Environmental Statement

Volume 2i: Scheme-wide Assessment

Chapter 23: Summary of mitigation

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23. SUMMARY OF MITIGATION

23.1 Introduction

23.1.1 This chapter of the Environmental Statement (ES) provides an overview of the mitigation proposed for the entirety of the Huddersfield to Westtown (Dewsbury) Route, herein referred to as the 'Scheme'. Throughout the ES (Volumes 2i and 2ii), embedded and additional mitigation measures are identified. Proposals for mitigation follow the mitigation hierarchy of avoid, reduce, mitigate and compensate.

23.2 Mitigation measures

Embedded mitigation measures

23.2.1 Where possible, environmental effects have been avoided through embedded mitigation developed as part of the design of the Scheme. Details of these measures are identified in Chapter 3 (Consideration of alternatives) in the Scheme-wide Assessment (Volume 2i of the ES).

23.2.2 Embedded mitigation in the Scheme design seeks to ensure that any adverse impacts will be avoided or minimised, as far as practicably possible. Examples of embedded mitigation include:

- The preferred design of Baker Viaduct Underbridge (RBA/2) removing the requirement for in-channel piers;
- The consideration of the shadowing effect of Baker Viaduct Underbridge (RBA/2) to minimise impacts on floating water-plantain;
- Retention of, and visibility of, as much original fabric of listed structures as possible;
- Inclusion of new finishes and materials that relate to the character of the area and the historic structure;
- Amendments to the design for works relating to the overhead power lines in proximity to an area of contamination in Route Section 5; and
- Siting and layout of construction compounds to avoid sensitive ecological receptors.

Additional mitigation measures

23.2.3 This chapter presents a summary of the environmental mitigation measures or management actions, which are required in addition to embedded mitigation measures, outlined for implementation throughout the construction and operational phases of the Scheme.

23.2.4 The tables included in this chapter provide cross references to the sections of the ES where mitigation measures are outlined. These include the Main Environmental Statement which comprises the Scheme-wide Assessment (referred to as ES Volume 2i) and the Route Section Assessments (referred to as ES Volume 2ii).

23.2.5 An overview of the key documents which contain additional mitigation measures is provided as follows:

Code of Construction Practice

23.2.6 Best practice environmental management measures will be implemented on site through application of a Code of Construction Practice (CoCP), which is split into Part A and Part B.

23.2.7 Part A of the CoCP is provided in Appendix 2-1 in Volume 3 of this ES. It sets out the general

principles, relevant measures and standards and environmental management requirements to be followed throughout the construction period.

23.2.8 Part B of the CoCP is a series of environmental delivery plans comprising:

- An External Communications Programme (including complaints procedure);
- A Pollution Prevention and Incident Control Plan (PPICP);
- A Waste Management Plan (WMP);
- A Materials Management Plan (MMP) including a separate Soils Mitigation Plan;
- A Nuisance Management Plan (NMP) concerning dust, wheel wash measures, air pollution and temporary lighting;
- A Noise and Vibration Management Plan (NVMP) (including a construction methodology assessment (includes requirement to secure consents under section 61 of the control of pollution act 1974);
- A demolition methodology statement for relevant buildings; and
- An Environmental Design Plan (EDP) (Land Contamination and Hydrogeology) – setting out the environmental requirements during the detailed design stage.

23.2.9 The content of the documents prepared under Part B of the CoCP are to be submitted as a condition[1] to be attached to the deemed planning permission[2] and agreed with the Local Authority (Kirklees Council) before construction works commence.

23.2.10 Management and monitoring actions are to be undertaken following completion of the Scheme.

Landscape and Ecological Management Plan

23.2.11 A Landscape and Ecological Management Plan (LEMP) will be prepared and submitted as a condition to be attached to the deemed planning permission and agreed with the Local Authority. The LEMP will include:

- A plan of existing trees and tree features (such as groups of trees or woodland) to be retained and to be removed in accordance with BS5837(2012);
- Detail extent, type and provenance of new planting;
- Timescale for the implementation of hard landscaping works;
- Full details of method statement for treatment and removal of invasive species;
- Implementation timetable and a five year post-completion monitoring schedule;
- Draft maintenance schedules for all landscape areas;
- Details of organisation(s) responsible for maintenance and monitoring;
- A plan of environmental mitigation details including areas of new plantings and details of any new habitats created;
- Details of location, design and construction of the wet features (ponds and Sustainable Drainage Systems); and
- Full details of mitigation measures for relevant protected species (including licensing mitigation requirements) including bats (including location of reinstated bat boxes, new bat boxes and protected foraging and commuting corridors); Floating Water Plantain (*Luronium Natans*); badgers; great crested newt, reptiles, otter and water vole, where appropriate.

[1] Deemed planning consent draft conditions version P02
[2] On making an order under the Transport and Works Act 1992, the Secretary of State may direct that planning permission shall be deemed to be granted, subject to such conditions (if any) as may be specified in the direction.

23.2.12 The LEMP will be informed by the Outline Environmental Mitigation Plan provided in Figure 2-3 in Volume 4 of the ES.

Construction Traffic Management Plan

23.2.13 A Construction Traffic Management Plan (CTMP) will be prepared and submitted as a condition to be attached to the deemed planning permission and agreed with the Local Authority.

23.2.14 The CTMP will include measures to be undertaken during the construction stage. Each stage of construction will be the subject of a separate CTMP. These documents will address the requirements for traffic management measures such as:

- Traffic route signage;
- Signing and guarding of compound access and egress;
- Co-ordination of road closures; and
- The need for diversions as well as any route timing or volume restrictions.

23.2.15 The CTMP will include a Rail Replacement Strategy which will provide details on how the replacement strategy will work when the railway is unable to operate to help reduce the impact of replacement bus services during rail closures.

23.2.16 The CTMP will also include a Travel Plan for Construction Staff to encourage the reduction of the use of single occupancy private vehicles to travel to the worksite or compound and the use of sustainable modes of transport.

Conservation Implementation Management Plan

23.2.17 Pursuant to the Listed Building Consent conditions, a Conservation Implementation Management Plan (CIMP) will be prepared for Huddersfield Station. Further CIMPs will be prepared for each of the other eight listed structures where works require Listed Building Consent. The CIMPs will be submitted to and agreed in writing by the Local Authority prior to works commencing on each listed structure.

23.2.18 The CIMPs will include methodologies for:

- Fabric removal, masonry repairs, vegetation removal, repointing, metalwork repairs and application of protective paint systems as appropriate;
- The identification of historically or architecturally significant elements of the fabric which once removed may be reused or preserved, and a strategy for their storage or reuse;
- Any improvements to the setting to sustain, enhance and better reveal the heritage asset affected;
- Exact affixing details of overhead line equipment (OLE) to be submitted; and
- Details of any maintenance access regime required.

23.3 Scheme-wide

23.3.1 Table 23-1 and Table 23-2 present a summary of the Scheme-wide environmental mitigation measures and management actions required throughout the Scheme which have been identified for the construction and operational phases.

23.3.2 The construction control measures identified in Table 23-1 be developed ahead of construction of the Scheme.

Table 23-1 Summary of Scheme-wide mitigation measures during construction

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
Historic environment	ES Volume 2i: Chapter 6 (Historic environment), Section 6.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 2 – Training and Competence Section 5 – Historic Environment Section 8 – Noise and Vibration Section 9 – Air Quality	Part A of the CoCP	All heritage assets	The following measures are included in Part A of the CoCP • Protective measures, such as protective panels to protect historic structures, to reduce the potential for accidental damage from the movement of construction traffic; • Measures to minimise the visibility of construction activity, plant and hoardings; and to reduce dust and noise; and • Toolbox talks to disseminate best practice for reducing and avoiding impacts, particularly for construction activity.
	ES Volume 2i: Chapter 6 (Historic environment), Section 6.6 (Mitigation measures) Section 5 – Historic Environment Section 9 – Air Quality	Planning condition 6	Listed buildings, historic structures and Conservation Areas	The CTMP will include measures to manage construction traffic activity in proximity to Listed Buildings and historic structures.
		Planning condition 5(v)		Part B of the CoCP will incorporate a NMP which will include details of how construction impacts will be managed, particularly in relation to the Listed Buildings and Conservation Areas near Longroyd Lane, Springwood, Huddersfield Station and Huddersfield Viaduct construction compounds.
	ES Volume 2i: Chapter 5 (Historic environment), Section 6.6 (Mitigation measures)	Planning condition 8	Potential buried archaeological remains	Potential impact on buried archaeological remains have been identified at the following locations: • The area of the Former railway goods yard (HER 6525) at Huddersfield Station; • Area of former Union Dyeware Mills (HER 6671); • The area of the former Hillhouse Sidings site (including the site of the White Stone Engine Shed (HER 18375)); • The area including the pillbox at Woodend Road (HER PRN: 6588); • The cropmark site to the southwest of Ravensthorpe Road (HER 642). Prior to any works in the above areas, confirmation will be agreed in writing with the LPA in consultation with West Yorkshire Archaeology Advisory Service (WYAAS) as to whether a Written Scheme of Investigation is required. A WSI will be submitted and agreed with the Local Authority, pursuant a condition to be attached to the deemed planning permission, in relation to the following locations: • Iron Age beehive quern at Bog Hall (HER 2105); and • Listed buildings of Thornhill Lees Hall and the associated area of medieval settlement (HER 2636).
	ES Volume 2i: Chapter 6 (Historic environment), Section 6.6 (Mitigation measures)	Listed Building Consent (LBC) conditions	Listed buildings/heritage assets	In compliance with the Listed Building Consent conditions, CIMPs will be prepared to cover each of the listed structures where works require Listed Building Consent. The CIMPs will be submitted to and agreed in writing by the Local Authority prior to works commencing on each listed structure. The CIMP will include methodologies for: • Fabric removal, masonry repairs, vegetation removal, repointing, metalwork repairs and application of protective paint systems as appropriate; • The identification of historically or architecturally significant elements of the fabric which once removed may be reused or preserved, and a strategy for their storage or reuse; • Any improvements to the setting to sustain, enhance and better reveal the heritage asset affected; • Exact affixing details of overhead line equipment (OLE) to be submitted; and • Details of any maintenance access regime required.
		LBC conditions		Historic building recording to Levels 1, 2 and 3, will be undertaken as appropriate.
Air quality	ES Volume 2i: Chapter 7 (Air quality), Section 7.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 9 - Air Quality	Part A of the CoCP	Receptors sensitive to changes in air quality (including dust)	Mitigation measures to address air quality effects are included in Part A of the CoCP. This includes the following: • Ensure an adequate water supply on the site; • Ensure water suppression is used during demolition operations where appropriate; • Maintain all dust control equipment in good condition and record maintenance activities; • Keep site fencing, barriers and scaffolding clean; • Ensure regular cleaning of hardstanding;

[3] Deemed planning consent draft conditions version P02

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
				• Provide and ensure the use of wheel cleaning facilities near the site exits wherever there is a potential for carrying dust or mud off the site; • Ensure all vehicles carrying loose or potentially dusty material to or from the site are fully sheeted; • Mix large quantities of cement, bentonite, grouts and other similar materials in designated areas which will be enclosed or shielded; • Store materials with the potential to produce dust away from site boundaries where reasonably practicable; • Minimise the amount of excavated material held on site; • Sheet, seal or damp down unavoidable stockpiles of excavated material held on site, where required; • Avoid double handling of material wherever reasonably practicable; • Use enclosed rubble chutes and conveyors where reasonably practicable or use water to suppress dust emissions from such equipment; • Sheet or otherwise enclose loaded bins and skips; • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; • Use design/prefabrication to reduce the need for grinding, sawing and cutting on site wherever reasonably practicable; • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction; • Carry out site inspections regularly to monitor compliance with dust control procedures set out above and record the results of the inspections, including nil returns, in a site log book; • Record any exceptional incidents causing dust episodes on or off the site and the action taken to resolve the situation in the site log book; • Distances from crushing plant to stockpiles will be kept to the minimum practicable to control dust generation associated with the fall of materials; and • Appropriate speed limits on access roads will be imposed and enforced for safety reasons and for the purposes of suppressing dust emissions.
	ES Volume 2i: Chapter 7 (Air quality), Section 7.6 (Mitigation measures)	Planning condition 5(v)		Part B of the CoCP will include a NMP where full details of the air quality protection measures including measures concerning dust, wheel wash measures and air pollution will be defined.
		Planning condition 6		To manage construction traffic emissions, temporary traffic diversions and traffic routes will be set out in the CTMP.
Noise and vibration	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures)	Planning condition 5(vi)	Receptors sensitive to changes in noise	Part B of the CoCP will include a NVMP, which will define the framework by which construction noise and vibration will be managed. It will include: • How works are to be conducted in accordance with Section 61 consents in consultation with the local authority; • Detail on the scheduling of staged Section 61 applications; • Details of construction noise and vibration thresholds and the criteria for noise insulation or temporary rehousing; • Details of how noise sensitive receptors (NSR), such as households, will be kept informed of construction works and how they can contact Network Rail; and • Details of BPM to reduce noise and vibration during construction. Where applicable, construction works will be managed via Section 61 applications for prior consent under the Control and Pollution Act 1974 (CoPA). The applications will detail the specific construction methods and the BPM used to reduce noise and/or vibration levels. Contractors will also be required to follow good construction practices as outlined in BS 5228-1 Part 1: Noise and BS 5228-1 Part 2: Vibration.
	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 2 – Community Consultation and Engagement	Planning condition 5(i)		In addition to inclusion in the NVMP, details of how NSR, such as households, will be kept informed of construction works and how they can contact Network Rail will also be detailed in the External Communications Programme under Part B of the CoCP. It will set out measures for informing local residents of the commencement and likely duration of the construction work activities.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures)			Where the assessment demonstrates that significant effects at residential NSR cannot be mitigated through BPM and, taking account of both noise level and the duration of the works, residents will be offered noise insulation or temporary rehousing.
	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 2 – Training and Compliance Section 8 – Noise and Vibration	Part A of the CoCP		Mitigation measures to reduce noise at source are set out in Part A of the CoCP and include: • Avoid unnecessary revving of engines and switch off equipment when not required; • Keep internal haul routes well maintained and avoid steep gradients, where possible; • Use rubber linings in, for example, chutes and dumpers to reduce impact noise; • Minimise drop height of materials; • Start-up plant and vehicles sequentially rather than all together; • Continuous noisy plant should be housed in acoustic enclosures, where practicable; • Exhaust silencing and plant muffling equipment should be fitted and maintained in good working order; • Static plant known to generate significant levels of vibration should be fitted with vibration dampening features • Each item of plant used should be selected so as to comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701 (Directive 2000/14/EC was transposed into UK legislation by the Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001/1701, which remain in force). • Consideration will be given to the recommendations set out in Annex B of BS5228-1, noise sources, remedies and their effectiveness; • Equipment should be well maintained and where possible should be used in the mode of operation that minimises noise; • Plant and equipment will be shut down when not in use; • Semi-static equipment will be sited and orientated as far as is reasonably practicable away from occupied buildings and, where feasible, will be fitted with suitable enclosures; • Materials will be handled in a manner that minimises noise; • All appropriate personnel will be instructed on Best Practicable Means (BPM) measures to reduce noise and vibration as part of their induction training and followed up by 'tool box' talks; • Audible reversing warning systems on mobile plant and vehicles should be of a type which, whilst ensuring that they give proper warning, have a minimum noise impact on persons outside sites. When reversing, mobile plant and vehicles should travel in a direction away from noise sensitive properties whenever possible. Where practicable, alternative reversing warning systems should be employed to reduce the impact of noise outside sites; and • The movement of plant onto and around the site will be in accordance with the approved hours of working and the location of any noise sensitive premises as far as is reasonably practicable.
	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures)	Planning condition 6		To manage construction traffic noise, temporary traffic diversions and traffic routes will be set out in the CTMP.
		Planning condition 5(iv)		The design of the Scheme seeks to reduce the amount of excavated material that needs to be removed and thus, associated vehicle movements through implementation of a MMP under Part B of the CoCP. Where it is necessary to move excavated material and it is reasonably practicable to do so, excavated material will be transported by public highway along designated lorry routes; using A roads and motorways where possible and minimising the use of local roads.
	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 9 – Noise and Vibration	Part A of the CoCP	Receptors sensitive to changes in vibration	Mitigation measures to address potential vibration effects across the Scheme are set out in Part A of the CoCP. Vibration mitigation measures include: • Where reasonably practicable, plant and/or methods of work causing significant levels of vibration at NSR should be replaced by other less intrusive plant and/or methods of working. For example, rotary bored piling produces significantly less vibration than percussive or vibratory piling; and • Stationary plant with the potential to generate vibration should be located away from NSR or/and isolated using resilient mountings. With regards to percussive or vibratory piling, the level of vibration generated at a receptor is proportional to the energy of the input of the equipment into the pile per blow/cycle. Reducing the energy input would therefore reduce the level of vibration at nearby NSR. However, the trade-off is that the duration for driving the piles to the required

