

Shaftholme Flyover

EIA Scoping Report

July 2010
Network Rail

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George Stephenson House, Toft Green, York, YO1 6HP

Mott MacDonald, 2nd Floor, 2 Brewery Wharf, Kendell Street, Leeds LS10 1JR, United Kingdom
T +44(0) 113 394 6700 F +44(0) 113 394 6701 W www.mottmac.com

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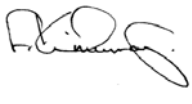
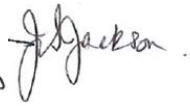
C	16th July 2010	Nicola Parker 	Fran Kilmurray 	Jackie Jackson 	Updated design details

Mott MacDonald, 2nd Floor, 2 Brewery Wharf, Kendell Street, Leeds LS10 1JR, United Kingdom
T +44(0) 113 394 6700 F +44(0) 113 394 6701 W www.mottmac.com

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Executive Summary

Mott MacDonald (MM) has been appointed by Network Rail (NR) to assist in the delivery of the Shaftholme Flyover scheme, to be located to the north of Doncaster, South Yorkshire. The project consists of a new flyover railway line over the East Coast Mainline (ECML) and 3km of associated new twin track railway. Once operational, this will provide a direct link between the Skellow and Askern lines, north of Doncaster station and will remove Humber Ports Coal freight traffic to the West Yorkshire power stations from the ECML. This will provide greater capacity and efficiency on the ECML for high speed passenger trains. Network Rail are also considering options as part of the Shaftholme Flyover scheme to provide a grade separated highway crossing over the ECML to the north of Joan Croft level crossing. Once the highway crossing is operational, it is the intention to close the Joan Croft level crossing.

Permission to undertake the development will be sought through application to the Infrastructure Planning Commission (IPC). An important aspect of the application is provision of the findings of an Environmental Impact Assessment (EIA), presented within an Environmental Statement (ES). This EIA Scoping report provides the proposed scope for the EIA for review by the IPC and statutory consultees and will be subsequently amended based on the Scoping Opinion and the recommendations of key stakeholders. It may also be updated as understanding of environmental conditions change. The final version of this environmental scoping report will be issued as a technical appendix to the ES.

The main aim of this EIA Scoping Report is to identify the technical environmental disciplines that will be assessed for potential effects during the construction and operational phases of the proposed scheme. A summary of the proposed assessments is presented in Table 1 overleaf.

Table 1 : Summary of technical disciplines to be considered as part of the EIA

Technical discipline	Scoped in / out		Brief justification for scoped-out sections
	Construction	Operation	
Air quality	✓	✓ (Partial)	Based on existing Doncaster Metropolitan Borough Council assessment results for rail operations in the area, it is apparent that operation of diesel freight along the new chord will not adversely affect air quality and will not require specific assessment in accordance with Defra criteria. However, consideration will be given to the operational effects resulting from changes in road traffic emissions for the opening year of the proposed highway crossing.
Archaeology & cultural heritage	✓	✓	N/A
Carbon effects	×	×	A detailed carbon footprinting exercise is being undertaken as a standalone report and will accompany the ES as a supporting document. Additional assessment is not considered necessary.
Community	✓	✓	N/A
Ecology	✓	✓	N/A
Electromagnetic compatibility	×	×	The new stretch of railway is for diesel freight, therefore OLE will only be present at the section crossing the ECML. The limited effects that onboard radio communication systems may have on radio services in the surrounding area will be minimal and will be appropriately assessed by telecommunications experts as part of the design process.
Geology & soils	✓	×	Once operational, the new chord will have no effect on geology & soils except in the event of an accident or emergency. Such events are not required to be assessed within EIA.
Landscape & visual assessment	✓	✓	N/A
Noise & vibration	✓	✓	N/A
Socio-economic effects	×	×	Socio-economic effects are of low relevance for this scheme due to the rural nature of the site area. Any potential implications can be acceptably considered as part of the community assessment.
Townscape	×	×	Not considered relevant due to rural nature of site and surrounding area.
Traffic & transportation	✓	×	Operation of the new chord will not result in any increase in road traffic.

1. The Scoping Process

1.1 Introduction

Mott MacDonald (MM) has been appointed by Network Rail (NR) to assist in the delivery of the Shaftholme Flyover scheme, located to the north of Doncaster, South Yorkshire. The project consists of a new flyover railway line over the East Coast Mainline (ECML) and 3km of associated new twin track railway. Once operational, this will provide a direct link between the Skellow and Askern lines, north of Doncaster station and will remove Humber Ports Coal freight traffic to the West Yorkshire power stations from the ECML. This will provide greater capacity and efficiency on the ECML for high speed passenger trains. As part of the scheme, NR is also considering options to provide a grade separated highway crossing over the ECML to the north of Joan Croft level crossing. Once the highway crossing is operational, it is the intention to close the Joan Croft level crossing.

MM commenced work on the project in August 2009 with an initial remit of developing the proposed Guidance for Railway Investment Projects (GRIP) stage 3 scheme to completion of a GRIP stage 4 design. The GRIP 4 outline design will then be taken forward for application through the Infrastructure Planning Commission (IPC), anticipated to be undertaken in December 2010. As part of the application, completion of an Environmental Impact Assessment (EIA), and subsequent production of an Environmental Statement (ES), is required owing to the size and nature of the development in accordance with Schedules 2 and 3 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. This EIA Scoping Report comprises the initial stage of the EIA process.

1.2 Purpose of Scoping

This EIA Scoping Report describes how the EIA will be undertaken and identifies the technical environmental disciplines that will be considered. Defining the environmental scope is one of the most critical parts of the study as it sets out the method for the detailed assessment.

The ES will be submitted as part of the overall IPC application. The IPC was established by the Planning Act 2008 and is an independent public body set up with the dedicated task of examining and deciding applications for nationally significant infrastructure projects (NSIPs) such as the Shaftholme Flyover scheme. The new infrastructure planning system has been designed to give the public, local authorities and interest groups much improved opportunities to get involved and make their views known, whilst also reducing the average time taken for major applications to be determined. Scoping consultees can find further information on the IPC and the application process at the IPC's web site www.independent.gov.uk/infrastructure or by calling their helpline on 0303 444 5000.

This draft scope for the EIA will be amended based on the IPC's Scoping Opinion and the recommendations of key stakeholders to ensure consideration when undertaking the EIA. It may also be updated as understanding of environmental conditions change.

1.3 Scoping Objectives

The objectives of scoping out an EIA are to:

- describe the overall approach to the EIA;
- identify the topics that will be assessed;
- eliminate any topics not to be assessed (i.e. be "scoped out");
- define the technical, spatial and temporal scope of the study for each topic;

- define the approach and methodology for baseline studies;
- define the approach and methodology for predicting environmental effects and for evaluating the significance of each effect;
- identify the methods to be adopted for incorporation of mitigation and other environmentally driven modifications into the design, as it develops; and
- provide a basis for agreeing the approach to the EIA and the methodologies to be followed with relevant stakeholders.

1.4 Environmental Impact Assessment

EIA is a process which identifies the environmental effects (both adverse and beneficial) of a proposed development. It ensures that the importance of these effects, and the opportunity for reducing any adverse effects, are properly considered as part of the design development process and are understood by the public, the relevant competent authorities, statutory authorities and other interested parties. EIA assists in decision making so that environmental factors can be given due weight, along with economic or social factors, when applications for development consent are being considered under IPC. EIA also helps developers to prevent, reduce and offset adverse environmental effects and ensures that environmental issues can be taken into account during the design of the scheme.

The requirements for EIA are defined by EC Directive 85/337/EEC, as amended. The requirements of the EIA Directive have been applied to IPC applications through the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. The required content of an ES is set out in Schedule 4 in Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.

The ES for the Shaftholme project will present the findings of the EIA. It is anticipated that the ES will comprise the following parts:

- Non-Technical Summary (NTS);
- a Main Statement volume, including all relevant scheme information, description of alternatives, summary of all technical disciplines, etc;
- a separate figures volume; and
- a Technical Appendices volume(s) to present detailed findings from the EIA.

1.5 Supporting Information

An Environmental Management Plan (EMP) has already been completed for the design stage of the scheme with the aim of aiding incorporation of environmental considerations in the design at an early stage. A project Sustainability Statement will also be undertaken as the design process evolves. These documents will not be presented within the ES but will form part of the IPC application as supporting information. A Flood Risk Assessment, separate Planning Statement and a report documenting the findings of a carbon footprinting exercise are currently being prepared and will also form part of the IPC application. Where relevant, information from these standalone reports will be incorporated into the ES and referenced appropriately, and the EIA process will similarly inform these studies as appropriate.

2. The Scheme

2.1 Project Overview

Network Rail intends to submit an application to the IPC to obtain permission to construct and operate a flyover grade separation and associated new twin-track railway at the Shaftholme and Joan Croft Junctions. This will provide a direct link between the Skellow and Askern lines in Doncaster, South Yorkshire and reduce volumes of freight traffic on the ECML. As part of the scheme, NR is also considering options to provide a grade separated highway crossing over the ECML to the north of Joan Croft level crossing. Once the highway crossing is operational, it is the intention to close the Joan Croft level crossing. An overview of the site location and layout is provided in Figures B1 and B2 in Appendix B.

At present, slow coal traffic from Immingham interacts with the ECML at Shaftholme and Joan Croft Junctions. These existing junctions are not currently aligned and as a result the rail freight traffic uses 15 miles of the ECML before reaching the Aire Valley power stations (Network Rail, April 2009). The ECML is intended to be an effective passenger railway line, and at off peak period's freight traffic occupies 22 minutes of each hour. This constrains the timetable, delays passenger services and limits the capacity of this part of the ECML route to provide growth in freight and passenger services. This project would resolve this issue of a local bottleneck at Shaftholme. Whilst delivering benefits itself, it is also forms part of a bigger programme of upgrades that covers the ECML, targeted at managing projected growth in both passenger and freight services.

2.2 Project History

The Shaftholme Flyover project is included in the ECML and Freight Route Utilisation Strategies (RUS) (Network Rail, February 2008 & March 2007 respectively). Since the ECML RUS was published, the Government has published its High Level Output Specification. This states the growth, safety and reliability targets for the rail industry to meet up to 2014, of which this project forms a part.

A number of previous studies have covered the option development of the project including work at GRIP 3 which identified a Preferred Option (Arup, November 2007). MM has developed this preferred option since August 2009 and the proposed railway alignment, associated embankment and multi-span viaduct structure is shown in Figure B2 in Appendix B. In conjunction with the development of the preferred option, MM has undertaken an assessment of possible construction route options, as shown in Figure B3 in Appendix B. These were presented to Network Rail by MM in December 2009 in the Initial Phase – Development of Project Footprint report and the preferred options are described in Section 2.5.2. Where appropriate, references will be made to these previous studies in the Scoping Report and subsequently in the Environmental Statement. An alternatives section will also be presented within the ES which describes the various options that have been considered during scheme development.

Alternatives to the railway flyover are limited due to the location, however alternative options will be reviewed as part of the EIA process.

2.3 Project Objectives

A set of overarching objectives for the ECML improvements have been developed by Network Rail, as outlined below:

- removal of slow moving freight trains off the high speed ECML providing greater capacity for long distance high speed trains;

- reduction in freight train mileage;
- improved reliability through reduced passenger and freight delays;
- helping to reduce road traffic congestion as an average freight train journey takes 50 lorry journeys off the road, and therefore improve road safety; and
- reducing carbon emissions; rail freight offers a 74% reduction in carbon emissions over road freight.

The Shaftholme project is one of many schemes which if implemented will aim to deliver these wider objectives.

2.4 Site Location

The area where the proposed railway flyover and chord is to be located is predominantly rural, with the surrounding land used mostly for agricultural purposes. The central location of the area of interest is located at approximately National Grid Reference 458200, 410300 (centre of the site), which is approximately 5km north of Doncaster, South Yorkshire. The location of the site is shown in Figure B1 in Appendix B.

2.5 Description of Proposed Works

2.5.1 Railway and Structure over the ECML

The preferred option currently comprises of approximately 3 km of new twin track railway, embankment and associated signalling infrastructure and new multi-span viaduct. The new railway and associated embankment will join the Askern line approximately 150m south of the Haywood MCB CCTV level crossing until joining the Skellow line approximately 500m after the Applehurst chord, close to Applehurst Lane UW level crossing. At this stage, it is proposed that a multi-span steel viaduct structure will be used for the twin track railway to cross Joan Croft lane and the ECML.

2.5.2 Construction Access Routes

It is proposed that two construction access routes will be used to serve the construction site, thereby enabling the project to be constructed East and West of the ECML. The routes are described below:

2.5.2.1 East of the ECML

To the east of the ECML, it is anticipated that access will be gained via a combination of rail and road. The bulk fill material will be delivered by rail into a new siding located at Thorpe Marsh power station and stockpiled until required for use.

The fill material will be subsequently loaded into wagons and transported to the working areas via existing roadways. From the stockpile there is a defined roadway, Field Station Road that runs west to the edge of the Thorpe Marsh nature reserve. Along this road there is a right turn to Applehurst Lane level crossing which leads north across the Skellow line. Once across the level crossing a new haul route will be formed which runs west, through the disused railway embankment to the site.

Access for other materials (beams, concrete etc), construction plant, small tools is expected to be via the existing road network. Other than local deliveries the probable route would be from the M18 via the A18, through Barnby Dun then Thorpe Bank Road into the power station. Once in the power station, any deliveries to the worksite will be via the construction route described above.

2.5.2.2 West of the ECML

To the west of the ECML, it is anticipated that access will be gained via the A19 from the motorway network to the north of Doncaster. From the A19, it is proposed that construction traffic will turn onto Rockley Lane, which will be operated as a one way system for construction traffic (the carriageway considered to be too narrow for two way construction traffic). Widening of the road will be avoided where possible to avoid loss of hedgerows and trees currently lining both sides of the road, however it may be necessary to provide passing places for normal traffic. The one way system will operate on Rockley Lane and Holme Lane.

It is proposed that a new section of haul route will be built from Storrs Lane to the Owston Grange No.1 level crossing over the Askern line. This will give access to the western end of the scheme and will allow fill material to be delivered for the embankments to the west of the ECML.

2.5.3 Highway crossing over the ECML

Network Rail is considering options as part of the Shaftholme Flyover scheme to provide a grade separated highway crossing over the ECML to the north of Joan Croft level crossing. Once the highway crossing is operational, it is the intention to close the Joan Croft level crossing. At this stage, it is proposed that a precast concrete integral bridge will be used to cross the ECML, and the new highway alignment required to enable the appropriate gradient to be reached has been developed to reflect the rural nature of the area and surrounding highways. The final design details for the highway crossing are yet to be finalised with the Highways Authority. The project team are developing a bridge design remit document that will be signed off by NR, MM and Doncaster Metropolitan Borough Council (DMBC).

2.6 Programme Outline

The current programme is dependent on third party approvals and other matters outside of the Shaftholme project's control, therefore it may be subject to change. However, Network Rail is working towards the following target dates:

Submission of IPC application:	June 2011
IPC decision expected	September 2012
Construction begins	January 2013
Final commissioning before operational service	June 2014

The construction programme is anticipated to be approximately 18 months in duration.

3. The EIA Methodology

3.1 Technical Scope

The technical scope outlines the disciplines that will be addressed in the EIA which according to Schedule 4, Part 1 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 includes:

"a description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors".

For the purposes of the Shaftholme Flyover scheme, it is proposed that the following aspects and any relevant inter-relationships will be considered as part of the EIA:

- air quality;
- archaeology and cultural heritage;
- community;
- ecology;
- geology and soils (including contaminated land);
- landscape and visual assessment;
- noise and vibration;
- traffic and transport;
- waste management; and
- water resources.

These environmental factors were reviewed on the basis of EIA best practice, the requirements of the EIA Directives as they apply to IPC applications, professional judgement, knowledge of the proposals and review of the baseline environment.

The following have been scoped out of the EIA process:

- carbon effects and climatic factors;
- electromagnetic effects (EMC); and
- socio-economic effects

For the assessment of carbon effects and climatic factors, a separate carbon footprint report will be undertaken by MM as part of the GRIP 4 design study. This topic could be included in the assessment, if required, at a later stage.

For EMC, the new stretch of railway will be for diesel freight, there will be very limited overhead electric lines (OLE) as part of the scheme. As such, it is considered that the limited effects that the onboard radio communication systems may have on radio services in the surrounding area will be minimal and can be appropriately assessed by telecommunications experts as part of the design process.

In the case of socio-economic effects, it is considered that they will be of lesser relevance due to the rural nature of the site area and therefore any potential effects such as those resulting from agricultural severance can be acceptably covered as part of the community assessment.

Should this situation change as the design develops, these topics will be reconsidered and if appropriate, scoped back into the assessment.

There is no requirement under IPC for inclusion of a planning section within the ES, and therefore it is not intended to prepare a separate planning and policy chapter. However, as the policy context is an important consideration for assessment of the various environmental disciplines, planning and policy matters will be addressed within each technical assessment where appropriate. A separate Planning Statement will also be prepared for submission as part of the IPC application.

3.2 Temporal Scope

The ES will address effects arising from the construction, temporary and permanent land take and operation of the Shaftholme scheme as follows:

- construction effects that may arise directly from construction activities (e.g. piling) and from the temporary use of land (e.g. construction sites), or from associated changes in traffic movements (e.g. diversions); and
- operational effects that may arise from the new infrastructure and traffic flows associated with the Shaftholme project.

It is normal practice, and indeed a part of some published policies and guidance, to allow for the growth of traffic or patronage over time, normally assumed to reach a stable peak within 15 years of opening. For example, this is consistent with the Calculation of Railway Noise and with road schemes. Similarly this is the period normally taken to assume that mitigation planting will have reached a suitable level of maturity. Therefore, operational effects will be assessed for the year of opening (currently anticipated to be late 2013), and the year of maximum growth/decline. This approach will give a worse case scenario. For certain environmental topics there will also be a need to look at longer term effects beyond this date.

It is currently intended that construction will commence in 2012, with operation of services commencing in late 2013.

3.3 Spatial Scope

The spatial scope is the geographical area that will be covered by the EIA. The definition of the spatial scope has taken account of:

- the footprint of the proposed works;
- the nature of the existing baseline environment;
- the manner in which effects are likely to be propagated (e.g. effects on watercourses may extend some distance downstream);
- the area affected (positively and negatively) by transport movements; and
- the geographical boundaries of the political and administrative authorities which provide the planning and policy context for the project.

The above text sets out the basic principles to define the spatial scope. The spatial scope may vary for each discipline, as described in the sections in Chapter 4.

3.4 Baseline

Environmental effects will be described in terms of the extent of change to the baseline environment. This baseline is generally taken to mean the environmental conditions that are prevalent at the time of the assessment or predicted to be the case at key points in the scheme's development.

Baseline environmental conditions, including those that are predicted to exist immediately prior to construction and operation of the Shaftholme project, as well as those currently existing will be identified by a number of means. They can be identified through the use of existing data available or through undertaking additional surveys, studies and modelling.

During the EIA process, relevant resources and receptors will be identified for each environmental topic and an appropriate baseline determined in respect of these. Resources are defined as the biophysical feature or item of "environmental capital" such as elements of ecological, landscape or heritage value, watercourses, dwellings, places of employment and community facilities. Receptors comprise human beings, either collectively or individually, and the socio-economic system upon which they depend.

Each of the environmental disciplines will prepare a baseline section for the ES in respect of their particular topic area. This will document the baseline conditions upon which the assessment of their topic area has been based. The baseline sections will be amended throughout the EIA process as new information emerges in line with the design development and with the consultation process. Where a significant volume of information is held for certain disciplines, separate baseline reports may be prepared and will be presented as technical appendices to the ES.

The main ES report will clearly set out the following aspects for the baseline:

- sources of information used;
- methodology used for any additional survey or modelling work;
- extent of consultation with external bodies;
- any limitations pertaining to the baseline information or to the collation process; and
- the spatial extent of the search area.

3.5 Assessment of Effects

An ES must report the likely significant environmental effects (whether positive or negative) that will result from the construction and operation of the scheme. There is no statutory definition of what constitutes a significant effect. However, the primary purpose of identifying the significant effects of a scheme is to inform the decision maker so that a balanced decision in respect of the development can be reached. On this basis, and in accordance with established EIA practice, a significant effect is considered to be: "an impact that, in isolation or in combination with others, should in the opinion of the EIA team be taken into account in the decision-making process."

The significance of an effect is assessed by looking at the change against existing and/or predicted baseline conditions as a result of the construction and operation of the scheme. The way that the significance of an effect is determined varies for each topic, but in broad terms it is the product of the degree of change (or the magnitude of the effect) and the sensitivity or value of the receptor or resource that is affected. The individual methodologies used for the assessment of significance of effects for each of the technical areas are shown in Chapter 4.

