In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix EM-001-00000

Electromagnetic interference

Affected receptors within 50m of railway and associated risks and mitigation

M151

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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 electromagnetic interference assessment described in the Route-wide effects report (Volume 3) of the Environmental Statement (ES) for the Proposed Scheme. It documents the potential risks to electrical equipment and human health resulting from the generation of electromagnetic fields from the Proposed Scheme. The Proposed Scheme will pass through the following Community Areas (CA):

- Hough to Walley's Green (MA01);
- Wimboldsley to Lostock Gralam (MA02);
- Pickmere to Agden and Hulseheath (MA03);
- Broomedge to Glazebrook (MA04);
- Risley to Bamfurlong (MA05);
- Hulseheath to Manchester Airport (MA06);
- Davenport Green to Ardwick (MA07); and
- Manchester Piccadilly Station (MA08).

1.1.2 This appendix should be read in conjunction with the Environmental Impact Assessment Scope and Methodology Report (Volume 5, CT-001-00001) and the Route-wide effects report (Volume 3).

1.1.3 Electric and magnetic fields are produced wherever electricity is used. The electric field is produced by voltage and the magnetic field by current. Electromagnetic fields (EMF), which refers to both electric and magnetic fields, can cause three types of effect:

- interference to electric and electronic equipment. This is called electromagnetic interference (EMI) and is the disturbance that affects an electrical system due to magnetic and electric fields, electromagnetic induction or electromagnetic radiation emitted from an external source;
- the potential to cause harmful effects in the human body through EMF; and
- the creation of induced voltages in metallic infrastructure where there is parallel running for a significant distance e.g. the Proposed Scheme running parallel and close to overhead electric power lines or metallic fences.

1.1.4 Electromagnetic Compatibility (EMC) is the ability of equipment to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to other equipment in that environment.

1.1.5 The principal source of EMF will be the traction power supply system which will power trains. Emissions from trains, signalling and communication systems and electrical and mechanical systems generally only affect the internal railway operating system and are therefore not considered further as having a wider potential effect.

1.1.6 Measurement boundaries are used throughout this report that correspond with the EMC Zoning Principle described in Network Rail standard NR/L2/RSE/30041 Electromagnetic Compatibility (EMC) Assurance Process[1].

[1] National Rail Standard (2012), *Electromagnetic Compatibility (EMC) Assurance Process NR/L2/RSE/30041,* 2nd Edition.

2 Policy and standards

2.1.1 There are no planning policies that specifically refer to EMI in any of the local development frameworks; however British and European standards exist which set limits and levels of disturbance for equipment and safe limits for exposure. The Proposed Scheme will comply with these standards.

2.1.2 The relevant British Standards and European Directives applicable to the emission and control of EMF are set out in the Route-wide effects report (Volume 3).

3 Assessment

3.1 Scope

3.1.1 A desk-top survey of the route of the Proposed Scheme was undertaken to identify any potentially sensitive sites within a 50m corridor either side of the centre of the nearest HS2 track and overhead line electrification.

3.1.2 The primary causes of EMI and EMF will come from the traction power distribution and overhead line electrification. The level of EMF diminishes rapidly with distance from the source, so the extent of any interference or harmful effects will be limited to only a short distance horizontally and vertically from the railway boundary or the boundary of any traction power sub-station or switching station. A 50m corridor was selected to identify all potential receptors within that area to demonstrate that the level of risk will be limited to a much shorter distance from the railway.

3.1.3 The assessment included receptors outside of the 50m corridor which were identified as having very sensitive electrical equipment or systems, which could be at risk of EMI. Receptors outside the 50m corridor were only considered where a significant risk was identified due to them having very sensitive equipment or systems.

3.1.4 Typical receptors identified by the study include residential zones, commercial zones, the current National Grid infrastructure and existing railways.

3.1.5 Infrastructure running parallel to the Proposed Scheme for any significant distance that may be susceptible to the effects of induced voltages was also identified. This included other railway infrastructure, metallic fences, pipelines, overhead power cables and telecommunications cables on motorways, where these assets are within 200m either side of the centre of the nearest track and overhead line for the Proposed Scheme. The infrastructure considered in this assessment is representative of the expected different types of utilities and nature of the EMI interactions of these with the Proposed Scheme.

3.1.6 Preliminary traction power modelling was undertaken which has identified proposed electromagnetic emissions data along the route of the Proposed Scheme[2]. This preliminary electromagnetic emissions data has formed the basis of the EMI risk assessment for the Proposed Scheme, to identify those receptors that may be at risk of EMI. HS2 Ltd will comply with BS EN 50121[3] series, which places limits on the maximum emissions at the railway boundary.

[2] EMC Strategy (2013), *C240-PBR-DS-STR-000-000001, Appendix A2*, pp.43-58.

[3] British Standards Institution (2017), *Railway applications - Electromagnetic Compatibility*, BS EN 50121 series.

3.1.7 HS2 data for traction current levels generated by the traction power is based on estimated maximum power usage at typical locations along the route of the Proposed Scheme and has generated estimated EMF contour plots that show worst-case levels of EMF[4].

3.1.8 Modelling traction power is a complex process, which will continue through the detailed design stages of the Proposed Scheme. Actual levels of EMF emitted cannot be confirmed until the Proposed Scheme is operational. However, levels of emitted EMF are not anticipated to exceed those used for this assessment.

3.1.9 For receptors within the study area, the baseline data was tabulated. Once each potentially sensitive receptor had been identified, an assessment was undertaken for compliance with the International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines and applicable harmonised EMC standards to identify the level of risk to human health and EMI. Additionally, if required, potential mitigation for each site was identified.

3.1.10 The assessment considered both the construction and operational phases of the Proposed Scheme.

3.2 Baseline

3.2.1 The Proposed Scheme will:

- require demolition of a small number of commercial and residential properties that lie within the land required for construction. Of the properties that will remain, very few will be within 20m from the centre of the nearest HS2 track;
- cross or run adjacent to existing conventional rail routes;
- directly interface with conventional rail routes at a number of locations;
- run adjacent to and under existing National Grid overhead power lines; and
- cross or run adjacent to existing motorways; motorways often have telecommunication and data cables running underneath, which may be at risk of induced voltages.

3.3 Comparisons with other railways

3.3.1 High Speed One was the first high speed railway to be built in the UK and is a 108km railway between St. Pancras International station in London and the Channel Tunnel in Kent. Trains operate at speeds of up to 300km/h for much of its route. High Speed One has been operating along its full length since 2007.

3.3.2 The electrification systems of both High Speed One and the Proposed Scheme operate at 25kV and are fundamentally similar. Currently approximately 6,000 route km of the UK

[4] The traction power modelling which underpins the EMF contour plots used in this assessment was for the Phase One section of route on which a higher service level (18TPH) is proposed compared to that for the Phase 2b section (between 4 and 10TPH). Hence this should add a further level of conservatism into the assessment.

railway system is electrified and, whilst there are some differences in system configuration (e.g. autotransformer vs classic feeding), more than half of this is with 25kV overhead line electrification. Thus the EMI impact of the Proposed Scheme on neighbours is anticipated to be similar to these electrified routes.

3.4 Emission levels

3.4.1 The results of the traction power modelling[2] have identified estimated levels of EMF along the route of the Proposed Scheme and have been used in determining the level of risk for each receptor. The level of risk will depend on the receptor location in relation to track level, i.e. in a cutting, on an embankment or viaduct, or in a tunnel.

3.4.2 In any case, the Proposed Scheme will comply with the BS EN 50121 series, which places limits on the maximum emissions at the railway boundary, which are below the ICNIRP Guidelines (2010) levels for worker exposure to EMF and protection of health.

3.4.3 The modelling results referred to above indicate less than 10μT (microtesla) level of EMF at distances of between 7 and 10m from the centre line of the nearest track. This level is significantly lower than the 100μT ICNIRP guidelines (1998) recommendation for general public exposure at 50Hz.

3.4.4 Outside the boundary of land required for the operation of the Proposed Scheme, the levels of radiated electric fields generated from the traction power will not exceed the 5kV/m (kilovolts per metre) threshold within the ICNIRP guidelines, for 50Hz, with typical values around 20% of this value, and hence will have no adverse effect on human health.

3.4.5 Exceeding the EMF reference level does not necessarily mean that the prescribed basic restrictions have been exceeded. Where reference levels have been exceeded then mitigation measures will be provided.

3.4.6 The plots from the traction modelling[2] indicate a 3A/m (ampere per metre) level of emissions at approximately 20m horizontally from the centre line of the track. This value of the 3A/m limit for residential immunity specified in BS EN 61000-6-1 and suggests that there could be some electrical interference with susceptible electrical equipment inside this distance.