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
				depth would be extended, which may cause a greater overall impact in terms of both vibration and noise. This may require consideration on a site-by-site basis. Reducing the resistance to pile penetration can reduce the levels of vibration generated by piling. This can be achieved by pre-boring, which removes some of the soil that would otherwise be displaced during the early stages of pile driving.
	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures)	Planning condition 5(vi)		Part B of the CoCP will include a NVMP. This will set out that where reasonably practicable, plant and/or methods of work causing significant levels of vibration at NSR should be replaced by other less intrusive plant and/or methods of working. For example, rotary bored piling produces significantly less vibration than percussive or vibratory piling. Under the NVMP, all construction works will also be managed through Section 61 applications under the CoPA. The application will detail the specific construction methods and the BPM used to reduce vibration levels. Measures will include: • Assessment of detailed construction programme; • The Section 61 application(s) will identify where vibration levels may need to be monitored at nearby locations during vibration generating activities where there is the potential for cosmetic building damage; and • A proportionate vibration monitoring programme will be detailed in the NVMP and/or Section 61 applications and monitoring locations and reporting will be agreed with the Local Authority. Trigger levels will be set such that works will stop should significant levels occur. Works would only commence once BPM to reduce the level of vibration have been applied. The vibration level at which cosmetic damage to buildings may occur is significantly higher than the level at which vibration may be perceptible. However, people's apprehension and perception of the possibility of damage occurs at much lower levels. As such, building condition surveys will be conducted, as stipulated by Network Rail guidance.
Biodiversity	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Part A of the CoCP	All biodiversity receptors	The Scheme will be delivered in line with the best practice environmental measures set out in Part A of the CoCP. Measures that are outlined include: • Vegetation clearance or other work activities that might potentially impact on nesting birds will be conducted outside the established nesting season, generally considered to be between March and August inclusive; • Sensitive clearance of vegetation, such as fingertip searches; • Establishing buffer/exclusion zones around sensitive ecological receptors; • Outlining pre-construction surveys and potential licencing requirements for protected species; and • Leaving a means of egress within excavations that are left open overnight.to minimise impact to protected species;
	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 9 – Air Quality	Planning condition 5(v)		In addition, dust resulting from construction activity which might affect biodiversity will be managed through the NMP under Part B of the CoCP.
	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(ii)		Water quality impacts to the watercourses, including pollution and sedimentation will be managed through the PPICP under Part B of the CoCP.
	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Badgers	The LEMP will include full details of mitigation measures required to minimise impact. The LEMP will be implemented prior to and during construction to minimise impacts on badger including pre-construction surveys to confirm the status of identified setts (and if any new setts have been created), and sensitive habitat clearance under an ecological watching brief, where necessary. Pre-construction surveys will be undertaken to confirm the established conditions. Where active setts are identified within and adjacent to the Scheme, measures will be implemented to minimise direct impacts and disturbance as far as possible, such as: • Through establishment of exclusion zones; • It may be necessary to install heavy-gauge chainlink or weldmesh over former setts to prevent re-excavation of the sett by badgers; and

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
				• It would also be necessary to discourage excluded badgers from excavating new setts in other areas of the Scheme that will be directly or indirectly impacted during construction by rendering habitat unsuitable, such as by clearing vegetation.
	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures)	Legislative requirement		Where direct or significant indirect impacts cannot be avoided on active badger setts, appropriate mitigation measures will be undertaken under the authority of a badger development licence from Natural England. Up to date information on the status of setts would be required to support a licence application. The following measures would likely be required as a condition of the licence, with required mitigation detailed within the LEMP: • Provision of an artificial sett within the local area to compensate for the loss of a main sett. This will be constructed well in advance of sett removal (up to 6 months in advance). The provision of artificial replacement setts is not normally required when outlier setts are closed; • Exclusion of badgers from setts using one-way gates and monitoring over a period of at least 21 days to ensure that exclusion has been effective; and • Destruction of the sett as soon as possible after exclusion to reduce the chances of re-occupation by badger. Sett closure is generally only permitted between July and November inclusive.
	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Legislative requirement	Breeding birds	Direct impacts on other nesting bird species during vegetation clearance would be adequately mitigated for via the removal of potential nesting habitat outside the bird breeding season, and pre-construction nest checks undertaken by a qualified ecologist where this is not possible.
		Part A of the CoCP	Fish	Potential disturbance of fish (for example, due to noise and vibration) will be mitigated through the implementation of measures within Part A of the CoCP to reduce acoustic disturbance.
		Planning condition 4		Mitigation measures are required in relation to biodiversity where temporary dewatering is required. In the event of dewatering (for example over-pumping) is required to create dry conditions, fish rescue will be implemented as part of environmental control measures secured via the LEMP.
Landscape, townscape and visual	ES Volume 2i: Chapter 10 (Landscape, townscape and visual), Section 10.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP: (Part A) Section 6: Townscape and Visual Amenity	Part A of the CoCP	All landscape, townscape and visual receptors	Mitigation measures to address potential landscape, townscape and visual effects are contained in Part A of the CoCP. These include: • the careful siting of temporary compound areas, construction machinery, materials and welfare facilities to avoid unnecessary disruption or visual intrusion, particularly with regards to the privacy of adjacent areas. • Measures to ensure the intensity and timing of construction lighting is appropriate are also outlined to limit disruption; • Erection of temporary site hoarding/fencing around construction areas to clearly delineate working areas and reduce disruption of nearby areas.
		Planning condition 6		Appropriate signage to be utilised to limit disruption of ongoing construction work. Details of how this will be managed will be included within the CTMP, which will be submitted to and agreed by the Local Authority pursuant to a condition to be attached to the deemed planning permission before construction works commence.
Water environment	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures)	Planning condition 5(viii)	Water quality	Mitigation measures to address potential water quality effects during the detailed design stage are identified in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP and include the following: • The drainage network serving each compound will include a cut-off chamber with a sluice valve, which will remain closed. The maintenance regime will include an agreed process for water quality monitoring and managed discharge of water from each compound via a sluice valve; • Suitable settlement tanks will be used to remove silts and debris during the dewatering process. The discharge methodology will be agreed with the Environment Agency (EA) where discharge consents are required; and • Where in-channel works are necessary, appropriate isolation techniques such as coffer dams and by-pass channels will be used; • Methods of work which reduce or eliminate working in the channel will be used; • On-line continuous water quality monitoring prior to construction, where high risks (dependant on receptor sensitivity and construction activity scale) from in-channel works are expected
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures)	Part A of the CoCP		The principles for protecting water resources during construction are outlined in Part A of the CoCP. Measures included in Part A of the CoCP will ensure that temporary drainage systems will be implemented to alleviate localised surface water flood risk and prevent obstruction of existing surface runoff pathways.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	ES Volume 3: Appendix 2-1: CoCP: (Part A) Section 7 – Water Resources	Planning condition 5(ii)		The PPICP to be included in Part B of the CoCP will address the protection of water quality during construction in detail. In addition to protecting water quality, the PPICP will address all potential effects in considering hydromorphology, flood risk and groundwater. This will include: • Oil or chemical storage areas should be bunded and lined in order to contain pollutants in the event of leakage; • Any station tracks, new car parks and associated access roads will incorporate, at least, oil interceptors before discharging to the receiving body of water to intercept potential oily substances that may build up on surfaces; • Procedures will be put in place to deal with accidental leakages or spillages of hydrocarbons and oils, or accidental release of hazardous substances during construction works; • Management processes will be in place for any polluting substances that are being brought on site and used as part of the construction process; • All measures will be in line with the requirements set out within the EA's General Guide to Prevention of Pollution (PPG 1), Working at Construction and Demolition Sites (PPG 6), Works and maintenance in or near water (PPG5) and Maintenance of structures over water (PPG23) and Control of water pollution from construction sites CIRIA 532. The PPGs contain a mix of regulatory requirements and good practice advice. They have been withdrawn by the EA but are still considered good practice advice to avoid pollution of watercourses; and • Site-specific responses will be prepared for potential pollution incidents (e.g. spillages) or extreme weather events (e.g. storms) which may cause an increase in sediment runoff.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy) ES Volume 3: Appendix 11-4 Summary of Scheme-wide drainage strategy	Planning condition 15		Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to manage any increase in runoff. The strategy will prevent the increased risk of flooding through an appropriate hierarchy of drainage and flood risk management.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP: (Part A) Section 7 – Water Resources	Planning condition 5(viii)	Hydromorphology	The following mitigation measures to address potential hydromorphology effects will be outlined in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • Methods of work which reduce or eliminate working in the channel; and • Where the erection of temporary in-channel structures is required for construction, appropriate isolation techniques will be used. These measures should be in place for the minimum possible period of time in order to minimise disruption of flow, sediments and biota.
		Planning condition 5(ii)		The PPICP to be included in Part B of the CoCP will include the following mitigation measures in relation to hydromorphology during construction: • Use of appropriate measures to ensure contaminants (including fine sediments) from construction activities do not enter the watercourse; • Use of appropriate erosion control and silt management measures to minimise the volume of sediment produced; and • Prepare site-specific responses for potential pollution incidents (e.g. spillages) or extreme weather events (e.g. storms) which may cause an increase in sediment runoff.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4		Details of the following will be included in the LEMP: • Any vegetation clearance in the riparian zone required for construction will be minimised; and • Timing of any temporary in-channel works to consider seasonality for watercourse biota.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6	Part A of the CoCP	Flood risk	Good construction site practice will be undertaken to minimise flood risk and drainage impacts. Part A of the CoCP will manage temporary flood risk associated with works within the waterbody and includes the following measures;

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	(Mitigation measures) ES Volume 3: Appendix 2-1: CoCP: (Part A) Section 7 – Water Resources ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy) ES Volume 3: Appendix 11-4 Summary of Scheme-wide drainage strategy			• Hazardous materials and sensitive equipment will be stored outside of flood zone within compounds; • Temporary drainage systems will be implemented to alleviate localised surface water flood risk and prevent obstruction of existing surface runoff pathways; and • Surface water flows will be managed during construction.
		Planning condition 15		Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to manage any increase in runoff. The strategy will prevent the increased risk of flooding through an appropriate hierarchy of drainage and flood risk management. The principal purpose of the Scheme-wide drainage strategy and the flood risk mitigation measures is to maintain the existing hydrological behaviour as far is reasonably possible.
		Planning condition 5(ii)		Measures to protect the water environment during construction will be employed through application of the PPICP under Part B of the CoCP, and will include the prevention of pollution, procedures in case of accidental spillages and monitoring. The PPICP will ensure compounds sign up to the EA's Floodline alert service where extents enter flood zones 2 and 3 make use of Flood Alert and Warning services.
		Planning condition 5(viii)	Groundwater	The following mitigation measures to protect groundwater will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • Where deep foundations extending beneath the groundwater table are designed to be part of the Scheme, these will be designed in accordance with industry standards – taking into account the site-specific water level and flow monitoring data obtained from intrusive ground investigation (GI) for the Scheme; • GI including boreholes and trial pits have been proposed across the Scheme to inform the detailed design of the Scheme and will include areas of notable groundwork activity (i.e. large cuttings, deep pilings/foundation); • A hydrogeological risk assessment will be carried based on GI data. Where the hydrogeological risk assessment identifies particular areas of risk, monitoring of groundwater will be undertaken pre-, during and post-construction. Details of the monitoring regime will be included within the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP; and • Where piling works are proposed a risk assessment will be undertaken in accordance with the EA's "Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater", Report NC/99/77 dated 2001.
Geology, soils and land contamination	ES Volume 2i: Chapter 12 (Geology, soils and land contamination), Section 12.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 10 – Geology, Soils and Land Contamination	Part A of the CoCP	Humans, Controlled waters, Local Wildlife Sites and crops/livestock and property	Mitigation measures to address the potential for encountering land contamination are identified in Part A of the CoCP and include the following; • Preparation/utilisation of health and safety risk assessments, method statements and appropriate Personal Protective Equipment (PPE) for the protection of construction workers, taking particular account of areas of likely higher risk (i.e. landfills, chemical works etc.); • Pre-commencement checks of any updates to abstraction points will be undertaken; • Implementing appropriate fuel storage (i.e. bunded tanks, allocated re-fuelling areas etc.) and pollution control measures (i.e. plant drip trays and spill kits) during construction; and • The use of hardstanding or compacted aggregate where practicable to minimise infiltration and the generation of dust that might contain contaminants.
		Planning condition 10		A planning condition to be attached to the deemed planning permission will ensure that the presence of contamination is identified, risks assessed, and proposed remediation works are agreed in order to make the site suitable for use. Where necessary, remediation of soil/groundwater contamination to reduce risks to human health, property and controlled waters, including subsequent verification of works will be undertaken. This will include the preparation of remediation verification reports.
	ES Volume 2i: Chapter 12 (Geology, soils and land contamination), Section 12.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A):	Planning condition 5(iv)		In line with Part B of the CoCP, an appropriate MMP will be implemented (and, where appropriate, verified) to provide a detailed assessment of the suitability of soils for reuse. A separate Soils Mitigation Plan will be contained within the MMP.
		Planning condition 5(iii)		An appropriate WMP will be implemented under Part B of the CoCP. Appropriate destinations for surplus soils will be identified within the WMP.
		Planning condition 5(ii)		Measures included in the PPICP under Part B of the CoCP will manage contamination mobilised during construction and/or migrating via new preferential pathways.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	Section 7 – Water Resources Section 11 – Resource Use and Waste Management			
	ES Volume 2i: Chapter 12 (Geology, soils and land contamination), Section 12.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 10 – Geology, Soils and Land Contamination Section 11 – Resource Use and Waste Management	Planning condition 11		The geology, soils and land contamination assessment resulted in a recommended condition to address the potential that contaminated land might be identified during pre-construction and construction. The condition also addresses the potential for effects on groundwater movement.
		Planning condition 5(viii)		Details of the following will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • Prior to construction, where land is required for temporary access or use as a construction compound, a walkover survey to confirm baseline conditions will be undertaken by a land contamination consultant prior to the Scheme Contractor taking possession of the land; • Further GI and risk assessment will be undertaken to appraise/confirm the nature and extent of geohazards, contamination, ground/mine gas etc. Geotechnical hazards will be assessed and, where necessary, mitigated through the detailed design process, through the use of ground improvement techniques and/or appropriate foundation design; • For construction compounds and access routes where land is to be excavated, soil samples will be collected from the upper 1m for laboratory testing to provide an indication of contamination baseline levels. Deeper sampling and/or installation of monitoring wells to collect groundwater may be required if evidence of substantial contamination is encountered, but this will be considered on a site-by-site basis. If a proposed compound area or access route is covered in hardstanding that will remain intact during construction works, then sampling may not be necessary; and • Where piling works are required, a piling risk assessment will be undertaken in general accordance with EA guidance[4], and where necessary implementation of piling techniques deemed appropriate to manage potential risks related to the creation of pathways to groundwater and/or ground gas or mine gas migration
		Planning condition 10		Where contamination/gas hazards are considered, via risk assessment, to pose an unacceptable risk then remediation of contamination will be undertaken. A remediation strategy will be prepared and submitted to and approved in writing by the relevant local planning authority. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed. Ground investigations should be designed in such a way as to avoid introducing additional pathways for contamination/gas migration to current and future property receptors.
Waste and materials	ES Volume 2i: Chapter 13 (Waste and materials), Section 13.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 11 – Resource Use and Waste Management ES Volume 3: Appendix 13: Materials Management Strategy (MMS)	Planning condition 5(iv)	Waste facilities and material availability	A Materials Management Strategy (MMS), which is provided in Appendix 13, aims to minimise, as far as is reasonably practicable, off site material imports and waste management and disposal, through the reuse of suitable site won material from excavations. The MMS will be developed into a MMP when the Scheme's design is finalised and prior to the construction phase. The MMP will produced in accordance with the Contaminated Land: Applications in Real Environments (CL:AIRE) – Definition of Waste: Development Industry Code of Practice (DoWCoP) and will be produced pursuant to a condition to be attached to the deemed planning permission under Part B of the CoCP. Measures to be incorporated into the MMP will include details of the Scheme requirement to implement a material tracking system to identify, track, monitor and report on material use.
		Planning condition 5(iii)		For the construction stage, the reduced and efficient use of materials will continue to be implemented through the WMP under Part B of the CoCP.
		Part A of the CoCP		Part A of the CoCP contains on-site mitigation measures which will be applied to the Scheme as good practice. These include: • Setting targets for waste recovery and recycling and communicating these to those working on the Scheme, with a clear understanding of what is expected;