The following type of effects will be considered:

- **direct effects** - effects that arise from activities that form an integral part of the project (e.g. land take and new infrastructure);
- **indirect effects** - effects that arise from activities not explicitly forming part of the project (e.g. noise changes due to an increase or decrease in road traffic flows on existing roads resulting from the operation of the Shaftholme project);
- **secondary effects** - effects that arise as a consequence of a direct or indirect effect of constructing or operating the scheme (e.g. reduced amenity of a community facility as a result of construction noise);
- **permanent effects** - effects that result from an irreversible change to the baseline environment or which persist for the foreseeable future;
- **temporary effects** - effects that persist for a limited period only. Where possible, these will be classified as short term (less than 1 year), medium term (1 to 3 years) and long term (more than 3 years);
- **positive effects** - effects that have a beneficial influence on receptors and resources;
- **negative effects** - effects that have an adverse influence on receptors and resources;
- **combined effects** – effects on one receptor due to different impacts from the same scheme; for example, where a combination of noise, dust and visual intrusion during construction has an overall effect of disturbance on a residential area; and
- **cumulative effects** - cumulative effects can be defined as the impacts on the environment which result from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (IEMA 2004). Cumulative effects may arise from the interaction of the Shaftholme project in conjunction with other existing or proposed development projects (DTLR, 2000) on the resources and / or receptors which benefit from an IPC consent or planning permission. The recent DCLG consultation paper “Environmental Impact Assessment: A guide to good practice and procedures” describes other developments as those that are ‘already begun or constructed or those that have not been commenced but have a valid planning permission’ (DCLG, 2006). These criteria will be used for the purposes of the Shaftholme project EIA.

The above types of effects will be assessed for both construction and operational phases of the scheme.

At present, no other planning applications have been identified for developments located within the vicinity of the Shaftholme scheme. This situation will be kept under review; however, should this remain the case, then a cumulative assessment will not be considered necessary and will therefore not be undertaken as part of the EIA.

The ES will also describe significant environmental effects that are relevant to the scheme as a whole i.e. scheme wide effects. These may include:

- individual local effects that are significant in a national or regional context, e.g. an impact on a nationally important resource;
- effects that are attributable to the scheme as a whole, e.g. enhanced accessibility across a wide area or a recognisable contribution to economic regeneration; or
- effects that support or compromise the ability of national or regional government to achieve its objectives.

3.6 Mitigation

An ES should also include a description of the measures envisaged to prevent, reduce and where possible remedy any significant adverse effects on the environment. The identification of such measures is an iterative process which will be undertaken in parallel with the design to aid in incorporation of measures into

the design during project development. This early adoption of appropriate mitigation will help reduce significant environmental effects to a practicable minimum.

Where significant effects are identified as part of the EIA, mitigation measures will be proposed to prevent these effects and aim to maintain existing baseline conditions as a minimum. Where measures are integral to the design and the scheme promoter (in this case, Network Rail) has committed to their implementation, it is termed “incorporated mitigation”. Where significant effects still remain after application of incorporated mitigation, they are termed significant residual effects and will be reported within the ES.

Any further mitigation measures suggested in respect of addressing significant adverse environmental effects but which are not incorporated into the design of the scheme for which powers are being sought is termed “supplementary mitigation”. Supplementary mitigation can also take the form of enhancement measures which aim to improve existing baseline conditions. These further supplementary mitigation measures may be discussed in the ES as activities which could be potentially undertaken but does not commit the developer to undertaking them. They will not form part of the assessment process (therefore do not reduce the level of an effect), and should not be considered as part of the application.

3.6.1 Management Procedures

An EMP was prepared for the design stage to aid integration of environmental measures and best practice from an early stage. It is anticipated that the EMP will be modified to include environmental management measures for the construction phase on completion of the ES. It is not currently intended to prepare a standard Code of Construction Practice (CoCP) for the scheme. This is due to requirements within internal NR procedures which will facilitate appropriate environmental practices during the construction works, and therefore removes the need for a CoCP.

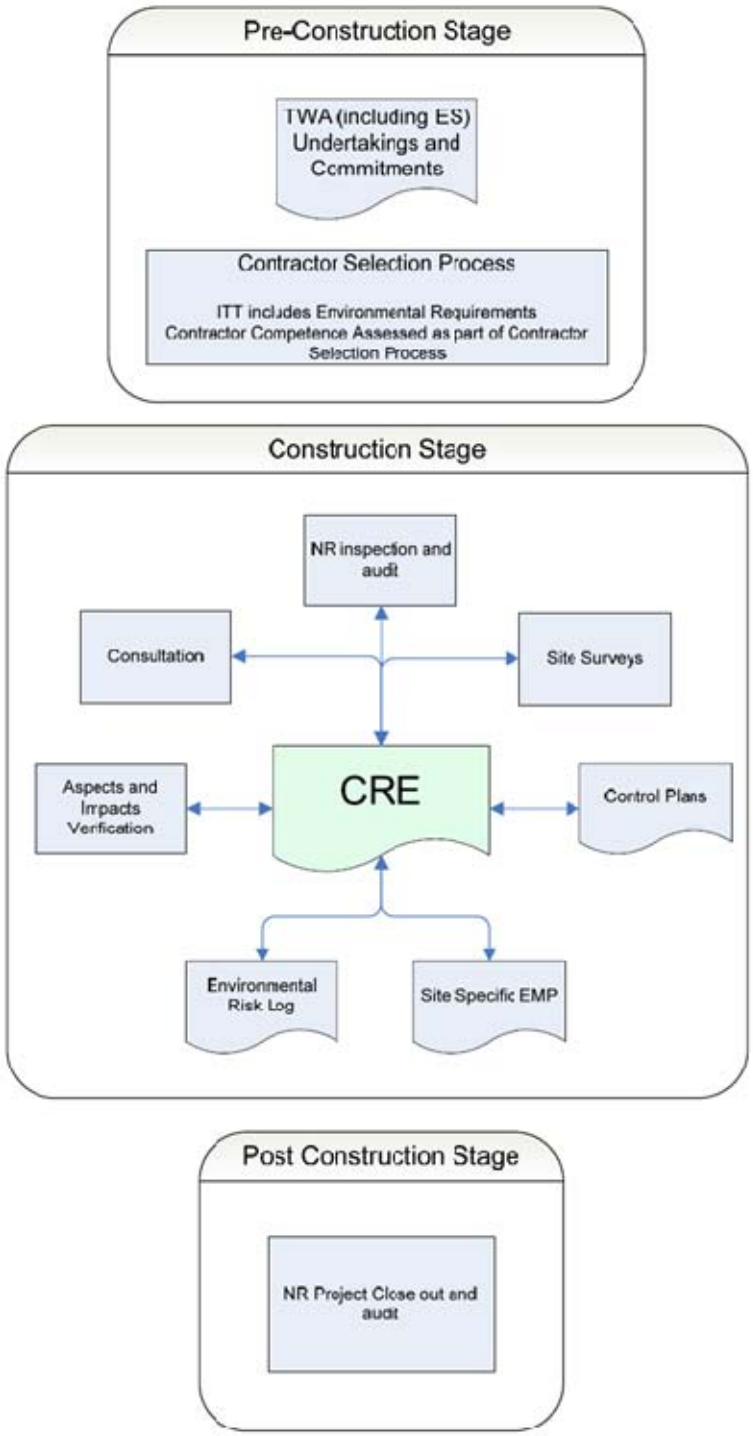
Network Rail is committed to environmental best practice and its Sustainability Policy, published in July 2009, includes a commitment to ‘protect our heritage and natural resources and seek opportunities to enhance them where reasonably possible’. This commitment is implemented primarily through NR’s Contract Requirements – Environment (CRE. The purpose of CRE, as set out on page 5 of the document, is as follows:

‘The purpose of the Contract Requirements – Environment is to provide a controlled source of mandatory environmental clauses that sets out the minimum requirements for each and every contract and the particular requirements for specific contracts. It also provides the framework for satisfying Network Rail that the contractor is fully aware of the environmental issues that could affect the Contract.’

CRE has been used successfully in numerous projects since its introduction in 1999, including the West Coast Re-modelling works at Nuneaton, Trent Valley 4-tracking and Euston Re-modelling. Compliance with CRE is mandatory for all Network Rail projects involving design or physical works and will be the key environmental management tool for the Shaftholme Flyover scheme.

Figure 3.1 below illustrates how the environmental commitments identified in the ES will be captured and integrated into the contractual responsibilities of the project using CRE.

Figure 3.1: Environmental Management Flow Chart



4. EIA Technical Scope and Methodologies

4.1 Introduction

This chapter of the report provides information about the scope and methodologies for the specialist impact assessments which will form the EIA and be presented within the ES. Each topic is presented in a separate section which provides the discipline-specific approach to the following:

- potential impacts of the Shaftholme project (both during operation and construction);
- assessment scope;
- resources and environmental receptors pertinent to the assessment;
- baseline conditions;
- assumptions and limitations;
- predication of significant effects;
- evaluation of significant effects; and
- mitigation and significant residual effects.

4.2 Air Quality

4.2.1 Introduction

The proposed scheme has the potential to cause air quality effects during the construction and operation phases. The key pollutants for consideration within the assessment of air quality effects are:

- nitrogen oxides (NO_x), particularly nitrogen dioxide (NO_2);
- fine particulates (particulate matter defined as those less than 10 and 2.5 microns in diameter; PM_{10} and $PM_{2.5}$ respectively);
- sulphur dioxide (SO_2); and
- dust (defined as particulate matter in the size range 1-75 microns in diameter).

In the UK, the presence of the above pollutants in ambient air is managed through legislation (including that transposed from EU Directives) and Government policy. With respect to NO_x, NO_2, PM_{10}, $PM_{2.5}$ and SO_2 a key tool in this management process is the establishment of air quality 'limit values' and 'objectives'. Air quality limit values and objectives specify the concentration of a pollutant, a time period over which that concentration is measured, and a date by which it should be achieved.

No statutory numerical criteria exist in relation to concentrations of dust in ambient air, or that deposited to land or other surfaces, and therefore none are included within Table 4.1 below. However, Section 79(1)(d) of the Environmental Protection Act 1990 defines a 'statutory nuisance' as *"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance".* Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. However, it is a defence if an operator employs the best practicable means to prevent or to counteract the effects of the nuisance.

No assessment is considered necessary for emissions of any pollutants other than those identified above as no significant emission sources of these pollutants are introduced or affected by the scheme and concentrations are expected to be well below air quality objectives within the study area.

On the basis of the above, numerical environmental quality standards relevant to the assessment are summarised in Table 4.1, hereafter referred to as air quality 'objectives'.

Table 4.1: Relevant Air Quality objectives

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date
Nitrogen Dioxide (NO_2)	1 hour	200 µg.m^{-3}	18 per calendar year	31 December 2005[(a)(b)] 1 January 2010[(c)]
	Annual	40 µg.m^{-3}	-	31 December 2005[(a)(b)] 1 January 2010[(c)]
Nitrogen Oxides (NO_x)	Annual	30 µg.m^{-3}	-	31 December 2000[(b)(d)]
Particulates (PM_{10})	24 hour	50 µg.m^{-3}	35 per calendar year	31 December 2004[(a)(b)] 1 January 2005[(c)]
	Annual	40 µg.m^{-3}	-	31 December 2004[(a)(b)] 1 January 2005[(c)]
Particulates ($PM_{2.5}$)	Annual	25 µg.m^{-3}	-	1st January 2015[(b)] 2020[(c)]
Sulphur Dioxide (SO_2)	1 hour	350 µg.m^{-3}	24 per calendar year	31 December 2004[(a)(b)] 1st January 2005[(c)]
	24 hour	125 µg.m^{-3}	3 per calendar year	31 December 2004[(a)(b)] 1st January 2005[(c)]
	15 minute	266 µg.m^{-3}	35 per calendar year	31 December 2005[(a)(b)]

Notes: [(a)] Air Quality (England) Regulations 2000 as amended
[(b)] Air Quality Strategy 2007.
[(c)] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe.
[(d)] For the protection of vegetation and ecosystems

4.2.2 Potential Impacts

4.2.2.1 Construction

Impacts during the construction phase which have the potential to affect local air quality include:

- emissions associated with on-site plant and vehicles;
- emissions associated with construction traffic on the local road network;
- emissions associated with diversions/changes to base traffic flows on the local road network; and
- on-site dust emissions arising from construction activities and vehicle movements. Dust can be mechanically transported (either by wind or re-suspension by vehicles). It can also arise from wind erosion on material stock piles, earth moving etc.

4.2.2.2 Operational

Emissions associated with changes in locomotive movements as a result of the proposals have the potential to affect local air quality due to changes in the quantity and location of SO_2 and NO_2 emissions from diesel engines. Defra's local air quality management technical guidance (LAQM (TG09)) provides criteria to determine whether a specific assessment of emissions from stationary or moving locomotives should be carried out, as summarised below:

- for stationary locomotives:
  - locations where diesel or steam locomotives are regularly stationary for periods of 15 minutes or more; and
  - there is the potential for regular outdoor exposure of individuals within 15 metres of the stationary locomotives.
- for moving locomotives:
  - sections of track that may have a large number of movements of diesel locomotives;
  - background annual mean NO_2 concentration is above 25 µg m^{-3}, and
  - there is the potential for long-term exposure within 30 m of the edge of the tracks.

However, Doncaster Metropolitan Borough Council's (DMBC) most recent Review and Assessment report produced in 2009 notes that none of the existing rail links in the Borough meet the Defra criteria outlined above and therefore no detailed assessment has been carried out. As the proposed scheme is also not anticipated to result in the TG(09) criteria being met, and available data indicates that existing pollutant concentrations in the area are low (annual mean NO_2 concentrations are well below 25 µg.m^{-3}), no assessment of the operational phase impacts from locomotive emissions will be undertaken.

The introduction of a separated highway crossing over the ECML to the north of Joan Croft Level Crossing has the potential to change traffic flow characteristics on the local road network, and therefore road traffic emissions which could affect local air quality.

4.2.3 Scope

4.2.3.1 Spatial Scope

Impacts on air quality arising from dust emissions from construction site activities and traffic are unlikely to occur more than 200 metres from the location in which they are carried out and hence the primary spatial scope for construction impacts will be confined to a study area within 200 metres of construction activity and/or site compounds. The Traffic and Transportation section provides further consideration of the impacts that construction traffic may have on the local road network, whilst effects on local residents, for example within Barnby Dun, will be accounted for within the Community assessment.

For impacts on air quality arising from construction traffic, guidance advises that contributions from vehicle emissions are generally imperceptible above background concentrations farther than 200 metres from the source. Therefore, for the assessment of road traffic emissions, consideration will not be given to receptors which are located farther than 200 metres away from affected roads. The assessment will primarily focus on those receptors likely to experience the highest concentrations and/or greatest change in concentrations as a result of the scheme. Such receptors are normally located within approximately 5 metres to 10 metres of the roadside.

At this stage it is not possible to identify which roads will undergo sufficient changes in traffic flows or to warrant inclusion within the assessment as traffic flow data are currently unavailable. However, the following are considered to be key considerations in determining which roads are to be assessed and therefore determine the spatial scope of the assessment:

- changes in Light Duty Vehicle (LDV) flows;
- changes in Heavy Duty Vehicle (HDV) flows;
- changes in traffic speeds;
- change in road alignment; and

- location of sensitive receptors.

DMBC has declared four AQMAs. However, the nearest is approximately 8 kilometres to the south of the proposed site and therefore will not be considered within the assessment.

4.2.3.2 Temporal Scope

For construction, the assessment will be based on the construction period and key phases within it.

As described above, no potentially significant operation phase impacts are anticipated from locomotive emissions and therefore no further assessment will be carried out. However, consideration will be given to the operational effects resulting from changes in road traffic emissions for the opening year of the proposed crossing.

4.2.4 Resources and Receptors

The assessment will consider the resources and receptors identified in Table 4.2.

Table 4.2: Air Quality Resources and Receptors

Resource/Receptor	Description
Residential properties	Residential properties in the study area
Sensitive community facilities	For example: hospitals, schools
Amenity areas	For example: parks and paths, sport facilities,
Commercial properties	Commercial properties in the study area

The air quality objectives are applicable at specific locations related to the various averaging periods over which they are measured (see Section 4.2.1). The receptors described in Table 4.2 will therefore be assessed in accordance with the guidance provided in Table 4.3.

Table 4.3: Locations where the air quality objectives are applied

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual Mean	All locations where members of the public might be regularly exposed.	Building façades of offices or other places of work where members of the public do not have regular access.
24 Hour Mean	Building façades of residential properties, schools, hospitals, libraries.	Gardens of residential properties.
1 Hour mean	All locations where the annual mean objective would apply.	Kerbside sites (as opposed to locations at the buildings façades), or any other location where public exposure is expected to be short-term.

4.2.5 Baseline

4.2.5.1 Sources of Information

The method for determining and appraising baseline conditions will be based on that proposed in best practice guidance for EIAs and will involve a desk study. The primary sources examined in the desk study will include:

- DMBC; and
- UK Air Quality Archive.

4.2.5.2 Baseline Surveys

It is considered that there are sufficiently robust air quality data publicly available for the study area. It is therefore considered unnecessary to undertake further air quality monitoring, although a site walkover will be undertaken to attain an appreciation of site conditions.

For this assessment, the most representative air quality data will be derived from DMBC's air quality monitoring sites and air quality background data available from the UK Air Quality Archive.

4.2.6 Assumptions and Limitations

4.2.6.1 Assumptions Concerning the Baseline Environment

Assessments will be based on the most recent data available for the study area. Projections of baseline air quality concentrations for future years will be based on guidance provided by Defra.

4.2.6.2 Assumptions Concerning Prediction of Impacts

The assessment of impacts from vehicle emissions will rely on traffic data, which includes predicted averaged speeds and traffic flows, provided by the project traffic consultants and therefore any assumptions made in the production of the traffic data will also be relied upon in the air quality assessment.

4.2.7 Prediction of Effects

4.2.7.1 Construction

Emissions of construction dust are associated with the movement and handling of minerals and therefore predominantly composed of the larger fraction of this range which does not penetrate far into the respiratory system. Particles such as PM_{10} and $PM_{2.5}$ which have a greater potential for health effects normally represent a smaller fraction of emissions. Therefore, the primary air quality issue associated with construction phase dust emissions is loss of amenity and/or nuisance caused by, for example, soiling of buildings, vegetation and washing and reduced visibility. There is no formally recognised methodology for determining these effects and, as described above, no statutory environmental quality standards for which to compare levels of deposited dust or concentrations in air.

The usefulness of numerical criteria to determine effects from construction dust is limited as the perception of loss of amenity or nuisance is affected by a wide range of factors such as character of the locality and sensitivity of receptors. As a result, assessment methodologies that are based on a qualitative approach are advocated in a range of guidance, including that produced by the Mayor of London, Buildings Research

Establishment and Defra. On this basis, a qualitative approach will be adopted for the assessment based on key issues identified in the guidance described above. Key stages in the assessment will be the identification of potential dust raising activities, the locations and types of sensitive receptors and resources and any other existing exacerbating or controlling factors such as meteorological conditions and screening.

Construction plant and vehicles are a source of the same pollutants as those associated with road traffic. If the potential exists for significant change in traffic flows as a consequence of construction or significantly increased levels of road traffic pollutants caused by traffic congestion or increased traffic flows on diversionary routes during construction, then local air quality effects will be assessed using the screening methodology set out in the Design Manual for Roads and Bridges (DMRB).

4.2.7.2 Operation

As with the construction phase road traffic assessment, there may be the potential for a significant change in traffic flows as a consequence of the new highway crossing, air quality effects will be assessed using the screening methodology set out in the Design Manual for Roads and Bridges (DMRB).

4.2.8 Evaluation of Effects

4.2.8.1 Importance of Receptor

Receptors as described in Section 4.2.4 will be considered as part of the air quality assessment. Evaluation of effects on local air quality from the proposed scheme will be assessed against the significance criteria established in the sections below.

4.2.8.2 Magnitude of Effect

A number of approaches can be used to determine whether the potential air quality effects of a development are significant. However, there remains no universally recognised definition of what constitutes 'significance' for air quality. Guidance is available from a range of regulatory authorities and advisory bodies on how best to determine and present the significance of effects within an air quality assessment. It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively.