3.4.7 Results from the preliminary modelling[22] estimates a maximum induced voltage per unit length of approximately 30V/km at 20m from the centre of the nearest track. Therefore, there is potential for any conductor within 20m to exceed a 60V touch threshold if it runs parallel to the Proposed Scheme for over 2km. Similarly, between 20m and 50m from the centre of the nearest track, there is risk of induced voltages of over 60V where parallel running is over 3km. The allowable touch threshold will depend on the nature of the neighbouring utility (e.g. telecoms cables versus metallic pipeline), the proximity and length of parallelism to the Proposed Scheme.

3.4.8 Motorways may have telecommunication lines that could be susceptible to induced voltages, when the motorway runs parallel to the Proposed Scheme for a significant distance (typically more than 2km and up to 200m separation). For induced voltages to occur, the motorway

would have to have continuous metal cable, which is considered unlikely due to the significant operational problems that are encountered with exceptionally long cable lengths.

3.4.9 Where the Proposed Scheme runs in tunnel, there is unlikely to be any risk from EMF or EMI due to the tunnel depth below ground level, where this depth is greater than 25m.

3.5 Assessment of effects during construction

3.5.1 Construction machinery and plant, and associated communications (e.g. construction radios) will comply with the applicable standards for EMC. Therefore, when installed, operated and maintained correctly, the risk of this apparatus producing EMF that exceeds published limits for workers and the public or causing EMI is considered to be low.

3.5.2 Power supplies used for construction are generally not sufficient to cause a major EMI risk. Specialist tunnel boring machines will be used for the construction of bored tunnel sections; these will typically require a high voltage electrical supply, normally at 11kV. This will come from the local Distribution Network Operator to a purpose-built sub-station within the work area. Such supplies will have no significant risk to health as the levels of EMF are very low for credible separation distances between such cables and the general public (expected to be greater than 250mm).

3.5.3 All construction activities will be confined to local areas. Mitigation will be controlled by adherence to British and European standards, which will be mandatory for all installation contractors. In addition, as set out in the draft Code of Construction Practice (CoCP), the nominated undertaker and its contractors will consider the impacts of EMI on wireless telecommunication systems during construction of the Proposed Scheme. This will include site-specific impacts from the demolition of buildings and the installation of tower cranes, and where appropriate will employ best practice technology to ensure that levels of radio frequency interference associated with the Proposed Scheme are low and at acceptable levels.

3.5.4 It is therefore considered that there will be no significant effects on a route-wide basis associated with construction.

3.6 Assessment of effects during operation

3.6.1 The primary source of EMF during operation will be the traction power supplies generated at 25kV AC; the voltage and current generated in other electrical supplies are not high enough to cause significant EMF outside the railway boundary.

3.6.2 The levels of EMF emitted by the traction power will vary along the route of the Proposed Scheme and the maximum values will last only for a few seconds at a time. The levels at any particular location depend on a number of variables, for example:

- individual train performance at any particular instant i.e. whether it is accelerating, at constant velocity, braking or at rest;

- the number of individual trains in any one electrical section; and
- proximity to a traction feeder sub-station.

3.6.3 The effects of EMF rapidly diminish with distance from the source, both horizontally and vertically.

3.6.4 Preliminary traction power modelling has been undertaken by HS2 Ltd[2] and the worst-case values of predicted EMF have been used to estimate the levels of EMF at any particular location along the Proposed Scheme[4].

Effects of EMF on human health

3.6.5 The Proposed Scheme will comply with BS EN 50121 series, which places limits on the maximum emission at the railway boundary. These limits are below ICNIRP guidelines, which define acceptable levels for EMF exposure of the general public and workers to provide protection against known adverse health effects.

3.6.6 At distances of between 7 and 10m from the track centreline of Proposed Scheme the estimated levels of EMF are below 10% of the maximum values recommended by ICNIRP in relation to human health for magnetic field exposure at 50Hz. For electric field exposure, the estimated levels from the Proposed Scheme are approximately 20% of the limits.

3.6.7 Where bridges will pass over or under the Proposed Scheme, the level of EMF exposure may be higher than that at ground level, however it is unlikely to reach maximum threshold. The level of exposure is also likely to be of a transient and short-term nature (e.g. crossing a bridge in a vehicle or on foot).

3.6.8 It is considered that there will be no significant EMF effects on human health on a route-wide basis associated with operation.

Effects on electrical equipment due to EMI

3.6.9 It is possible that EMI risks may affect equipment at receptors within 20m from the centre of the nearest track or receptors with very sensitive electrical or electronic equipment. This distance will depend on the localised situation, for example it will depend on whether the Proposed Scheme is on a viaduct, in a cutting or tunnel. Where an EMI risk is identified, these receptors will be further evaluated during the detailed design stage and/or at testing and commissioning. Mitigation may be applied, for example in the form of replacement with less sensitive equipment or relocation of equipment where practicable.

3.6.10 Beyond 20m from the Proposed Scheme, the estimated levels of EMI are below the threshold for electrical interference for residential, commercial and light-industrial receptors (specified in BS EN 61000-6-1) and no risk has been identified.

3.6.11 The estimated levels of EMI are below the threshold for electrical interference for industrial receptors (specified in BS EN 61000-6-2), and no risk to these receptors has been identified.

3.6.12 Three third-party receptors beyond 50m from the Proposed Scheme have been identified which have very sensitive equipment or systems. These are Pickmere Radio Telescope, Manchester Airport and The Christie NHS Foundation Hospital. The assessment has identified a potential significant EMI risk to these receptors and on a precautionary basis a likely significant effect has been identified at these receptors. Further detail about these receptors is included in Section 4. HS2 Ltd is undertaking on-going engagement with the owners and operators of these facilities about their equipment to establish the electromagnetic sensitivity levels and risk of EMI. Any appropriate mitigation measures will be identified during on-going engagement.

3.6.13 In accordance with guidance from the Medicines and Healthcare Products Regulatory Authority, EMF generated from power lines is not considered to pose a significant risk to people with active medical implants including pacemakers[5]. Therefore, no potential significant impact on the operation of active medical implants is anticipated, provided the immunity performance is in line with the requirement of the applicable harmonised standards.

Other receptors

3.6.14 Where the Proposed Scheme will run close to an existing conventional rail route, any effects of EMC, EMI or EMF will be mitigated by complying with the BS EN 50121 and BS EN 50122 suite of standards. It may be necessary for HS2 Ltd to agree and implement specific design solutions with Network Rail to mitigate or eliminate the risk of EMI to the conventional rail network.

3.6.15 Induced voltages from the Proposed Scheme's overhead traction power could affect metallic infrastructure that runs parallel to the Proposed Scheme. For this to have a significant risk of interference, the infrastructure would have to run close to the Proposed Scheme and for a considerable distance, typically greater than 2km. Any potential interference risk identified at this stage will be considered further in the detailed design stage. It is anticipated that the interference risks would be localised.

3.6.16 Other effects, such as induced voltages and earthing and bonding issues associated with the interface with other railways and third parties such as utilities, will be mitigated through design and construction in compliance with British, European and industry standards and best practice. Where required, HS2 Ltd will agree design solutions with affected third parties such as Network Rail, Transport for Greater Manchester, National Grid and Highways England, where reasonably practicable.

3.6.17 Cathodic protection (CP) systems as used installed on neighbouring buried utilities such as some metallic pipelines could be affected by the Proposed Scheme. These risks will be considered further in the detailed design stage, and it is anticipated that the risk would be mitigated through application of British, European and industry standards and best practice.

[5] Medicines and Healthcare Products Regulatory Authority. Available online at: www.mhra.gov.uk.

Wildlife

3.6.18 The limited number of published studies addressing the risk of EMF to wildlife shows little or no evidence of a significant environmental impact. From current information the exposure limits in the ICNIRP guidelines for protection of human health are also protective of wildlife.

3.7 Climate change

3.7.1 The levels of generated EMF and EMI are dependent on the traction power, which has been calculated for a worst-case scenario based on the maximum trains running per hour. Any change in climate is unlikely to affect the output from the traction power and cause any significant increase in EMF or EMI.

3.8 Conclusions

3.8.1 It is considered that there are no significant effects on a route-wide basis associated with the construction of the Proposed Scheme, related to both risk of EMI to electronic equipment and systems, or risk to human health.

3.8.2 It is considered there are no significant effects to human health associated with operation of the Proposed Scheme.

3.8.3 A list of receptors that may be at risk from EMI is detailed in Section 4.

3.8.4 Receptors at potential risk from EMI (equipment immunity) are those residential and commercial buildings that will remain within 20m of the centre of the nearest track.

3.8.5 Within 20m, the levels of EMI emitted may cause some interference to sensitive electrical equipment. A further review will be undertaken at detailed design and/or testing and commissioning. Where electrical equipment is found to be adversely affected, initial mitigation would be to reposition the assets at the receptors locations, or if not possible, replace with less sensitive equipment.

3.8.6 Receptors at potential risk from induced voltages are infrastructure running close to and parallel for over 2km in length and include: other railway infrastructure, metallic fences, pipelines, overhead power cables and telecommunications cables on motorways. Representative examples of the infrastructure and utilities have been presented in Section 4, which cover the expected different types of utilities and the nature of the EMI interactions of these examples with the Proposed Scheme. Engagement with utility operators by HS2 Ltd is on-going to ensure that all relevant utilities are identified and assessed from an EMC perspective.