[4] EA. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater. Report NC/99/77. 2001.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
				• Using components that can be prepared off-site to minimise waste generation on-site; • Not over ordering materials and using materials brought to site as efficiently as possible; • Organising deliveries so materials arrive on-site as they are needed to reduce the possibility of damage and wastage occurring; • Having clearly defined and separated skips on-site and a clearly demarked waste area(s); and • Training staff to understand how they should sort any waste material and providing regular reminders and updates.
Traffic and transport	ES Main Statement Volume 2i: Chapter 14 (Traffic and transport), Section 14.6 (Mitigation measures) Volume 3: Appendix 2-1: CoCP (Part A): Section 3.11 Travel Plan for Construction Staff Section 12 Public Access and Highways	Part A of the CoCP	Users of the local road network	Measures to reduce impacts of construction traffic and minimise disruption caused by construction traffic, temporary road works/restrictions/diversionary routes etc. are outlined in Part A of the CoCP. These include construction vehicle routing and nuisance management measures. Where large vehicles will be reversing for the purpose of delivering to a work site, banksmen will be used as necessary.
	ES Main Statement Volume 2i: Chapter 14 (Traffic and transport), Section 14.6 (Mitigation measures)	Planning condition 6		Details of the measures to minimise disruption will be incorporated into a CTMP. Each stage of construction will be the subject of a specific CTMP. These documents will address the requirements for traffic management measures such as: • Traffic route signage; • Signing and guarding of compound access and egress; • Co-ordination of road closures; and • The need for diversions as well as any route timing or volume restrictions. A Travel Plan for Construction Staff will be also be produced as part of the CTMP to reduce the impacts from workforce commuting, as well as managing travel between the strategic construction compounds and satellite compounds. The plan will seek to encourage staff to use sustainable modes of transport, such as public transport, where practical, as an alternative to the private car. Operatives who work at the satellite construction compounds are to be encouraged to travel and report to the strategic construction compounds at the start of each shift. This will be achieved by the provision of the main welfare/canteen and clocking in facilities at the strategic construction compounds. They will then travel via minibus to the smaller satellite site. This will minimise the impact of operatives and staff trips on the local highway network within the vicinity of the satellite construction compounds.
			Temporary station closure/service disruption	The CTMP will include a Rail Replacement Strategy which will provide details on how the replacement strategy will work when the railway is unable to operate to help reduce the impact of replacement bus services during rail closures.
Population and human health	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 12 – Public Access and Highway ES Volume 4: Figure 2-1 Public Rights of Way	Planning condition 6	Sensitive and wider population groups	The CTMP will set out details to: • Allow ongoing access to community facilities, local businesses, open space and recreation facilities where practicable; • Allow ongoing access for Non-Motorised Users (NMU) and vehicle travellers where possible; • Maintain access to the railway, public transport, routes and stops and minimise disruptions where possible; and • Minimise actual and perceived severance for communities nearby.
	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures)	Planning condition 5(i)	Education, healthcare services and other social infrastructure	An External Communications Programme under Part B of the CoCP will manage engagement with the local community and emergency services to raise awareness of the proposed works, minimise effects on the local community and ensure community safety.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	ES Volume 3: Appendix 2-1: CoCP (Part A), Section 2 – Community Consultation and Engagement			
	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 6 – Townscape and Visual Amenity	Part A of the CoCP	Housing and local residents/landowners	The following will be included in Part A of the CoCP: • Where temporary land is required from residential properties, a schedule of condition will be prepared, and the land restored to its original condition on completion of the works.
		Planning condition 5(i)		An External Communications Programme under Part B of the CoCP will include measures to minimise potential effects on residents.
	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 12 – Public Access and Highways	Part A of the CoCP	Users of PRoW and footpaths	Mitigation measures are incorporated into Part A of the CoCP to minimise disruption to local communities and users of PRoW and footpaths etc. Measures include maintaining access where possible during construction.
		Planning condition 6		Further details on the measures to minimise disruption to local communities and users of PRoW and footpaths etc will be included in the CTMP. These measures will include: • Temporary and permanent diversions and realignments implemented where applicable where construction prevents access; • NMU routes being kept open at all times where practicable; • Local resident access maintained at all times where possible; and • New temporary provision provided, if required.
	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 12 – Public Access and Highways	Planning condition 6	Work and training – local residents and community facilities	Any temporary disruptions to local businesses and access to work and training will be minimised as far as reasonably practicable. The CTMP will identify the plans to maintain access for local residents and community facilities.
		Planning condition 5(i)	Work and training – local businesses	An External Communications Programme under Part B of the CoCP will set out measures for informing local businesses of the commencement and likely duration of the construction work activities to ensure effective engagement.
	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 2 – Community Consultation and Engagement	Planning condition 5(i)	Social cohesion and lifetime neighbourhoods	An External Communications Programme under Part B of the CoCP will ensure effective engagement continues with Kirklees Council and local communities.
Vulnerability to climate	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures) ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP: (Part A) Section 7 – Water Resources ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy)	Part A of the CoCP	Scheme during heavier rain/wetter winters	Best practice environmental management measures will be implemented on site through application of the measures proposed within Chapter 11 (Water environment) and also the accompanying Flood Risk Assessment in Appendix 11-1. The environmental management measures are also set out in Part A of the CoCP.
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures)	Network Rail Engineering Standards		Mitigation measures to be considered during detailed design will include increasing the resilience of the signalling system and so reduce delays. This will be implemented through Network Rail engineering standards.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures) ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy)	Planning condition 5(viii)	Scheme during wetter winters	The following additional flood mitigation, which will be considered during the detailed design of the Scheme[5], are to be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • Designing out underground substations; • Real-time monitoring of water levels in key drainage assets; • Flood detection alarms in key locations to facilitate power system controller's judgment on whether a controlled manual shutdown would be required; • Flood gates and flood pumps for critical assets; and • A power supply system design that provides adequate redundancy.
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP: (Part A) Section 7 – Water Resources	Part A of the CoCP	Scheme during hotter/drier summers	Best practice environmental management measures to manage erosion of soils and the mobilisation of more debris, which could block or reduce the capacity of the Scheme's drainage infrastructure, will be implemented in accordance with Part A of the CoCP.
		Planning condition 5(ii)		Further details on measures to reduce soil erosion will be included in the PPICP under Part B of the CoCP.
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures) ES Volume 2i: Chapter 10 (Landscape, townscape and visual), Section 10.6 (Mitigation measures)	Planning condition 4		Chapter 10 (Landscape, townscape and visual) includes proposals to reduce erosion by retaining existing trees and vegetation wherever possible. The Outline Environmental Mitigation Plan, provided in Figure 2-3, outlines the landscape proposals and management of proposed replacement planting. Further details will be included in the LEMP.
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures)	Network Rail Engineering Standards		Mitigation measures to reduce impacts on exposed infrastructure from extreme heat include the use of more resilient design specifications. These will be investigated during detailed design and implemented (where appropriate) through Network Rail engineering standards.
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A). Section 4 – Ecology and Nature Conservation	Planning condition 4	Scheme during extreme weather – stormier weather impacting trees	The Outline Environmental Mitigation Plan, provided in Figure 2-3, outlines the landscape proposals and management of proposed replacement planting. Further details will be included in the LEMP.
Effects on climate	ES Volume 2i: Chapter 17 (Effects on climate), Section 17.6 (Mitigation measures)	Planning condition 5(viii)	The atmosphere	Mitigation has been and will continue to be applied in line with carbon reduction hierarchy, throughout the detailed design and construction stages. As the detailed design develops, more focus will be given to 'building clever', and construction mitigation will be incorporated into the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
	ES Volume 2i: Chapter 17 (Effects on climate), Section 17.6 (Mitigation measures) Volume 3: Appendix 2-1: CoCP (Part A): Section 3 – General Site Operations Section 8 – Noise and Vibration;	Part A of the CoCP		Mitigation measures to 'build efficiently' are included in Part A of the CoCP. These include: • Targets will be set for waste recovery and recycling (e.g. a minimum of 90% non-hazardous waste to be reused or recycled by 2023/24 in line with Network Rail Key Performance Indicators (KPIs), and these will be communicated to those working on the Scheme; • Fixed site plant and temporary offices will be powered by mains electrical sources wherever practicably possible, reducing reliance on diesel and associated emissions; • Machinery and vehicles which are not in use will be shut down rather than being allowed to idle; • Energy efficiency of vehicles will be maximised, by full loading and efficient routing; and • Use of local labour will be reflected within the main works contracts, to reduce emissions from worker travel.

[5] Detailed design of the Scheme and the subsequent construction phase will be undertaken in line with Network Rail's engineering standards

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	Section 9 – Air Quality; and Section 11 – Resource Use and Waste Management.			
	ES Volume 2i: Chapter 17 (Effects on climate), Section 17.6 (Mitigation measures)	Planning condition 5(iv)		A MMP under Part B of the CoCP will ensure that material resource management minimises wastage through application of the waste hierarchy.
	ES Volume 2i: Chapter 17 (Effects on climate), Section 17.6 (Mitigation measures) Section 11 – Resource Use and Waste Management.	Planning condition 5(iii)		A WMP will be prepared and included under Part B of the CoCP. This will remain a live document which will be updated to reflect the ongoing effort to 'design out' waste.
	ES Volume 2i: Chapter 17 (Effects on climate), Section 17.6 (Mitigation measures) Volume 3: Appendix 2-1: CoCP (Part A): Section 3.11 – Travel Plan for Construction Staff	Planning condition 6		A Travel Plan for Construction Staff will be implemented as part of the CTMP to encourage sustainable travel to the site. Local contractors will be used where possible, reducing the distance driven by employees.
Electromagnetic interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	Health and Safety requirement	Receptors susceptible to electromagnetic interference (EMI) or electromagnetic fields (EMF)	Mitigation measures that are expected to form part of the ongoing Electromagnetic Compatibility (EMC) assurance activities throughout the project lifecycle (embedded mitigation): • A robust Network Rail Engineering EMC Assurance Process is in place throughout the project lifecycle to ensure that EMC/EMI is correctly managed; • Application of applicable EMC standards and good practices by the designers and installers; • Product acceptance and required levels of EMC compliance are achieved for apparatus to be procured as part of the Scheme; and, • The findings of the EMI risk assessments are taken forward by the Scheme for management throughout the remainder of the project lifecycle to ensure the EMC/EMI risks to railway neighbours is addressed and managed.
Agriculture	ES Volume 2i: Chapter 19 (Agriculture), Section 19.6 (Mitigation measures) Volume 3: Appendix 2-1: CoCP (Part A): Section 11 – Resources and Waste	Planning condition 5(iv)	Agricultural soils and best and most versatile soils (loss of agricultural soils)	A survey of the existing condition of the temporarily and permanently acquired agricultural land will be made prior to any works starting. Part B of the CoCP will include a MMP which will incorporate a Soils Mitigation Plan. This will include a pre-disturbance record of the soil's physical characteristics and Agricultural Land Classification (ALC) grade of the land. The quality and quantity of soil on-site will be maintained by implementing appropriate techniques for stripping, stockpiling and reinstatement, in accordance with Defra's 2009 Code of Practice for the Sustainable Use of Soils on Construction Sites and include details of suppression of noxious weeds on stockpiles. At the end of the construction phase all agricultural land that is not to be permanently acquired is to be restored to a condition suitable for its existing land uses, if agriculture is the agreed end-use.
	ES Volume 2i: Chapter 19 (Agriculture), Section 19.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 2 – Community Consultation and Engagement	Planning condition 5(i)	Agricultural holdings	Impacts of construction on the affected agricultural holdings will be minimised through liaison between the contractor and landowner/tenant, as set out in the External Communications Programme under Part B of the CoCP, to be produced and approved by the Local Planning Authority, pursuant to a planning condition to be attached to the deemed planning permission.
	ES Volume 2i: Chapter 19 (Agriculture), Section 19.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 8 – Noise and Vibration	Part A of the CoCP		Mitigation measures detailed in Part A of the CoCP include: • Demarcation of the construction working corridor once defined, in order to prevent disturbance to adjacent land outside of the Scheme boundary; • Provision of temporary access to land which is severed by construction works, if required by the landowner; • Diversion or restoration of existing land drainage systems affected by the engineering works; and • Suppression of dust and reduction of noise in the vicinity of livestock.