Any description of an effect of a development is informed by numerical results. However, an element of professional judgement must also be involved. To ensure that the descriptions of effects used within the assessment are clear, consistent and in accordance with recent guidance, definitions for the assessment of road traffic emissions will be adapted from Environmental Protection UK's (EPUK) Development Control: Planning for Air Quality document[8]. Table 4.4 provides descriptors for changes in NO_2 and PM_{10} concentrations as a result of proposed scheme.

Table 4.4: Magnitude Descriptors for Predicted Change in Concentrations

Description	NO2/PM10 Concentrations
Very large	Increase/decrease > 25%
Large	Increase/decrease ≥ 15 - 25%
Medium	Increase/decrease ≥ 10 - 15%
Small	Increase/decrease ≥ 5 - 10%
Very Small	Increase/decrease ≥ 1 - 5%

Description	NO2/PM10 Concentrations
Extremely Small	Increase/decrease < 1%

Note: Adapted from EPUK Guidance

The magnitude of any change identified must be considered in the context of existing air quality conditions within the study area to determine the significance of that magnitude. The most important aspects to consider are whether existing concentrations are above or below the relevant air quality objectives and whether existing receptors are within an AQMA.

4.2.8.3 Level of Significance

Table 4.5 provides descriptors for the significance of air quality effects based on the magnitude of change in the context of existing conditions. Table 4.5 is applicable to receptors where concentrations increase or decrease as a result of the proposed scheme. EPUK recognise that professional judgement is required in the interpretation of air quality assessment significance. Table 4.5 is intended as a tool to help interpret the results to the air quality assessment.

As described in Section 4.2.7.1, the assessment of construction phase dust effects will follow a qualitative approach and therefore an evaluation of effects based on numerical results is not possible. Nevertheless, the criteria of the assessment will be structured to ensure that conclusions are made based on a clear and logical framework. Key elements taken account of in the evaluation of effects will be:

- classification of dust emission potential for activities to be carried out;
- identification of impact magnitude based on the emission potential and length of time the activities will be carried out; and
- identification of receptor sensitivity based on type and distance from the emission source.

Table 4.5: Description of Significance of Effect

Absolute Concentrations in Relation to Standard	Extremely Small	Very Small	Small	Medium	Large	Very Large
Increase with scheme						
Above standard without scheme	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below standard without scheme, above with scheme	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below standard with scheme, but not well below	Negligible	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
Well below standard with scheme	Negligible	Negligible	Slight adverse	Slight adverse	Slight adverse	Moderate adverse
Decrease with scheme						
Above standard with scheme	Slight beneficial	Slight beneficial	Substantial beneficial	Substantial beneficial	Very substantial beneficial	Very substantial beneficial
Above standard without scheme, below with scheme	Slight beneficial	Moderate beneficial	Substantial beneficial	Substantial beneficial	Very substantial beneficial	Very substantial beneficial
Below standard without scheme, but not well below	Negligible	Slight beneficial	Slight beneficial	Moderate beneficial	Moderate beneficial	Substantial beneficial
Well below standard without scheme	Negligible	Negligible	Slight beneficial	Slight beneficial	Slight beneficial	Moderate beneficial

Notes: The above significance criteria have been used as a framework for this assessment. However, professional judgment is still required to determine the significance of any change

'Standard' = air quality limit value, 'Well below standard' = <75% of the air quality limit value level

4.2.9 Mitigation and Significant Residual Effects

Mitigation strategies for any identified impacts from the construction phase, as identified above, will be provided based on advice from recognised bodies as well as from previous project experience. This will enable subsequent assessment of any significant residual effects remaining after application of mitigation. A significant residual effect in terms of air quality will be assumed to be any effect considered to be moderate, substantial or very substantial adverse, as described in Table 4.5.

Incorporated mitigation related to noise aspects will also be documented within the Environmental Management Plan (EMP) for the scheme, which will be implemented throughout the construction period. The EMP will identify a series of measures to reduce the environmental effects during the construction period and will cover environmental and safety aspects affecting the interests of residents, businesses, the general public and the natural environment in the vicinity of the works.

4.3 Archaeology and Cultural Heritage

4.3.1 Introduction

The Archaeology & Cultural Heritage section has been prepared by Northern Archaeological Associates (NAA) Ltd.

This section sets out the methodology for the assessment of effects on the archaeology and cultural heritage resource within the study area. For the purpose of this assessment, this resource is considered to include scheduled monuments, listed buildings, conservation areas, registered battlefields, registered historic parks and gardens and non-designated features of national, regional or local archaeological, historical or architectural interest and value. These features include archaeological remains, palaeoenvironmental deposits, historic buildings, historic open spaces, historic features and the wider historic landscape. Such sites can make an important contribution to the local distinctiveness of an area and its sense of place.

The assessment to be presented within the ES will describe the baseline archaeology and cultural heritage resource within the study area and consider the potential for previously unrecorded remains within the proposed route corridor. It will describe how the proposals will impact on this resource and assess the significance and severity of the effects arising from both the construction and operational impacts.

Mitigation measures will be recommended where appropriate. The assessment will conclude with the significance of the residual effects taking into account this mitigation. Indirect, cumulative impacts and secondary effects will also be assessed and the assessment will draw on the conclusions from other disciplines notably, landscape and visual amenity, noise and vibration.

Consultation and dialogue with statutory and non-statutory consultees who have an interest in the protection, conservation and management of the archaeology and cultural heritage resource will be maintained throughout the duration of the assessment.

4.3.1.1 Existing information

A preliminary appraisal of information relating to the archaeology and built environment has been undertaken using the following data sources:

- www.magic.gov.uk;
- www.imagesofengland.org.uk;
- www.pastscape.org.uk;
- English Heritage, 1996, *County List of Scheduled Monuments;*
- English Heritage, 2001, *Register of Parks and Gardens of Special Historic Interest in England;*
- www.english-heritage.org.uk - Register of Historic Battlefields; and
- www.doncaster.gov.uk - Conservation Areas Map.

These sources record two Scheduled Monuments within less than 2km of the site, comprising the Thorpe in Balne moated site, chapel and fish pond, approximately 1.8km to the north-east and Tilts moated site approximately 1km to the south-west. It seems unlikely given the intervening distance that there will be any significant impact on the setting of either sites but this will need to be confirmed as part of the EIA, particularly in the case of the Tilts moated site, given that it falls within the 1km study area for Scheduled Monuments (see Section 4.3.3.1 below).

The nearest listed buildings are located within Thorpe in Balne village, approximately 1.5km to the north-east. These include the Grade II* listed Manor House Farm and Grade II barn on the north side of the village and the Grade II listed Poplar Farmhouse on Thorpe Lane. Within the wider area there are listed buildings recorded at Shaftholme, *c.*2km to the south; Owston village to the west and Barnby Dun village to the east. The nearest Conservation Areas are Sutton, Owston and Adwick-le-Street, all to the west of the development area. Again the potential for adverse impact on the setting of these buildings is probably low but will need to be addressed as part of the EIA.

There are no recorded Historic Parks and Gardens or Registered Battlefields within 2km of the development area, and therefore they will not require consideration during the EIA.

In addition to the designated sites, there are a number of undesignated sites of regional and local importance within the vicinity of the site. These include at least three late-Iron Age/Romano-British enclosures and fields systems to the north and east. There are also a number of medieval sites including additional unscheduled moats, deserted medieval village sites at Tilts to the south and Shirley Pool to the north and a number of areas of medieval ridge and furrow. Given the nature of these sites, there is the potential that unrecorded remains of both late-Iron Age/Romano-British and medieval date could lay within the development area and this will need to be further assessed as part of the EIA.

With the exception of a Neolithic polished stone axe, there are no recorded early prehistoric sites and it is not clear at this stage whether there is a high potential for unrecorded remains of this period to be present within the development area.

4.3.2 Potential Impacts

4.3.2.1 Construction

Construction impacts on archaeological and cultural heritage remains may arise as a result of the following activities:

- temporary and permanent land take;
- demolition and site clearance;
- excavation, ground disturbance and compaction;
- use of plant and machinery;
- building up site levels with made-ground;
- construction of new infrastructure;
- modification of existing infrastructure;
- visual intrusion and disruption to access during construction;
- creation of increased noise / dust during construction;
- diversion or alteration of existing services;
- installation of new services; and
- landscaping and planting.

These activities could lead to the following effects on the historic resource:

- total or partial loss/damage of the above- and/or below-ground archaeological remains;
- structural damage to historic buildings due to proximity of excavation, demolition works, vibration etc;
- severance or loss of features such that the physical or visual integrity of a site is compromised and the ability to understand and appreciate the remaining elements is diminished;
- long-term burial of archaeological remains;

- temporary alteration and/or visual intrusion into the historic setting/character of a designated site or undesignated site of national or regional significance;
- temporary effects on the access to, and amenity of, designated sites or undesignated sites of national or regional significance; and
- opportunity to investigate and record archaeological remains and buildings of architectural or historic interest.

There may also be cumulative effects from the accumulation of different effects on the same resource, or accumulation of impacts on the same type of receptor.

4.3.2.2 Operational

Effects from the operational phase of the scheme may arise as a result of the adverse or beneficial impacts upon the special architectural or historic interest of a designated site (or undesignated site of national importance) and its setting, character or appearance.

Impacts can arise as a result of:

- physical and visual changes arising from new or modified infrastructure
- the scale, mass, design or form of a new development and its relationship to the designated resource; and
- changes in noise levels.

These changes could lead to the following effects on the historic resource:

- increased visual intrusion both to and from sites/buildings of national or regional importance;
- alteration to the historic setting/character of a designated site or undesignated site of national or regional significance;
- increase or decrease in noise, vibration or dust such that the amenity or physical fabric of a nationally or regionally important site is either adversely affected or improved;
- opportunities to enhance the character and setting of a designated site or undesignated site of national or regional significance; and
- opportunities for heritage related education and tourism.

4.3.3 Scope

4.3.3.1 Spatial Scope

Based on the centre line of the route corridor, the proposed detailed study areas are as follows depending on the receptors being assessed:

- Scheduled Monuments, listed buildings, Conservation Areas: 1km study area;
- Medieval, Roman or earlier archaeological sites and finds: 1km study area; and
- post-medieval and modern archaeological sites and non-listed buildings of local importance: 0.5km study area.

It is has already been identified that there are no registered parks and gardens or registered battlefields within 2km of the development site and therefore they will not be considered within the EIA.

4.3.3.2 Temporal Scope

The assessment will consider the significance of the effects that will arise during both the construction and operational phases based on any changes compared to the baseline (i.e. the conditions which would exist if the proposals did not go ahead). The operational effects will be assessed for the year of opening, and the year of maximum growth/decline which is normally assumed to be within 15 years of opening.

4.3.4 Resources and Receptors

The assessment will consider the resources outlined in Table 4.6.

Table 4.6: Archaeological Resources and Receptors

Resource/Receptor	Description
Scheduled Monuments	Nationally designated (statutorily protected) sites.
Known archaeological sites and finds	Sites and finds as noted on the South Yorkshire Historic Environment Record and National Monuments Record databases, or identified during the course of the study. Data will be collated and analysed as part of the baseline study.
Areas of archaeological potential	Areas with reasonable potential to contain previously unrecorded archaeological deposits, including palaeoenvironmental remains. Such areas will be identified by the baseline study.
Listed Buildings	Nationally designated (statutory protection) sites
Conservation Areas	Areas designated by Doncaster Metropolitan Borough Council (statutory protection)
Locally Listed Buildings	Undesignated historic buildings identified as being 'valued' for their contribution to the local scene, local architecture, or for local historical associations.

As identified in section 4.3.1.1 above, there are no registered battlefields or historic parks and gardens within the defined study area for the Shaftholme scheme, and therefore no assessment of such resources is required.

4.3.5 Baseline

4.3.5.1 Objectives

The principal objectives of the baseline assessment would be to:

- identify recorded archaeology and cultural heritages sites, buildings/structures and finds within the specified study areas;
- review data, undertake map regression analysis where appropriate and review preliminary scheme design proposals;
- assess the potential for previously unrecorded sites of archaeological, architectural or historic interest;
- identify those features that should be retained and/or enhanced because of their intrinsic importance;
- identify those features or areas which require further evaluation in order to fully establish either importance or likely development impacts;
- assess the potential effects of the proposals in terms of the effects of construction and operational impacts on the archaeology and cultural heritage resource;
- assess the degree of conflict and/or compliance with regional and local planning policies relevant to archaeology and the built environment; and
- recommend appropriate design amendment, mitigation and/or enhancement which could be taken to prevent, reduce or remedy any adverse effects identified.

4.3.5.2 Method

The method for determining and appraising baseline conditions will involve both desk study and baseline survey. The assessment will be undertaken in accordance with the published standards and guidance set out below:

- DETR (1994) Planning Policy Guidance (PPG) 15 *Planning and the Historic Environment,* as amended by DETR Circular 01/01*;*
- DOE (1990) Planning Policy Guidance (PPG) 16 *Archaeology and Planning* (DoE 1990);
- DETR (2000) *Guidance on the Methodology for Multi-Modal Studies* (Volume 2, Chapter 4, section 4.9 – the Heritage of Historic Resources);
- DoT (1995) *Design Manual for Roads and Bridges, Environmental Assessment* (Volume 11, Section 3, Part 2 – Cultural Heritage);
- English Heritage: Conservation Principles;
- DoT (2003) Transport Analysis Guidance Unit 3.3.9: *the Heritage of Historic Resources;* and
- Institute for Archaeologists (2001, revised 2008) Standard and Guidance for archaeological desk-based assessment.

Consultation during the assessment process will be maintained with the following organisations and individuals:

- South Yorkshire Archaeology Service; and
- English Heritage, Yorkshire and Humberside Regional Office.

4.3.5.3 Sources of Information

Information relating to the historic environment will be obtained from the following organisations;

- South Yorkshire Archaeology Advisory Service;
- English Heritage;
- Doncaster Council Planning Services;
- Doncaster Archives;
- Doncaster Library – local history collection;
- Doncaster Museum and Art Gallery; and
- Cambridge University Committee on Aerial Photographs.

The information sources consulted will include:

- South Yorkshire Historic Environment Record;
- English Heritage National Monument Record (archaeology & aerial photographic records);
- English Heritage Register of Historic Parks and Gardens;
- English Heritage Register of Battlefields;
- English Heritage listed buildings data base;
- Portable Antiquities Scheme database;
- www.imagesofengland;
- www.heritagegateway;
- www.magic.gov.uk;
- www.old-maps.co.uk;
- www.doncaster.gov.uk;
- vertical and oblique aerial photographs;

- published and unpublished sources (documentary material, archaeological studies, fieldwork reports, local histories);
- cartographic information; and
- relevant borehole and geotechnical data.

4.3.5.4 Baseline Surveys

Baseline surveys will be undertaken in two stages. An initial baseline walkover survey of the route corridor options will be undertaken to assess character, survival, condition and setting of aspects of the cultural heritage resource. It will also assess existing land use and provide further information on areas of possible ground disturbance and general archaeological potential. The second stage will be more detailed targeted site inspections of affected buildings/sites undertaken as part of the assessment of effects.

4.3.6 Assumptions and Limitations

4.3.6.1 Assumptions Concerning the Baseline Environment

The assessment will be reliant on available data and will endeavour to ensure that the data is accurate and up-to-date. The baseline data will be based on desk-based assessment and visual inspection. No detailed surveys are proposed at this stage. However, databases are limited in their ability to predict new sites and the information should be seen as a starting point for further research rather than a definitive list.

4.3.6.2 Assumptions Concerning Prediction of Impacts

The current understanding of the extent and survival of archaeological remains within the study area is likely to be limited due to lack of data. The exact nature, extent, date, degree of preservation and significance of known and potential archaeological remains can be difficult to accurately predict from desk-based studies alone. The uncertainty in predicting impacts and effects upon such resources is inherent in all such studies and should be stressed. The baseline surveys will be restricted to external visual inspection, which will limit the ability to assess the effects of visual intrusion from within property boundaries or interiors of historic buildings.

4.3.7 Prediction of Effects

4.3.7.1 Construction

The prediction of construction effects will be based upon an assessment of detailed scheme drawings of the proposals, the nature and extent of groundworks, proposed construction methods and duration of construction.

4.3.7.2 Operation

The prediction of operational effects will be based on an assessment of the scheme design, and the predicted change from the existing baseline environment. Reliance will be placed on the assessment of the impacts of the operational effects from other disciplines in particular landscape and visual, noise and vibration. Operational impacts can have both positive and negative effects.

4.3.8 Evaluation of Effects

4.3.8.1 Importance of Receptor

The importance and sensitivity of archaeology and cultural heritage receptors will be based on Table 4.7 below. Assessment of importance is based on a combination of designated status and professional judgement. It takes into account the Secretary of State's non-statutory criteria for the scheduling of ancient monuments (PPG 16 Annex 4); assessment criteria adopted by English Heritage as part of its Monuments Protection Programme and the Secretary of State's Principles of Selection Criteria for Listed Buildings (PPG 15, paragraph 6.10).

It is also recognised that occasionally sites can have a lower or higher than normal sensitivity within a local context. Assessment of sensitivity also needs to take into account the component of the site that is being affected and the ability of the site to absorb change without compromising the understanding or appreciation of the resource.

Table 4.7: Assessment of importance of Archaeological Resources and Receptors

Importance Scale	Example of Receptor
National (High sensitivity)	Scheduled Monument; Grade I or II* Listed Building; Grade I or II* Registered Park and Garden Undesignated feature or landscape of national or international importance and value
Regional (High sensitivity)	Grade II Listed Building; Grade II Registered Park and Garden; Registered Battlefields; Conservation Areas
County (Medium sensitivity)	Undesignated feature or landscape of county importance and value
Local (Low sensitivity)	Undesignated feature or landscape of local importance and value Sites so badly damaged that too little remains to justify inclusion into a higher grade The receptor is tolerant of change without detriment to its character

4.3.8.2 Magnitude of Effect

The magnitude of effect will be determined as the predicted change to the existing baseline environment during construction and operation of the scheme. Impact and effects are described both quantitatively and qualitatively, as appropriate. The effect of this impact refers to the consequence of the change on the receptor, or particular value or sensitivity.

Table 4.8: Relationship between Magnitude of Impact and Effect

Magnitude of Impact	Effects
High	Significant change to baseline conditions, or causing breaches of legislation or statutory objectives
Moderate	Moderate change to baseline conditions
Low	Slight change to baseline conditions
Negligible	Negligible change to baseline conditions
Nil	No discernible change to baseline conditions

4.3.8.3 Level of Significance

Each type of effect will be allocated a level of significance as shown in Table 4.9.

Table 4.9: Evaluation of Significance

Magnitude	Low Importance	Medium Importance	High Importance
Low	Nsig	Nsig/Psig	Psig
Moderate	Nsig/Psig	Psig	Sig
High	Psig	Sig	Sig

Key: Nsig: not significant; Sig; significant; Psig; potentially significant

Where potentially significant effects arise there will be professional assessment as per the topic methodology to determine those effects which are deemed significant.

The assessment will also consider cumulative effects, where several types of effect act on the same resources and/or receptors. In some cases it may be that several "slight" effects may, individually, be insignificant but acting together may produce a significant effect on a sensitive archaeological resource

4.3.9 Mitigation and Significant Residual Effects

Mitigation measures for archaeology and cultural heritage will be incorporated at various stages during the design, construction and operation of the development. The main stages would be as follows:

- during the route selection stage to identify a route which avoids or minimises environmental effects;
- during the design stage to avoid or minimise impacts and associated effects;
- during the design stage to incorporate beneficial effects;
- in advance of construction to remedy effects;
- during construction to minimise effects; and
- after commencement of operation of the development to mitigate significant residual effects arising from the development which are unavoidable and cannot be reduced further.

Within the assessment and throughout the duration of the scheme, mitigation measures will be considered in the following hierarchy:

- first, avoid adverse effects as far as possible by use of preventative measures including scheme design;
- second, minimise or reduce adverse effects to 'as low as practicable' levels; and
- third, remedy or compensate for adverse effects which are unavoidable and can be reduced further.

4.4 Community

4.4.1 Introduction

This section presents the scope and methodology of the assessment of potential effects on the community from the Shaftholme project. A community assessment includes the processes of analysing, monitoring and managing the impacts on communities, both beneficial and adverse, of planned interventions such as the project itself, and any change in processes invoked by those interventions. Due to the rural nature of the development site, socio-economic considerations will also be considered, where relevant, within the community assessment.

Impacts and effects relating to other environmental topics such as noise, visual, traffic and air quality will be addressed in the respective studies and only be raised in the community assessment if there is a particular effect likely to arise beyond any individual impacts on resources and receptors. This will avoid double counting of significant effects.

The assessment will be undertaken with reference to the Highways Agency's DMRB. Relevant policy framework documents include those of the Department of Communities and Local Government's Communities and Neighbourhoods agenda at the national level as well as the Regional Spatial Strategies and the Local Development Framework.