3.8.7 Where induced voltages have been highlighted as a risk, the risk will be mitigated by designing, building, operating and maintaining the Proposed Scheme to British, European and industry standards and best practice.

3.8.8 EMI risks have been identified for specific third party receptors which fall wholly, or partially, outside the +/-50m corridor used in the assessment. Three third-party receptors have been identified which have very sensitive equipment or systems where there is a potential significant EMI risk and where a likely significant effect has been identified on a precautionary basis. These are Pickmere Radio Telescope, Manchester Airport and The Christie NHS Foundation Hospital. These are also detailed in Section 4.

3.8.9 HS2 Ltd is undertaking on-going engagement with the owners and operators of these facilities to establish the electromagnetic sensitivity levels and risk of EMI. Any appropriate mitigation measures will be identified during on-going engagement.

4 Potentially affected receptors

4.1 Hough to Walley's Green (MA01)

Electromagnetic field exposure assessment (health immunity)

4.1.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 1: Potentially affected receptors within MA01 for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-872	ML 251+000 to ML 252+000	38.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-873	ML 251+000 to ML 252+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-874	ML 251+000 to ML 252+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA01-875	ML 252+000 to ML 253+000	40.8	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-877	ML 252+000 to ML 253+000	46.1	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-883	ML 252+000 to ML 253+000	37.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-898	ML 252+000 to ML 253+000	43.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-899	ML 252+000 to ML 253+000	48.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-928	ML 251+000 to ML 252+000	37.3	Detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-933	ML 252+000 to ML 253+000	38.1	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-934	ML 251+000 to ML 252+000	22.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-936	ML 252+000 to ML 253+000	45.8	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-945	ML 251+000 to ML 252+000	48.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-950	ML 252+000 to ML 253+000	43.3	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-965	ML 251+000 to ML 252+000	45.9	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-969	ML 252+000 to ML 253+000	48.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-972	ML 252+000 to ML 253+000	43.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-974	ML 252+000 to ML 253+000	49.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-979	ML 251+000 to ML 252+000	45.8	Detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-987	ML 251+000 to ML 252+000	41.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-997	ML 251+000 to ML 252+000	6.4	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA01-1022	ML 252+000 to ML 253+000	40.8	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-1024	ML 252+000 to ML 253+000	43.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-1025	ML 252+000 to ML 253+000	38.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-1028	ML 252+000 to ML 253+000	42.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-1030	ML 252+000 to ML 253+000	46.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA01-UTI-003	ML 248+000	35	Tele-communications Mast Asset owner: O2	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Receptor is located near tunnel approximately 35m horizontal distance from alignment and vertically 20.3m above alignment.
MA01-UTI-004	ML 252+000	2	Tele-communications Mast Asset owner: Vodafone/O2	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Receptor is located where HS2 scheme runs in a portal area. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. This asset is removed as part of the Proposed Scheme and replaced by MA01-UTI-009.
MA01-UTI-005	ML 253+000	26	Tele-communications Mast Asset owner: Vodafone	Commercial	BS EN 61000-6-1	3	<3	N	N/A	MA01-UTI-005 and MA01-UTI-006 are believed to be the same asset, with multiple mobile phone operators utilising the same mast.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										This asset is removed as part of the Proposed Scheme and replaced by MA01-UTI-012.
MA01-UTI-006	ML 253+000	31.15	Tele-communications Mast Asset owner: Not on plans	Commercial	BS EN 61000-6-1	3	<3	N	N/A	MA01-UTI-005 & MA01-UTI-006 are believed to be the same asset, with multiple mobile phone operators utilising the same mast. This asset is removed as part of the Proposed Scheme and replaced by MA01-UTI-012.
MA01-UTI-007	ML 253+000	37	Tele-communications Mast Asset owner: O2	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Unclear if MA01-UTI-007 & MA01-UTI-008 still exist, despite being shown on public utility records.
MA01-UTI-008	ML 253+000	42	Tele-communications Mast Asset owner: Not on plans	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Unclear if MA01-UTI-007 & MA01-UTI-008 (still exist, despite being shown on public utility records.
MA01-UTI-009	ML 252+000	19.16	Tele-communications Mast	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined	Shares the same distance from route

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			Asset owner: Not known		(worst case)				at design stage	centre line as MA01-UTI-0011. Receptor is located near where the HS2 scheme transitions from a tunnel to a portal and is approximately 20m horizontal distance from alignment and vertically 15.4m above alignment. Specific immunity of equipment to be determined at design stage to confirm whether mitigation is required. This is a new mast being constructed during the HS2 scheme, replacing MA01-UTI-004.
MA01-UTI-012	ML 253+000	46.4	Tele-communications Mast Asset owner: Vodaphone	Commercial	BS EN 61000-6-1	3	<3	N	N/A	This is a new mast being constructed during the HS2 scheme, replacing MA01-UTI-005 and MA01-UTI-006.

Electromagnetic interference assessment (induced voltages on cables and pipes)

Table 2: Potentially affected receptors within MA01 for electromagnetic compatibility assessment (induced voltages on cables and pipes)[6]

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-UTI-1020 – 1.88km	ML 249+000 to ML 251+000	54.8	Utility Asset owner: Instalcom Material (where known): Not available	Telecoms Cable	CCITT part VI	25 normal 430 fault	To be determined at design stage	N	N/A	Separation from HS2 > 50m and length of parallelism is < 2km Existing cable runs alongside WCML within 200m distance from the HS2 alignment. Crossover angle 0◦. This is an existing telecommunications cable, situated within the existing Network Rail railway assets through Crewe. It is proposed that the asset will be assured and retained during the HS2 scheme.

[6] The utilities shown in these tables are representative of the different types of utilities that the Proposed Scheme will interact with.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA01-UTI-903 – 5.76km	ML 250+000 to ML 257+000	50-31.9	Utility Asset owner: Instalcom Material (where known): Not available	Telecoms Cable	CCITT part VI	25 normal 430 fault	To be determined at design stage	Y	To be determined at design stage	Cable route extends the existing route alongside WCML within 200m distance from the HS2 alignment. Runs alongside existing 25kV electrified parallel route. Proximity between 20m-50m exceeds parallelism of 3km. Crossover angle 0◦. This is an existing telecommunications cable, situated within the existing Network Rail railway assets through Crewe and along the WCML. It is proposed that the asset will be assured and retained during the HS2 scheme.
MA01-UTI-986 – 6.12km	ML 251+000 to ML 257+000	50-43.2	Utility Asset owner: Vodaphone Material (where	Telecoms Cable	CCITT part VI	25 normal 430 fault	To be determined at design stage	Y	To be determined at design stage	Cable route extends the existing route alongside WCML within 200m distance from the HS2 alignment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			known): Not available							Runs alongside existing 25kV electrified parallel route. Proximity between 20m-50m exceeds parallelism of 3km. Crossover angle 0◦. This is an existing telecommunications cable, situated within the existing Network Rail railway assets through Crewe and along the WCML. It is proposed that the asset will be assured and retained during the HS2 scheme.
MA01-UTI-996 – 5.98km	ML 251+000 to ML 257+000	50-43.2	Utility Asset owner: Instalcom Material (where known): Not available	Telecoms Cable	CCITT part VI	25 normal 430 fault	To be determined at design stage	Y	To be determined at design stage	Cable route extends the existing route alongside WCML within 200m distance from the HS2 alignment. Runs alongside existing 25kV electrified parallel route. Proximity between 20m-50m exceeds parallelism of 3km.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Crossover angle 0◦. This is an existing telecommunications cable, situated within the existing Network Rail railway assets through Crewe and along the WCML. It is proposed that the asset will be assured and retained during the HS2 scheme.