Environmental topic	Cross–reference for further detail	Mechanism by which the measures are secured[3]	Receptor	Proposed mitigation measures
	Section 9 – Air Quality Section 12 – Public Access and Highways			
Public open space	ES Volume 2i: Chapter 20 (Public open space), Section 20.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A), Section 4 – Ecology and Nature Conservation Section 6 – Townscape and Visual Amenity	Part A of the CoCP	Users of public open space	Part A of the CoCP includes the following measures to minimise effects on public open space: • Retention of access to public open space where reasonably practicable to do so, taking account of safety issues in terms of conflict between users and construction works; and • Screening of construction structures through planting etc. to minimise disruption to public open space.
		Planning condition 4		Where vegetation removal is proposed in areas of public open space, replacement planting or measures to enable regeneration will be undertaken in line with the Outline Environmental Mitigation Plan in Figure 2-3, with further details (including planting plans) included within the LEMP.
Socio-economic	ES Volume 2i: Chapter 21 (Socio-economic), Section 21.6 (Mitigation measures)	Planning condition 6	Local businesses	Measures to limit disruption to business activity will be detailed in a Construction Traffic Management Plan (CTMP) and implemented during construction. This will include details on diversion routes, signage and support provided for business access (for operations, workers and customers).
		Planning condition 5(i)		An External Communications Programme will be prepared and implemented under Part B of the CoCP and will include details on liaison to be undertaken with local businesses prior to and during construction.

Table 23-2 Summary of Scheme-wide mitigation measures during operation

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Proposed mitigation measure
Historic environment	n/a	n/a	The mitigation proposed during construction is applicable for effects identified during the operational phase and is not duplicated here. (Impacts start during construction and continue during operation).	
Air quality	n/a	n/a	The operation of the Scheme is not predicted to have a significant effect on local air quality and therefore mitigation measures are not proposed.	
Noise and vibration	ES Volume 2i: Chapter 8 (Noise and vibration), Section 8.6 (Mitigation measures)	Planning condition 13	Receptors sensitive to changes in noise	Track-side noise barriers are proposed at eight locations where there will be potential significant adverse effects and where noise attenuation may be effective (i.e. where they will remove line-of-sight of the railway at the NSR), as follows: • Red Doles Road, Huddersfield; • Topaz Close, Huddersfield; • Station Road, Bradley; • Helm Lane, Mirfield; • Woodend Road, Mirfield; • Mirfield Viaduct; • Huddleston Close/Marina; and • Mavis Street/Mavis Avenue. Proposed track-side noise barriers will be located within 5m of the track and will be absorptive to prevent any degradation in acoustic performance due to the reverberant build-up of noise between the noise barrier and the train. The exact heights, lengths and positions of the noise barriers are subject to detailed design, also taking account of any non-acoustic constraints. Following a detailed study, the details along with a programme of implementation, will be agreed with the Local Authority.
		Legislative requirement		Where noise barriers are not feasible for non-acoustic reasons, consideration will then be given to noise insulation. Noise insulation may take the form of enhanced or secondary glazing, together with consideration of the ventilation requirements. Noise insulation is considered secondary to noise barriers as it does not have the potential to benefit external amenity, nor the wider area. It should be noted that the assessment undertaken details receptors that may qualify for noise insulation and is therefore indicative, but the full legally required assessment for qualification under the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (NIRR) would be conducted at a later stage and any required insulation work installed no later than 6 months after the commissioning of the railway, taking into account the benefits of the track-side noise barriers detailed above.
				Non-statutory noise insulation may be offered by Network Rail to 14 NSR which are not eligible for statutory noise insulation, to address the effects of noise at these properties. Where suitable noise levels are not considered achievable by the existing provision, the noise insulation of the property may be improved by an amount at least equal to increase in noise due to the Scheme, or by an amount at which reasonable internal noise levels can be achieved (whichever is lower).
		Network Rail engineering standards		With regards to PA system noise, the mitigation measures will reflect the Network Rail Standards specification of the system in terms of loudspeaker location, directivity, orientation. Electronic visual information displays may also be incorporated but these will typically complement the PA system and are not as a replacement.
Biodiversity	ES Volume 2i: Chapter 9 (Biodiversity), Section 9.6 (Mitigation measures) ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan	Planning condition 4	All biodiversity receptors	The Outline Environmental Mitigation Plan in Figure 2-3 which shows replacement vegetation and planting has been produced for the Scheme. The detailed planting regime and maintenance requirements over a 5-year period will be defined in the LEMP.
Landscape, townscape and visual	ES Volume 2i: Chapter 10 (Landscape, townscape and visual), Section 10.6 (Mitigation measures)	Planning condition 4	All landscape, townscape and visual receptors	Measures to minimise effects during operation include reinstatement of vegetation to existing baseline condition and replacement planting, as and where appropriate The Outline Environmental Mitigation Plan in Figure 2-3 shows areas of replacement vegetation and planting. The aim of which is to integrate the Scheme into its surrounding context and soften its visual impacts through hedgerows, shrub groups and trees.

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Proposed mitigation measure
	ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan			A detailed landscape/ecological scheme will be prepared as part of the LEMP and will include details on the landscape proposals and management of any replacement planting over a 5-year period.
Water environment	ES Main Statement Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 11-1: Flood Risk Assessment ES Volume 3: Appendix 11-4: Summary of Scheme-wide drainage strategy (Appendix A – Scheme-wide drainage strategy)	Planning condition 15	Hydromorphology	Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a planning condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to mitigate water quality risks during operation.
	ES Main Statement Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 11-2 Water Framework Directive (WFD) Assessment ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Part A of the CoCP		Best practice guidelines regarding mitigation measures to protect the water environment (both ground and surface) in terms of the Water Framework Directive (WFD) (i.e. biological elements, physico-chemical elements and hydromorphological supporting elements) are outlined in Part A of the CoCP and will be implemented to ensure there are no effects during operation.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures)	Planning condition 5(viii)		Further measures for best practice during the detailed design will be included in the EDP (Land Contamination and Hydrogeology) in Part B of the CoCP. These include: • Minimising the length of watercourse culverted; • Using culverts which allow for a natural bed, creation of scour pools downstream of the culvert; • Designing the culvert to reflect the natural bed profile and ensure connectivity through the culvert; • For bridge and viaduct design, such best practice measures will include minimising the length of watercourse affected, setting abutments back from the channel banks (where practicable) to retain connectivity and minimising the extent of in-channel structures as part of the design process; and • Where new or extended crossings associated with the Scheme require some adjustment of the watercourse planform to align through the proposed culvert or structure; any realignments required will be designed by an appropriately qualified fluvial geomorphologist to safeguard their long-term stability.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4		Where bed and bank reinforcement are required, “greener” measures will be used as priority over hard engineering which is to be detailed within the LEMP.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures)	Planning condition 15	Water quality	Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a planning condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to mitigate water quality risks during operation.
	ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy) ES Volume 3: Appendix 11-4: Summary of Scheme-wide drainage	Planning condition 15	Flood risk	The principal purpose of the flood risk mitigation measures is to maintain the existing hydrological behaviour as far is reasonably possible. Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a planning condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to mitigate flood risks during operation and incorporate attenuation of runoff to minimise flood risk where required.

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Proposed mitigation measure
	strategy	Planning condition 5(ii)		The PPICP under Part B of the CoCP will ensure that where permanent works are located in flood zones 2 or 3, the site will sign up to the EA's Floodline service making use of Flood Alert and Warning services during operation.
	ES Volume 2i: Chapter 11 (Water environment), Section 11.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Part A of the CoCP		Part A of the CoCP will ensure that hazardous materials and sensitive equipment will be stored out of flood zones 2 and 3 during operation.
Geology, soils and land contamination	ES Volume 2i: Chapter 12 (Geology, soils and land contamination), Section 12.6 (Mitigation measures)	Network Rail Engineering Standards/Best Practice	Humans, controlled waters, Local Wildlife Sites and crops/livestock and property	The Scheme will be operated in accordance with the relevant regulations, best practice guidance and Network Rail maintenance standards in applying best available techniques (BAT) and pollution prevention. Guidance will include CIRIA Publication C736 Containment Systems for the Prevention of Pollution[6] and the EA's Approach to groundwater protection guidance[7]. Therefore, it is considered that no further specific mitigation measures will be required in relation to geology, soils and land contamination during the period of operation.
Waste and materials	n/a	n/a	Operational waste has been scoped out of the assessment and therefore no mitigation is proposed.	
Traffic and transport	ES Volume 2i: Chapter 14 (Traffic and transport), Section 14.6 (Mitigation measures)	n/a	The operation of the Scheme is not predicted to have a significant effect on traffic and transport and therefore mitigation measures are not proposed.	
Population and human health	ES Volume 2i: Chapter 15 (Population and human health), Section 15.6 (Mitigation measures)	n/a	The operation of the Scheme is not predicted to have a significant effect on population and human health and therefore mitigation measures are not proposed.	
Climate vulnerability	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures)	Network Rail Engineering Standards	Scheme during hotter summers	The Scheme design addresses the issue of asset vulnerability to extreme weather events through the application of Network Rail Engineering Standards. The engineering standards are augmented by the TRU Programme-wide "Weather Resilience and Climate Change Adaptation Plan". This work is identified in the ES with main workstreams identified below: • The Scheme will use Continuous Welded Rail (CWR) rather than a jointed track design, which would be more susceptible to buckling. This will reduce but not remove the potential of track temperature impacts. Further opportunities will be investigated during detailed design. These will include: • Using more resilient design specifications – improving the track-bed and subgrade, increasing the rigidity and weight of the superstructure of the track, using mono block concrete sleepers (and shortening the distance between them), using fixing systems that are resistant to lateral displacement and using higher quality steel; • Painting sections of the rail white to reflect the sunlight (shown to keep rail temperatures up to 5ºC lower in sunlight); and • Laying down new rail at times with higher temperatures will also be investigated (however this can reduce the tracks ability to contract during freezing spells creating tensile stress which is another pathway to failure.
			Scheme during hotter summers	Standard fire-resistant design of structures and in-built fire systems and safety equipment will be included as required. The design will seek to protect vulnerable signalling and telecommunications equipment from heat damage. Possible measures include heat reflective paint, siting assets in less vulnerable locations (i.e. shaded areas) and/or using heat shield hoods.
		Network Rail Engineering Standards	Scheme during heavier rain with wetter winters	Use axle counters instead of track circuits – Track circuits are a train detection system that relies on electrical conductivity and can be negatively affected by wet weather.
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures)	Planning condition 15		Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a planning condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to mitigate impacts during operation.

[6] CIRIA, Publication C736 Containment Systems for the Prevention of Pollution: Secondary, tertiary and other measures for industrial and commercial premises, 2014.
[7] Environment Agency (2017) The Environment Agency's approach to groundwater protection; Guidance: Protect groundwater and prevent groundwater pollution; and Guidance: Groundwater protection technical guidance.

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Proposed mitigation measure
	ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy)			
	ES Volume 2i: Chapter 16 (Climate vulnerability), Section 16.6 (Mitigation measures)	Planning condition 5(viii)	Scheme's drainage system due to drier summers	The design includes for all steep embankments to be planted and for topsoil retention systems to be used as required following investigation during detailed design. Best practice during the detailed design will be included in the EDP (Land Contamination and Hydrogeology) in Part B of the CoCP, which will include the following as required: • Sustainable drainage systems (SuDS) attenuation/treatment to allow sediment to settle out of the main flow; and • Catch pits which have sumps where silt can be trapped. These will be accessible to assist regular clearing.
		Network Rail Engineering Standards	Scheme during extreme weather	Where required the design protects electrical equipment against mains electrical supply surge and lightning current by including surge protection devices such as varistors. Key electrical components will be regularly checked by their operators, and replacement cycles may be shortened if deterioration rates increase.
Effects on climate	ES Volume 2i: Chapter 17 (Effects on climate), Section 17.6 (Mitigation measures)	n/a	The operation of the Scheme is not predicted to have a significant effect on climate and therefore mitigation measures are not proposed.	
Electromagnetic interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	See Table 23-2	Impacts start during construction and continue during operation. The mitigation measures proposed during construction are applicable for effects identified during the operational phase, as set out in Table 23-2.	
Agriculture	ES Volume 2i: Chapter 19 (Agriculture), Section 19.6 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 11 – Resource Use and Waste Management	Planning condition 5(iv)	Agricultural soils	The Soils Mitigation Plan which will be contained within the MMP under Part B of the CoCP will set out details of the aftercare period, during which time problems with settlement, drainage and weed infestation will be rectified.
Public open space	ES Main Statement Volume 2i: Chapter 20 (Public open space), Section 20.6 (Mitigation measures)	Planning condition 4	Users of public open space	To minimise effects on users of public open space, replacement planting or measures to enable regeneration will be undertaken in line with the Outline Environmental Mitigation Plan in Figure 2-3, with further details (including planting plans) included within the LEMP
Socio-economic	ES Main Statement Volume 2i: Chapter 21 (Socio-economic), Section 21.6 (Mitigation measures)	n/a	The operation of the Scheme is not predicted to have a significant adverse effect in relation to socio-economics and therefore mitigation measures are not proposed.	

23.4 Route Section 1 – Huddersfield

23.4.1 Tables 23-3 and Table 23-4 present a summary of the environmental mitigation measures and management actions which have been identified throughout the construction and operational phase of Route Section 1. Scheme-wide measures have not been repeated in these tables, although they are applicable to Route Section 1.

Construction

Table 23-3 Proposed mitigation measures during construction in Route Section 1

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Huddersfield Station, Grade I Listed Building, NHLE 1277385	Permanent impacts arising at construction on online heritage assets, as a result of their alteration or removal and temporary impacts to assets settings	• Historic building recording to Level 3 on the trainshed roof; • Historic building recording to Level 2 on the tea rooms.
					Measures to be implemented in accordance with the CIMP include: • Monitoring of the tea rooms during dismantling and reconstruction; • Appropriate methodology for Tea Room dismantling, storage and reconstruction; and • Opportunities for sustainable reuse of materials.
	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 6 (Historic environment), Section 6.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 2 – Training and Compliance Section 5 – Historic Environment	Part A of the CoCP			Measures included within Part A of the CoCP comprise: • Minimising construction activity within close proximity to heritage assets; and • Toolbox talks.
	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Huddersfield Viaduct (Span 1) Underbridge MVL3/92(1) John William Street Culvert (MVL3/91B), Grade II Listed Building (NHLE 1223531)		• Historic building recording to Level 2 on Huddersfield Viaduct (Span 1) Underbridge (MVL3/92(1)); and • Opportunities for sustainable reuse of materials.
			Huddersfield Viaduct (MVL3/92)		• Historic building recording to Level 2 on Huddersfield Viaduct (Span 29) Underbridge (MVL3/92(9)); • Historic building recording to Level 1 on Huddersfield Viaduct (Span 4) Underbridge (MVL3/92(3)); • Historic building recording to Level 1 of the sections of the parapet of the viaduct which are proposed to be altered to accommodate the attachment of OLE, prior to the commencement of works on the structure; and • Opportunities for sustainable reuse of materials.
	ES Volume 2ii: Route Section Assessment – Route Section 1 – Huddersfield Chapter 6 (Historic	Part A of the CoCP	Empire Cinema Grade II Listed Building (NHLE 1288963)		Measures included in Part A of the CCP include: • Minimising construction activity in close proximity to heritage assets; and • Toolbox talks.