4.4.2 Potential Impacts

4.4.2.1 Construction

Potential community impacts during construction include:

- residential and community issues: residential amenity (overall impacts of safety and security, noise, air quality, visual landscape and visual intrusion), loss of facilities, services and land used by the community, loss of access to agricultural land;
- accessibility issues: improving access to community facilities, services; reducing severance and improving amenity and safety of journeys for pedestrians and other users of non-motorised transport; and
- temporary closure of, or disruption to, the use and amenity of community facilities; temporary displacement of groups of residents.

4.4.2.2 Operational

Potential impacts during operation include:

- demolition of, and/or permanent land-take from community facilities and residential properties;
- permanent agricultural severance of agricultural land;
- permanent severance and/or diversion of public rights-of-way; and
- cumulative impacts resulting from noise, dust, traffic and visual intrusion.

4.4.3 Scope

4.4.3.1 Spatial Scope

The practicality of defining the spatial parameters of local communities is complex because different communities often overlap and seamlessly merge into one another. Furthermore, there are a range of defined community characteristics, for example:

- geographical: defined by specific distances measured for example on a metric scale or by walking distance;
- administrative: defined by local government boundaries such as wards or boroughs; and
- socio-cultural: defined by shared interests, values or bonds such as religion or class status or family.

It is recognised that the area of influence of community impacts is generally more localised than that of related socio-economic impacts, the effects of which are often more widespread. With these considerations in mind, the assessment area consists of the local area of influence (LAI, primarily for localised community impacts) and the wider area of influence (WAI, whereby further reaching community impacts could be felt). The geographical characteristics and boundaries of these areas are defined as follows:

- local area of influence (LAI): the project construction site and construction routes and the surrounding area within 500m radius; and
- wider area of influence (WAI): includes the LAI but extends further into Doncaster town centre and surrounding areas.

4.4.3.2 Temporal Scope

The scheme will be assessed by comparing the existing community conditions (the baseline) with the change expected over time as a result of impacts predicted in the construction period and once the project is operational. The effects of the project on community facilities will be assessed at the peak of the construction period, and at the opening year of the project. Effects are considered unlikely to persist in the long term (i.e. 15 years after becoming operational).

4.4.4 Resources and Receptors

The assessment will consider, where relevant, the resources and receptors outlined in Table 4.10.

Table 4.10: Defining Resources and Receptors

Resources	Receptors
Community resources are considered as business or community assets, amenities and opportunities. These include: • nurseries, schools; • clinics, surgeries and other emergency services; • residential properties in terms of their occupation and amenity; • residential homes and care facilities; • sports and recreation facilities; • public-rights of way (and other access routes of local importance); • entertainment facilities;	Community receptors are individuals, socio-cultural groups, community organisations or business entities. These include: • public and private for-profit and not-for-profit businesses and organisations; • individual employers, employees, and job seekers; • property owners, both residential and commercial; • community residents and users of community resources; • workers, especially public transport users; and

Resources	Receptors
• public open space; and • local communities as a whole.	• community organisations and networks.

4.4.5 Baseline

4.4.5.1 Sources of Information

The method for determining and appraising baseline conditions will be based on that proposed in best practice guidance for EIAs. This will involve both desk study and survey work. Baseline data on resources and receptors will be collected for the spatial scope identified above. The data will comprise maps locating these resources and receptors, together with a description of their number and location.

The following sources will be used:

- large-scale OS maps;
- field inspection;
- directories of local services;
- local, regional and national government economic, social and planning policies and strategies; and
- websites of local voluntary sector and community organisations.

4.4.5.2 Baseline Surveys

The following surveys will be undertaken:

- interviews with users and operators of community facilities (as appropriate);
- interviews with societies and user groups (as appropriate); and
- site visits to map/validate key community resources and receptors.

4.4.6 Assumptions and Limitations

4.4.6.1 Assumptions Concerning the Baseline Environment

Assessments will be based on the most recent data available for the study area. Projections relating to the baseline environment in future years will be based on published data where available.

4.4.6.2 Assumptions Concerning Prediction of Impacts

The community is anticipated to adjust to any effects that are predicted over the design horizon of the project, and new or replacement facilities will develop if demand exists. The assessment will not attempt to predict social change or assume changes in the pattern of use of facilities over time.

4.4.7 Prediction of Effects

Effects will be predicted by setting the degree of change due to the project (magnitude) against the type and sensitivity of each resource or receptors (importance) within the context of the local community.

4.4.7.1 Construction

There are number of potential effects that may arise during the construction phase of the scheme. These include:

- effects on community access. Construction activities can potentially have a negative impact on the access of local community to community facilities and services;
- effects of construction disturbance (e.g. temporary closure, truck movements, diversions). The temporary effect of construction activities can potentially annoy people and cause psychological disturbance during construction phase; and
- effects on local community safety and security.

4.4.7.2 Operation

Operational effects on the community are likely to be minimal due to the nature of the scheme, existing railway operations in the region and the sparse population within the surrounding area. However, potential effects that may arise during the operational phase of the scheme include:

- any permanent diversion of public rights-of-way could be a potentially negative effect; and
- the wider community effects in the Doncaster Town Centre are likely to be positive through the improved public transportation on the ECML and direct and indirect benefits this provides.

4.4.8 Evaluation of Effects

The assessment will focus on impacts that are likely to have significant effects on the community as a whole, or for discreet sections of it, rather than for individuals.

The assessment will identify both direct and cumulative effects. Direct effects could include land acquired from property and severance or diversion of a public right-of-way. Cumulative effects could include the general impairment of the amenity or well-being of the community where multiple impacts many cause a significant effect on the same resources or receptors.

4.4.8.1 Importance of Receptor

Receptors relevant to the community assessment are set out in Table 4.10. In the assessment of community effects, receptor importance is defined as their sensitivity. The sensitivity of receptors is governed by their capacity to cope with changes that ultimately reflect their vulnerability; that is their access to, or control over, additional or alternative resources of a similar nature. For example, for community organisations or businesses, vulnerability can be measured in terms of their resilience to loss of premises or funding. For community residents, vulnerability can be considered as their resilience to social exclusion caused by loss of access to local amenities and services or other resources. High, medium and low sensitivity are defined below in Table 4.11.

Table 4.11: Community Sensitivity Criteria

Sensitivity	
High	An already vulnerable receptor with very little capacity and means to absorb changes
Medium	A non- vulnerable receptor with limited capacity and means to absorb changes
Low	A non-vulnerable receptor with sufficient capacity and means to absorb changes.

4.4.8.2 Magnitude of Effect

The magnitude of an effect is the extent to which receptors gain or lose access to, or control over, community resources resulting in greater social exclusion or inclusion. The magnitude of an effect on a receptor reflects consideration of information and analysis relating to:

- spatial extent (localised/isolated vs. widespread with potential secondary effects);
- extent (number of people, households or businesses affected);
- duration (temporary impacts will be short or medium term);
- reversibility (permanency of impact);
- likelihood;
- scope for mitigation and adjustment; and
- value of resource.

Guideline criteria used to determine the magnitude of effects are presented in Table 4.12.

Table 4.12: Community Magnitude Criteria

Magnitude	
Major	A probable effect that either affects the well-being of groups of many people within a widespread area or continues beyond the project life and is effectively permanent, requiring considerable intervention to return to the community baseline. Alternatively, a probable effect that affects a high value community resource that services a number of wards at the borough level.
Moderate	A possible effect that will likely affect either the well-being of a group of people beyond the site boundary into the local area or continue beyond the project life so that the community baseline is re-established within a year or so, perhaps with some intervention. Alternatively, a possible effect that affects a medium value community resource that provides services at the ward level.
Minor	An effect that may affect the well-being of a small number of people and/or households, or occurs exceptionally, mostly within the site boundary and does not extend to beyond the life of the project so that the community baseline returns naturally or with limited intervention within a few months. Alternatively, an effect that affects a lower value community resource that provides a local service.
Negligible	An effect that is localised to a specific location within the project site and is temporary or unlikely to occur with no detectable effect on the well-being of people or a community resource service so that the community baseline remains consistent.

4.4.8.3 Level of Significance

Significance is a product the magnitude of an effect and the sensitivity (importance) of the receptor that is experiencing the impact. Each type of effect will be allocated a level of significance as shown in Table 4.13.

Table 4.13: Evaluation of Significance

Magnitude	Low Importance	Medium Importance	High Importance
Low	Nsig	Nsig/Psig	Psig
Moderate	Nsig/Psig	Psig	Sig
High	Psig	Sig	Sig

Key: Nsig: not significant; Sig; significant; Psig; potentially significant

Where potentially significant effects arise there will be professional assessment as per the topic methodology to determine those effects which are deemed significant. Significant residual effects will be reported in the ES.

The assessment will also consider cumulative effects, where several types of effect act on the same resources and/or receptors. In some cases it may be that several effects may, individually, not be significant but acting together may produce a significant effect on a sensitive receptor. Professional judgement will be applied to the results of the assessment to identify any perceived significant cumulative effects of the scheme on the community.

4.4.9 Mitigation and Significant Residual Effects

The community assessment will propose appropriate mitigation measures that may reduce any negative effects and enhance any positive effects. Any significant residual effects remaining after consideration of mitigation will be detailed within the ES.

4.5 Ecology

4.5.1 Introduction

This section presents the methodology and scope for assessing impacts and associated effects of the project on ecological features and receptors. This includes natural, semi-natural and modified habitats along the proposed railway chord and the construction route options statutory and non-statutory designated sites, protected species and Biodiversity Action Plan (BAP) or otherwise notable species and habitats.

The subsequent Ecological Impact Assessment (EcIA) will follow the guidelines set out by the Institute of Ecology and Environmental Management (IEEM) in 2006, as endorsed by Natural England, the Environment Agency, and other statutory consultees. Evaluation of ecological features and resources follows the IEEM criteria, as does the assessment of effects. When describing the importance of effects of construction and operation on ecological features and resources, the terminology used follows that of WebTAG (The Department for Transport's Website for Transport Analysis Guidance).

The EcIA will be focused on flora, fauna and the habitats that support them. The principal habitats in the project footprint are arable areas with associated habitats including semi-natural woodland, plantation woodland, scrub, scattered trees, standing water, running water and hedgerows.

Besides the requirements of the EIA Regulations 1999, particular attention is given to species and habitats protected under the following legislation:

- Wildlife and Countryside Act 1981 (as amended);
- Countryside and Rights of Way Act 2000;
- Conservation (Natural Habitats &c.) Regulations 1994 (as amended 2004, 2007, 2008);
- Protection of Badgers Act 1992; and
- Wild Mammals (Protection) Act 1996.

The EcIA also has regard to policies and plans including:

- Planning Policy Statement 9 (PPS9): Biodiversity and Geological Conservation;
- Working with the grain of nature – A biodiversity strategy for England (Defra 2002, 2006);
- UK Biodiversity Action Plan (UKBAP); and
- Biodiversity Action Plan for Doncaster.

Ecological survey works had commenced prior to completion of this scoping report. As such, relevant information has been incorporated into the scoping report from information recently obtained through site survey.

4.5.2 Potential Impacts

4.5.2.1 Construction

Potential impacts during construction include:

- construction noise and vibration, and associated dust deposition on foliage;
- temporary land take of any construction areas;
- temporary drainage arrangements whilst embankments are constructed;
- temporary fragmentation of habitats due to vegetation clearance;

- creation of barriers to animal movement;
- loss of habitats and disturbance for protected species such as breeding birds and bats, through vegetation clearance, tree felling and building demolition;
- disturbance due to human presence during construction; and
- accidental pollution of watercourses and ponds from dust and spillages.

4.5.2.2 Operational

Potential impacts during operation include:

- permanent land take of any construction areas where new infrastructure has been built;
- permanent loss of habitats and disturbance for protected species such as breeding birds and bats;
- fragmentation of habitats due to vegetation clearance and associated habitat loss;
- creation of barriers to animal movement;
- positive reinstatement or creation of habitats; and
- enhancement through changes in habitat management, such as regular clearance of vegetation.

4.5.3 Scope

4.5.3.1 Spatial Scope

As part of the scoping work, an Extended Phase 1 Habitat Survey was conducted during October 2009, to map habitats and assess the potential need for further detailed protected species surveys, with the exception of areas inaccessible at the time of the survey (see Section 4.5.6.1). The field survey concentrated on a corridor of approximately 500 m wide for the chord and on the adjacent fields for the highway crossing and construction route options. The desk based survey considered records of notable species and designated sites within 2 km of the proposed new chord and within 300 m of the highway crossing and construction route options.

Based on existing survey information, the receptors in Table 4.14, Table 4.15 and Table 4.16 will be assessed as part of the EcIA. The Phase 1 survey will contribute to the baseline information in the EcIA.

4.5.3.2 Temporal Scope

The temporal scope of the assessment covers the construction period, commencement of operations and a period of 15 years thereafter.

4.5.4 Resources and Receptors

4.5.4.1 Designated Sites

The following statutory and non-statutory designations were identified within 2 km of the proposed development. Although they are not statutory, Local Wildlife Sites are a material consideration in planning decisions. A summary of the designated sites located close to the project footprint and construction route is presented in Table 4.14.

Table 4.14: Designated sites within 2 km of the proposed chord and the construction route options

Designated sites	Central grid references	Locations
International Designations (statutory)		
There are no international designations within 2 km of the proposed chord or within 300 m of the construction route.		
National Designations (statutory)		
There are no national designations within 2 km of the proposed chord or within 300 m of the construction route.		
Local Designations (non statutory)		
Randall Croft Wood Local Wildlife Site (LWS)	SE558100	West of the A19, opposite western entrance of Holme Lane, adjacent to proposed construction route.
Sixteen Acre Plantation LWS	SE562099	East of the A19 and south of entrance of Holme Lane.
Brick Kiln Plantation LWS	SE557108	East of the A19.
Thorpe Marsh Reserve LWS	SE587094	Road access from the railway sidings would be adjacent to the reserve.

4.5.4.2 Habitats with Biodiversity Value

A summary of the habitats with biodiversity value located close to the construction route and the proposed chord is presented in Table 4.15.

Table 4.15: Summary of habitats with biodiversity value in the field survey area.

Habitats	Level of protection	Area effected in the study area
Semi-natural woodland	UK BAP Habitat	Proposed railway chord and construction routes
Plantation woodland	-	Proposed construction routes
Scrub	Doncaster BAP Habitat	Proposed railway chord and construction routes
Scattered trees	-	Proposed railway chord, highway crossing and construction routes
Improved/semi-improved grassland and Arable	-	Proposed railway chord and highway crossing
Tall ruderal	-	Proposed railway chord and construction routes
Standing water including a number of ponds	UK BAP Habitat	Proposed railway chord and construction routes
Running water	UK BAP Habitat	Proposed construction routes
Hedgerows	UK BAP Habitat	Proposed railway chord, highway crossing and construction routes
Ditches	-	Proposed railway chord and construction routes

4.5.4.3 Protected and Notable Species

The information presented in Table 4.16 has been compiled from information obtained from local records and direct observation of the species or suitable habitat as documented in the Extended Phase 1 Habitat Survey and Ecological Walkover Report.

Table 4.16: Summary of protected and notable species in the field survey and desk study areas.

Protected and notable species	Legal protection	Biodiversity Value	Area effected in the study area
Breeding birds	All breeding birds protected under the EC Birds Directive and the W&CA (1981).	UK BAP and some Doncaster LBAP	Proposed railway chord, highway crossing and construction routes
Bats	Protected under the EC Habitats Directive and the W&CA (1981).	UK BAP and Doncaster LBAP	Proposed railway chord and construction routes
Badger	Protected under the Badger Act (1973 rev. 1991), protection of the Badgers Act (1992).	-	Proposed railway chord and construction routes
Roe deer	-	Doncaster LBAP species	Potential on the proposed railway chord, highway crossing and construction routes
Brown hare	-	UK BAP species	Proposed railway chord, highway crossing and construction routes
Reptiles	Protected under the W & CA (1981 as amended).	UK BAP and grass snake Doncaster LBAP	Proposed railway chord and construction routes
Amphibians	Great crested newts are protected under the EC Habitats Directive and the W&CA (1981).	UK BAP	Proposed railway chord
Terrestrial Invertebrates	-	Some UK BAP and Doncaster LBAP	Proposed railway chord, highway crossing and construction routes
Vascular Plants	-	Some Doncaster BAP	Proposed railway chord, highway crossing and construction routes
Pest species - Rabbits	Pests Act 1954 and Wild Mammals Protection Act 1996 prohibits the cruel treatment of wild mammals, but allows legitimate pest control by humane means.	-	Proposed railway chord, highway crossing and construction routes

4.5.5 Baseline

4.5.5.1 Sources of Information

The method for determining and appraising baseline conditions has been based on that proposed in best practice guidance for EIAs. This involves both desk study and survey work. The desk study and the initial Extended Phase 1 Habitat Survey were conducted by Mott MacDonald in October 2009, and will be used to inform the scope of the EcIA as well as forming part of the baseline.

4.5.5.2 Desk Study

Sources examined in the desk study will include:

- data on protected species and locally designated sites from Doncaster Metropolitan Borough Council Biological Records Centre and South Yorkshire bat group;
- data on statutory designated sites from Multi-Agency Geographic Information for the Countryside (magic.gov.uk);
- data from the National Biodiversity Network; and
- local BAP and areas of protected conservation status from available publications, reports and online databases have also been reviewed.

4.5.5.3 Baseline Surveys

Baseline surveys undertaken to date include an initial Extended Phase 1 Habitat Survey and Ecological Walkover based on methods in the JNCC (2003) *Handbook for Phase 1 Habitat Survey: a technique for environmental audit*. The Extended Phase 1 Habitat Survey includes an assessment of habitats in the field survey areas and their potential to support protected species. As such, the Extended Phase 1 Habitat Survey provides both baseline information on ecological features and resources along the construction route options and the proposed railway chord, and also defines the scope of further protected species surveys.

Based on the desk study and the Extended Phase 1 Habitat Survey,

Table 4.17 documents the recommendations for additional baseline surveys to obtain further information where the identified habitat areas including protected and notable species are likely to be affected by the works. Surveys require suitable weather conditions and can be seasonally constrained. These recommendations are based on the current works programme and proposed access routes. Further surveys may be required should the design of the project or the proposed construction routes change.

Table 4.17: Recommended surveys

Species	Proposed railway chord	Existing access routes	Proposed new haul routes	Proposed highway crossing
Breeding birds	✓	✓	✓	✓
Bats	✓	✓	✓	✓
Badger	✓	✓	✓	x
Otter	x	x	x	x
Water Vole	x	x	x	x
Reptiles	✓	x	✓	x
Great Crested Newt	✓	x	x	x
White-clawed Crayfish	x	x	x	x
Pest species - Rabbits	✓	✓	✓	✓

4.5.6 Assumptions and Limitations

4.5.6.1 Assumptions Concerning the Baseline Environment

Protected species were not specifically searched for during the initial Extended Phase 1 although the potential for habitats to support them was noted. Furthermore, biological records are only based on the information that is available at the time for the site. Therefore, a lack of species records does not imply that the species is necessarily absent from any given area.

It should be noted that the absence of records of certain protected or rare species does not preclude their presence on a site. There is always a risk of protected or rare species being over-looked, either owing to the timing of the survey or the scarcity of the species at the site. In addition, the protected species surveys upon which the EIA is based will cover a single season rather than being drawn from any long term data sets, and so the baseline description of the scheme area prior to development is largely based on a narrow window of time. Desk-based information has been used to supplement the field survey and set it in context, and the baseline description is based on the current field surveys, desk study data, and the professional judgement of the assessors.

At the time of the survey several areas of privately owned land were not accessible and as such the assessment of potential for protected species and the identification of habitat types were restricted. However, where possible, habitats were observed and mapped from the adjacent roads.

The following locations were not fully accessible at the time of the Extended Phase 1 Habitat survey due to land access issues and as such the assessment of potential for protected species and the identification of habitat types were restricted. However, where possible, habitats were observed and mapped from the adjacent roads:

- triangular area of land including railways embankments between the ECML to the west, Skellow line to the south and the Applehurst chord;
- grounds of Thorpe Marsh Power Station;
- Several fields either side of Rockley Lane and two fields either side of Askern Line by Storrs Lane, all observed from the road;
- several fields either side of Rockley Lane, observed from the road;
- Brick Kiln Plantation which lies between Rockley Lane and Holme Lane;
- fields along Bell Croft Lane, Thorpe Lane and Marsh Road, observed from the road and the ponds located on this land was not surveyed;
- Sixteen Acre Plantation, Thornhurst Golf Club and several fields either side of Rockley Lane, observed from the road; and
- fields north of Thorpe Marsh Power Station, between Thorpe Bank and Marsh Lane, observed from the road.