4.2 Wimboldsley to Lostock Gralam (MA02)

Electromagnetic field exposure assessment (health immunity)

4.2.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 3: Potentially affected receptors within MA02 for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA02-007	ML 265+000	45.1	Detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA02-008	ML 266+000	35.8	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA02-011	ML 266+000	34.8	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA02-012	ML 266+400	43	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA02-013	ML 266+400	31	Domestic outbuilding	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA02-016	ML 267+000	16.8	Power Station / Energy Production	Industrial	BS EN 61000-6-2	30	<30	N	N/A	
MA02-021	ML 269+000	48.1	Tele-communication	Commercial	BS EN 61000-6-1 (as a minimum)	3	<3	N	N/A	
MA02-023	ML 269+000	32	Tele-communication	Commercial	BS EN 61000-6-1 (as a minimum)	3	<3	N	N/A	

Electromagnetic interference assessment (induced voltages on cables and pipes)

Table 4: Potentially affected receptors within MA02 for electromagnetic compatibility assessment (induced voltages on cables and pipes)[6]

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA02-UTI-1158 – 1.84km	ML 268+000 to ML 270+000	>46.2	Utility Asset owner: United Utilities Material (where known): Plastic	250mm diameter Potable Water mains	N/A	N/A	N/A	N	None required	Plastic pipe. Hence, not susceptible to EMI. Existing route runs alongside WCML within 200m distance from the HS2 alignment. Separation is between 20m-50m but parallelism is less than 3km. Crossover angle 0◦.
MA02-UTI-353 – 3.27km	ML 267+000 to ML 271+000	>50	Utility Asset owner: Cadent Gas Material (where known): Steel	300mm diameter High Pressure Gas pipeline (Asset ID No. HP40)	BS EN 50443	60 normal 1000 fault	To be determined at design stage	N	To be determined at design stage	Cable route extends the existing route alongside WCML within 200m distance from the HS2 alignment. Where its previous route spanned for 2.33km from ML 267+600 to ML 270+000. Within 200m of the route of the Proposed Scheme for 3.27 km, crossing HS2

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										lines at ML 268+000, ML 269+200 and ML 270+500. Crossover angle 20◦/20◦/30◦.
MA02-UTI-480 – 1.81km	ML 267+000 to ML 269+000	>50	Utility Asset owner: Scottish Power Energy Network Material (where known): Not available	33 kV Overhead Electricity Line	BS EN 50522	52 normal 320 fault	To be determined at design stage	N	To be determined at design stage	Cable route extends the existing route alongside WCML within 200m distance from the HS2 alignment. Within the 200m of the route of the Proposed Scheme for 1.81 km, crossing HS2 lines at ML 267+600 and 268+500. Crossover angle 45◦/30◦. This is an existing asset that is to be removed and diverted elsewhere as part of the Proposed Scheme.
MA02-CD-291	ML 267+000	0	Utility	New assumed metallic pipeline and cable link (fibre optic)	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	This receptor is a committed development [MA02/291] (see Volume 5. CT-004-00000. Planning data). Crosses the alignment with a crossover angle of approximately 60◦.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA02-CD-292	TBC	TBC	Mid Cheshire line extension to Manchester Airport	Railway Assets	BS EN 50122	60 normal 645 fault	To be determined at design stage	Y	To be determined at design stage	This receptor is a committed development [MA02/292] (see Volume 5. CT-004-00000. Planning data). Further information required to carry out detailed assessment at design stage. There is an interface with the existing Mid Cheshire line.
MA02-CD-293	MS 265+500	0	Crewe-Middlewich-Northwich line	Railway Assets	BS EN 50122	60 normal 645 fault	To be determined at design stage	Y	To be determined at design stage	This receptor is a committed development [reference MA02/293] (see Volume 5, Appendix: CT-004-00000, Planning data). Returning the Crewe-Middlewich-Northwich line to passenger traffic and consider opening new stations to serve this route at Middlewich and Gadbrook Park.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Crosses the alignment with a crossover angle of approximately 70◦. There is an interface with the existing Crewe-Middlewich-Northwich line.

4.3 Pickmere to Agden and Hulseheath (MA03)

Electromagnetic field exposure assessment (health immunity)

4.3.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 5: Potentially affected receptors within MA03 within the 50m band, for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA03-003	ML 274+700	47	Detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA03-006	MS 278+400	32.3	Tele-communication	Commercial	BS EN 61000-6-1	3	<3	N	N/A	

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
					(as a minimum)					

Table 6: Potentially affected receptors within MA03 outside the 50m band, for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
No identifier	ML 272+100	150	Pickmere Radio Telescope	Radio telescope				Y	Requirement for mitigation not yet identified (if any required).	HS2 Ltd is undertaking on-going engagement with the owners and operators of these facilities about their equipment to establish the electromagnetic sensitivity levels and risk of EMI.

Electromagnetic interference assessment (induced voltages on cables and pipes)

Table 7: Potentially affected receptors within MA03 for electromagnetic compatibility assessment (induced voltages on cables and pipes)[6]

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA03-UTI-001 – 4.02km	ML 276+000 to MS 280+000	0-200	Utility Asset owner: National Grid Material (where known): Uninsulated Aluminium Overhead Line	400kV Overhead Electrical Line	BS EN 50522	52 normal 320 fault	To be determined at design stage	Y	To be determined at design stage	Electrical Line runs parallel to HS2 line within 200m. Length of parallelism is greater than 2km. Electrical Line crosses the HS2 at ML 276+600 and MS 279+300. Crossover angle 30◦/20◦ This is an existing asset that is to be removed and diverted in several locations, in order to achieve the necessary clearances over the HS2 railway.
MA03-UTI-002 – 8.32km	ML 266+000 to ML 281+000	0-200	Utility Asset owner: National Grid	900mm diameter High Pressure Gas Pipe Pipeline	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Gas pipeline runs within 200 m, crossing the HS2 rail line at ML 267+100, ML 267+600, ML 272+500,

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			Material (where known): Steel	(Asset ID No. TX43)						ML 272+800, MS 276+350 and ML 280+200. Crossover angle 30◦/30◦/20◦/30◦/60◦/20◦.
MA03-UTI-003 – 2.73km	ML 279+000 to ML 280+000	0-200	Utility Asset owner: N/A Material (where known): N/A	Gas Pipe Feeder	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 rail line at MS 279 + 200. Crossover angle 20◦. No official record of a utility asset at this location. May be a duplicate of either MA03-UTI-142 or MA03-UTI-148.
MA03-UTI-142 – 2.82km	MS 277+000 to MS 280+000	0-200	Utility Asset owner: National Grid Material (where known): Steel	900mm diameter High Pressure Gas Pipeline (Asset ID No. TX44)	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 alignment at MS 279+200. Crossover angle 20◦.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA03-UTI-148 – 2.74km	MS 277+000 to MS 280+000	0-200	Utility Asset owner: Cadent Gas Material (where known): Steel	300mm diameter High Pressure Gas Pipeline (Asset ID No. HP45)	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 alignment at MS 279+200. Crossover angle 20◦.
MA03-UTI-149 – 4.24km	MS 272+000 to ML 281+000	0-200	Utility Asset owner: National Grid Material (where known): Steel	900mm diameter High Pressure Gas Pipeline (Asset ID No. TX42)	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 alignment at MS 272+500, MS 272+800, MS 276+400 and MS 280+200. Crossover angle 20◦/20◦/60◦/20◦.
MA03-UTI-209 – 2.25km	MS 277+000 to ML 279+000	>92.7	Utility Asset owner: Scottish Power Energy Network Material (where	132kV Overhead Electricity Line	BS EN 50522	52 normal 320 fault	To be determined at design stage	N	To be determined at design stage	Length of parallelism is greater than 2km, but separation distance is greater than 50m. Crossover angle 0◦.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			known): Uninsulated Aluminium Overhead Line							
MA03-UTI-210 – 4.02km	MS 276+000 to ML 280+000	0-200	Utility Asset owner: National Grid Material (where known): Uninsulated Aluminium Overhead Line	400kV Overhead Electrical Line	BS EN 50522	52 normal 320 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme for 4.02 km, crossing the HS2 alignment at MS 276+600, MS and MS 279+300. Crossover angle 20◦/20◦.
MA03-UTI-219 – 2.58km	ML 276+000 t0 ML 281+000	0-200	Utility Asset owner: Zayo Material (where known): Fibre Optic cable (assume metallic	Telecoms cable	CCITT part VI	25 normal 430 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 alignment at MS 279+600 and MS 280+300. Crossover angle 20◦/45◦.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			sheath/armour)							
MA03-UTI-230 – 2.57km	ML 276+000 t0 ML 281+000	0-200	Utility Asset owner: Zayo Material (where known): Fibre Optic cable (assume metallic sheath/armour)	Telecoms cable	CCITT part VI	25 normal 430 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 alignment at MS 279+600 and MS 280+300. Crossover angle 20◦/45◦.

4.4 Broomedge to Glazebrook (MA04)

Electromagnetic field exposure assessment (health immunity)

4.4.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

4.4.2 No equipment immunity risks have been identified within this community area.

Electromagnetic interference assessment (induced voltages on cables and pipes)

4.4.3 No induced voltage risks have been identified within this community area.

4.5 Risley to Bamfurlong (MA05)

Electromagnetic field exposure assessment (health immunity)

4.5.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 8: Potentially affected receptors within MA05 for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA05-002	ML 292+200	48.4	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Taylor Business park
MA05-007	ML 293+200	48	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	
MA05-013	ML 296+000	23	Tele-communication	Commercial	BS EN 61000-6-1	3	<3	N	N/A	
MA05-015	ML 296+400	3.7	Hopper / Silo / Cistern / Tank	Light Industrial	BS EN 61000-6-1	3	>3	Y	None required	Identified as car park / scrap yard. Not EM sensitive.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA05-016	ML 296+400	1.1	Hopper / Silo / Cistern / Tank	Light Industrial	BS EN 61000-6-1	3	>3	Y	None required	Identified as car park / scrap yard. Not EM sensitive.
MA05-UTI-003	ML 293+300	27	Tele-communications Mast Asset owner: EE/3 Mobile	Commercial	BS EN 61000-6-1 (worst case)	3	<3	N	N/A	Mast is being removed without replacement as part of the current scheme.
MA05-UTI-004	ML 296+400	23	Tele-communications Mast Asset owner: Vodaphone/O2	Commercial	BS EN 61000-6-1 (worst case)	3	<3	N	N/A	Mast is being removed without replacement as part of the current scheme.
MA05-UTI-005	ML 296+400	24	Tele-communications Mast Asset owner: Vodaphone/O2	Commercial	BS EN 61000-6-1 (worst case)	3	<3	N	N/A	Believed to be a duplication of MA05-UTI-004.