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Impact	Proposed mitigation measures
	environment), Section 6.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 2 – Training and Compliance Section 5 – Historic Environment		The Sportsman and the Marhaba takeaway Grade II Listed Building (NHLE 1464388)		
Air quality	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice measures set out Table 23-1.		
Noise and vibration	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice measures in Table 23-1.		
Biodiversity	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice measures set out Table 23-1.		
Landscape, townscape and visual	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 10 (Landscape, townscape and visual), Section 10.6 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the measures set out Table 23-1.		
Water environment	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 11 (Water environment), Section 11.6 (Mitigation measures)	Planning condition 5(viii)	Aire & Calder Carb. Limestone/ Millstone Grit/Coal Measures WFD groundwater body	Construction activities relating to remodelling of Huddersfield Station and associated retaining wall.	Where major works are proposed, site-specific intrusive GI will be undertaken to obtain appropriate groundwater level and quality monitoring in the vicinity of the works. GI to be designed in such a way as to avoid introducing additional pathways for contamination migration. GI to be undertaken pre-, during and post-construction. A risk assessment is to be completed prior to any subsurface works being undertaken to consider any potential pollution pathways which may contribute to groundwater contamination. Details of the requirements for GI and associated risk assessments will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
					The following mitigation measures to protect groundwater are to be included in the EDP (Land Contamination and Hydrogeology) in Part B of the CoCP: • Where deep foundations extending beneath the groundwater table are designed to be part of the Scheme, these are to be designed in accordance with industry standards – taking into account the site-specific water level and flow monitoring data obtained from intrusive GI for the Scheme; and • If piling is required, a piling risk assessment is to be carried out to ensure the selected piling method does not introduce contamination pathways into the aquifer.
Geology, soils and land contamination	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Planning condition 5(viii)	Humans	New Distribution Network Operator (DNO) equipment, underground tank, services and lift pits at Station from mine gas from on-site sources	During the ongoing GI, monitoring wells have been/will be installed into boreholes drilled across the Huddersfield Station area in order to allow gas data to be collected from the contamination source or likely pathway (e.g. bedrock above shallow coal workings). Further details on GI and monitoring will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Impact	Proposed mitigation measures
		Planning condition 10			Where hazards are considered, via risk assessment, to pose an unacceptable risk then a remediation options appraisal and/or strategy will be prepared and submitted to and agreed by the Local Authority.
Population and human health	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond those identified in the Table 23-1.		
Electromagnetic Interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	Network Rail Engineering Standards	Yorkshire Children's Centre	Susceptible to EMI and EMF	Given the proximity of this property to the track, further assessment will be required regarding EMC and EMF levels (e.g. modelling or calculation of anticipated field levels) in accordance with Network Rail's engineering risk assessment. The final track layout and details of OLE (including the extent of electrification into the headshunt, if applicable), shall be reviewed and assessed prior to construction.

Operation

Table 23-4 Proposed mitigation measures during operation in Route Section 1

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 6 (Historic environment), Section 6.6 (Mitigation measures)	LBC condition	Huddersfield Viaduct (MVL3/92) Grade II Listed Building NHLE 1223531	Physical alterations to the fabric of the asset and replacement of the deck of Huddersfield Viaduct (Span 1) Underbridge MVL3/92(1)	Historic building recording to Level 1, including recording of the setting.
Air quality	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	n/a	None required.		
Noise and vibration	ES Volume 2ii: Route Section 1 – Huddersfield Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Biodiversity	ES Volume 2ii: Route Section Assessment – Route Section 1 – Huddersfield Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Landscape, townscape and visual	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Water environment	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	Planning condition 5 (viii)	Aire & Calder Carb. Limestone/Millstone Grit/Coal Measures WFD groundwater body	Permanent presence of the remodelled Huddersfield Station and associated retaining wall.	To mitigation the effects of the operational phase, site-specific intrusive GI must be undertaken to obtain appropriate groundwater level and quality monitoring in the vicinity of the works. GI is to be designed in such a way as to avoid introducing additional pathways for contamination migration. GI is to be undertaken pre-, during and post-construction. Details of the GI requirements will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Geology, soils and land contamination	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Population and human health	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Electromagnetic Interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	Network Rail Engineering Standards	Yorkshire Children's Centre	Susceptible to EMI and EMF	Given the proximity of this property to the track, further assessment will be required regarding EMC and EMF levels in accordance with Network Rail engineering risk assessment (e.g. modelling or calculation of anticipated field levels). The final track layout and details of OLE (including the extent of electrification into the headshunt, if applicable), shall be reviewed and assessed prior to construction to ensure no effects during operation.

23.5 Route Section 2 – Hillhouse and Fartown

23.5.1 Tables 23-5 and Table 23-6 present a summary of the additional environmental mitigation measures and management actions which have been identified throughout the construction and operational phase of Route Section 2. Scheme-wide measures have not been repeated in these tables, although they are applicable to Route Section 2.

Construction

Table 23-5 Proposed mitigation measures during construction in Route Section 2

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Peel's Pit Underbridge (MVL3/100)	Direct works to structure	Historic building recording to Level 1
					Materials for external elevations shall be submitted to and agreed by the Local Authority
			Ridings Underbridge (MVL3/99)	Beneficial impact created by the sympathetic works to the structure	Historic building recording to Level 1
					Materials for external elevations shall be submitted to and agreed by the Local Authority
Air quality	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond the best practice detailed in the Table 23-1.		
Noise and vibration	ES Volume 2ii: Route Section 1 – Huddersfield, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond the best practice detailed in Table 23-1. However, the noise barriers required for the temporary and permanent operational uses of the Hillhouse sidings will serve to mitigate the effects of construction activity at the compound.		
Biodiversity	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Floating water-plantain in Huddersfield Broad Canal (Sir John Ramsden Canal LWS)	Loss of individual plants	Liaison with Natural England is ongoing to confirm likely requirements for species licensing, any detailed macrophyte survey required to support it, and any necessary additional mitigation measures.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			Watercourse protection in consideration of floating water-plantain will be identified in the LEMP. Any licencing requirements will also be included in the LEMP.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(ii)			Watercourse protection in consideration of floating water-plantain will be managed by the PPICP under Part B of the CoCP.
	ES Volume 2ii: Route Section Assessment – Route Section 2 – Hillhouse and Fartown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 –	Planning condition 4	Reptile	Loss of habitat for reptile	Phased vegetation clearance, will be implemented during construction where necessary as part of standard environmental control measures which will be set out in the LEMP.
		See Table 23-1	Badger	Disturbance and loss of habitat for badgers	No specific mitigation measures proposed beyond those identified in Table 23-1.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	Ecology and Nature Conservation				
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan	Legislative requirement	Bats presumed hibernation roost Peel's Pit Underbridge (MVL3/100) (in advance of survey completion)	Destruction of this roost as a result of construction works (infilling)	Destruction of this roost would need to be undertaken in accordance with an approved Natural England European Protected Species Mitigation (EPSM) Licence. The following mitigation measures may be required as a condition of the EPSM licence: • Provision of an alternative roosting site (bat boxes suitable for use by hibernating bats) on nearby structures or trees that will not be subject to significant disturbance during construction and where no roosting opportunities currently exist. Alternative roosting sites would need to be in place before bats are excluded from the presumed roost in Peel's Pit Underbridge (MVL3/100); • Timing of construction works between May and October to avoid the hibernation season (which runs November to March inclusive); • If works cannot be timed to avoid the hibernation season, exclusion of roosting bats from roosting features within Peel's Pit Underbridge (MVL3/100) using one-way exclusion devices and/or other suitable methods. This would need to be completed outside the hibernation period to prevent return of the bats prior to the hibernation period (November to March inclusive); • Ecological supervision and regular inspections during works to ensure that bats continue to be excluded from roosting features and to remove any opportunistic bats that return as necessary; and • Monitoring of replacement roost sites during construction to determine their effectiveness and the need for any alterations. Recommended sites for bat boxes include mature trees within woodland to the north-east of Field House Overbridge (MVL3/98), which meets these requirements. Details are included in the Outline Environmental Mitigation Plan in Figure 2-3.
		Planning condition 4	Otter	Disturbance of otters during construction	Pre-construction surveys to determine the presence/likely absence of otter resting sites and sensitive habitat clearance under an ecological watching brief, will be undertaken where necessary. Details will be included in the LEMP.
		Legislative requirement			If otter resting sites are identified prior to or during construction, measures to minimise direct impacts and disturbance as far as possible, such as through establishment of exclusion zones, will be implemented. Where direct or significant indirect impacts on otter resting places cannot be avoided, appropriate mitigation measures will be undertaken under the authority of an otter EPSM licence, such as the creation of replacement resting sites outside of working areas. The potential for otter to become trapped in open excavations will be adequately mitigated by leaving a means of egress within excavations that are left open overnight.
Landscape, townscape and visual	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	No specific mitigation measures proposed beyond the best practice detailed in the Table 23-1.			
Water environment	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(viii)	Blackhouse Dike Watercourse – works to Red Doles Culvert (MVL3/96A)	Proposed works to Red Doles Culvert (MVL3/96A) may impact water quality	The EDP (Land Contamination and Hydrogeology) under Part B of the CoCP will outline methods of work which will reduce or eliminate working in the channel, which will be implemented at Blackhouse Dike: • Where in-channel works are necessary, appropriate isolation techniques will be used such as coffer dams and by-pass channels. These measures should be in place for the minimum possible period of time to minimise disruption of flow, sediments and biota; and

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
					• Regular visual inspections during in-channel works to assess magnitude of potential pollution events downstream of works and whether additional mitigation is required.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The LEMP will ensure that seasonality of in-channel biota is considered when planning construction works and ensure vegetation clearance required for construction is minimised.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(ii)	Huddersfield Broad Canal	Potential pathway for sediment-laden runoff from compounds to enter the canal	Measures to be included in the PPICP in Part B of the CoCP include: • Appropriate erosion control and silt management measures will be used to minimise the volume of sediment produced; and • Site-specific responses for potential pollution incidents (e.g. spillages) or extreme weather events (e.g. storms) which may cause an increase in sediment runoff will be prepared
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The LEMP will ensure that seasonality of in-channel biota is considered when planning construction works, to minimise potential harm.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	Planning condition 5(viii)	Aire & Calder Carb. Limestone/Millstone Grit/Coal Measures WFD groundwater body	Construction activities relating to the retaining wall and earthworks	The following mitigation measures to protect groundwater will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • A hydrogeological risk assessment will be carried based on GI data to inform the design process; • Where deep foundations extending beneath the groundwater table are designed to be part of the Scheme, these are to be designed in accordance with industry standards – taking into account the site-specific water level and flow monitoring data obtained from intrusive GI for the Scheme; and • Where piling works are proposed a risk assessment will be undertaken in accordance with the EA's "Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater", Report NC/99/77 dated 2001.
		Planning condition 5(viii)			Where the hydrogeological risk assessment identifies particular areas of risk, monitoring of groundwater will be undertaken pre-, during and post-construction. Details of the monitoring regime will be included within the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Geology, soils and land contamination	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Part A of the CoCP	Public using temporary platform during construction on-site.	Contamination mobilised during construction	Part A of the CoCP details the installation of hoardings or fencing with dust sheets around the temporary platform.
		Planning condition 10			Asbestos was recorded in one soil sample from the Hillhouse construction compound. If asbestos contamination is considered to pose an unacceptable risk then a remediation options appraisal/strategy will be prepared, submitted to and approved in writing by the Local Authority, pursuant to a condition to be attached to the deemed planning permission.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
		Planning condition 5(viii)	Secondary A aquifer	Contamination and gas from on- and off-site sources	During the ongoing GI, monitoring wells have been/will be installed into boreholes drilled into key source areas, including the Hillhouse construction compound and on-site historical landfills in Route Section 2, to allow groundwater data to be collected from the contamination sources. Following completion of the monitoring programme (during the detailed design stage) the data will be used to refine the Conceptual Site Model (CSM) and to undertake a risk assessment (pile types, if such is deemed necessary by the designers, will also be considered within CSM and assessment). Details of the GI requirements and monitoring programme will be detailed in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Population and human health	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond those detailed in Table 23-1.		
Electromagnetic Interference	ES Main Statement Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	Network Rail Engineering Standards	SUEZ recycling and recovery UK – Kirklees	Susceptible to EMI	In line with Network Rail Engineering Standards, buried services records will have to be reviewed to identify any metallic cables and/or pipes originating from the compound and running close and/or parallel to the railway that may be susceptible to induced hazardous touch voltages which pose a risk of electric shock. Where metallic pipes are in close proximity to traction power and earth conductors, utilities may need to be gapped and bonded, or insulated to mitigate this risk. This shall be verified and investigated during detailed design to determine any additional mitigation measures once utilities survey data is available.

Operation

Table 23-6 Proposed mitigation measures during operation in Route Section 2

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those detailed in Table 23-2.		
Air quality	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	n/a	None proposed.		
Noise and vibration	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	Planning condition 13	Noise sensitive receptors	Temporary and permanent noise impacts from Hillhouse sidings	Track-side noise barriers are proposed, for the noise impacts associated with the temporary and permanent operational phase of the Hillhouse stabling sidings, to the rear of properties to the north of Hillhouse sidings on Alder Street, Abbey Road and Hammond Street and also to the west of the sidings on Topaz Close. The location and design of the measures is subject to a feasibility study and the detail will be submitted to and agreed by the Local Authority pursuant to a condition to be attached to the deemed planning permission. The track-side noise barriers are not likely to attenuate noise in NSR adjacent to the Hillhouse Compound such that significant adverse effects are wholly avoided, and additional mitigation will be required in the form of noise insulation in affected properties.
					Noise insulation: • As stated above, the track-side noise barriers are not likely to attenuate noise in NSR adjacent to the Hillhouse Compound such that significant adverse effects are wholly avoided, and additional mitigation is proposed in the form of noise insulation at affected properties. These measures include; • Glazing and ventilation will be offered to NSR adjacent to the Hillhouse Compound which may experience significant adverse effects from both the temporary and permanent operation of the compound. Where feasible, the specification will be capable of achieving internal noise levels in bedrooms between 5 and 10dB below the guideline noise level of 30 decibels (dB) LAeq,8h stated in BS 8233:2014 (i.e. 20-25dB LAeq,8h) or a Noise Rating level of 20dB (NR20) during periods of freezing temperatures when the trains in the sidings may be ticking-over. • Subject to a further assessment following detailed design and the barrier feasibility study, an indicative glazing specification of 42dB Rw+Ctr is proposed to bedroom spaces facing the Hillhouse Compound site. Such a specification would typically require enhanced double glazing and secondary glazing. An alternative means of ventilation will be provided which meets the requirements of the Building Regulations 2010 Approved Document F, reducing the reliance on open windows (although windows will be openable at the occupants' discretion) that does not compromise the integrity of the sound insulation.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	Network Rail engineering standards			The Hillhouse stabling sidings will be managed by employing BPM in the management of the site to reduce noise egress as far as possible.
Biodiversity	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those detailed in Table 23-2.		