4.5.6.2 Assumptions Concerning Prediction of Impacts

The prediction of impacts and the description of the ecological baseline are based on a single season of field surveys for habitats and protected species, rather than on long term data sets spanning multiple years. Therefore, baseline information and impact assessment is based on a relatively limited data set, although desk study elements such as long term species records and information on designated sites help to set the field survey data in context. In addition, information on concurrent developments in the same area, and on long term changes in the distribution of species and habitats in the Zone of Influence (ZoI) is limited.

4.5.7 Prediction of Effects

The prediction of ecological effects takes into account the importance of each ecological resource/feature, known as an ecological receptor, and the magnitude, duration, reversibility, extent, timing and frequency of impacts on the receptors. The evaluation of receptors uses a geographical frame of reference, using the baseline data and assessors' professional judgement, to determine the relative value of receptors. An effect is considered to be significant if it affects an ecological receptor above a certain threshold value. If the receptor is below that threshold value, then effects to it are not considered to be significant. This approach is in accordance with the IEEM (2006) guidance on EcIA.

The description of impacts (with regard to their extent, magnitude, duration, etc.), uses terminology in accordance with WebTAG. The significance – or not – of impacts of any given magnitude or character is outlined in Table 4.18.

4.5.7.1 Construction

Prediction of construction impacts will focus on activities that will directly and indirectly affect the integrity of ecological receptors within the ZoI. This will include activities such as:

- vegetation clearance and associated habitat loss (temporary and permanent);
- noise and vibration and associated disturbance;
- construction – associated disturbance;
- construction and use of site compounds leading to disturbance and temporary habitat loss;
- land take leading to habitat loss (temporary and permanent); and
- accidental pollution of watercourses and ponds.

Potential impacts from construction are outlined in Section 4.5.2. They will be assessed with regard to their:

- extent;
- magnitude;
- severity;
- duration;
- reversibility;
- timing (e.g. if they occur in a breeding season); and
- frequency.

4.5.7.2 Operation

Prediction of operational impacts will focus on activities that will directly and indirectly affect the integrity of ecological receptors within the ZoI. This will include activities such as:

- land take leading to permanent habitat loss;
- increased human activity and lighting along the routes and associated disturbance; and
- maintenance and management of vegetation along each route.

Potential impacts from operation are outlined in Section 4.5.2. They will be assessed with regard to their:

- extent;
- magnitude;
- severity;
- duration;

- reversibility;
- timing (e.g. if they occur in a breeding season); and
- frequency.

4.5.8 Evaluation of Effects

Effects are evaluated based on the importance or value of each receptor and the importance of the effects to those receptors. Effects are considered significant only if above a certain threshold level, as outlined in Section 4.5.7.

4.5.8.1 Importance of Receptor

The value or potential value of an ecological resource or feature should be determined within a defined geographical context. The following frame of reference is used:

- international;
- UK;
- national i.e. England;
- regional, e.g., Yorkshire and Humber;
- county or metropolitan - e.g. in South Yorkshire;
- district or unitary authority, city, or borough, e.g. Doncaster;
- local or parish; and
- within ZoI only.

Broadly following the IEEM guidelines a range of criteria has been considered in assigning ecological value, as follows:

- presence of sites or features designated for their nature conservation interest;
- biodiversity value; for example: habitats or species which are rare or uncommon, species rich assemblages, species which are endemic or on the edge of their range, large populations or concentrations of uncommon or threatened species, and/or plant communities that are typical of valued natural/semi-natural vegetation types;
- potential value, as addressed by targets to increase the biodiversity value of designated sites and some BAP species and habitats;
- presence of legally protected sites or species;
- presence of UKBAP and Doncaster BAP habitats and species;
- secondary and supporting value; for example: habitats or features which provide a buffer to valued features, or which link isolated areas;
- social value - the extent to which a site and its wildlife provide a resource that people use or enjoy;
- economic value; for example: ecological resources that offer financial opportunities, such as entrance fees; and
- social and economic values associated with biodiversity have been considered as part of the local evaluation of the site, where there is sufficient information to do so.

4.5.8.2 Magnitude of Effect

Effects will be characterised as either significant or not significant, primarily on the basis of effects on ecosystem integrity or conservation status of species, with the scale of the impact provided by the geographic scale above. To provide a summary of the overall assessment, a seven-point scale has been used to summarise the importance of an effect as follows:

- substantial beneficial: the impact is likely to cause a permanent beneficial effect on the integrity of an international, UK and/or nationally important ecological feature;
- moderate beneficial: the effect is of a magnitude likely to benefit a regional and/or metropolitan valued ecological feature;
- minor beneficial: the effect is of a magnitude likely to benefit a borough and/or locally valued ecological feature or be a short-term benefit to regional and/or metropolitan feature;
- negligible: no discernible effect;
- minor adverse: the effect is likely to be adverse to a borough and/or locally value ecological feature, or a short-term or readily remediated effect i.e. with no permanent effect on its integrity, or to a feature of borough/metropolitan importance;
- moderate adverse: the effect is likely to be long-term adverse to a feature of regional and/or metropolitan value; and
- substantial adverse: the impact is likely to cause a permanent adverse effect on the integrity of an international and/or nationally important ecological feature.

This scale is not reflected in IEEM guidance, it is in line with WebTAG guidance for ecological impact assessments, but it can assist in comparing the importance of ecological effects with those arising in other disciplines. In this assessment, any moderate or substantial effect is deemed to be significant. Where multiple effects occur, the highest level of significance is used to give an overall judgement. In addition, if multiple low-level effects occur, they may be cumulatively assessed as having a higher level of importance, allowing assessment of the worst-case effect.

4.5.8.3 Level of Significance

Each type of effect will be allocated a level of importance as shown in Table 4.18, based on the value of the receptor (with reference to IEEM) and the magnitude of effect (with reference to WebTAG).

Table 4.18: Evaluation of significance

Magnitude	Low Importance Local or Parish	Medium Importance District/County	High Importance Regional/National/ UK/International
Negligible/Low	Nsig	Nsig	Nsig
Minor /Low Beneficial or Adverse	Nsig	NSig	NSig
Moderate Beneficial or Adverse	Nsig	Sig	Sig
Substantial /High Beneficial or Adverse	Sig	Sig	Sig

Key: Nsig: not significant; Sig: significant

The assessment will also consider cumulative effects, where several types of effect act on the same resources and/or receptors. In some cases it may be that several “slight” effects may, individually, be insignificant but acting together may produce a significant effect on a sensitive ecological resource. Professional judgement will be applied to the results of the assessment to identify any perceived significant cumulative effects of the scheme on ecological receptors.

4.5.9 Mitigation and Significant Residual Effects

Mitigation may be incorporated as part of the design ("incorporated mitigation") in order to address effects that may otherwise be considered significant. Alternatively, mitigation may be carried out in addition to that which is inherent in the scheme design, known as "supplementary mitigation". This could include creation of bat roosts by placement of boxes to mitigate for the loss of habitat and would not be part of the design. This latter mitigation will not be taken into consideration during the assessment. Mitigation will also take into account the possibility of obtaining protected species licenses from Natural England under the Wildlife and Countryside Act 1981, where relevant.

4.6 Geology and Soils

4.6.1 Introduction

This section describes the methodology to be used in the assessment of geology and soils, including contaminated land, which may affect, or be affected by, the construction and operation of the Shaftholme project.

Schemes such as the Shaftholme project can have an impact on both the geology and soils of the area. Constraints could also be imposed on the construction of the scheme as a result of existing ground conditions. This is of particular significance due to the construction of a number of structures crossing the ECML and associated stretches of embankment.

Impacts may be adverse or beneficial; the assessment methodology is designed to identify both and subsequently seek ways in which to minimise adverse impacts and maximise beneficial impacts. There is also an opportunity for environmental gain through remediation where proposed works impinge on contaminated land. However, due to the rural nature of most of the site area, it is considered that risk from contamination is likely to be restricted to the tie-in locations on the existing railway corridor.

As part of these works a geotechnical and geo-environmental desk study report has been prepared by Mott MacDonald in November 2009, covering the site area and its vicinity. These reports will be updated with additional ground investigation data, as appropriate as the design evolves. Where relevant, the findings of the ground investigations (GI) will be taken into account during the EIA.

4.6.2 Potential Impacts

4.6.2.1 Construction

Direct and indirect impacts on geology and geomorphology may occur during construction processes. This may lead to issues such as the collapse of old coal mine workings or cutting through important geological exposures and creating new exposures.

Impacts relating to the existence of contaminated land may occur where works break ground or where ground is disturbed, e.g. during significant excavation works, piling and construction of foundations and ground improvements.

Potential ground risks to the proposed development include:

- degradation of foundation structures due to contaminated groundwater or soil;
- risk of high groundwater affecting design and construction of the works;
- risk of exposure of future site users or site construction workers to contaminated ground or groundwater; and
- financial risks associated with the possible disposal costs of removing or remediating contaminated material off site.

4.6.2.2 Operational

With the inclusion of mitigation measures, it is considered unlikely that there will be significant impacts from soils or contaminated land during the operational phase of the scheme. It is therefore proposed to scope this aspect out of the EIA.

4.6.3 Scope

4.6.3.1 Spatial Scope

This study will consider all locations where physical works and ground disturbance will take place, i.e. during the construction of foundations.

The spatial scope has been defined by the initial baseline desk studies which have sought to identify those locations of likely geotechnical risk and contamination sources, and where pathways and pollutant linkages could result from construction activities. In addition, the desk studies have identified where the geological conditions may impact the methodology used to construct the project.

The GI has included contamination testing and the information with assist in the refinement of the source-pathway-receptor linkages.

The targets for the ground investigation have included:

- contamination in near surface soils and groundwater;
- depth of groundwater if near surface; and
- confirm founding solution for the structures.

4.6.3.2 Temporal Scope

The baseline scenario will consider the degree to which the project as they exist in 2010 are contaminated, and the current impacts on any particular resources or receptors. The future baseline will take into account any currently planned developments or remediation works which may affect the contamination status of land affected by the project.

Assessment during the construction period will consider the impact and associated effects of the construction on areas of potentially contaminated land within the spatial scope of the proposed project and associated works, including any remediation of any contamination if deemed to be required.

4.6.4 Resources and Receptors

The following resources outlined in Table 4.19 will be considered in the assessment. It is not anticipated that these resources will all be significantly affected but it is necessary to demonstrate that these important receptors have been considered. Incorporated mitigation such as Personal Protective Equipment and H&S for construction workers will address the majority of any potential health risks associated with the Shaftholme project.

Table 4.19: Geology & Soils Resources and Receptors

Resource/Receptor	Description
Geology and Geomorphology	

Resource/Receptor	Description
Regionally important geology	Cutting through important geological strata, excavation of valuable geological assets
Contaminated Land	
Human Health	Including construction and maintenance workers, local residents and users of the site area
Controlled Waters	Pollution could occur to aquifers and local surface watercourses
Fabric of infrastructure	Contaminated material could affect the integrity of building materials used in construction

Potential impacts that may occur during construction of the Shaftholme project include:

- health impacts from exposure of construction workers, maintenance workers, and occupants of adjacent sites to contaminated soil, dust or groundwater during excavation, construction or remediation works; and
- creation of pathways for potential soil, groundwater and gas contaminants (e.g. piling for foundations), thereby increasing the likelihood of migration.

At this stage in the project, the final design details are not yet known, for example the design of the structural foundations, materials to be used for embankment construction, etc. In light of the potential requirement for heavy structures to bear high loads it is prudent to consider that piling may be necessary in some locations. As the design progresses actual requirements will be calculated and requirements for any piling made clear. Until the ground investigation and reporting has been completed it is not possible to definitively determine whether sites which may be subject to piling are contaminated or not.

The risk of creating pathways during construction at potentially contaminated sites will be assessed further once a geotechnical ground investigation has been undertaken and foundation design determined, along with the risks associated with contamination which will be determined from contamination testing.

4.6.5 Baseline

4.6.5.1 Sources of Information

The method for determining and appraising baseline conditions will be based on that proposed in best practice guidance for EIAs. This will involve both the desk study and intrusive ground investigation survey work.

An indicative list of sources for baseline information is given below:

- historical Ordnance Survey mapping;
- consultation with DMBC;
- British Geological Survey (BGS) data including maps and boreholes;
- Department of the Environment Industry Profiles;
- Environment Agency (EA) Groundwater Source Protection Zones;
- EA Groundwater Vulnerability Maps;
- EA surface water classifications;
- search of designated ecologically and geologically sensitive receptors (Ramsar, SSSI, RIGS);
- historical ground investigation information collated by DMBC as part of their potentially contaminated land database; and

- a review of the data in reports prepared by Landmark Information Group Limited, the Coal Authority and Lankelma Limited.

The geotechnical and geo-environmental desk study have provided broad ground investigation recommendations to develop a detailed understanding of the extent of any contamination at the site and any potential geotechnical issues. At this stage of the investigation gas risks have not been included. However, should these risks be shown by further enquiries to be greater than low, then investigation and assessment of these issues may need to be undertaken.

4.6.5.2 Baseline Surveys

Geology and geomorphology

The baseline studies will identify any geological and geomorphological features which are considered to be of national importance.

These sites could be identified as:

- Site of Special Scientific Interest (SSSI) – have some legal protection under the Wildlife and Countryside Act 1981 against operations which might damage their interest; and
- Regionally Important Geological sites (RIGS) – geological or geomorphological sites excluding SSSI's that are considered worthy if protection for their educational, research, historical or aesthetic importance.

The desk studies have confirmed that the scheme does not run through any areas designated above and will therefore not be considered any further.

Contaminated Land

Reference will be made to the Environment Agency Guidance on Requirements for Land Contamination Reports, and the following information will be obtained and review as part of the desk study phase of the EIA;

- local authority site surveys including contaminated land surveys;
- historical information about land use in the area;
- published information on previous soil surveys in the area; and
- information compiled as part of any investigative works associated with the scheme.

As identified above, it is considered that risk from contamination is likely to be restricted to the existing railway corridor (and therefore should only be encountered at points where aspects of the new development intersect with existing track) as the majority of the site area is greenfield land utilised for agricultural purposes. An intrusive ('Phase 2') investigation specifically for identification of contaminated land will only be recommended should the desk study ('Phase 1') findings highlight the presence of areas of potential risk as a result of historical contamination which may be encountered during the works.

4.6.6 Assumptions and Limitations

4.6.6.1 Assumptions Concerning the Baseline Environment

Principle assumptions and limitations for this assessment are as follows:

- baseline conditions will be established in part from historical data;
- the actual presence of contamination will only be assessed following ground investigations undertaken during the detailed design stage;
- potentially contaminating land uses, which may have existed between the dates of the historical OS surveys, may have been omitted from the maps;
- if made ground is excavated during the works, it is assumed that a policy will be adopted to re-use it elsewhere on the scheme where feasible; and
- the scheme will adopt a strategy for the disposal of contaminated spoil which cannot be re-used elsewhere that complies with all relevant waste management legislation in order to ensure that potential significant effects from contaminated spoil disposal is avoided.

4.6.6.2 Assumptions Concerning Prediction of Impacts

No assumptions have been made at this stage.

4.6.7 Prediction of Effects

The main potential effects arising from land contamination at the Shaftholme project, prior to the incorporation of mitigation measures, will occur during the construction phase and are detailed in Table 4.20 below.

Table 4.20: Potential Effects of Land Contamination on Sensitive/Important Receptors

Sensitive/Important Receptors	Potential Effects
Construction Workers	Direct or indirect ingestion of contaminated soil and groundwater, inhalation, dermal contact Concentration of flammable or asphyxiating gases in confined spaces Inhalation of asbestos fibres during building demolition
Controlled Waters (ground or surface waters)	Contamination of a ground or surface water resources Reduction in water quality, particularly at licensed abstraction points Impacts to aquatic environment
Ecological Sites	Phytotoxic impacts on plant species Toxic impacts on fauna Indirect impacts via contamination of water resources
Built Environment	Chemical attack on buried concrete structures Permeation of water supply pipelines Concentration of explosive gases above LEL

The EA provides guidance on EIA with regard to contamination issues (Scoping Guidelines on EIA; The Environment Agency, May 2002). There is also a considerable body of guidance that has been prepared in order to assist both local authorities and practitioners in assessing the degree to which land is contaminated and deciding whether such land is contaminated within the meaning of the Part IIA of the Environmental Protection Act 1990 (as amended) and associated guidance.

The Environmental Protection Act provides a statutory definition of contaminated land:

“Contaminated Land is any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that…

- significant harm is being caused or there is a significant possibility of such harm being caused; or

- significant pollution of controlled waters is being, or is likely to be caused."

Underpinning the guidance is a source-pathway-receptor methodology, which is used to identify Significant Pollutant Linkages (SPLs). The following definitions apply:

- Source/ hazard: contamination identified (exceeding corresponding guideline values);
- Pathway: the means by which the hazardous contamination can come into contact with the receptor; and
- Receptor: the entity which is vulnerable to harm from the source.

Without a significant pollutant linkage the contamination source may be a hazard but does not constitute a risk to human health or the environment. Therefore, when assessing the potential for contamination to cause a significant effect, the extent and nature of the potential source or sources of contamination must be assessed, the pathways identified, and any sensitive receptors or resources identified and appraised, to determine their value and sensitivity to contamination related impacts.

If a significant hazard has been identified and potential sensitive receptors are present, then the potential impacts will be determined by considering the pathways whereby the hazard may affect the receptors. During the assessment it will be assumed that there will be (either during or after construction) a pathway present between the source and the receptor, unless there is a clear indication that this will not be the case.

The strength of pathway between a source and receptor is a function of the distance between the two and the ease or otherwise of the migration pathway. For example, on sites underlain by impermeable clays, the migration pathway via groundwater would be weak even over short distances. Within sands, the migration pathway would be strong for receptors in close proximity to a source and weak for receptors at some distance from the source.

For a scheme such as Shaftholme where much of the site area is greenfield land, the migration pathway for soil or water contamination is generally strong.

The pathway is invariably strong for construction workers on contaminated sites, because they are likely to be in close proximity to the soils, particularly during groundworks. However, the effect may be weaker as the effects are acute (short term), as opposed to being chronic (long term).

4.6.8 Evaluation of Effects

The combination of the sensitivity of the receptor and the magnitude of the effect will provide an indication of the level of contamination on the site, and the nature and severity of possible effects. It should be noted that both rankings may vary in accordance with the different scenarios being considered (i.e. baseline, construction and operation).

The likely severity of the effects will be assessed using the matrix in Table 4.21, in conjunction with professional judgement to consider the site specific factors that may be of relevance. Where there is no pathway, it is considered that there would be no impact.

Table 4.21: Severity of Effects Incorporating Mitigation

Magnitude of Impact	Sensitivity of Receptor		
	Low	Medium	High
Low	1	2	3
Moderate	2	3	4
High	3	4	5

A descriptive meaning for each of the five points on the severity of effects scale, and the corresponding significance of the impact is detailed in Table 4.22. Indicative examples of potential impacts for each scale point are included for illustration (adapted from CIRIA publication C552).

Table 4.22: Significance Criteria

Scale Point		Description and examples	Significance
1	**Negligible Impact**	-No discernable negative effects	**Not Significant**
2	**Slight Impact**	-Easily preventable, non-permanent health effects on humans - Minor, low-level and localised contamination of on-site soils -Easily repairable damage to crops/buildings/infrastructure	
3	**Minor Impact**	-Easily preventable, permanent health effects on humans -Pollution of non-sensitive water resources -Localised damage to crops/buildings/infrastructure (on or off site)	**Significant**
4	**Moderate Impact**	-Medium/long term (chromic) risk to human health -Medium long term risk of pollution of sensitive water resource or ecosystem -Significant damage to crops/buildings/infrastructure (on or off site) -Contamination of off-site soils	
5	**Major Impact**	- Short term (acute) risk to human health -Short term risk of pollution of sensitive water resource or ecosystem -Catastrophic damage to crops/building/infrastructure	

Where identified, significant effects for the construction and operational phases of the scheme, following the incorporation of typical mitigation measures, will be reported in the Environmental Statement.

4.6.9 Mitigation and Significant Residual Effects

Once potential significant effects are identified, consideration will be given to how such effects can be mitigated. The approach to mitigation will focus on four aspects:

- design measures required to ensure that the final design of the project does not lead to any long term degradation of the environment;
- mitigation required prior to the commencement of construction to render the site suitable for development or to minimise existing adverse effects;
- mitigation required during the construction period to minimise construction effects on areas of contaminated ground; and

- remedial methods required to treat or, where this is not possible, appropriately remove and dispose of contaminated material.