Electromagnetic interference assessment (induced voltages on cables and pipes)

Table 9: Potentially affected receptors within MA05 for electromagnetic compatibility assessment (induced voltages on cables and pipes)[6]

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA05-UTI-001 – 3.15km	ML 290+000 to ML 301+00	0-200	Utility Asset owner: National Grid Material (where known): Steel	1050mm diameter High Pressure Gas Pipeline (Asset ID No. TX55, TX56 & TX57)	BS EN 50443	60 normal 1000 fault	To be determined at design stage	Y	To be determined at design stage	Length of parallelism is greater than 2km. Within 200m of the route of the Proposed Scheme, crossing the HS2 rail line at ML 290 + 800, ML 297+900, ML 298+200 and ML 300+100. Crossover angle 45◦/30◦/45◦/60◦.

4.6 Hulseheath to Manchester Airport (MA06)

Electromagnetic field exposure assessment (health immunity)

4.6.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 10: Potentially affected receptors within MA06 within the 50m band, for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA06-002	MS 282+400	24	Other Utility Use	Commercial	BS EN 61000-6-1	3	<3	N	N/A	No change.
MA06-008	MS 288+000	28.3	Indoor / Outdoor Leisure / Sporting Activity / Centre	Commercial	BS EN 61000-6-1	3	<3	N	N/A	
MA06-012	MS 288+900	8.5	Hopper / Silo / Cistern / Tank	Light Industrial	BS EN 61000-6-1	3	>3	Y	None required	Asset is close to the demolition zone and is assumed to be associated with the hotel which is to be demolished.
MA06-UTI-002	MS 290+100	1.8	Tele-communications Mast Asset owner: Vodaphone/O2	Commercial	BS EN 61000-6-1	3	>3	Y	None required	This existing mast is to be removed and relocated to MA06-UTI-003 as part of the Proposed Scheme.
MA06-UTI-003	MS 290+100	27.12	Tele-communications Mast Asset owner: Not known	Commercial	BS EN 61000-6-1	3	<3	N	N/A	This is the proposed location for the relocation of mast MA06-UTI-002.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA06-CD-132	MS 289+000	44	Utility	Industrial	BS EN 61000-6-2	30	<30	N	N/A	This receptor is a committed development [MA06/132] (see Volume 5. CT-004-00000. Planning data). Erection of a proposed CHP unit with GRP enclosure, Heat Trim radiator, exhaust chimney and palisade security fencing.
MA06-CD-042	MS 289+700 to MS 290+400	0 to 50	Office / Work studio	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined once further detail available	This receptor is a committed development [MA06/042] (see Volume 5. CT-004-00000 Planning data). High quality, sustainable, B1 business/office employment related development. Specific immunity of equipment to be determined to confirm risk level once further details of the proposed

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										development are available.
MA06-CD-043	To be determined once further detail available	To be determined once further detail available	Dwelling	Residential	BS EN 61000-6-1	3	To be determined once further detail available	To be determined once further detail available	To be determined once further detail available	This receptor is a committed development [MA06/043] (see Volume 5. CT-004-00000 Planning data). Large area of development. Delivery of approximately 1830 residential units. High density development will be encouraged within the district centres of Northenden, Baguley and Wythenshawe. Alignment will be in a tunnel from MS 290+000 to MS 303+000 which may correspond to the location of the development or part thereof. At this time the information about this committed

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										development did not allow the location to be specified more precisely. This may be a duplication of MA07-CD-027.

Table 11: Potentially affected receptors within MA06 outside the 50m band, for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
No identifier	MS 289+500	200	Manchester Airport	Airport's communication and navigation systems				Y	Requirement for mitigation not yet identified (if any required).	HS2 Ltd is undertaking on-going engagement with the owners and operators of these facilities about their equipment to establish the electromagnetic sensitivity levels and risk of EMI.

Electromagnetic interference assessment (induced voltages on cables and pipes)

4.6.2 No induced voltage risks have been identified within this community area.

4.7 Davenport Green to Ardwick (MA07)

Electromagnetic field exposure assessment (health immunity)

4.7.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 12: Potentially affected receptors within MA07 within the 50m band, for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-002	MS 290+000 to MS 291+000	40.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Tunnel depth less than 25m.
MA07-004	MS 290+000 to MS 291+000	16.1	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-005	MS 290+000 to MS 291+000	26.9	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-006	MS 290+000 to MS 291+000	40.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-007	MS 290+000 to MS 291+000	21.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-010	MS 290+000 to MS 291+000	37.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-011	MS 290+000 to MS 291+000	35.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-013	MS 290+000 to MS 291+000	30.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-016	MS 290+000 to MS 291+000	43.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-019	MS 290+000 to MS 291+000	31.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-020	MS 290+000 to MS 291+000	5.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-021	MS 290+000 to MS 291+000	13.2	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-022	MS 290+000 to MS 291+000	27.9	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-024	MS 290+000 to MS 291+000	26.9	Electricity Sub-Station	Industrial	BS EN 61000-6-2	30	<30	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-048	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-052	MS 290+000 to MS 291+000	5.1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-056	MS 290+000 to MS 291+000	11.5	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-061	MS 290+000 to MS 291+000	20.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-068	MS 290+000 to MS 291+000	28.44	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-104	MS 291+000 to MS 292+000	38.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-107	MS 291+000 to MS 292+000	34.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-110	MS 291+000 to MS 292+000	30.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-112	MS 291+000 to MS 292+000	27.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-113	MS 291+000 to MS 292+000	18.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-132	MS 290+000 to MS 291+000	0	Education	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage TBD	Receptor is near tunnel which is less than 25m depth. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA07-167	MS 290+000 to MS 291+000	29.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-170	MS 290+000 to MS 291+000	12.3	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-172	MS 290+000 to MS 291+000	4.2	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-174	MS 290+000 to MS 291+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-176	MS 290+000 to MS 291+000	5.7	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-179	MS 290+000 to MS 291+000	5.7	Self-contained flat (includes	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			maisonette/apartment)							A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-183	MS 290+000 to MS 291+000	5.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-186	MS 290+000 to MS 291+000	4.1	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-187	MS 290+000 to MS 291+000	1.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-190	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-194	MS 290+000 to MS 291+000	28.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-195	MS 290+000 to MS 291+000	6.2	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-196	MS 290+000 to MS 291+000	30.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-204	MS 290+000 to MS 291+000	37.6	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-205	MS 290+000 to MS 291+000	35.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-207	MS 290+000 to MS 291+000	37.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-210	MS 290+000 to MS 291+000	43.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-211	MS 290+000 to MS 291+000	43.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-212	MS 290+000 to MS 291+000	32.7	Self-contained flat (includes	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			maisonette/apartment)							
MA07-213	MS 290+000 to MS 291+000	46.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-214	MS 290+000 to MS 291+000	43.9	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-216	MS 290+000 to MS 291+000	43.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-238	MS 290+000 to MS 291+000	4.2	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-243	MS 291+000 to MS 292+000	28.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-244	MS 290+000 to MS 291+000	14	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-246	MS 290+000 to MS 291+000	16.1	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-247	MS 290+000 to MS 291+000	45.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-249	MS 290+000 to MS 291+000	45.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-252	MS 290+000 to MS 291+000	34.6	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-254	MS 290+000 to MS 291+000	43.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-255	MS 290+000 to MS 291+000	48.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-256	MS 290+000 to MS 291+000	44.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-257	MS 290+000 to MS 291+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-259	MS 290+000 to MS 291+000	9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-260	MS 290+000 to MS 291+000	48.1	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-269	MS 291+000 to MS 292+000	35.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-270	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-271	MS 291+000 to MS 292+000	42.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-272	MS 291+000 to MS 292+000	47.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-273	MS 290+000 to MS 291+000	20.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-274	MS 290+000 to MS 291+000	13.1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-275	MS 290+000 to MS 291+000	5.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-277	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