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Landscape, townscape and visual	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those detailed in Table 23-2.		
Water environment	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	Planning condition 5(viii)	Blackhouse Dike Watercourse – works to Red Doles Culvert (MVL3/96A) Blackhouse	Loss of approximately 10m of open watercourse to accommodate extension to Red Doles Culvert (MVL3/96A).	The EDP (Land Contamination and Hydrogeology) under Part B of the CoCP will include the following measures to ensure that effects during operation are minimised: • Proposed culvert gradient to remain similar to the existing; • Buried boulder bed check should be in place at the opening of the culvert extension to ensure that the invert level of the culvert does not become perched above the natural riverbed; • Localised works such as vegetation management/planting and bed and bank reprofiling in the vicinity of the culvert opening to be undertaken to maximise watercourse continuity and habitat value; • Depressed culvert invert and a suitable bed substrate to be provided within the culvert extension to promote a natural bed continuity through the structure; • Post-construction monitoring by a qualified geomorphologist to ensure watercourse stability. Some natural adjustment is expected; and • Culvert works should be monitored and maintained regularly to ensure watercourse conveyance.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 11-1: Flood Risk Assessment (Appendix A – Scheme-wide drainage strategy)	Planning condition 15		Increase in length of approximately 10m due to widening of embankment. Potential increase in runoff resulting in potential increase in flood risk	Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a planning condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to manage any increase in runoff and ensure there are no effects during operation.
	ES Volume 3: Appendix 11-4 Summary of Scheme-wide drainage strategy	Planning condition 5(ii)	Blackhouse Dike Flood Zone 2 Floodplain at Hillhouse Sidings	Potential increase in run off and potential loss of floodplain	The PPICP under Part B of the CoCP will ensure that the operational Hillhouse Sidings site will sign up to the EA's Floodline service, making use of Flood Alert and Warning services during operation.
		Planning condition 15	Topaz Close Culvert (MVL3/96AA) Unnamed Watercourse at Field House Culvert Huddersfield Broad Canal	Potential increase in run off	Works will be undertaken in accordance with the Scheme-wide drainage strategy, appended to the Flood Risk Assessment in Appendix 11-1. The strategy, compliance with which forms a planning condition to be attached to the deemed planning permission, follows a set of design principles for the foul and surface water drainage works and will be adhered to in order to manage any increase in runoff and ensure there are no effects during operation.
	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	Planning condition 5(viii)	Aire & Calder Carb. Limestone/ Millstone Grit/ Coal Measures WFD groundwater body	The permanent presence of the retaining wall and earthworks may act as a barrier to groundwater and may affect local groundwater levels, flow and quality in the underlying water-bearing strata.	Where the hydrogeological risk assessment identifies particular areas of risk, monitoring of groundwater will be undertaken pre-, during and post-construction. Details of the monitoring regime will set out in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Geology, soils and land contamination	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those detailed in Table 23-2.		
Population and human health	ES Volume 2ii: Route Section 2 – Hillhouse and Fartown, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those detailed in in Table 23-2.		
Electromagnetic Interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	See Tables 23-2 and 23-5.	No specific mitigation measures proposed beyond those detailed in in Table 23-2 and Table 23-5.		

23.6 Route Section 3 – Deighton and Bradley

23.6.1 Tables 23-7 and Table 23-8 present a summary of the environmental mitigation measures and management actions which have been identified throughout the construction and operational phase of Route Section 3. Scheme-wide measures have not been repeated in these tables, although they are applicable to Route Section 3.

Construction

Table 23-7 Proposed mitigation measures during construction in Route Section 3

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 3 – Deighton and Bradley Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Wheatley's Overbridge (MVL3/103). Grade II Listed Building NHLE 1450537	Removal of asset	Historic building recording to Level 3
					Measures to be implemented include: • Incorporation of heritage interpretation in replacement bridge design; and • Opportunities for sustainable reuse of materials.
			Whitacre Street Overbridge (MVL3/101)	Alteration of asset (existing bridge's main span will be demolished and replaced with new weathering steel deck)	Historic building recording to Level 2.
					Measures to be implemented include: • Materials for external elevations shall be submitted to and agreed by the Local Authority; and • Opportunities for sustainable reuse of materials.
Air quality	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-1.		
Noise and vibration	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-1.		
Biodiversity	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-1	Badger	Potential disturbance and obstruction or destruction of two non-main setts and any unidentified setts	The mitigation measures detailed in Table 23-1 will be implemented to minimise direct impacts and disturbance as far as possible on active setts identified in Route Section 3.
		See Table 23-1			Where active setts are identified, measures to minimise direct impacts and disturbance are outlined in Table 23-1.
Landscape, townscape and visual	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-1.		
Water environment	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(ii)	Deighton Culvert (MVL3/101A)	Risk of increased runoff from new track	The PPICP under Part B of the CoCP will detail measures to mitigate risk of increased runoff. This includes using the MET office Weather Warnings and the EA Floodline alert service for this location for potential storm events, flood alerts and warnings relevant to the area of the construction works. The Contractor will assess any change from base flow condition and be familiar with the normal dry weather flow conditions for the water feature and be familiar with the likely hydrological response of the water feature to heavy rainfall. Should flooding be predicted, works close or within the water features should immediately be withdrawn.
		Planning condition 5(ii)	Unnamed Watercourse at Bradley Culvert	Proposed works to Bradley Culvert (MVL3/102A) may impact water quality	Regular visual inspections during in-channel works are required to assess magnitude of potential pollution events downstream of works and whether additional mitigation is required.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
					Measures will be in place to limit watercourse siltation during construction (e.g. silt dams, ponding of water to allow silt to deposit) as implemented through the PPICP under Part B of the CoCP.
		Planning condition 4			The LEMP will ensure that any vegetation clearance required for construction will be minimised. Details will be provided in the LEMP.
	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(ii)	Huddersfield Broad Canal	Potential pathway for sediment laden runoff from Deighton Station construction compound	The following measures will be implemented through the PPICP under Part B of the CoCP: • Appropriate erosion control and silt management measures will be used to minimise the volume of sediment produced; and • Site-specific responses for potential pollution incidents (e.g. spillages) or extreme weather events (e.g. storms) which may cause an increase in sediment runoff will be prepared.
	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The LEMP will ensure that seasonality of in-channel biota is considered when planning construction works, to minimise potential harm.
Geology, soils and land contamination	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Planning condition 5(viii)	Secondary A aquifer	Contamination mobilised from onsite sources	During the ongoing GI, monitoring wells have been/will be installed into boreholes drilled into key groundwater source areas (beneath an on-site historical landfill and old chemical works) in order to allow groundwater data to be collected from the contamination sources. Following completion of the monitoring programme (during the detailed design stage) the data will be used to refine the CSM and to undertake a risk assessment (pile types, if such is deemed necessary by the designers, will also be considered within CSM and assessment).Further details on GI and monitoring will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Population and human health	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond those identified in Table 23-1.		

Operation

Table 23-8 Proposed mitigation measures during operation in Route Section 3

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor ID	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond those identified in Table 23-2.		
Air quality	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-2.		
Noise and vibration	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-2.		
Biodiversity	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-2.		
Landscape, townscape and visual	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond the best practice in Table 23-2.		
Water environment	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(viii)	Unnamed Watercourse at Bradley Culvert	Loss of approximately 5m of watercourse to accommodate extension to Bradley Culvert (MVL3/102A).	Measures to minimise the impact on watercourse are to be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP. These include: • Proposed culvert gradient to remain similar to the existing; • Buried boulder bed check will be in place at the opening of the culvert extension to ensure that the invert level of the culvert does not become perched above the natural riverbed; • Localised works such as vegetation management/planting and bed and bank reprofiling in the vicinity of the culvert opening will be undertaken to maximise watercourse continuity and habitat value; • Depressed culvert invert and a suitable bed substrate will be utilised within the culvert extension to promote a natural bed continuity through the structure; • Post-construction monitoring by a qualified geomorphologist to ensure watercourse stability. Some natural adjustment is expected; and • Culvert will be monitored and maintained regularly to ensure watercourse conveyance.
Geology, soils and land contamination	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond those identified in Table 23-2.		
Population and human health	ES Volume 2ii: Route Section 3 – Deighton and Bradley, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond those identified in Table 23-2.		

23.7 Route Section 4 – Colne Bridge and Battyeford

23.7.1 Tables 23-9 and Table 23-10 present a summary of the environmental mitigation measures and management actions which have been identified throughout the construction and operational phase of Route Section 4. Scheme-wide measures have not been repeated in these tables, although they are applicable to Route Section 4.

Construction

Table 23-9 Proposed mitigation measures during construction in Route Section 4

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	B6118 Bridge Road Overbridge (MVL3/107) Grade II Listed Building NHLE 1450265	Partial demolition and rebuild	Historic building recording to Level 3.
					Measures to be implemented in accordance with CIMP include: • Incorporation of heritage interpretation in replacement bridge design; and • Opportunities for sustainable reuse of materials.
			Heaton Lodge Footbridge (MVL4/4) Non-designated heritage asset	Removal of asset	Historic building recording to Level 3
					Measures to be implemented in accordance with CIMP include: • Incorporation of heritage interpretation in replacement bridge design; • Opportunities for sustainable reuse of materials; and • Opportunities for careful dismantling and resurrection at heritage railway/museum.
			Colne Viaduct Underbridge (MVL3/109)	Beneficial impact to widen a section of the viaduct replacing	Historic building recording to Level 1
			Parks Overbridge (MVL3/110 and MVL4/1)	Demolition of existing bridge	Historic building recording to Level 1
			Cooper Bridge Intersection (MVL4/2)	Replacement of the existing masonry arch with a new two-span continuous precast concrete deck.	Historic building recording to Level 1
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 5 – Historic Environment Section 6 – Townscape and Visual Amenity Section 8 – Noise and Vibration Section 9 – Air Quality	Part A of the CoCP	Number 2 Lock, Calder & Hebble Navigation Grade II Listed Building NHLE 1313801	Change in asset setting due to removal of screening vegetation	The following measures are included in Part A of the CoCP: • Installation of protective measures and screening to prevent permanent setting impact; • Agreed construction traffic programme to manage construction traffic crossing; and • Measures to minimise visibility of construction activity and reduce dust and noise.
Air quality	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond the best practice detailed in Table 23-2		
Noise and vibration	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond the best practice detailed in Table 23-2.		

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Biodiversity	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Floating water-plantain	Huddersfield Broad Canal Underbridge (MVL3/108S)	No in-channel works or channel de-watering will be undertaken in Huddersfield Broad Canal during construction, which will avoid potential direct impacts on this plant species. Further details will be included in the LEMP.
		Planning condition 4	In-channel habitat and aquatic species (including the priority species floating water-plantain)	Colne Viaduct Underbridge (MVL3/109)	No in-channel works or channel de-watering will be undertaken in the River Colne during construction, which will avoid potential direct impacts on this plant species. Further details will be included in the LEMP.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Daubenton's bat maternity roost (present within the structure)	Impact on maternity bat roost due to re-construction of Colne Viaduct Underbridge (MVL3/109)	The reconstruction of Colne Viaduct Underbridge (MVL3/109), will be undertaken in accordance with an approved Natural England EPSM licence.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The following mitigation measures will likely be required as a condition of the EPSM licence, with mitigation required detailed in the LEMP. All mitigation would be overseen by a licensed bat ecologist: • Provision of alternative roosting sites (bat boxes suitable for use by Daubenton's bats) on nearby bridges over rivers that will not be subject to significant disturbance during construction and where no roosting opportunities currently exist). Alternative roosting sites need to be in place before bats are excluded from the existing roost in Colne Viaduct Underbridge (MVL3/109); • Exclusion of roosting bats from roosting features in Colne Viaduct Underbridge (MVL3/109) using one-way exclusion devices and/or other suitable methods. This would need to be completed during April, September or October only to avoid the periods when bats are most vulnerable during breeding (May to August inclusive) and hibernation (November to March inclusive); • Ecological supervision and regular inspections during works to ensure that bats continue to be excluded from roosting features and to remove any bats that return as necessary; • Monitoring of replacement roost sites during construction to determine their effectiveness and the need for any alterations; • Re-instatement of roosting features as far as possible in the re-constructed bridge to allow bats to continue roosting within the structure in the long term. Provision of alternative roosting sites in the bridge to compensate for any roosting features lost; and • Monitoring of the bridge for several years after completion of construction works to determine the effectiveness of re-instated/replacement roosting features and the need for any alterations.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Pipistrelle bat roost present in Heaton Lodge Cottage 32030_B1	Impacts on bat roost due to demolition of Heaton Lodge Cottages	Demolition of Heaton Lodge cottages 32030_B1 will need to be undertaken in accordance with an approved Natural England EPSM licence.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The following mitigation measures will likely be required as a condition of the EPSM licence for demolition of Heaton Lodge Cottages, with mitigation required detailed in the LEMP: • Provision of an alternative roosting site (a bat box suitable for use by common pipistrelle bats) on a nearby tree that will not be subject to significant disturbance during construction and where no roosting opportunities currently exist. The alternative roosting site needs to be in place before soft demolition; • Soft demolition of identified roosting feature under supervision of a licenced ecologist. This would need to be completed during September – May inclusive when bats were least likely to be present. The supervising licenced ecologist would be able to remove any opportunistic bats present; • Monitoring of replacement roost site during construction to determine its effectiveness and the need for any alterations; and