4.7 Landscape and Visual Amenity

4.7.1 Introduction

Due to the nature of the scheme and the relatively undeveloped nature of the site area, it is considered that construction of the Shaftholme Flyover will have an effect on the visual appearance of the local landscape and this therefore needs to be assessed. Due to the rural nature of the site and surrounding area, it is not proposed to include any assessment of townscape as part of the EIA.

The landscape and visual impact assessment will determine the likely effects of the proposed development on the landscape resource and the visual receptors within a defined area. In considering this, the effects through the developments entire life cycle from construction, through to operation will be examined. This section describes the methods used to assess the effects, how the baseline conditions will be arrived at and how the potential direct and indirect effects of the proposed development will be derived. The assessment will also consider the likely effects of other 'granted' developments in the vicinity of the project insofar as they may affect the effects of the development proposals. In addition, mitigation measures required to prevent, reduce or offset the effects and the residual effects remaining after mitigation will also be considered. The proposed development will be addressed with respect to two principal issues as follows:

4.7.1.1 Landscape effects

Landscape effects are changes in the fabric, character and quality of the landscape, which may in turn affect the perceived character and value ascribed to the landscape.

Landscape effects can include direct effects upon specific townscape elements (such as loss of buildings, trees or areas of grass) or indirect effects on the landscape character and, importantly, designated areas such as Conservation Areas. However, though of relevance to this assessment, development effects upon the setting of landscape heritage features (e.g. listed buildings) are more fully described under the Archaeology & Cultural Heritage section.

Due to the rural nature of the proposed site area, it is considered that a townscape assessment will not be required as part of the EIA.

4.7.1.2 Visual effects

Visual effects relate to specific changes in the composition of views and the effects of those changes on visual receptors (e.g. residents, business users, users of recreational open space).

4.7.2 Potential Impacts

4.7.2.1 Construction

Potential impacts during construction include:

- visual effects associated with construction traffic and plant;
- removal of vegetation including trees; and
- removal of public realm.

4.7.2.2 Operation

Potential impacts during operation include:

- visual effects associated with additional rail freight traffic;
- visual effects of new permanent infrastructure such as the railway embankment and structure over the ECML; and
- changes in the overall landscape character as a result of the above.

4.7.3 Scope

4.7.3.1 Spatial Scope

The landscape and visual impact assessment will determine the likely effects of the proposed development on the landscape resource and the visual receptors within a defined area. The spatial scope will be developed via identification of the Zone of Theoretical Visual Influence (ZTVI). A full description of the Shaftholme project is given in Section 2 of this Scoping Report. In considering this, the effects through the developments entire life cycle from construction, through to operation will be examined.

4.7.3.2 Temporal Scope

The temporal scope of the assessment will commence this year (2010) with the assessment of the baseline landscape conditions that currently exist. Ongoing effects of the proposed project will be assessed:

- during the construction period;
- one year after completion of the scheme; and
- 15 years after completion of the scheme, to assess the scheme once any mitigation planting has matured.

4.7.4 Resources and Receptors

There are a number of visual receptors surrounding the Shaftholme project that currently have views of the planned development and are therefore likely to be affected by the proposals. In decreasing order of sensitivity, these visual receptors are categorised into the following groups and the potential effects of the development proposals on these receptors will be described:

- people residing at properties with views of the proposed development = “high sensitivity”;
- users of outdoor recreational facilities including public rights of way, and public realm whose attention or interest may be focussed on the landscape= “moderate sensitivity”;
- people engaged in outdoor sport or recreation = “moderate sensitivity”; and
- travellers on roads, lanes and railway lines within and around the study area = “low sensitivity”.

The receptors categories that will be used for the assessment include:

- architectural and built heritage context;
- mass, scale and height of built-form;
- permeability and legibility; and
- spatial organisation, linkages and streetscape.

4.7.5 Baseline

4.7.5.1 Sources of Information

The assessment methodology that will be used will be developed from guidance set out in:

- 'Townscape Character Assessment' produced by the Countryside Agency in April 2002;
- 'Guidelines for Townscape and Visual Assessment' produced by the Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA) in 2002 (Second Edition);
- 'By Design', Department of the Environment, Transport and the Regions and Commission of Architecture and the Built Environment, 2000; and
- The DfT Design Manual for Road and Bridges Volume 11.

As part of the consultation process, close liaison with DMBC planning and landscape officers, and other statutory bodies where relevant will be carried out to safeguard the robustness of the landscape and visual impact assessment.

4.7.5.2 Baseline Surveys

The assessment will seek to identify the significance of changes to the character of the existing landscape and visual amenity which would arise from construction and operation of the proposed development.

The first step is identification of existing or 'baseline' conditions, including landscape character, landscape planning designations, approved developments, the visual envelope, key visual receptors and landscape features in the vicinity of the proposed development, by both desktop, field study and available visualisation modelling.

It is intended that these character areas will form the framework for the landscape and visual impact assessment. These character areas will be assessed in terms of their quality, condition, and capacity to respond to the proposed development.

The visual envelope and principal viewpoints towards the development define the area that would be visually influenced by the proposed development. This visual envelope along with the key visual receptors will be illustrated through mapping data. From the initial baseline studies a number of 'viewpoints' will be derived that are representational of the potential impacts of the project for key character areas/visual receptors. These viewpoints will provide the opportunity to provide a visual illustration of potential impacts through the use of photomontages. These viewpoints locations will be agreed with DMBC before carrying out any detailed studies on them.

In relation to any potential tree loss, this will be covered in the Ecological impact assessment. This will provide locational information, a qualitative assessment and the anticipated impact and associated effect on trees within the project footprint.

4.7.6 Assumptions and Limitations

4.7.6.1 Assumptions Concerning Baseline Environment

Where appropriate, visual receptors will be grouped rather than identified individually for the purposes of the assessment.

Due to the timing of this project, this assessment will be carried out during the summer months whilst trees are in leaf.

The assessment will focus on the public domain where possible. However if it is deemed important to gain access to private land/properties, a request will be submitted to Network Rail to agree access with the appropriate landowner.

4.7.6.2 Assumptions Concerning Prediction of Impact

The description of the significance of the visual effect will relate to groups rather than individual properties. The ZTVI will be generated using site observation which will then be plotted on plans. In addition, to help illustrate the assessment, it is likely that the following other plans and illustrations will be produced:

- landscape context plans showing key features and morphology;
- landscape character area plans to show the key areas;
- visual envelope plan to show extent of views and visibility from local infrastructure; and
- key views and sensitivity of receptors.

In quantifying effects, the assessment process aims to be as objective as possible. However, whilst in some instances changes to a view can be factually defined, or direct loss of features quantified, the evaluation of landscape character and visual effect frequently requires qualitative judgements to be made. This is generally considered acceptable if based on 'professional expertise', supported by clear evidence, reasoned argument and informed opinion. The conclusions of this assessment therefore combine objective measurement with informed professional interpretation.

4.7.7 Prediction of Effects

This stage will provide a detailed description of the proposed development and its associated infrastructure. Therefore in this case, it will describe the proposed construction routes, the alignment of the twin track railway and associated structure over the ECML and the new highway crossing over the ECML. This will be followed by an assessment of the likely effect of the proposed development on baseline conditions. The predicted impacts on the landscape and visual receptors, together with the significance of the effects, will be assessed using the methodology described and will be split into construction and operation.

4.7.8 Evaluation of Effects

4.7.8.1 Importance of Receptor

In order to ascertain the effect of the development within the landscape context, it is necessary to evaluate the proposals in relation to the receptors that will experience the proposed development. The significance of a development will be in part, dependent on the sensitivity of the receptor. Sensitivity refers to the ability of a landscape character area or visual receptor to accommodate change associated with the proposed development.

Sensitivity therefore varies between receptor types, for example a heritage landscape containing listed buildings and ascribed with Conservation Area status may be more sensitive to change than an urban fringe townscape, which has been heavily modified by more intrusive business and light industrial detractors. Similarly, given the relative speed at which the observer moves and the level of awareness the observer is likely to have in a view, residents would normally be more sensitive to changes of view than car drivers.

Sensitivity of Landscape Character Receptors

The sensitivity of the landscape/visual receptors are considered in terms of the landscape value including its perceived and designated importance; landscape quality in terms of it distinctiveness and condition/intactness; and landscape capacity, its ability to accommodate change.

Table 4.23: Criteria for sensitivity of landscape character receptors

Sensitivity	Description
High	Important components of a landscape of particularly distinctive character are relatively small in scale/rare, which are highly susceptible to change. This applies to local designations such as conservation areas, neighbourhood centres, listed buildings, scheduled ancient monuments.
Medium	A landscape of moderately valued characteristics which is reasonably tolerant of changes. This applies to residential suburbs, public open/green space, wildlife sites or historic houses/gardens.
Low	A relatively indistinct landscape character, the nature of which is potentially tolerant of substantial changes with little overall effect. This applies to areas of low landscape quality that have already been affected by significant areas of transport infrastructure.
Negligible	This applies to areas that have no designations, and are large in scale such as industrial/commercial areas

Sensitivity of Visual Receptors

The sensitivity of visual receptors is considered in terms of type of receptor, the longevity of that receptor, and the activity associated with that receptor.

Table 4.24: Criteria for sensitivity of visual receptors

Sensitivity	Description
High	Uses where attention or interest is focused on the landscape character such as residential properties where it is likely that a change to the view is liable to be immediately and permanently experienced.
Medium	Uses where focus on the landscape is indirect/passive or where the primary focus is not on the appreciation of the landscape or views of it such as, indirect views from residential communities, users of parks/public squares and users of footpaths/cycle ways
Low	Uses where the landscape is experienced in a transient nature. E.g. people travelling through or past the proposed development on roads and other transport routes.
Negligible	Places where the focus is not influenced by the landscape or views of it. E.g. Industrial, commercial uses such as places of work and recreational/community facilities

4.7.8.2 Magnitude of Effect

Magnitude of effect is a means of predicting the degree to which the landscape character, features or views will be changed by the proposed development.

Magnitude of Effect upon Landscape Character

The magnitude of change on the landscape receptors are considered in terms of the **scale of change**, the proportion and degree to which the landscape is affected, the **nature** of the perceived contrast/integration of the development; and the **duration** and **'reversibility'** of the change.

Table 4.25: Criteria for determining the magnitude of effect upon landscape character

Criteria	Description
High	Introduction of major new features/elements within landscape and/or total loss of or major alteration to existing key elements/features/characteristics of the baseline conditions, resulting in a fundamental change to the landscape character
Medium	Introduction of new feature/element and/or partial loss of or alteration to one or more key elements/features/characteristics of the baseline conditions. Landscape character will be partially changed
Low	Introduction of a minor feature/element and/or the Minor loss of or alteration to one or more key elements/features/characteristics of the baseline conditions. Changes rising will be noticeable but the underlying landscape character will be broadly as existing
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline conditions.

Magnitude of Effect upon Visual Receptors

The magnitude of change on the visual receptors are considered in terms of the scale of change of view, which includes the extent and frequency to which the view has been affected and the scale of the proposed development in relation to its landscape context; the degree of contrast/integration of the proposed development, the distance of the visual receptor from the development; the angle/position of view in relation to the receptors, and the duration and 'reversibility' of the change.

Table 4.26: Criteria for determining the magnitude of effect upon visual receptors

Criteria	Description
High	The Shaftholme project becomes a dominant feature within the field of view
Medium	The Shaftholme project are visually prominent however they do not necessarily dominate the view
Low	The Shaftholme project is noticeable but not intrusive within the field of view.
Negligible	The Shaftholme project is indistinct and form a minor or insignificant element within the overall landscape view.

4.7.8.3 Level of Significance

By combining the assessment of both magnitude and sensitivity, it is possible to predict the *significance* of effect, which may be categorised into seven broad levels- ***major***, ***major/moderate***, ***moderate***, ***moderate/slight***, ***slight***, ***slight/negligible*** or ***negligible***.

These effects can be either beneficial or adverse depending on the nature of the development and the mitigation and enhancement measures proposed. In order to ensure the robustness of the assessment process this assessment has considered the 'worst case scenario' to be assessed. This assessment of the significance of the effect will therefore depend on the degree to which the proposal and mitigation measures:

- complement, respect and fit into the existing scale, landform and pattern of the landscape context;
- enable enhancement, restoration or retention of the landscape character and visual amenity; and
- affect strategic and important views in addition to the visual context of receptors.

The establishment of *thresholds of effect*, or significance of effect, is recognised as a valid way of standardising the conclusions of the landscape and visual impact assessment. For the purposes of this landscape and visual impact assessment, it is proposed that these are:

- **Major** – a fundamental change to the landscape character or view;
- **Moderate/Major** – a material, but non-fundamental change to the landscape character or view;
- **Moderate** – an easily noticeable but non-material change to the landscape character or view;
- **Moderate/Slight** – a noticeable but non-material change to the landscape character or view;
- **Slight** – a detectable and easily overlooked non-material change to the landscape character or view;
- **Slight/Negligible** – a barely detectable change to the landscape character or view; and
- **Negligible** – no or barely detectable change to the landscape character or view.

Potential significance of effect upon Landscape Character/Views

Table 4.27: Evaluation of Significance

Magnitude of Change	Sensitivity			
	High	Medium	Low	Negligible
High	Major	Major/Moderate	Moderate	Moderate/Slight
Medium	Major/Moderate	Moderate	Moderate/Slight	Slight
Low	Moderate	Moderate/Slight	Slight	Slight/Negligible
Negligible	Moderate/Slight	Slight	Slight/Negligible	Negligible

The landscape and visual impact assessment will classify the significance of effects as either 'significant' or 'not significant' in the following way:

- visual effects assessed as major or major/moderate are interpreted as significant; and
- visual effects assessed as either moderate, minor or negligible are interpreted as not significant.

The assessment will also consider cumulative effects, where several types of effect (in this case other transport and development proposals) act on the same resources and or receptors. In some cases it may be that several slight effects may, individually, be insignificant but acting together may produce a significant effect on a sensitive resource.

4.7.9 Mitigation and Significant Residual Effects

The identification of potential landscape and visual effects is an important part of the iterative design process because it can help avoid or minimise potential negative effects of the development and, where appropriate, will also help to identify opportunities for landscape enhancement. This will include the recommendations for mitigation measures and design considerations to offset or reduce identified effects. The effects will be reassessed on the basis of mitigation measures being in place, to enable determination of any remaining significant residual effects.

4.8 Noise and Vibration

4.8.1 Introduction

The construction and operation of the Shaftholme project have the potential to give rise to both temporary and permanent noise and vibration effects at sensitive receptors in the vicinity of the scheme extents and affected rail links. This section of the report identifies the potential impacts, describes how the effects of the impacts will be assessed, and what generic mitigation measures will be considered with regard to noise and vibration within the EIA carried out in support of the IPC application for the scheme.

4.8.2 Potential Impacts

An impact is considered to be a physical change (e.g. in the level of noise or vibration) that is expected to occur in the implementation of any aspect of the scheme. An 'effect' is considered to be the observed result of an impact with respect to the sensitivity of identified receptors.

4.8.2.1 Construction

Potential temporary impacts arising from the construction phase include:

- noise and vibration impacts arising from excavations and the construction of new infrastructure for the scheme;
- noise and vibration impacts arising from construction traffic using the public highways and haul roads; and
- activities within contractors compounds.

4.8.2.2 Operational

Potential permanent impacts arising from the operation of the scheme include:

- noise and vibration from rail traffic on the new rail link (rolling noise, bridge noise, impact noise over new point-work, audible warning devices);
- changes in noise and vibration from rail traffic on existing routes affected by the use of the new link e.g. the intended increase in freight traffic between Colton Junction and Shaftholme Junction via Knottingley; and
- noise and vibration from road traffic using the new road bridge and approaches in crossing the ECML near Joan Croft crossing.

Generally, ground-borne vibration generated by the movement of rail traffic is localised and arises by the passage of rolling loads over discontinuities in the rail running surfaces (e.g. rail joints, switches and crossings). Ground-borne vibration due to the operation of the scheme will be considered and evaluated where receptors may be exposed to perceptible levels of vibration.

4.8.3 Scope

4.8.3.1 Spatial Scope

It is expected that the spatial extent of the assessment would include:

- all locations where construction impacts generated by activities within the site boundary are likely to directly affect sensitive receptors;
- diversion routes on public highways during construction if required;
- haul roads;
- contractor's compounds;
- areas alongside the proposed rail link and new highway crossing; and
- areas adjacent to other parts of the rail network where the existing noise and vibration impacts of rail traffic are expected change as a result of the scheme.

In terms of construction noise the extent of the assessment will be limited to areas where the calculated total noise (construction noise plus pre-construction ambient noise) is expected to exceed the pre-construction ambient noise level by 5 dB or more subject to the threshold values follows:

- 45 dB(A) during the night periods defined as 23:00 to 07:00 on any day of the week;
- 55 dB(A) during evenings and weekends defined as 19:00 to 23:00 on weekdays; 13:00 to 23:00 on Saturdays and 07:00 to 23:00 on Sundays; and
- 65 dB(A) during the daytime periods defined as 07:00 to 19:00 on weekdays and 07:00 to 13:00 on Saturdays.

The spatial extents will be defined by the application of this criterion within the calculations carried out in predicting the potential effects and refined as the details of the scheme are more certain.

In terms of operational effects, the assessment will be limited to locations with at least a 1.0 dB change in the level of noise of rail traffic in the year of opening compared to the baseline year.

4.8.3.2 Temporal Scope

The noise and vibration assessment will encompass:

- days and hours of construction activity; and
- year of scheme opening and greatest impact within 15 years of opening.

4.8.4 Resources and Receptors

The assessment will consider any of the resources outlined in Table 4.28. The list is not exhaustive and site specific receptors will be identified through consultation, the use of mapping and existing site details, during walk-over surveys and site visits. This will be used to guide the selection of baseline survey positions and make appropriate allowances in the evaluation of effects.

Table 4.28: Noise & Vibration Resources and Receptors

Resource/Receptor	Description
Dwellings	Houses and any other building in residential use such as public houses, hotels etc.
Commercial premises	Shops, offices etc.
Community facilities	Libraries, public halls, sports centres, theatres, concert halls, places of worship etc.
Recreational facilities	Amenity areas, footpaths, sports grounds etc
Educational establishments	Schools, university campus
Designated sites	If relevant, environmentally sensitive areas and buildings sensitive to the effect of noise and vibration
Other	Any other premises highly sensitive to noise and vibration such as laboratories etc

4.8.5 Baseline

4.8.5.1 Sources of Information

The method for determining and appraising baseline conditions will be based on that proposed in best practice guidance for EIAs. This will involve both desk study and survey work.

Sources examined in the desk study will include:

- Defra noise mapping[1];
- rail and road traffic flows; and
- any previous assessments.

In addition, consultation will be undertaken with DMBC, to establish other sources of information which may assist in deriving the baseline noise and vibration conditions for the areas of interest.

4.8.5.2 Baseline Surveys

Site survey work and walkovers have yet to be carried out in order to observe the baseline noise conditions representative of sensitive receptors potentially affected by the scheme.

Noise surveys would comprise short term and long term measurements at locations representative of key receptors. Particular emphasis will be placed on new infrastructure corridors and where a significant change in noise level is expected. Measurement locations would be focussed on the most sensitive receptors, in particular dwellings, etc. Noise surveys will also be required in areas where the existing noise levels are low, or where the ambient noise climate is comprised of mixed sources such as traffic and noise from commercial or industrial premises.

The survey strategy and collection of data shall be carried out in consultation with Network Rail and DMBC.

As a minimum the equivalent continuous noise level L_{Aeq}, maximum level L_{Amax} and the statistical indices L_{A10}, L_{A50} and L_{A90} will be recorded over the appropriate intervals and at periods depending on the nature of the impact considered.

4.8.6 Assumptions and Limitations

4.8.6.1 Assumptions Concerning the Baseline Environment

It is recognised that it is not possible to conduct noise monitoring that accounts for all periods of the day and week at positions representative of all the sensitive receptors within the study area. Priority would be given to characterising the baseline noise climate at the most sensitive times of the day that fall within the periods of construction phase hours of working and the most sensitive periods within the hours that rail services operate. Individual monitoring locations will be selected to provide a suitable overall representation of the baseline noise climate at the sensitive receptor locations.

4.8.6.2 Assumptions Concerning Prediction of Impacts

Typically, information on rail freight movements (e.g. timings, vehicles types, train lengths, speeds) is uncertain and it is unlikely that the full details of the construction plant to be used, methodology and programme will be known. Therefore, best available information will be used.

