient protection from flashover. Risk assessment of the proximity of the Overhead Catenary System (OCS)/Pantograph to the extended platform at Carlisle Station.		
OM17	Impact upon emergency response/ evacuation procedure, including for hazardous facilities.	Permanent closure/diversion of an emergency response route making routes inaccessible/delaying response time for emergency services to deal with incident and/or those evacuating. Inadequate spacing between emergency access/egress points in tunnels causes delay to those responding	Delay to emergency response leading to fatality/injury to member(s) of public. Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Consultation with the emergency services, Transport for Greater Manchester and owners/operators of hazardous facilities, Health and Safety Executive, local authorities and utility providers to understand locations of hazardous sites/assets, with mitigation incorporated into design as appropriate. Operational conflicts to be avoided or minimised where possible. Early engagement with emergency services and affected sites so that emergency response strategies can be revised, if required. Permanent diversions/alternative routes to be identified, communicated and agreed with the relevant parties and implemented. Traffic-related effects in relation to Major hazard sites are outlined in Table 1 above.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.

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		to an incident/those evacuating.				
OM18	Airport related incident.	Electromagnetic interference with aircraft navigation and control systems and emergency channels/ response, leading to aircraft related incident or delay in emergency response. Presence of a balancing pond/mitigation planting attracts large flock forming birds, increasing the risk of bird strike, subsequently increasing the risk of an aircraft related incident.	Aircraft incident results in fatality/injury to member(s) of public and/or irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.). Pollution of groundwater/ surface water receptors because of release of contaminants.	Consultation throughout development of design with airports, including Manchester Airport and NATS, to identify key operational risks and agree appropriate permanent control measures. Airport safety requirements integrated into detailed operational design. Balancing ponds used to avoid requirement for permanent water features related to the Proposed Scheme. Balancing ponds and water treatment areas are to be below ground tanks or planted wetlands to minimise the risk of / the presence of large flock forming birds. A wildlife hazard impact assessment is being undertaken for Manchester airports in line with CAP772. Once complete, the findings will be shared with each respective airport to identify and agree appropriate actions to minimise any identified risks resulting from the Proposed Scheme.	Yes	Considered to be ALARP if all mitigation measures outlined are correctly implemented.
OM19	Electromagnetic interference.	Failure of safety critical functions and systems	Severe disruption to rail transportation.	Signalling and telecommunications designs have and will continue to follow the appropriate standards to mitigate the risk of failure of safety critical functions and systems.	Yes	Considered to be ALARP if all mitigation

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		(control systems etc.), including cyber terrorism leading to train failure, signal failure, runaway train, failure in controlling the train service, high winds.	Major accident causing injury/fatality to Network Rail staff, and adjacent receptors, Spillage of pollutants.			measures outlined are correctly implemented.

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