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
					• Monitoring of the replacement roost site for several years after completion of construction works to determine the effectiveness of re-instated/replacement roosting features and the need for any alterations.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Bats – Roosting bats present in mature trees adjacent to Colne Viaduct Underbridge bridge (MVL3/109)	Demolition/felling of mature trees with roosting bats present	Demolition/felling of mature trees would need to be undertaken in accordance with an approved Natural England EPSM licence. Reconstruction of Colne Viaduct Underbridge (MVL3/109), which supports a Daubenton's bat maternity and hibernation roost, will need to be undertaken in accordance with an approved Natural England EPSM licence
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The following mitigation measures will likely be required as a condition of the EPSM licence for the Daubenton's bat maternity roost (present within Colne Viaduct Underbridge (MVL3/109)), with required mitigation detailed in the LEMP: • Provision of alternative roosting sites (bat boxes suitable for use by Daubenton's bats) on nearby bridges over rivers that will not be subject to significant disturbance during construction and where no roosting opportunities currently exist. Alternative roosting sites need to be in place before bats are excluded from the existing roost in Colne Viaduct Underbridge (MVL3/109); • Exclusion of roosting bats from roosting features in Colne Viaduct Underbridge (MVL3/109) using one-way exclusion devices and/or other suitable methods. This would need to be completed during April, September or October only to avoid the periods when bats are most vulnerable during breeding (May to August inclusive) and hibernation (November to March inclusive); • Ecological supervision and regular inspections during works to ensure that bats continue to be excluded from roosting features and to remove any bats that return as necessary; • Monitoring of replacement roost sites during construction to determine their effectiveness and the need for any alterations; • Re-instatement of roosting features as far as possible in the re-constructed bridge to allow bats to continue roosting within the structure in the long term. Provision of alternative roosting sites in the bridge to compensate for any roosting features lost; and • Monitoring of the bridge for several years after completion of construction works to determine the effectiveness of re-instated/replacement roosting features and the need for any alterations.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Bats – assumed roosts (prior to completion of winter hibernation surveys) Individual willow trees - 32150_T1 and 32150_T2	Potential direct impacts due to felling of trees	Based on a worst-case scenario of roosting presence, felling trees would need to be undertaken in accordance with an approved Natural England EPSM licence
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The following mitigation measures will likely be required as a condition of the EPSM licence, with required mitigation detailed in the LEMP: • Provision of an alternative roosting site (bat boxes suitable for use by hibernating bats) on nearby structures or trees that will not be subject to significant disturbance during construction and where no roosting opportunities currently exist. Alternative roosting sites would need to be in place before bats are excluded from the presumed roost in these trees; • Timing of tree removal between May and October to avoid the hibernation season (which runs November to March inclusive); • If works cannot be timed to avoid the hibernation season, exclusion of roosting bats from roosting features within these trees using one-way exclusion devices and/or other suitable methods. This would need to be completed outside the hibernation period to prevent return of the bats prior to the hibernation period (November to March inclusive); • Ecological supervision immediately prior to felling to ensure that bats continue to be excluded from roosting features and to remove any opportunistic bats that are present; and • Monitoring of replacement roost sites during construction to determine their effectiveness and the need for any alterations.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	ES Volume 2ii: Route Section Assessment – Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-1	Badger	Destruction of a single active main badger sett and other non-main around Heaton Lodge Junction	A badger development licence will need to be obtained from Natural England to permit the destruction of the two setts identified in Route Section 4, as well as any other active or partially used setts identified. This would be undertaken in line with the approach set out in Table 23-1. The mitigation measures detailed in Table 23-1 will be implemented to minimise direct impacts and disturbance as far as possible on active setts identified in Route Section 4
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Otter	Potential loss of riparian habitat and displacement of otter as a result of disturbance	Pre-construction surveys to determine the presence/likely absence of otter resting sites and sensitive habitat clearance under an ecological watching brief, where necessary, will be outlined in the LEMP. If otter resting sites are identified prior to or during construction, measures to minimise direct impacts and disturbance as far as possible, such as through establishment of exclusion zones, will be implemented.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement			Where direct or significant indirect impacts on otter resting places cannot be avoided, appropriate mitigation measures will be undertaken under the authority of an otter EPSM licence, such as the creation of replacement resting sites outside of working areas.
Landscape, townscape and visual	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond those identified in Table 23-1.		
Water environment	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	Planning condition 5(viii)	Aire & Calder Carb. Limestone/ Millstone Grit/ Coal Measures WFD groundwater body	Construction activities may act as a barrier to groundwater and may affect local groundwater levels, flow and quality in the underlying water-bearing strata.	The EDP (Land Contamination and Hydrogeology) to be included in Part B of the CoCP will include the following measures: • Site-specific intrusive GI to be undertaken to obtain appropriate groundwater level and quality monitoring in the vicinity of the works. Ground investigations to be designed in such a way as to avoid introducing additional pathways for contamination migration. GI to be undertaken pre-, during and post-construction; and • A specific risk assessment is to be undertaken to assess the risk to groundwater associated with the Heaton Lodge cutting. This must include a dewatering risk assessment and consider any potential pollution pathways which may contribute to groundwater contamination. The design of the cutting must take into account the results of this hydrogeological risk assessment.
Geology, soils and land contamination	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Planning condition 5(viii)	Secondary A Aquifer and River Colne and River Calder	Contamination by off-site landfill	During the ongoing GI, monitoring wells have been/will be installed into boreholes drilled along the alignment of the new cutting in order to allow groundwater data to be collected to establish whether or not groundwater has been impacted by the up-slope landfill. Following completion of the monitoring programme (during the detailed design stage) the data will be used to refine the Conceptual Site Model (CSM) and to undertake a risk assessment (pile types, if such is deemed necessary by the designers, will also be considered within CSM and assessment). Details will be set out in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Population and human health	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond those identified in Table 23-1.		
Agriculture	ES Volume 2i: Chapter 19 (Agriculture), Section 19.6 (Mitigation measures)	Planning condition 5(iv) Table 23-1	Agricultural soils	Temporary and permanent land take resulting in loss of agricultural soils	At the end of the construction phase, 4.097ha of the 7.83ha of land acquired in Route Section 4 is to be restored to a condition suitable for its existing land use, if agriculture is the agreed end-use. A survey of the existing condition of this 6.0ha will be made before any works start. Network Rail will prepare a Soils Mitigation Plan as part of the MMP in advance of construction that includes a pre-disturbance record of the soil's physical characteristics and ALC grade. The measures identified in Table 23-1 will be applicable for this land.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	ES Volume 3: Appendix 2-1: CoCP (Part A): Section 11 – Resource Use and Waste Management				

Operation

Table 23-10 Proposed mitigation measures during operation in Route Section 4

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measure
Historic environment	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Number 2 Lock, Calder & Hebble Navigation. Grade II Listed Building. NHLE 1313801	Change in asset setting due to removal of screening vegetation.	Installation of appropriate screening to the south of the railway line that maintains views to Colne Bridge (Grade II Listed Building: NHLE1221180), defined in the CIMP.
Air quality	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	n/a	None proposed. No operational adverse effects.		
Noise and vibration	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Biodiversity	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Barn Owl	Potential collision hazard to foraging and commuting barn owls during operation at Heaton Lodge.	Soft landscaping along the new section of railway line around Heaton Lodge junction is proposed as defensive planting to avoid creating barn owl foraging along new railway cutting. This is included in the Outline Environmental Mitigation Plan in Figure 2-3 and will be further detailed in the LEMP.
Landscape, townscape and visual	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Water environment	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Planning condition 5(viii)	Unnamed Watercourse at Colnebridge Culvert	Loss of open watercourse to accommodate extension of Heaton Lodge Junction, Mirfield Culvert (MVN2/190A).	Measures to minimise the effect of the loss of watercourse are to be outlined in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • Proposed culvert gradient will remain similar to the existing; • Buried boulder bed check will be in place at the opening of the culvert extension to ensure that the invert level of the culvert does not become perched above the natural riverbed; • Localised works such as vegetation management/planting and bed and bank reprofiling in the vicinity of the culvert opening will be undertaken to maximise watercourse continuity and habitat value; • Depressed culvert invert and a suitable bed substrate will be utilised within the culvert extension to promote a natural bed continuity through the structure; • Post-construction monitoring by a qualified geomorphologist to ensure watercourse stability. Some natural adjustment is expected; and
			Unnamed watercourse at Heaton Lodge Junction	Loss of open watercourse to accommodate extension of Heaton Lodge Junction,	

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measure
				Mirfield Culvert (MVN2/190A).	• Culvert works will be monitored and maintained regularly to ensure watercourse conveyance.
			Bradley Culvert (MVL3/106A)	Increased flood risk	As outlined in Part A of the CoCP, culverts will be appropriately sized to ensure there is no increase in flood risk.
			Colnebridge Culvert (MVL3/110A)		
Geology, soils and land contamination	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 11 – Resource Use and Waste Management	Planning condition 5(iv)	Workers in fields/on nearby agricultural land that was used as compounds	Contaminants originating from historical colliery Livestock and crops on the above-mentioned land	As part of the ongoing GI, Soil and Made Ground samples have been/will be collected from these areas. Mitigation measures will be included in the Soils Mitigation Plan, which forms part of the MMP under Part B of the CoCP. This will include a suitable thickness of sub/topsoil, that meets site specific re-use criteria, to be placed over colliery spoil/ash to sever the exposure pathway to end-users, for example.
	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Planning condition 10			Where hazards are considered, via risk assessment, to pose an unacceptable risk then a remediation options appraisal and/or strategy will be prepared and submitted to and agreed by the Local Authority. Any required remediation will be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.
Population and human health	ES Volume 2ii: Route Section 4 – Colne Bridge and Battyeford, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond those identified in Table 23-2.		

23.8 Route Section 5 – Mirfield and Lower Hopton

23.8.1 Tables 23-11 and Table 23-12 present a summary of the environmental mitigation measures and management actions which have been identified throughout the construction and operational phase of Route Section 5. Scheme-wide measures have not been repeated in these tables, although they are applicable to Route Section 5.

Construction

Table 23-11 Proposed mitigation measures during construction in Route Section 5

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	Part A of the CoCP	Woodend Road Overbridge (MVN2/191)	Demolition	Historic building recording to Level 2. Measures to be implemented include: • Materials for external elevations shall be submitted to and agreed with Kirklees Council; • Monitoring undertaken during demolition; and • Opportunities for sustainable reuse of materials.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 2 – Training and Competence	Part A of the CoCP	Mirfield Viaduct Underbridge (MVN2/192) Grade II Listed Building (NHLE 1313676)	Physical change to structures	Part A of CoCP includes details of toolbox talks.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Wheatley's Viaduct Underbridge (MVN2/196) Grade II Listed Building (NHLE 1450703)		Historic building recording to Level 1.
	ES Volume 3: Appendix 2-1: CoCP (Part A): Section 2 – Training and Competence	Part A of the CoCP			Part A of CoCP includes details of toolbox talks.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	Planning condition 6	Ledgard Bridge Grade II Listed Building (NHLE 1183989)	Physical impacts on the fabric of the structure due to collision and splashes	The CTMP will include protective measures to minimise impact to the Listed structure including: • Traffic management; • Agreed construction traffic programme to manage construction traffic.
	ES Volume 3: Appendix 2-1: CoCP (Part A): Section 5 – Historic Environment Section 6 – Townscape and Visual Amenity	Part A of the CoCP			Part A of the CoCP includes measures to minimise the visibility of construction activity and detail protective measures, such as protective panels and warning signs to protect historic structures.
Air quality	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	n/a	None proposed.		
Noise and vibration	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-1.		
Biodiversity	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Great Crested Newts	Loss of suitable terrestrial habitat and indirect impacts on water bodies.	Construction works to the north of the railway line within 500m of the water bodies associated with the GCN population may need to be completed in accordance with an approved Natural England EPSM licence.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4			The following mitigation measures will likely be required as a condition of the EPSM licence, with required mitigation to be included in the LEMP. All mitigation would be overseen by a suitably licensed ecologist: • Removal and exclusion of GCN from working areas, using amphibian drift fencing where appropriate and necessary; • Destructive searches of potential refugia in working areas; and • Habitat re-instatement and enhancement to compensate for any permanent habitat loss. Non-licensed reasonable avoidance measures will be implemented during vegetation clearance to the south of the railway line within 500m of the water bodies associated with the GCN population (GCN_019a and GCN_019b). These will include measures such as sensitive clearance of vegetation, fingertip searches of vegetation and destructive searches of potential refugia. The approach and rationale will be documented in a Precautionary Working Method document and works will be completed under the supervision of an Ecological Clerk of Works.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-1	Badger	Possible damage, destruction or disturbance of badger setts	The mitigation measures detailed in Table 23-1 will be implemented to minimise direct impacts and disturbance as far as possible on active setts identified in Route Section 5.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Otter	Localised displacement of otter as a result of disturbance	The LEMP will be implemented prior to and during construction to minimise impacts on otters. Measures included in the LEMP comprise: • Pre-construction surveys will be undertaken to determine the presence/likely absence of otter resting sites; and • Sensitive habitat clearance under an ecological watching brief, where necessary. If otter resting sites are identified, measures to minimise direct impacts and disturbance as far as possible, such as through establishment of exclusion zones, will be implemented.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement			Where direct or significant indirect impacts on otter resting places cannot be avoided, appropriate mitigation measures will be undertaken under the authority of an otter EPSM licence, such as the creation of replacement resting sites outside of working areas.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Part A of the CoCP	River Calder	Possible pollution of watercourse	Part A of the CoCP ensures that the need for in-channel works or channel de-watering in the River Calder will be avoided during construction.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Floating water-plantain	This species is fully protected under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended), and therefore the potential localised loss of individual plants in the River Calder during construction (as a result of potential localised in-channel works) may be licensable.	Liaison with Natural England is ongoing to confirm likely requirements for species licensing, any detailed macrophyte survey required to support it, and any necessary additional mitigation measures.
		Planning condition 4			Any licencing requirements for floating water-plantain will be detailed in the LEMP.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Landscape, townscape and visual	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-1	No specific mitigation proposed beyond the best practice in Table 23-1.		
Water environment	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Part A of the CoCP	River Calder and associated Flood Zone 2 and Flood Zone 3	Potential loss of floodplain, and floodplain conveyance due to increase in surface water runoff from new rail track, construction compounds at Ledgard Bridge and Steanard Lane and change in hardstanding at Mirfield Station.	Part A of the CoCP will ensure that hazardous materials and sensitive equipment will be stored outside of flood zone within the compound where possible.
		Planning condition 5(viii)	Aire and Calder Carb. Limestone/ Millstone Grit/ Coal Measures WFD groundwater body	Piling activity and retaining walls and sub surface engineering have potential to increase runoff	A Hydrogeological Risk Assessment is required following site-specific GI to allow temporary drainage systems to be designed to accommodate groundwater derived flow as well as surface runoff; alleviate localised surface water flood risk, and prevent obstruction of existing surface runoff pathways and development of new ones. Details will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	Planning condition 5(viii)		Construction activities relating to sheet piling at Mirfield Station resulting in groundwater effects	Specific intrusive GI to be undertaken to obtain appropriate groundwater level and quality monitoring in the vicinity of the works. Ground investigations to be undertaken pre-, during and post-construction. Details of GI requirements will be detailed in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
		Part A of the CoCP			The following mitigation measures to protect groundwater are included in Part A of the CoCP: • Where deep foundations extending beneath the groundwater table are designed to be part of the Scheme, these are to be designed in accordance with industry standards – taking into account the site-specific water level and flow monitoring data obtained from intrusive GI for the Scheme. • A piling risk assessment is to be carried out to ensure the selected piling method does not introduce contamination pathways into the aquifer. • A risk assessment is to be completed prior to any subsurface works being undertaken to consider any potential pollution pathways which may contribute to groundwater contamination.
Geology, soils and land contamination	ES Volume 2ii: Route Section Assessment – Route Section 5 – Mirfield and Lower Hopton, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Planning condition 5(viii)	Groundwater and the River Calder	Contamination of assets from contaminants migrating from the chemical works	GI and Scheme design will consider the layout of the existing remediation infrastructure present in the vegetated area between the railway and the river in order to minimise the risk of damaging the pipework, etc. During the ongoing GI, monitoring wells have been/will be installed into boreholes in order to allow groundwater data to be collected from the plume migrating through the superficial deposits. Following completion of the monitoring programme the data will be used to refine the CSM and to undertake a risk assessment (pile types/depths, drainage routes/depths, will also be considered within CSM and assessment). Details of the GI and monitoring requirements will be detailed in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Population and human health	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 15 (Population and	See Table 23-1	No specific mitigation measures proposed beyond those measures detailed in Table 23-1.		

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	human health), Section 15.4 (Mitigation measures)				
Electromagnetic Interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	Planning condition 5(i)	Dr Reddy's Laboratories EU Ltd	Possible EMI interference	Consultation with the site owner shall be undertaken to determine the presence of any highly sensitive equipment and its location within the site. Details of liaison will be included in the External Communications Programme under Part B of the CoCP.
		Network Rail Engineering Standards			An EMI risk assessment will need to be carried out to identify any specific mitigations required in conjunction with the owner, which will then need to be managed during the detailed design stages.

Operation

Table 23-12 Proposed mitigation measures during operation in Route Section 5

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor ID	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Air quality	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	n/a	None proposed. No operation effects.		
Noise and vibration	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	n/a	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Biodiversity	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	n/a	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Landscape, townscape and visual	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-2 and 23-11	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Water environment	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 11 (Water environment), Section 11.5 (Mitigation measures)	See Table 23-2 and 23-11	No specific mitigation measures proposed beyond those identified in Table 23-2 and Table 23-11.		
Geology, soils and land contamination	ES Volume 2ii: Route Section Assessment – Route Section 5 – Mirfield and Lower Hopton, Chapter 12 (Geology, soils and land contamination, Section 12.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Population and human health	ES Volume 2ii: Route Section 5 – Mirfield and Lower Hopton, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures proposed beyond those identified in Table 23-2.		
Electromagnetic Interference	ES Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	See Table 23-2 and 23-11	No specific mitigation measures proposed beyond those identified in Table 23-2 and Table 23-11.		

23.9 Route Section 6 – Ravensthorpe and Westtown

23.9.1 Tables 23-13 and Table 23-14 present a summary of the environmental mitigation measures and management actions which have been identified throughout the construction and operational phase of Route Section 6. Scheme-wide measures have not been repeated in these tables, although they are applicable to Route Section 6.