4.8.7 Prediction of Effects

The assessment of the effects of noise and vibration impacts generally comprises some or all the following elements:

- identification of potential sources and prediction of noise and vibration impacts likely to be generated at nearby sensitive receptors including dwellings;
- comparison of impacts with the baseline conditions and appropriate criteria for acceptability;
- evaluation of the effects; and
- consideration of possible additional mitigation measures and review of effects if appropriate and an assessment of any residual effects.

The character, nature, times and durations of the potential impacts often vary widely, thus a simple single approach to the prediction and assessment procedure is not appropriate.

The following two approaches will be adopted for the assessment procedure:

- based on exceeding an absolute threshold level; and
- based on an increase relative to the prevailing or existing baseline noise level.

Reference will be made to the following documents:

- Draft Guidelines for Noise Impact Assessment. Institute of Acoustics and Institute of Environmental Management and Assessment (2002)[2];
- Planning Policy Guidance 24: Planning and Noise[3];
- British Standard BS 4142 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' (1997)[4];
- Calculation of Railway Noise (CRN) (1995)[5];
- DMRB Volume 11 Section 3 Part 7 HA 213/08 Noise and Vibration (2008)[6]. This is not a statutory or regulatory document but provides a detailed methodology for the assessment of noise from road traffic and will be used to assess the noise impacts from affected public highways during the construction period. The methodology requires the use of the Department of Transport Memorandum 'Calculation of Road Traffic Noise' (CRTN) (1988)[7];
- BS 5228 Code of practice for noise and vibration control on construction and open sites, Parts 1 and 2, Noise and Vibration (2009)[8];
- World Health Organisation: Guidelines for Community Noise (1999)[9];
- BS 8233 Sound insulation and noise reduction for buildings. Code of practice (1999)[10];
- Noise Insulation (Railways and Other Guided Systems) Regulations 1995[11];
- BS 7385 Parts 1 and 2 Evaluation and measurement for vibration in buildings (1990)[12];
- BS 6472 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting (2008)[13]; and
- The Delivery Manual DEL04 – Environment (V8.02). Guide to Railway Investment Projects. Network Rail (2008)[14].

The list is not exhaustive and in addition relevant local/regional policies and guidelines will be taken into account where appropriate.

4.8.7.1 Construction

The study area for potential impacts of noise and vibration from construction operations will be defined as details of the implementation of the scheme are determined. This is likely to consider all receptors adjacent

to all areas where construction activities are expected to occur, site compounds and all access points and haul roads.

BS 5228–1:2009 provides a methodology for calculating noise levels generated by fixed and mobile plant used for a range of typical construction operations. The standard does not define strict criteria to determine the significance of effects of noise impacts although examples of how limits of acceptability have been applied historically and some examples of assessing significance are presented. 'Example Method 1 – The ABC method' (Annex E 'Significance of Noise Effects' section E.3.2) will be adopted for the assessment of effects at residential receptors as the approach considers the expected changes in ambient noise levels and better reflects conventional EIA methodologies compared with the use of fixed/absolute noise limits. The method is summarised in Table 4.29.

The method uses threshold noise levels for daytimes, evenings and weekends and night-times which are derived from the baseline L_{Aeq} noise levels at the façade of receptor rounded to the nearest 5 dB(A).

Table 4.29: BS 5228 Threshold Values used in the ABC Method

Assessment category threshold value period	Threshold value LAeq dB(A)		
	Category A	Category B	Category C
Night-time (2300-0700)	45	50	55
Evenings and weekends	55	60	65
Daytime (0700-1900) and Saturdays (0700-1300)	65	70	75
Category A threshold values apply where baseline noise levels rounded to the nearest 5 dB are less than these values.			
Category B threshold values apply where baseline noise levels rounded to the nearest 5 dB are equal to Category A values.			
Category C threshold values apply where baseline noise levels rounded to the nearest 5 dB are higher than the Category A values			
A significant effect is indicated where the overall ambient noise level during construction exceeds the threshold level in the category appropriate to the baseline noise level at the receiver			
Where baseline noise levels exceed the Category C threshold values then a significant effect is indicated where the overall ambient noise level during construction is 3 dB greater than the baseline			

In the assessing the significance of effects on other building type receptors such as hotels, educational establishments etc (defined in BS 5228–1:2009) the 'Example method 2 – 5 dB(A) change method' will be adopted. A significant effect is indicated where noise levels due to construction exceeds the Category A levels defined above and the ambient level during construction increases by 5 dB or more above the baseline level ($L_{Aeq,period}$). For public open space, a significant impact is indicated where construction increases the ambient noise level ($L_{Aeq,period}$) by 5 dB or more.

Vibration from construction will be calculated in accordance with BS 5228 Part 2, and evaluated in terms of both building damage risk and human disturbance in accordance with guideline levels provided in BS 5228–2:2009 and where appropriate BS 6472–1:2008.

4.8.7.2 Operation

The study area for potential effects due to rail noise and road traffic noise will be defined by predicted changes in received noise levels, as a result of the scheme of at least 1.0 dB on scheme opening.

The calculation procedures presented in CRN will be adopted for the calculation of the levels of noise from rail traffic under the 'Do-minimum' condition (without scheme) and 'Do-something' condition (with scheme).

Similarly, the procedures described within CRTN and the additional advice within DMRB HA213/08 will be used for the calculation of road traffic noise.

There is no specific guidance or widely accepted methodologies used for the prediction and evaluation of effects of operational noise such as noise from audible warning devices (e.g. train horns) or auxiliary equipment. Reference will be made to the requirements and recommendations of the Railway Safety and Standards Boards as well a comparison of descriptors such as the LAmax and LAeq attributable to potential impacts with appropriate characteristics of the baseline noise climate. These aspects will be considered in more detail as part of the EIA process.

Operational noise impacts from fixed plant (e.g. at upgraded level crossing sites) will be assessed in accordance with BS 4142:19974.

The detailed calculation methodology will be presented in the specialist noise and vibration study of the EIA.

4.8.8 Evaluation of Effects

The evaluation of effects is presented in the following sections. At this stage, it should be stressed that the tables are indicative and are likely to be subject to alteration as the baseline studies and noise impact assessment commence, and further information becomes available.

4.8.8.1 Importance of Receptor

Noise affects people in a number of different ways. This may include factors such as enjoyment of quiet spaces, ability to communicate with others, ability to concentrate at home or at work, participation in social and community activities. As a consequence it is not appropriate to consider a single criterion when assessing the value of an existing noise environment.

Table 4.30 gives three criteria that will be used to determine the value of a noise environment. The four criteria will be used individually or in combination to determine the value of any particular area affected by the proposed scheme.

Table 4.30: Criteria for determining value of a noise environment

Value	Criterion		
	1	2	3
	Ability to absorb change (increase) in noise without altering character	Geography	Susceptibility
Very High	No ability to absorb change [increase] in noise level without fundamentally altering character	International importance	People or operations are extremely susceptible to noise where any change (increase) would permanently stop people working
High	Low ability to absorb change (increase) in noise level without fundamentally altering character	National importance	People or operations are particularly susceptible to noise where any change (increase) would stop people working for long periods
Moderate	Some ability to absorb change (increase) in noise level without fundamentally altering character	Regional/ county importance	People or operations are moderately sensitive to noise, where any change (increase) would stop people working for short periods
Low	High ability to absorb change (increase) in noise level without fundamentally altering character	District/ parish importance	People or operations are not very sensitive to noise, where any change (increase) would stop people working for very short periods

Value	Criterion		
	1	2	3
	Ability to absorb change (increase) in noise without altering character	Geography	Susceptibility
Negligible	Tolerant of change (increase) in noise without altering its character	No listed importance	People or operations are not at all sensitive to noise, where any change (increase) would not stop people working

4.8.8.2 Magnitude of Effect

The magnitude of a noise impact is related generally to the ability of a human to perceive a change in the noise level. For example, changes of up to +/-1 dB are generally considered barely perceptible and can reasonably be assumed to have negligible effect.

Table 4.31 presents the magnitude of impact resulting from different changes in noise level.

Table 4.31: Impact magnitudes

Noise change LAeq,T	Magnitude of impact
< -5.0	Major beneficial
-4.9 to -3.0	Moderate beneficial
-2.9 to -1.0	Minor beneficial
-0.9 to 0.1	Negligible beneficial
0	None
0.1 to 0.9	Negligible adverse
1.0 to 2.9	Minor adverse
3.0 to 4.9	Moderate adverse
> 5.0	Major adverse

4.8.8.3 Level of Significance

The significance of the effect of any noise impacts will be based on a consideration of the environmental noise value, or sensitivity, of existing features and the magnitude of the noise impacts on them.

Using the receptor values described in

Table 4.30 and the impact magnitude classification in Table 4.31, the significance of any effects will be considered using the matrix presented in Table 4.32.

In addition to the adoption of the evaluation of significance matrix in Table 4.32, it will be appropriate to also give due consideration to resulting absolute noise levels, and other emerging guidance on best practice.

Table 4.32: Evaluation of Significance

		Magnitude of Impact								
		Major Beneficial	**Moderate Beneficial**	**Minor Beneficial**	**Negligible Beneficial**	**None**	**Negligible Adverse**	**Minor Adverse**	**Moderate Adverse**	**Major Adverse**
Environmental Value	**Very High**	Very Substantial Beneficial	Substantial Beneficial	Moderate Beneficial	Low Beneficial	Neutral	Low Adverse	Moderate Adverse	Substantial Adverse	Very Substantial Adverse
	High	Substantial Beneficial	Moderate Beneficial	Low Beneficial	Slight Beneficial	Neutral	Slight Adverse	Low Adverse	Moderate Adverse	Substantial Adverse
	Moderate	Moderate Beneficial	Low Beneficial	Slight Beneficial	Negligible Beneficial	Neutral	Negligible Adverse	Slight Adverse	Low Adverse	Moderate Adverse
	Low	Low Beneficial	Slight Beneficial	Negligible Beneficial	Negligible Beneficial	Neutral	Negligible Adverse	Negligible Adverse	Slight Adverse	Low Adverse
	Negligible	Slight Beneficial	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial	Neutral	Negligible Adverse	Negligible Adverse	Negligible Adverse	Slight Adverse

Note: Effects will be considered to be significant when identified as have a moderate, substantial or very substantial effect.

4.8.9 Mitigation and Significant Residual Effects

The Noise Insulation Regulations (Railways and Other Guided Systems) 1995[11] provide a mechanism for secondary insulation of living areas affected by both rails noise and construction noise. Insulation against construction noise is discretionary, while mitigation against traffic noise can be either discretionary or statutory, depending on whether the track is new or altered. A protocol for the provision of discretionary insulation will be developed in consultation with Network Rail and used to identify potential receptors and outlined within the EIA.

If potentially significant construction noise and vibration effects are predicted, recommendations will be identified to minimise these to acceptable levels. Amongst others, this may include the erection of temporary noise barriers around working areas or alternative methods of working. The contractor may additionally be required to seek prior consent under Section 61 of the Control of Pollution Act 1974[15] for its works in advance of commencing works, which will require 'best practicable means' to be adopted at all times.

Potential methods to mitigate operational railway noise are:

- appropriate track design;
- modification to operating procedures e.g. the holding a trains at previous signals;
- rail and check lubricators;
- rail grinding;
- acoustic barriers;
- ‘low noise’ switches and crossings;
- welded rail to minimise joint noise;
- isolation of track from the bridge structure;
- damping of the bridge structure; and
- regular inspection and maintenance of vehicles and the track.

Potential methods to mitigate noise from road traffic include:

- appropriate design to encourage smooth driving behaviour;
- appropriate speed restrictions;
- surfacing carriageways with a noise reducing surfacing material;
- acoustic barriers; and
- regular inspection and maintenance of the carriageway.

Incorporated mitigation related to noise aspects will also be documented within the Environmental Management Plan (EMP) for the scheme, which will be implemented throughout the construction period. The EMP will identify a series of measures to reduce the environmental effects during the construction period and will cover environmental and safety aspects affecting the interests of residents, businesses, the general public and the natural environment in the vicinity of the works.

4.9 Traffic and Transport

4.9.1 Introduction

This section describes the scope and methodology adopted to assess the transportation affects of the Shaftholme project. The operational, site specific issues and the implications of the project as a whole will be addressed. The relationship with adjoining areas as well as construction impacts will be considered.

A full Traffic Assessment (TA) and traffic management plan will be produced as standalone documents to accompany the IPC application and will inform the traffic information contained within the Environmental Statement. The TA and traffic management plan have not been scoped out as yet but it is anticipated that the details contained within this document will help define that scope.

Both the traffic management plan and the ES will utilise guidance contained within the Department for Transport (DfT) Transport Assessment Guidelines, March 2007. During construction, the Shaftholme project will have an effect on the trunk road network; however once operational, the project should have little or no impact on the trunk road network. Government Policy contained within Circular 02/2007: Planning and the Strategic Road Network, which relates to the impact of development on the trunk road network, will be complied with, when considering the impacts of the Shaftholme project.

4.9.2 Potential Impacts

4.9.2.1 Construction

The potential impacts of construction will be informed by the DfT Guidance on Transport Assessments ("the DfT Guidance"). Potential impacts during construction will include:

- changes in road traffic levels and amenity as a result of road closures/diversions due to construction traffic. Also changes to traffic levels, the environment and amenity from transportation of materials, waste and staff will be considered;
- changes to transport trips and amenity for the general public for all modes as a result of the construction; and
- consideration of potential severance caused by temporary closure/diversion of roads.

4.9.2.2 Operational

Operation of the scheme will comprise freight movements along defined railway routes. The only change to the local highway network would be the construction of the new highway crossing to the north of the existing Joan Croft level crossing and the associated benefits this will provide through a reduction in delays by closing the level crossing. At this stage, the design of the new highway crossing and highway alignment are yet to be finalised, however traffic speed surveys will be carried out to determine the traffic speed on the network which will influence the design and a survey will also be carried out regarding the level of non-motorised users. Survey outputs are included in the bridge design remit document.

Following a meeting with Doncaster Metropolitan Borough Council (DMBC), Network Rail and Mott MacDonald on 2 July 2010, DMBC stated that they did not expect an increase in traffic due to the new highway crossing and therefore there was no requirement for a Transport Assessment, subsequently the operational effects on traffic and transportation can be scoped out of the EIA.

4.9.3 Scope

4.9.3.1 Spatial Scope

The assessment will consider significant changes to traffic and transport conditions as a result of the operation and construction of the Shaftholme project. The assessment will include:

- the transport and highway network in the vicinity of the Shaftholme project. The assessment may consider the highway network that construction traffic may utilise up to the strategic road network;
- the local public transport scheme and its interfaces with the Shaftholme project; and
- the pedestrian and cycling network and its interfaces with the Shaftholme project.

4.9.3.2 Temporal Scope

The assessment and design horizons will be defined in accordance with the DfT Guidance.

4.9.4 Resources and Receptors

The assessment will consider the potential resources and receptors outlined in Table 4.33.

Table 4.33: Traffic and Transport Resource and Receptors

Resource/Receptor	Description
Private and Commercial vehicles	Cars, Commercial Vehicles and Taxis
Users of public transport	Buses and Rail
Emergency vehicles	Police vehicles, Ambulances and Fire Engines
Pedestrians	Pedestrian
Cyclists	Cyclists
People with disabilities	People with disabilities
Equestrians	Equestrians
Other key receptors defined by air quality and noise specialists	Defined in Sections 4.2 and 4.8 respectively

4.9.5 Baseline

4.9.5.1 Sources of Information

The method for determining and appraising baseline conditions will be based on that proposed in best practice guidance for EIAs and the DfT Guidance. This will involve both desk study and survey work.

Sources examined in the desk study will include:

- Doncaster Metropolitan Borough Council and Highways Agency information;
- liaison with stakeholders;
- information available from the traffic surveys; and
- traffic and pedestrian information where appropriate.

The assessments will utilise traffic flows using traffic growth agreed with the highway authorities.

4.9.5.2 Baseline Surveys

The baselines surveys to be used in the assessment will be determined following discussion of the scope of the traffic management plan.

4.9.6 Assumptions and Limitations

4.9.6.1 Assumptions Concerning the Baseline Environment

The baseline information will be based on the best information available at the time. The information will be obtained from appropriate suppliers and determined from the agreed scope of the traffic management plan.

4.9.6.2 Assumptions Concerning Prediction of Impacts

The operational and construction impacts of the Shaftholme project will be considered based on the best available information. The sources of information and assumptions will be agreed within the traffic management plan.

4.9.7 Prediction of Effects

4.9.7.1 Construction

The assessment of effects of traffic and transport impacts during construction of the Shaftholme project will be considered. A traffic management plan will be prepared in accordance with the DfT Guidance, as requested by DMBC.

4.9.7.2 Operation

It is considered that there will be no operational effects on the road network and therefore it is proposed that this aspect is scoped out of the EIA.

4.9.8 Evaluation of Effects

4.9.8.1 Importance of Receptor

- **Low importance**

Any transport effects are insignificant with regard to the construction of the Shaftholme project. The transport network continues to operate as normal.

- **Medium importance**

Any transport effects which lead to degradation of performance of the transport network as a result of the construction of the Shaftholme project, which leads to temporary difficulties, annoyance or delay that may be incurred by the operator, third part or member of the public.

- **High importance**

Any transport effects lead to degradation of performance of the transport network as a result of the construction of the Shaftholme project in such a way that leads to permanent or substantial difficulties, annoyance, delay or injury that may be incurred by the operator, third party or member of the public.

4.9.8.2 Magnitude of Effect

- **Low magnitude**

Any transport effects that happen infrequently and so are usually accepted as a rare occurrence e.g. fault conditions.

- **Moderate magnitude**

Any transport effects that happen more frequently.

- **High magnitude**

Any transport effects that occur regularly during construction of the Shaftholme project.

4.9.8.3 Level of Significance

Each type of effect will be allocated a level of significance as shown in Table 4.34.

Table 4.34: Evaluation of Significance

Magnitude	Low Importance	Medium Importance	High Importance
Low	Nsig	Nsig/Psig	Psig
Moderate	Nsig/Psig	Psig	Sig
High	Psig	Sig	Sig

Key: Nsig: not significant; Sig; significant; Psig; potentially significant

Where potentially significant effects arise there will be professional assessment to determine those effects which are deemed significant; these effects and the rationale behind the assessment will be reported in the ES.

The assessment will also consider cumulative effects, where possible, where several types of effect act on the same resources and/or receptors. In some cases it may be that several “slight” effects may, individually, be insignificant but acting together may produce a significant effect on a sensitive resource.

4.9.9 Mitigation and Significant Residual Effects

The transport construction and operational impacts of the Shaftholme project will be considered in accordance with the DfT Guidance: Planning and the Strategic Road Network. The need to mitigate the effects will be considered in line with those documents, as well as with Central Government and Local Government Policy. The type of mitigation will also be dependent upon policy and guidance documents.

4.10 Waste Management

4.10.1 Introduction

Waste that will be generated as a result of the Shaftholme project can be separated into two discrete phases:

- excavation and construction waste during the construction of the Shaftholme project; and
- wastes associated with maintenance of the new line.

In addition to waste creation, there will also be significant volumes of materials required to be brought on to the construction site for elements of the works such as embankment construction. The direct effects relating to material management on site will also be considered within this chapter.

In assessing the significance of the potential environmental effects, there is a wide ranging framework that regulates the control and management of waste. The key legislation relevant to the Shaftholme project includes:

- Environmental Protection Act 1990 (and subsequent Amendments to);
- Council Directive 75/442/EEC (Waste Framework);
- Waste Strategy 2000 for England and Wales (and Waste Strategy Review);
- Hazardous Waste (England and Wales) Regulations 2005;
- The Site Waste Management Plan Regulations 2008; and
- The Waste Management (England and Wales) Regulations 2006.

4.10.2 Potential Impacts

New developments and infrastructure in the UK has the potential to create impacts resulting from the management of materials imported and exported from site. However, many of the indirect effects relating to issues such as traffic, noise and dust generation will be addressed in other sections of the EIA. As a result, this section will concentrate on the material management options for:

- excavation/construction wastes;
- importing of construction materials and
- maintenance wastes;

This section of the ES has been structured with reference to these potential impacts and also considers inert, non-hazardous and hazardous wastes for each phase of the development.

4.10.2.1 Construction

The Shaftholme project is likely to generate waste during the construction phase. This may include excavation waste from earthworks, demolition waste if applicable and excess waste materials generated during construction.

In addition to the waste generated from the excavations, it can be expected that during the construction the following wastes will be generated:

- general construction waste including building and maintenance wastes from the construction phase, inert construction materials, packaging materials and empty containers;

- sewage sludge from portable toilets and office facilities; and
- commercial waste from site office, canteen and work facilities, such as food waste, paper, plastics, drinks containers, office consumables, etc.