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										unlikely to be significant for equipment found in residential environment.
MA07-278	MS 290+000 to MS 291+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-279	MS 290+000 to MS 291+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-280	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-281	MS 290+000 to MS 291+000	24.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-283	MS 290+000 to MS 291+000	11.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-284	MS 290+000 to MS 291+000	17.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										for equipment found in residential environment.
MA07-285	MS 290+000 to MS 291+000	13.7	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-286	MS 290+000 to MS 291+000	3.7	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-287	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-289	MS 290+000 to MS 291+000	18.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-293	MS 290+000 to MS 291+000	38.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-294	MS 290+000 to MS 291+000	30.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-296	MS 290+000 to MS 291+000	23.6	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-297	MS 290+000 to MS 291+000	8.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-299	MS 290+000 to MS 291+000	8.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-303	MS 290+000 to MS 291+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										for equipment found in residential environment.
MA07-306	MS 290+000 to MS 291+000	5.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-308	MS 290+000 to MS 291+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-315	MS 291+000 to MS 292+000	18.7	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-319	MS 290+000 to MS 291+000	12.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-331	MS 290+000 to MS 291+000	4	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-333	MS 290+000 to MS 291+000	36.8	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-334	MS 290+000 to MS 291+000	3.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-335	MS 290+000 to MS 291+000	39.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-337	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-339	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-341	MS 290+000 to MS 291+000	6.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-343	MS 290+000 to MS 291+000	11	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-348	MS 290+000 to MS 291+000	7.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-349	MS 290+000 to MS 291+000	14.6	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-350	MS 290+000 to MS 291+000	16.4	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-351	MS 290+000 to MS 291+000	16.3	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-352	MS 290+000 to MS 291+000	27.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-353	MS 290+000 to MS 291+000	28.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-354	MS 290+000 to MS 291+000	19.6	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-355	MS 290+000 to MS 291+000	14.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-356	MS 290+000 to MS 291+000	18.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-357	MS 290+000 to MS 291+000	17.5	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required.	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-358	MS 290+000 to MS 291+000	21.6	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-359	MS 290+000 to MS 291+000	19.3	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-360	MS 290+000 to MS 291+000	17.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-361	MS 290+000 to MS 291+000	12.3	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-362	MS 290+000 to MS 291+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-363	MS 290+000 to MS 291+000	0	Office / Work Studio	Commercial	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-364	MS 290+000 to MS 291+000	48	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-365	MS 290+000 to MS 291+000	46.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-366	MS 290+000 to MS 291+000	48.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-367	MS 290+000 to MS 291+000	42.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-368	MS 290+000 to MS 291+000	34.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-387	MS 290+000 to MS 291+000	47.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-388	MS 290+000 to MS 291+000	36.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-389	MS 290+000 to MS 291+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-390	MS 290+000 to MS 291+000	36.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-400	MS 290+000 to MS 291+000	11.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										for equipment found in residential environment.
MA07-402	MS 290+000 to MS 291+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-405	MS 290+000 to MS 291+000	2.1	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-406	MS 291+000 to MS 292+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-407	MS 290+000 to MS 291+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-408	MS 290+000 to MS 291+000	4.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-409	MS 290+000 to MS 291+000	0	Children's Nursery / Crèche	Commercial	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-412	MS 290+000 to MS 291+000	4.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-421	MS 290+000 to MS 291+000	48.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-422	MS 291+000 to MS 292+000	10.1	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-423	MS 290+000 to MS 291+000	48.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-426	MS 290+000 to MS 291+000	41.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-430	MS 291+000 to MS 292+000	47.2	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-432	MS 291+000 to MS 292+000	47.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-435	MS 290+000 to MS 291+000	34.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-438	MS 290+000 to MS 291+000	33.1	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-440	MS 290+000 to MS 291+000	30.9	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-444	MS 290+000 to MS 291+000	45.1	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1541	MS 294+000 to MS 295+000	20.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1545	MS 294+000 to MS 295+000	28.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1554	MS 294+000 to MS 295+000	31.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1558	MS 294+000 to MS 295+000	34.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1560	MS 294+000 to MS 295+000	37.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1563	MS 294+000 to MS 295+000	40.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1566	MS 294+000 to MS 295+000	32.1	Shop / Showroom	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

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MA07-1572	MS 294+000 to MS 295+000	44.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1576	MS 294+000 to MS 295+000	47.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-1581	MS 294+000 to MS 295+000	47.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5021	MS 302+000 to MS 303+000	1.1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5024	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5026	MS 302+000 to MS 303+000	21.1	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5027	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5036	MS 302+000 to MS 303+000	23.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5037	MS 302+000 to MS 303+000	31.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5043	MS 302+000 to MS 303+000	39.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5047	MS 302+000 to MS 303+000	47.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5048	MS 302+000 to MS 303+000	13.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5049	MS 302+000 to MS 303+000	0.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5050	MS 302+000 to MS 303+000	27.7	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5052	MS 302+000 to MS 303+000	15.3	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5054	MS 302+000 to MS 303+000	1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5055	MS 302+000 to MS 303+000	16.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5056	MS 302+000 to MS 303+000	34.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5057	MS 302+000 to MS 303+000	15.3	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5063	MS 302+000 to MS 303+000	27.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5065	MS 302+000 to MS 303+000	25.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5066	MS 302+000 to MS 303+000	21.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5068	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5069	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5070	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5071	MS 302+000 to MS 303+000	26.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5072	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5073	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5076	MS 302+000 to MS 303+000	35	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5077	MS 302+000 to MS 303+000	33	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5078	MS 302+000 to MS 303+000	28	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5079	MS 302+000 to MS 303+000	36.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5080	MS 302+000 to MS 303+000	38.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5081	MS 302+000 to MS 303+000	22.6	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5082	MS 302+000 to MS 303+000	14.9	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5084	MS 302+000 to MS 303+000	1.7	Detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5087	MS 302+000 to MS 303+000	19.8	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5089	MS 302+000 to MS 303+000	7.5	Detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5093	MS 302+000 to MS 303+000	46.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5095	MS 302+000 to MS 303+000	43.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5099	MS 302+000 to MS 303+000	39.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5101	MS 302+000 to MS 303+000	7.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5102	MS 302+000 to MS 303+000	35.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5104	MS 302+000 to MS 303+000	39.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5106	MS 302+000 to MS 303+000	0	Detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5107	MS 302+000 to MS 303+000	41.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5108	MS 302+000 to MS 303+000	14.1	Dwelling	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5110	MS 302+000 to MS 303+000	6.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5111	MS 302+000 to MS 303+000	48.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5112	MS 302+000 to MS 303+000	40.6	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5113	MS 302+000 to MS 303+000	3.3	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5114	MS 302+000 to MS 303+000	0.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5116	MS 302+000 to MS 303+000	34.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5117	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5118	MS 302+000 to MS 303+000	31.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5119	MS 302+000 to MS 303+000	20.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5120	MS 302+000 to MS 303+000	27.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5121	MS 302+000 to MS 303+000	18.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5122	MS 302+000 to MS 303+000	18.1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5123	MS 302+000 to MS 303+000	16.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5124	MS 303+000 to MS 304+000	27.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5125	MS 303+000 to MS 304+000	30.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5126	MS 303+000 to MS 304+000	34.1	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5128	MS 303+000 to MS 304+000	22.6	Railway Asset	Transport	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5129	MS 303+000 to MS 304+000	36.9	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5148	MS 302+000 to MS 303+000	18	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5150	MS 302+000 to MS 303+000	7.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5153	MS 302+000 to MS 303+000	5.9	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	TBD	Receptor is near tunnel which is less than 25m depth. Specific immunity of equipment to be determined to confirm