Construction

Table 23-13 Proposed mitigation measures during construction in Route Section 6

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	LBC conditions	Occupation Underbridge (MDL1/10) Grade II Listed Building (NHLE 1450702)	Physical alterations to structure	Historic building recording to Level 2
			Toad Holes, Dewsbury Underbridge (MDL1/12) (Grade II Listed, NHLE 1450704)		
			Ming Hill Underbridge (MDL1/14) (Grade II Listed, NHLE 1450704)		
		LBC conditions	Station Footbridge (MDL1/4) Non-designated heritage asset	Removal of asset	• Historic building recording to Level 2
		LBC conditions			• Opportunities for sustainable reuse of materials under CIMP
Air quality	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond those identified in Table 23-1.		
Noise and vibration	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond those identified in Table 23-1.		
Biodiversity	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	River Calder and the Calder and Hebble Navigation.	Temporary disturbance of in-channel habitat and aquatic species	The extent of river training walls required for Baker Viaduct Underbridge (RBA/2) on the River Calder will be minimised through detailed design and detailed in the LEMP. The design, where possible, will also seek opportunities to soften the hard-engineered solution through, for example, rough rather than smooth structure facing. It will also incorporate green bank protection solutions to transition hard engineering to the existing bankface. Enhancement of existing riparian habitat adjacent to and downstream of Baker Viaduct Underbridge (RBA/2). This will include enhancement (through tree planting and vegetation management) of approximately 90m of bank habitat on the right bank between Baker Viaduct Underbridge (RBA/2) and a pipe crossing downstream adjacent to the existing weir. Details for enhancement of this reach will be included in the LEMP.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan		Standing water bodies within Thornhill Quarry site (GCN_023 and GCN_024)	The loss of the two ecologically important ponds	New pond habitat will be created to fully compensate for the loss of the two potentially ecologically important ponds within Thornhill Quarry site (GCN_023 and GCN_024). Where possible, this will be completed prior to the removal of the existing ponds in order to ensure continuous provision of standing water habitat. Where it is not possible to create compensation ponds prior to the loss of existing ponds, smaller ponds/scrapes will be created in advance of the works to provide temporary transitional habitat for species of conservation interest. Larger areas of pond habitat will then be created following construction to compensate for the total area of standing water lost. Details including locations of compensation ponds are included in the Outline Environmental Mitigation Plan in Figure 2-3 and will be detailed in the LEMP. The existing ponds will be drained and removed sensitively to minimise impacts on associated flora and fauna. Animals (such as newts) will be recovered from the ponds as far as possible and transferred to the newly created ponds and/or other suitable habitat outside construction areas. Aquatic plants will be recovered and transferred to the newly created ponds (where applicable and possible) in order to enhance their value and speed up their establishment. The sensitive removal of the existing ponds will be completed in accordance with an approved method statement and under the supervision of an ecologist (where necessary).
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Planning condition 4	Floating water-plantain	Localised loss of individual plants in the River Calder and the Calder and Hebble Navigation and water quality impacts	Pre-construction surveys will be completed of the potentially affected areas will be undertaken to confirm whether floating water-plantain is present within the affected areas. Details will be included in the LEMP. Micro-siting of construction activities will be undertaken in the first instance where avoidance is possible.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement			Liaison with Natural England is ongoing to confirm likely requirements for species licensing, any detailed macrophyte survey required to support it, and any necessary additional mitigation measures. Movement of plants under EPSM licence will be undertaken in advance of construction works where avoidance is not possible.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Bats – Daubenton's bat maternity roost in Off Forge Lane Underbridge (MVN2/206)	Construction and use of the Ravensthorpe Area compound could indirectly impact the roost, both through disturbance (noise, vibration and artificial light) of the roost itself and disturbance of connecting riparian habitats along the Calder and Hebble Navigation, which are likely to be important for the integrity of the roost.	Specific bat mitigation, which will be outlined within the LEMP is as follows: • A buffer zone will be maintained around the bat roost in structure Off Forge Lane Underbridge (MVN2/206) in order to avoid disturbance during establishment and use of the Ravensthorpe construction compound. This compound will not extend beyond the public footpath that runs between Scholefield Underbridge (MVN2/205) and Off Forge Lane Underbridge (MVN2/206) over the Calder and Hebble Navigation. This will maintain a minimum 75m distance between the compound and the bat roost; • Construction lighting within the Ravensthorpe Area compound will be positioned and designed so as to minimise light spill onto the Calder and Hebble Navigation and associated riparian habitats, as far as possible; and • Hoods and covers will be used to direct lighting onto working areas only.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement	Bats - presumed summer/ hibernation roosts in trees in advance of	Direct impacts (felling) from works to overhead power lines	Destruction of these roosts would need to be undertaken in accordance with an approved Natural England EPSM licence.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan	Planning condition 4	surveys		The following mitigation measures may be required as a condition of the EPSM licence, with mitigation required detailed in the LEMP. All mitigation would be overseen by a licensed bat ecologist. • Provision of an alternative roosting site (bat boxes suitable for use by hibernating bats) on nearby structures or trees that will not be subject to significant disturbance during construction and where no roosting opportunities currently exist. Alternative roosting sites would need to be in place before bats are excluded from the presumed roost in these trees; • Timing of tree removal may be required based on type of bat roost, should one be present; • Ecological supervision immediately prior to felling to ensure that bats are absent from roosting features and to remove any opportunistic bats that are present; • Monitoring of replacement roost sites during construction to determine their effectiveness and the need for any alterations; and • Recommended sites for replacement bat boxes include mature trees within Lady Wood and woodland north of Lees Hall Road, which meet these requirements.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-1	Badger	Establishment and use of the Ravensthorpe Area compound will result in the destruction of two identified non-main badger setts	The mitigation measures detailed in Table 23-1 will be implemented to minimise direct impacts and disturbance as far as possible on the partially active sett identified.
		Legislative requirement	Little-ringed plover	Disturbance due to Forge Lane compound	Construction of the Forge Lane compound will by priority commence outside the bird nesting season (March to August inclusive) in order to render the site unsuitable for little-ringed plover and discourage the species from breeding. If this is not possible, it will be necessary to complete a targeted survey for little-ringed plover (between April and July) to determine whether the species is present and breeding with appropriate protection implemented. If found to be breeding at the site, it would be necessary to avoid direct impacts and disturbance of breeding birds, which would likely constrain the establishment of the compound and result in construction delays.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation	Planning condition 4	Otter	Construction works will result in the localised loss of riparian habitat and disturbance could result in displacement of otter	Pre-construction surveys to determine the presence/likely absence of otter resting sites and sensitive habitat clearance under an ecological watching brief, where necessary. Further details will be included in the LEMP. If otter resting sites are identified prior to or during construction, measures to minimise direct impacts and disturbance as far as possible, such as through establishment of exclusion zones, will be implemented. Construction lighting within the Ravensthorpe Area compound will be positioned and designed so as to minimise light spill onto the Calder and Hebble Navigation, the River Calder and their associated riparian habitats, as far as possible.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	Legislative requirement			Where direct or significant indirect impacts on otter resting places cannot be avoided, appropriate mitigation measures will be undertaken under the authority of an otter EPSM licence, such as the creation of replacement resting sites outside of working areas.
Landscape, townscape and visual	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures proposed beyond those identified in Table 23-1.		

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	ES Volume 3: Appendix 2-1: CoCP (Part A): Section 4 – Ecology and Nature Conservation Section 6 – Townscape and Visual Amenity				
Water environment	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Part A of the CoCP	River Calder and Calder and Hebble Navigation	Risk of contamination from adjacent construction compounds and activity from the Baker Viaduct Underbridge (RBA/2)	Part A of the CoCP will ensure that, due to the nature of the work, continuous water quality monitoring will be used prior to, during and following in-channel works to identify and assess magnitude of potential pollution events downstream of works and whether additional mitigation is required.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP (Part A): Section 7 – Water Resources	Part A of the CoCP	Flood plain in the vicinity of Baker Viaduct Underbridge (RBA/2)	Potential loss of floodplain, change in channel flow conveyance and floodplain conveyance Increase in surface water runoff from Baker Viaduct Underbridge (RBA/2).	Part A of the CoCP will ensure that hazardous materials and sensitive equipment will be stored outside of flood zone within the compound.
		Planning condition 5(ii)	Unnamed Watercourse at Long Plantation	Displacement of waterbody from excavation and laying of underground power cables	Watercourse will require flow to be pumped over works to maintain downstream flow during construction and this will be managed through implementation of the PPICP under Part B of the CoCP.
Geology, soils and land contamination	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 12 (Geology, soils and land contamination), Section 12.4 (Mitigation measures)	Planning condition 10	Users of adjacent land and property	Contaminated dust from on-site	Efforts to minimise disturbance of and creation of spoil from the Thornhill Quarry site (which is known to contain asbestos). If asbestos contamination is considered to pose an unacceptable risk then a remediation options appraisal/strategy will be prepared, submitted to and approved in writing by the Local Authority, pursuant to a condition to be attached to the deemed planning permission.
		Planning condition 5(viii)	Secondary A Aquifer	Contamination originating from landfill	During the ongoing GI, monitoring wells have been/will be installed into boreholes drilled into these key source areas (landfill sites) in order to allow groundwater data to be collected from the contamination sources. Following completion of the monitoring programme (during the detailed design stage) the data will be used to refine the CSM and to undertake a risk assessment (pile types, if such is deemed necessary by the designers, will also be considered within CSM and assessment). Further details on GI and monitoring will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
Population and human health	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-1	No specific mitigation measures beyond those identified in Table 23-1.		
Electromagnetic interference	ES Main Statement Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6	Network Rail Engineering Standards	Longley Concrete	Vulnerability to EMI	A Power Supply Unit (PSU) is proposed to the rear of these premises. Consultation with the owner and a risk assessment will be undertaken to determine any additional mitigation measures. Liaison with landowners will be managed in accordance with the External Communications Programme under Part B of the CoCP.

Environmental topic	Cross-reference for further detail	Mechanism by which measures are secured	Receptor	Impact	Proposed mitigation measures
	(Mitigation measures)		SUEZ recycling and recovery UK - Dewsbury		Buried services records will have to be reviewed to identify any metallic cables and/or pipes originating from the compound and running close and/or parallel to the railway that may be susceptible to induced hazardous touch voltages which pose a risk of electric shock. Where metallic pipes are in close proximity to traction power and earth conductors, utilities may need to be gapped and bonded, or insulated to mitigate this risk (e.g. use of PVC piping). This shall be verified and investigated during detailed design to determine any additional mitigation measures once utilities survey data is available.
			Vodafone, O2		Buried services records will have to be reviewed to identify any metallic cables and/or pipes originating from the compound and running close and/or parallel to the railway that may be susceptible to induced hazardous touch voltages which pose a risk of electric shock. Where metallic pipes are in close proximity to traction power and earth conductors, utilities may need to be gapped and bonded, or insulated to mitigate this risk (e.g. use of PVC piping). This shall be verified and investigated during detailed design to determine any additional mitigation measures once utilities survey data is available.

Operation

Table 23-14 Proposed mitigation measures during operation in Route Section 6

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Impact	Proposed mitigation measures
Historic environment	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 6 (Historic environment), Section 6.4 (Mitigation measures)	See Table 23-2.	No specific mitigation proposed beyond the best practice in Table 23-2.		
Air quality	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 7 (Air quality), Section 7.4 (Mitigation measures)	n/a	None proposed. No operational effects.		
Noise and vibration	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 8 (Noise and vibration), Section 8.4 (Mitigation measures)	Planning condition 13	Noise sensitive receptors	Change in noise levels	A retaining wall is proposed between the proposed realignment of Thornhill Road and the rear garden of 26 Brooks Yard which would serve as a noise barrier to reduce noise levels in external amenity space and ground floor areas.
Biodiversity	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 9 (Biodiversity), Section 9.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond the best practice in Table 23-2.		
Landscape, townscape and visual	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 10 (Landscape, townscape and visual), Section 10.4 (Mitigation measures)	See Table 23-2	No specific mitigation proposed beyond the best practice in Table 23-2.		
Water environment	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 2-1: CoCP	Planning condition 4	Calder and Hebble Navigation	Permanent presence of the Baker Viaduct Underbridge (RBA/2) across the canal.	Vegetation management in the riparian corridor in vicinity of the viaduct is outlined in the Outline Environmental Mitigation Plan in Figure 2-3 and will be detailed further in the LEMP.
		Planning condition 5 (viii)	River Calder	Permanent presence of Baker Viaduct	Hydraulic modelling will be used to further inform the design – including comparison of velocities (and potential for scour) between the baseline and the proposed works both

Environmental topic	Cross-reference for further detail	Mechanism by which the measures are secured	Receptor	Impact	Proposed mitigation measures
	(Part A): Section 4 – Ecology and Nature Conservation			Underbridge (RBA/2) across the River Calder, including the presence of in-channel river training walls.	upstream and downstream. Detailed design will seek to minimise the effects during operation. Further details on the hydraulic modelling, along with the following mitigation measures, will be detailed in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP: • Minimising the length of bank to be physically modified (hard engineering); • Using softer measures at the transition area between the hard bank protection and the natural riverbank; and • Using grey/green measures to "soften" the aesthetic of the river training walls, where practicable;
		Planning condition 4			The following will be included in the LEMP to minimise effects on the River Calder during operation: • Planting shrubs and trees along riparian corridor downstream of the viaduct to enhance riparian connectivity and complexity.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 11-1: Flood Risk Assessment	Planning condition 5(viii)	River Calder and associated floodplain	Displacement of flood waters – increased flood risk	Any displacement of flood waters will be mitigated through flood volume compensation, where required. Proposed viaduct soffit levels are to be set approximately 600mm above the 1% plus climate change peak flood level. Flood relief culverts may be incorporated through piled embankment to provide conveyance of flood flows. Details of these measures will be included in the EDP (Land Contamination and Hydrogeology) under Part B of the CoCP.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 3: Appendix 11-1: Flood Risk Assessment ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan	Planning condition 4		Loss of floodplain	Where flood plain is lost, compensatory flood storage will be provided on a volume for volume and level for level basis. An area approximately 2,200m^2 has been identified for compensatory flood storage requiring 2,500m^3 of cut activity to return peak flood level to be modelled pre-Scheme peak flood level. This is shown on the Outline Environmental Mitigation Plan in Figure 2-3 and will be implemented in accordance with the detail to be contained within the LEMP.
	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 11 (Water environment), Section 11.5 (Mitigation measures) ES Volume 4: Figure 2-3 Outline Environmental Mitigation Plan	Planning condition 4	Thornhill Quarry ponds	Displacement of waterbody and loss of flood attenuation from construction of piled embankment associated with new track alignment.	Provide replacement of lost environmental asset. The locations of the replacement ponds are shown on the Outline Environmental Mitigation Plan in Figure 2-3 and will be implemented in accordance with the further details to be included in the LEMP.
Population and human health	ES Volume 2ii: Route Section 6 – Ravensthorpe and Westtown, Chapter 15 (Population and human health), Section 15.4 (Mitigation measures)	See Table 23-2	No specific mitigation measures beyond those identified in Table 23-2.		
Electromagnetic interference	ES Main Statement Volume 2i: Chapter 18 (Electromagnetic interference), Section 18.6 (Mitigation measures)	Network Rail Engineering Standards	A risk assessment of the PSU to be installed to the east of Ravensthorpe Station between the diverging lines (Thornhill Quarry site) shall be carried out at detailed design stages to identify and mitigate the risks induced by this installation. This assessment shall also consider any cumulative effects and identify any required additional mitigations necessary to reduce effects during operation.		