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										whether the risk identified is significant.
MA07-5164	MS 302+000 to MS 303+000	2.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5165	MS 302+000 to MS 303+000	23.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5167	MS 302+000 to MS 303+000	31.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5168	MS 302+000 to MS 303+000	40	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5169	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5171	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5187	MS 302+000 to MS 303+000	1.1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5192	MS 302+000 to MS 303+000	1.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5194	MS 302+000 to MS 303+000	5.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5195	MS 302+000 to MS 303+000	3.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5196	MS 302+000 to MS 303+000	9.5	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5197	MS 302+000 to MS 303+000	4.2	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5198	MS 302+000 to MS 303+000	5.3	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5199	MS 302+000 to MS 303+000	34	Terraced	Residential	BS EN 61000-6-1	3	<3	N	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5201	MS 302+000 to MS 303+000	3.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5202	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5203	MS 302+000 to MS 303+000	40.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5204	MS 302+000 to MS 303+000	28	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5205	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5206	MS 302+000 to MS 303+000	3.3	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5207	MS 302+000 to MS 303+000	7.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5208	MS 302+000 to MS 303+000	13	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5209	MS 302+000 to MS 303+000	1.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5210	MS 302+000 to MS 303+000	0.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5211	MS 302+000 to MS 303+000	5.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5212	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5213	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5214	MS 302+000 to MS 303+000	1.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5216	MS 302+000 to MS 303+000	8.3	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5217	MS 302+000 to MS 303+000	2.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5219	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5226	MS 302+000 to MS 303+000	6.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5229	MS 302+000 to MS 303+000	3.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5232	MS 302+000 to MS 303+000	6.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5233	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5235	MS 302+000 to MS 303+000	10.2	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5237	MS 302+000 to MS 303+000	14.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5239	MS 302+000 to MS 303+000	42.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5242	MS 302+000 to MS 303+000	40.6	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5243	MS 302+000 to MS 303+000	3.5	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5245	MS 302+000 to MS 303+000	7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5248	MS 302+000 to MS 303+000	11.9	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5249	MS 302+000 to MS 303+000	4.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5250	MS 302+000 to MS 303+000	5.4	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5253	MS 302+000 to MS 303+000	1.1	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5254	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5256	MS 302+000 to MS 303+000	18	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5257	MS 302+000 to MS 303+000	28.8	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5267	MS 302+000 to MS 303+000	32.8	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5270	MS 302+000 to MS 303+000	32	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5271	MS 302+000 to MS 303+000	18	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5278	MS 302+000 to MS 303+000	41	Workshop / Light Industrial	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5282	MS 302+000 to MS 303+000	23.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5283	MS 302+000 to MS 303+000	47	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5285	MS 302+000 to MS 303+000	44.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5286	MS 302+000 to MS 303+000	31	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5287	MS 302+000 to MS 303+000	42.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5288	MS 302+000 to MS 303+000	7.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5290	MS 302+000 to MS 303+000	40.3	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5294	MS 302+000 to MS 303+000	18.1	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	N/A	Receptor is near tunnel which is less than 25m depth. Assumed not EM sensitive (low relevance in terms of EMC).
MA07-5297	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5298	MS 302+000 to MS 303+000	11.3	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										for equipment found in residential environment.
MA07-5299	MS 302+000 to MS 303+000	25	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5301	MS 302+000 to MS 303+000	20.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5303	MS 302+000 to MS 303+000	19.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5304	MS 302+000 to MS 303+000	16	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5305	MS 302+000 to MS 303+000	11.2	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5307	MS 302+000 to MS 303+000	15.4	Telephone Box	Commercial	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5308	MS 302+000 to MS 303+000	5.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5309	MS 302+000 to MS 303+000	4.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5310	MS 302+000 to MS 303+000	3.2	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5311	MS 303+000 to MS 304+000	0.1	Hopper / Silo / Cistern / Tank	Other (Ordnance Survey Only)	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5312	MS 302+000 to MS 303+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5314	MS 302+000 to MS 303+000	8.5	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5315	MS 302+000 to MS 303+000	6.3	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5316	MS 302+000 to MS 303+000	2.8	Office / Work Studio	Commercial	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5317	MS 302+000 to MS 303+000	5	Self-contained flat (includes	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			maisonette/apartment)							A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5318	MS 302+000 to MS 303+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5319	MS 302+000 to MS 303+000	2.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5320	MS 302+000 to MS 303+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5321	MS 302+000 to MS 303+000	0	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5324	MS 302+000 to MS 303+000	29.3	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5325	MS 302+000 to MS 303+000	4.3	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5328	MS 302+000 to MS 303+000	8.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5329	MS 302+000 to MS 303+000	8.5	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5330	MS 302+000 to MS 303+000	2.8	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5331	MS 302+000 to MS 303+000	2.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5332	MS 302+000 to MS 303+000	0	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5333	MS 302+000 to MS 303+000	10	Dwelling	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5334	MS 302+000 to MS 303+000	33.8	Detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5335	MS 302+000 to MS 303+000	5	Dwelling	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5340	MS 302+000 to MS 303+000	19.5	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5342	MS 302+000 to MS 303+000	17.3	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5343	MS 302+000 to MS 303+000	11.9	Detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5344	MS 302+000 to MS 303+000	8.5	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5345	MS 302+000 to MS 303+000	6.3	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										residential environment.
MA07-5346	MS 302+000 to MS 303+000	24.5	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5348	MS 302+000 to MS 303+000	7.2	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5349	MS 302+000 to MS 303+000	0.2	Dwelling	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5359	MS 302+000 to MS 303+000	48.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5360	MS 302+000 to MS 303+000	2.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5361	MS 302+000 to MS 303+000	49.2	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5362	MS 302+000 to MS 303+000	6.9	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5366	MS 302+000 to MS 303+000	49.4	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5367	MS 302+000 to MS 303+000	34.7	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5369	MS 302+000 to MS 303+000	29.6	Semi-detached	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5370	MS 302+000 to MS 303+000	39.5	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5374	MS 302+000 to MS 303+000	19.2	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5375	MS 302+000 to MS 303+000	46.4	Dwelling	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5377	MS 302+000 to MS 303+000	49.1	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5379	MS 302+000 to MS 303+000	31.7	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5380	MS 302+000 to MS 303+000	11.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5381	MS 302+000 to MS 303+000	40.1	Self-contained flat (includes maisonette/apartment)	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5383	MS 302+000 to MS 303+000	0	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										unlikely to be significant for equipment found in residential environment.
MA07-5384	MS 302+000 to MS 303+000	14.8	Semi-detached	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5385	MS 302+000 to MS 303+000	39.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5386	MS 302+000 to MS 303+000	9.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5387	MS 302+000 to MS 303+000	48.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.
MA07-5389	MS 302+000 to MS 303+000	0.3	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5390	MS 302+000 to MS 303+000	8.8	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5391	MS 302+000 to MS 303+000	44.8	Terraced	Residential	BS EN 61000-6-1	3	<3	N	N/A	Receptor is near tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-5392	MS 302+000 to MS 303+000	2.6	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-5394	MS 302+000 to MS 303+000	6.7	Terraced	Residential	BS EN 61000-6-1	3	>3	Y	None required	Receptor is near tunnel which is less than 25m depth. A small exceedance of the 50Hz magnetic field immunity limit is unlikely to be significant for equipment found in residential environment.
MA07-CD-111	MS 299+800 to MS 304+000	0 to 50	Office / Work studio/ light industrial/ education / health centre	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined once further detail available	This receptor is a committed development [MA07/111] (see Volume 5. CT-004-00000. Planning data).

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Receptor is located near parts of the tunnel which is less than 25m depth. Carry out detailed assessment at design stage. Actual susceptibility to 50Hz magnetic fields (if any) to be determined. Large area of development.
MA07-CD-110	MS 299+800 to MS 304+000	0 to 50	Dwellings / Education	Residential/ Commercial	BS EN 61000-6-1	3	>3	Y	To be determined once further detail available	This receptor is a committed development [MA07/110] (see Volume 5. CT-004-00000. Planning data). Receptor is located near parts of the tunnel which is less than 25m depth. Carry out detailed assessment at design stage. Actual susceptibility to 50Hz

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										magnetic fields (if any) to be determined. Large area of development.
MA07-CD-026	MS 287+500 to MS 296+000	0 to 50	Office / Work studio/ light industrial	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined once further detail available	This receptor is a committed development [MA07/026] (see Volume 5. CT-004-00000. Planning data). Receptor is located near parts of the tunnel which is less than 25m depth. Carry out detailed assessment at design stage. Actual susceptibility to 50Hz magnetic fields (if any) to be determined. Large area of development.
MA07-CD-027	MS 287+500 to MS 296+000	0 to 50	Dwellings	Residential	BS EN 61000-6-1	3	>3	Y	To be determined once further	This receptor is a committed development [MA07/027] (see

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
									detail available	Volume 5. CT-004-00000. Planning data). Receptor is located near parts of the tunnel which is less than 25m depth. Carry out detailed assessment at design stage. Actual susceptibility to 50Hz magnetic fields (if any) to be determined. Large area of development.
MA07-CD-299	MS 294+800 to 299+800	0 to 50	Dwellings	Residential	BS EN 61000-6-1	3	>3	Y	To be determined once further detail available	This receptor is a committed development [MA07/299] (see Volume 5. CT-004-00000. Planning data). Receptor is located near parts of the tunnel which is less than 25m depth.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Carry out detailed assessment at design stage. Actual susceptibility to 50Hz magnetic fields (if any) to be determined. Large area of development.
MA07-UTI-001	MS 293+100	7	Tele-communications Mast Asset owner: Vodaphone/O2 or Arqiva	Commercial	BS EN 61000-6-1	3	>3	Y	TBD	Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm whether the risk identified is significant. Mast to be retained in current location as part of HS2 scheme.
MA07-UTI-002	MS 293+100	11.06	Tele-communications Mast Asset owner: N/A	N/A	N/A	N/A	>3	N	N/A	A Mast no longer exists at this location after recently being removed.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA07-UTI-003	MS 293+100	9	Tele-communications Mast Asset owner: N/A Material (where known): N/A	N/A	N/A	N/A	N/A	N	N/A	This is a duplication of MA07-UTI-002 and no longer exists.
MA07-UTI-005	MS 297+100	25.4	Tele-communications Mast Asset owner: EE	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Existing mast to be retained above the proposed tunnel alignment.
MA07-UTI-006	MS 297+100	24.41	Tele-communications Mast Asset owner: Arqiva	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Existing mast to be retained above the proposed tunnel alignment. Likely to be a duplicate of MA07-UTI-005.
MA07-UTI-007	MS 300+000	1	Tele-communications Mast Asset owner: Arqiva	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Carry out detailed assessment at design stage. Receptor is located on top of tunnel. Where the receptor is located approximately 1m horizontal distance from alignment and

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										vertically 41.9m above alignment. Therefore, EMI risks are unlikely due to tunnel depth below ground level. Existing mast to be retained above the proposed tunnel alignment.
MA07-UTI-008	MS 300+000	10.2	Tele-communications Mast Asset owner: EE	Commercial	BS EN 61000-6-1	3	>3	Y	TBD	Carry out detailed assessment at design stage. Receptor is located near tunnel. Where the receptor is located approximately 10m horizontal distance from alignment and vertically 41.9m above alignment. Therefore, EMI risks are unlikely due to tunnel depth below ground level.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. Existing mast to be retained above the proposed tunnel alignment. Likely to be a duplicate of MA07-UTI-007.
MA07-UTI-009	MS 302+600	30.7	Tele-communications Mast Asset owner: EE	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Existing mast to be retained above the proposed tunnel alignment.
MA07-UTI-012	MS 293+000	34	Tele-communications Mast Asset owner: Network Rail	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Modified Telecommunication Mast. This is the proposed location for a relocated Network Rail GSM-R mast located adjacent to the existing railway line.

Table 13: Potentially affected receptors within MA07 outside the 50m band, for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there any potential EMC risk? (Y/N)	Mitigation measures	Comments
No identifier	MS 297+400	> 55	The Christie NHS Foundation Hospital	Hospital's diagnostic equipment sensitive to EMI				Y	Requirement for mitigation not yet identified (if any required).	HS2 Ltd is undertaking on-going engagement with the owners and operators of these facilities about their equipment to establish the electromagnetic sensitivity levels and risk of EMI.

Electromagnetic interference assessment (induced voltages on cables and pipes)

4.7.2 No induced voltage risks have been identified within this community area.

4.8 Manchester Piccadilly Station (MA08)

Electromagnetic field exposure assessment (health immunity)

4.8.1 No health immunity risks have been identified within this community area.

Electromagnetic compatibility assessment (equipment immunity)

Table 14: Potentially affected receptors within MA08 for electromagnetic compatibility assessment (equipment immunity)

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA08-001	MS 304+000	0.1	Workshop / Light Industrial	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-003	MS 304+000	17.8	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-004	MS 304+000	0.1	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Identical coordinates to the following receptors: MA08-05, 09, 19, 23 to 26, 30 to 33, 35 to 36, 48,50,51. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-006	MS 304+000	48.7	Workshop / Light Industrial	Commercial	BS EN 61000-6-1	3	<3	N	N/A	
MA08-007	MS 304+000	1.4	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined	Specific immunity of equipment to be determined to confirm

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
									at design stage	the risk level and any mitigation required.
MA08-012	MS 304+000	45.1	Rail Infra-structure Services	Other (Ordnance Survey Only)	BS EN 61000-6-1	3	<3	N	N/A	
MA08-017	MS 304+000	20.7	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	<3	N	N/A	
MA08-018	MS 304+000	0.2	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-029	MS 304+000	24.1	Car / Coach / Commercial Vehicle / Taxi Parking / Park and Ride Site	Commercial	BS EN 61000-6-1	3	<3	N	N/A	
MA08-037	MS 304+000	7.3	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-040	MS 304+000	1.9	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	>3	Y	None required	Within demolition area. Hence no mitigation required.
MA08-052	Ms 304+000	40	Advertising Hoarding	Commercial	BS EN 61000-6-1	3	<3	N	N/A	

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA08-053	MS 304+000	0.1	Tele-communication	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-057	MS 304+000	6.6	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-058	MS 304+000	7.3	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-059	MS 304+000	6.3	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA08-060	MS 304+000	1	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-061	MS 304+000	7	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-062	MS 304+708	6.8	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-063	MS 304+708	5.1	Public Car Parking	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined	Traction load significantly less here than on the rest of the Proposed Scheme due

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
									at design stage	to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-064	MS 304+708	6.8	Shop / Showroom	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										the risk level and any mitigation required.
MA08-067	MS 304+708	6.7	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. Receptor ID changed from MA08-035 to MA08-092.
MA08-073	MS 304+708	21.4	Hopper / Silo / Cistern / Tank	Other (Ordnance Survey Only)	BS EN 61000-6-1	3	<3	N	N/A	
MA08-084	MS 304+708	23.1	Self-contained flat (includes	Residential	BS EN 61000-6-1	3	<3	N	N/A	

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			maisonette/apartment)							
MA08-085	MS 304+708	0.2	Car / Coach / Commercial Vehicle / Taxi Parking / Park and Ride Site	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-086	MS 304+708	7	Workshop / Light Industrial	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-087	MS 304+708	7	Shop / Showroom	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-088	MS 304+708	7	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined	Traction load significantly less here than on the rest of the Proposed Scheme due

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
									at design stage	to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-089	MS 304+708	6.8	Shop / Showroom	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										the risk level and any mitigation required.
MA08-090	MS 304+708	6.6	Commercial	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-093	MS 304+708	6.9	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-094	MS 304+708	6.7	Workshop / Light Industrial	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-097	MS 304+708	6.3	Warehouse / Store / Storage Depot	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined	Traction load significantly less here than on the rest of the Proposed Scheme due

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
									at design stage	to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required.
MA08-CD-038	MS 303+400 to MS 304+708	0 to 50	Office / Work studio	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										the risk level and any mitigation required. Large area of development.
MA08-CD-042	MS 303+900 to MS 304+708	0 to 50	Shop / Showroom / Store	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. Large area of development.
MA08-CD-044	MS 303+900 to MS 304+708	0 to 50	Dwelling	Residential	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. Large area of development.
MA08-CD-096	MS 304+000 to MS 304+708	0 to 50	Office / Work studio/ light industrial	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
										determined to confirm the risk level and any mitigation required. Large area of development.
MA08-CD-129	MS 302+200 to MS 303+800	0 to 50	Dwelling	Residential	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. Large area of development.
MA08-UTI-001	MS 304+000	1	Tele-communications Mast	Commercial	BS EN 61000-6-1	3	>3	Y	None required – see comment	Existing mast to be relocated to MA08-UTI-008/MA08-UTI-010,

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			Asset owner: EE							away from the track alignment.
MA08-UTI-002	MS 304+000	0	Tele-communications Mast Asset owner: Not known	Commercial	BS EN 61000-6-1	3	>3	Y	To be determined at design stage	Traction load significantly less here than on the rest of the Proposed Scheme due to slow moving and stationary rolling stock and lack of implement of trains in other locations. Emissions likely to be < 3A/m Carry out detailed assessment at design stage. Specific immunity of equipment to be determined to confirm the risk level and any mitigation required. Large area of development.
MA08-UTI-004	MS 304+500	50	Tele-communications Mast Asset owner: Vodaphone	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Mobile mast located within existing Network Rail Station, to be retained in current location through-out HS2 scheme.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (A/m)	Estimated emission level (A/m)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
MA08-UTI-005	MS 304+500	50	Tele-communications Mast Asset owner: EE	Commercial	BS EN 61000-6-1	3	<3	N	N/A	Mobile mast located within existing Network Rail Station, to be retained in current location through-out HS2 scheme.
MA08-UTI-006	MS 304+300	4	Tele-communications Mast Asset owner: O2/Vodaphone	Commercial	BS EN 61000-6-1	3	>3	Y	None required-see comment	Existing mast to be relocated to MA08-UTI-007/MA08-UTI-009, away from the track alignment.

Electromagnetic interference assessment (induced voltages on cables and pipes)

Table 15: Potentially affected receptors within MA08 for electromagnetic compatibility assessment (induced voltages on cables and pipes)[6]

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
No identifier	MS 304+708	<200	Manchester Piccadilly Station	Railway Assets	BS EN 50122	60 normal 645 fault	To be determined at design stage	N	To be determined at design stage	Station and lines run approximately parallel within the HS2 200m corridor.

Identifier	Approximate railway chainage (km + m)	Horizontal distance from route centre line (m)	Sensitive installation	Receptor	Reference	Immunity limit (V)	Estimated emission level (V)	Is there potential EMC risk? (Y/N)	Mitigation measures	Comments
			Asset owner: Network Rail Material (where known): Various							Length of parallelism is less than 2km and separation is never less than 20m.
No identifier	MS 304+708	0	Metrolink tram Asset owner: Transport for Greater Manchester (TfGM) Material (where known): Various	Railway Assets	BS EN 50122	60 normal 645 fault	To be determined at design stage	Y	To be determined at design stage	Metrolink tramline crosses underneath the HS2 alignment as it runs through Piccadilly Station. Crossover angle 70◦.

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