All the waste materials specified could be classified as inert, non-hazardous or hazardous, and depending on their nature, will require treatment and disposal. Any inert and non-hazardous materials have the potential to be re-used and recycled either on-site or off-site.

Where feasible, alternative methods of waste disposal will be considered rather than resorting to landfill. For example, it may be possible to reuse excavated materials on site as part of the embankment construction if they are suitable. This would also reduce the volume of material to be imported on to site which would have both cost and environmental benefits. These options should be identified during the design of the project and production of the Site Waste Management Plan (SWMP).

The intention of the SWMP is to design out waste from the inception of the project. Sites which can recover the waste will be identified and the waste will be allocated according to the waste hierarchy and any stipulations on approved suppliers in DMBC Waste Strategy.

4.10.2.2 Operational

It is not anticipated that operation of the scheme will generate any wastes and therefore it is proposed that this aspect is scoped out of the EIA.

4.10.3 Scope

4.10.3.1 Spatial Scope

During construction, most of the waste will be generated within the immediate environs of the construction site or route alignment and any re-use, recycling or treatment will wherever practicable take place on site or adjacent to the site. However, it is possible that some disposal of materials may be required either locally or further afield. The location of such sites is not known at this stage, but will be identified and included as part of the assessment.

4.10.3.2 Temporal Scope

Waste related impacts will be assessed for the demolition/construction and operational phases of the scheme. The operational phase will be based on the design life of 15 years.

4.10.4 Resources and Receptors

The assessment will consider the resources and receptors outlined in Table 4.35.

Table 4.35: Material Management Resources and Receptors

Resource/Receptor	Description
Waste receiving facilities	Includes recycling and sorting facilities, reprocessers and waste transfer stations
Waste transportation providers	Includes waste haulage vehicles, waste carriers, skip container providers
Waste disposal facilities	Includes waste treatment facilities, landfill etc

Resource/Receptor	Description
Local residents	Includes, local residents and businesses and users of the Shaftholme scheme

4.10.5 Baseline

4.10.5.1 Sources of Information

The sources of information examined in the desk study will include:

- waste arisings data from national databases i.e. Defra/Environment Agency;
- consultation with DMBC on waste services provisions in the scheme area;
- local policies relevant to waste management;
- topographical survey; and
- earthworks / cut and fill information.

4.10.5.2 Baseline Surveys

It is not intended to undertake any survey work as part of the waste management assessment for the Shaftholme EIA as all required information can be obtained through desk study.

4.10.6 Assumptions and Limitations

The assessment of effects will be based on data sourced from relevant legislation, as outlined in Section 4.10.1.

4.10.6.1 Assumptions Concerning the Baseline Environment

It is assumed that the data sources will be available and any information relating to earthworks and cut and fill will be provided prior to commencement of the EIA.

4.10.6.2 Assumptions Concerning Prediction of Impacts

The assessment will be limited to the Shaftholme project footprint and will consider only construction, demolition and operational wastes. Reference shall be made to traffic movements associated with waste haulage; however, detailed information will be covered under the Traffic and Transport section of the ES. Similarly, air quality and noise associated with waste haulage vehicles shall be covered by their chapters of the ES respectively.

4.10.7 Prediction of Effects

The methods that will be utilised to predict the effects will include developing baseline modelling for the various waste streams and waste process flow diagrams. This will identify specific waste solutions for the waste streams generated.

4.10.7.1 Construction

The potential impacts on all receptors from the disturbance and removal of possible contamination within the site during the demolition/construction phase will need to be assessed when information from ground

surveys and tests are available. The assessment of significance from a contaminated land perspective will be covered by the Geology & Soils section of the EIA (as discussed in Section 4.6).

4.10.7.2 Operation

The potential impacts for during operation are limited to potential wastes generated during maintenance works and the subsequent need for additional waste management services.

4.10.8 Evaluation of Effects

The generation and handling of waste materials from the development, operation and ultimate decommissioning of the facility is an important aspect of the environmental assessment and control. The environmental effects should not be significant if:

- the management and mitigation measures identified in this section are implemented;
- there is diligent compliance with legislation and Duty of Care; and
- there is regular monitoring and reporting.

The potential effects can be controlled and should not form a barrier to the construction, commissioning and operation of the development. It is anticipated that procedures will be identified for adoption through preparation of a SWMP and an Environmental Management Plan (EMP) to ensure that the effects on the surrounding environment are minimised.

4.10.8.1 Importance of Receptor

The significance of potential impacts is a function of the presence and sensitivity of receptors, and magnitude (duration, spatial extent, reversibility, likelihood and threshold) of the impact. However, many of the impacts will be covered in more detail within other sections of the ES, e.g. Air Quality, Noise and Vibration, etc. Such impacts include dust generated during waste removal operations, odour from biodegradable wastes, traffic impacts from the removal of wastes from site and the noise associated with the handling of such materials.

The sensitivity of residential developments to the waste management process will be determined by their proximity to the routes. The ecological environment could also be considered a sensitive receptor to waste generation and handling activities, and surveys will be carried out to establish the extent of wildlife at the development site.

4.10.8.2 Magnitude of Effect

When describing the magnitude of impacts from waste generation, reference will be made to the following parameters based on the types and volumes of wastes materials generated:

- High – Contaminated or Hazardous waste materials produced;
- Moderate – Non- Hazardous materials; and
- Low – Inert materials.

4.10.8.3 Level of Significance

Each type of effect will be allocated a level of significance by assessing both their importance and the magnitude of effect, as shown in 4.36.

The significance of an effect will be assessed based on the magnitude of the effects and the nature of the resource or receptor, taking into account the waste management options for the waste material either on-site or off-site.

Table 4.36: Evaluation of Significance

Magnitude	Low Importance	Medium Importance	High Importance
Low	Nsig	Nsig/Psig	Psig
Moderate	Nsig/Psig	Psig	Sig
High	Psig	Sig	Sig

Key: Nsig: not significant; Sig; significant; Psig; potentially significant

Where potentially significant effects arise there will be professional assessment as per the topic methodology to determine those effects which are deemed significant and these effects will be reported in the ES.

The assessment will also consider cumulative effects, where several types of effect act on the same resources and/or receptors. In some cases it may be that several "slight" effects may, individually, be insignificant but acting together may produce a significant effect on a sensitive resource.

4.10.9 Mitigation and Significant Residual Effects

An Environmental Management System (EMS) incorporating a construction EMP and a SWMP will be implemented at an early stage in the process to ensure that waste management procedures are put in place to minimise any environmental risk.

The SWMP will:

- identify individual responsibilities for resource and wastes management;
- identify the types and quantities of waste that will be generated;
- identify resource management options for those wastes;
- identify procedures to ensure the use of appropriately licensed/registered waste management carriers and facilities; and
- incorporate a plan for monitoring and reporting on resource use and quantities of waste generated.

Identification of mitigation and residual effects is a highly legislated and regulated practice. The use of a SWMP during the construction phase, in addition to the construction EMP and application of NR's CRE obligations, will introduce the necessary management and monitoring measures required to minimise effects of these activities.

The scope for re-use of materials will be fully explored, including reuse of excavation materials and exploring opportunities for recycling any steel, timber and clean hardcore. Contaminated materials will be treated and reused where feasible.

It is anticipated that responsibility will be assigned to competent personnel, waste will be segregated and stored in secure, designated amenities, uplifted by appropriately certified waste contractors and disposed of at appropriately permitted waste management facilities. All regulatory waste paperwork will be completed and held on record for the required period of time. This will also assist in monitoring the types and quantities of waste generated and comply with the duty of care requirements.

4.11 Water Resources

4.11.1 Introduction

This section describes the proposed scope and methodology of assessment of effects on water resources associated with water quality, hydrological and hydrogeological impacts during the construction and operation of Shaftholme Junction.

A flood risk assessment is also currently being undertaken in accordance with the latest government guidance relating to development and flood risk, as set out in Planning Policy Statement 25: Development and Flood Risk (PPS25); the results from this flood risk assessment will be fed into the EIA. Informal consultation has also been undertaken with the Environment Agency as part of the FRA. The scoping and methodology for the flood risk assessment are not described herein but will be reported as a standalone document.

Any consideration of the significance and magnitude of potential effects on the water environment will have regard to Planning Policy Statement 23: Planning and Pollution Control (PPS23) and the Water Framework Directive. The Environment Agency Policy and Practice for the Protection of Groundwater will be followed as appropriate. Assessment for water resources will also involve close liaison with the work on geology and soils, and waste management.

4.11.2 Potential Impacts

The scheme is not expected to lead to major interventions in the water environment. However, taking this into account, the impacts to be considered are listed below.

Pollution will be controlled by reference to the relevant laws and guidelines and appropriate mitigation measures identified as part of this environmental appraisal.

4.11.2.1 Construction

Potential impacts during the construction of the Shaftholme flyover include:

Water Quality

- direct discharges (accidental or otherwise) of drainage or effluent from construction sites to groundwater or surface waters;
- the potential for pollution of surface water passing to watercourses or drains; and
- the potential for groundwater pollution.

Hydrogeology

- changes to recharge; and
- changes to groundwater flows resulting from temporary dewatering schemes if they are needed.

Hydrology

- temporary changes to drainage patterns due to construction works as a result of construction of access roads, bridges, viaducts and earthworks;

- a network of flood routes operate thought the River Don Catchment; the construction works may create temporary changes to these routes;
- changes to surface water flows resulting from temporary dewatering schemes if they are needed;
- increased flood risk due to construction works within the fluvial floodplains;
- increased sedimentation of surface watercourses as a result of construction site run-off;
- the potential for the blocking of culverts and sewers due to build up of sedimentation or debris;
- impacts on surface water flow passing to drains;
- the potential for any diversion and interruption of local sewer and water mains, reducing the capacity of the systems locally; and
- the proposed works are located within flood zones 2 and 3a, construction works may result in temporary flood storage volume loss.

4.11.2.2 Operational

It is not anticipated that there will be any operational effects on the quality of water resources, except in the event of an emergency; as such events do not require consideration within an EIA, operational effects on water resources will not be included in the EIA.

Potential impacts to be covered separately by the flood risk assessment will include:

- permanent loss of flood routes within the catchment; and
- permanent loss of floodplain and flood storage capacity.

4.11.3 Scope

4.11.3.1 Spatial Scope

The spatial scope for identification of effects on receptors and resources will be taken as:

Water Quality

- surface waters within 250m of the site footprint;
- aquifers within 250m of the site footprint; and
- groundwater abstractions whose published SPZ or equivalent time of travel zone (TTZ) passes within 250m of the site footprint.

Hydrogeology

- Groundwater abstractions located within 250m of the scheme footprint (no large scale dewatering is planned during construction so a larger scoping radius is not required).

Hydrology

- Surface waters and drainage patterns within 250m of the scheme footprint and implications for wider catchment management.

The flood risk assessment will cover an individual scope of analysis appropriate to each element of flooding.

4.11.3.2 Temporal Scope

Effects will be considered in relation to both construction and operation. This includes impacts associated with the construction phase that may have effects persisting in the long term e.g. changes in river morphology due to gradual deposition of sediment.

In all cases the assessment will need to be mindful of the implications of climate change, as described in Annex B of PPS25.

4.11.4 Resources and Receptors

The assessment will consider the water resources and receptors outlined in Table 4.37.

Table 4.37: Water Resources and Receptors

Resource/Receptor	Description
Surface water	Any controlled waters or other surface water features that may be affected by the proposed development. This predominantly includes It also includes licensed or protected rights to abstract or discharge to surface water.
Groundwater	The presence and quality of any aquifers. Key receptors are licensed and protected rights to abstract or discharge to groundwater. Consideration will be given to rights under application through Section 32 consents or in determination. The EIA will focus on those abstractions which are most likely to be impacted based on an assessment of their location relative to the site and groundwater flow directions. It is not thought that there are any groundwater dependent ecosystems in the area.
Floodplains	Land with pre-existing flooding potential, key receptors are the Shaftholme Junction site and surface watercourses.
Landform and drainage patterns	The morphology of the land Key receptors include any areas that may be affected by changes in the surface water flow regime on the site. This includes areas potentially at significant distances from the site which may be subject to increased flooding due to an increase in overland flows from the site or from changes to flow patterns through the site.

4.11.5 Baseline

A baseline study will be carried out to establish the existing water regime, including drainage patterns, and to assess its sensitivity to the construction and operation of Shaftholme Junction. It will use data collected relating to hydrology, hydrogeology, flood records, tide levels, surface water quality, water abstraction locations and land drainage systems.

4.11.5.1 Sources of Information

The method for determining and appraising baseline conditions will be based on that proposed in best practice guidance for EIAs. This will involve both desk study and survey work.

Sources examined in the desk study will include:

- private water supply information (Protected Rights) held by the Environmental Health Department in DMBC;
- information held by the Environment Agency on abstractions from and discharges to groundwater and surface water;
- Source Protection Zones (SPZ) where available from the Environment Agency. The equivalent time of travel zones will be calculated using analytical formulae if SPZs are unavailable;
- existing hydraulic modelling of main rivers (Ea Beck, River Don) from the Environment Agency;

- groundwater data from site investigations and Mott MacDonald Geo-environmental desk studies;
- relevant groundwater vulnerability maps;
- discussions with the Environment Agency regarding permanent and temporary works;
- discussions with the Dun Drainage Commissioners (DDC);
- data on surface water quality from the Environment Agency;
- published data collected by the Institute of Hydrology;
- topographic data;
- British Geological Survey (BGS); and
- information compiled as part of any investigative works associated with the project.

Additional and supplementary information on surface water features will be obtained from Ordnance Survey maps, site surveys and aerial photographs.

A separate FRA will be undertaken for the scheme. Information from this will be considered as part of the EIA as necessary. As part of this FRA, consultation with the Environment Agency and local authorities will be required to establish information available in terms of flood modelling data and historical data for all flood mechanisms affected by the proposals. Early discussions have been held with EA by NR and also as part of the FRA; future liaison will also include discussions related to the treatment and disposal of drainage.

4.11.5.2 Baseline Surveys

A detailed topographic survey giving ground levels to GPS derived OS datum will be carried out by the design team if not available from the client.

The information available to inform the baseline is such that hydrological monitoring will be carried out for 12 months as part of the EIA.

4.11.6 Assumptions and Limitations

The principal assumptions and limitations for this assessment are outlined in Sections 4.11.6.1 and 4.11.6.2. Additional assumptions may be revealed during the environmental appraisal process.

4.11.6.1 Assumptions Concerning the Baseline Environment

- No further monitoring of water bodies is assumed to be necessary;
- no new topographic survey of watercourses is assumed to be necessary;
- no new hydraulic modelling of watercourses is assumed to be necessary;
- baseline conditions will be established in part from historical data, and it is assumed that conditions are not expected to change before or during the construction and operation of the scheme other than as described in PPS 25;
- it is assumed that the proposed works will not create impermeable areas, therefore there will be no requirement for surface water drainage systems;
- no major dewatering works will be required during construction and it is therefore assumed that the hydrogeology of the shallow aquifers will not be investigated in detail as part of the baseline;
- it is assumed that data provided by third parties is accurate;
- source protection zones may not be available from the Environment Agency for all groundwater receptors and it is assumed that equivalent 'Time of Travel Zones (TTZ)' will be calculated as part of the assessment using a similar methodology to that used by the Environment Agency; and

- the baseline water quality data presented is expected to include limited coverage of the parameters listed under the Drinking Water Regulations or as List 1 and List 2 substances under the groundwater regulations. Instead, greater reliance will be made on data for selected major ions (usually chlorides or sulphates) or gross physical chemistry such as electrical conductivity or suspended solids.

4.11.6.2 Assumptions Concerning Prediction of Effects

- Climate change estimates include uncertainty. The assessment will be limited to the scenarios described in PPS 25. Estimates may be modified as climate change research advances, bringing a potential need for the flood risk assessment to be reviewed in the future;
- further ground investigations have been completed, and thus further groundwater level data will become available in future as a result of monitoring. This data would be reported to the Environment Agency through the EMP process but would not available within the ES; and
- cumulative effects on groundwater flooding due to other developments planned or proposed within the area of the spatial scope cannot be predicted and would not be assessed within the ES.

4.11.7 Prediction of Effects

4.11.7.1 Construction

- For hydrogeology, hydrology and surface water flood risk effects during the construction phase, it is assumed there will be no significant effects. This will be managed by appropriate provisions in the CoCP, following best practice and incorporated mitigation measures;
- pollution will be controlled by reference to the relevant laws and guidelines and appropriate provisions of the CoCP and no prediction methodologies will be needed; and
- it is anticipated that the construction of the works will have a minor impact upon flood routes within the catchment.

4.11.7.2 Operation

- Water quality effects from drainage to watercourses will be predicted by reference to the DMRB;
- no impacts on groundwater quality are considered likely during operation and therefore no prediction methodology for the effect is proposed; and
- it is anticipated that the proposed works will reduce the flood storage capacity within the catchment, this is not expected to be a significant amount. It is anticipated that flood routes will be permanently affected by the proposed works.

4.11.8 Evaluation of Effects

4.11.8.1 Importance of Receptor

There are no defined significance criteria for the assessment of water resources. Thus the impacts and associated effects will be assessed against the criteria described below, which are based on those within the DfT's *Transport Analysis Guidance*, Unit 3.3.11. The overall impacts of Shaftholme Junction will be summarised in an evaluation summary table.

The value of water resources is in part defined by legislation which protects all controlled waters in England and Wales and which, in effect, protects all water bodies (surface or groundwater). Thus there cannot be a water feature that has negligible value. But the value of controlled waters can be defined outside of the legal status by taking into account the use and conservation importance of the water body. This is set out in Table 4.38 below.

Table 4.38: Criteria for Determining Value of Water Features

Value	Criteria	Examples
Very High	High importance and rarity, international scale and limited potential for substitution	Internationally shared water resources. Catchments used for interbasin transfers Water resources that perform major function in relation to internationally protected sites (SPA, SAC, RAMSAR site)
High	High importance & rarity, national scale, or regional scale with limited potential for substitution	Water resources used for major potable supplies (i.e. by a water supply utility) with limited potential for substitution Water resources that perform major function in relation to nationally protected sites (SSSI)
Medium	Medium importance and rarity, local or regional scale, and some potential for substitution	Locally important water resources used for public water supplies but which can be substituted Private water supplies Water resources that perform major function in relation to regionally important sites (SINCs, SNICs etc)
Low	Low or medium importance and rarity, local scale. Good potential for substitution.	Controlled waters with limited potable use, or limited input to sensitive or important ecosystems

4.11.8.2 Magnitude of Effect

The magnitude of an effect can vary considerably and should also consider the timescale over which the impact occurs. The impact must be defined as temporary or permanent and whether it is reversible or not. Typical criteria are set out in Table 4.39 below.

Table 4.39: Criteria for Determining the Magnitude of Impact

Magnitude	Typical criteria			
High	The proposal (either on its own or with other proposals) may affect the integrity of the water body either in terms of quality or quantity and could render it permanently unusable, or such it would require substantial permanent treatment to ensure it was useable by existing or future users. The function of the water body is impacted such that there is a substantive and permanent change (+ve/-ve) in function e.g. as a means of transmitting flood flows.			
	Groundwater Levels (GWL)	Groundwater Flows (GWF)	Groundwater Quality (GWQ)	Surface water Quality (SWQ)
	Sandstone: >+/-5 m change at sources Drift: >+/-2 m change at >20 m from site	Flow into basements or >20% change in average flow at >200 m from site	Deterioration within 50 day TTZ/SPZ and loss of supply	Contamination of main river causing deterioration to below the RQO score
Moderate	The quality or quantity of the water body would be reduced (or improved) such that moderate works would be required to ensure continuity of its existing use or function. The function of the water body is impacted such that there is a moderate and measurable change (+ve/-ve) in function (e.g. as a means of transmitting flood flows). Or, a major impact that only affected the water body for a limited time frame and was reversible and could be mitigated by some temporary works.			
	GWL	GWF	GWQ	SWQ
	Sandstone: +/- 2 to 5 m change at sources Drift: >+/- 0.5 to 2 m change at >20 m from site	>10% change in average flow at >100 m from site	Temporary deterioration within 400 day TTZ/SPZ or permanent deterioration in used aquifer outside	Temporary risk of contamination affecting main river or receptor (eg abstraction)
Low	The impacts would affect the quantity or quality but in a manner which did not materially affect its use or function.			

Magnitude	Typical criteria			
	GWL	GWF	GWQ	SWQ
	Sandstone: <+/- 2 m change at sources Drift: <+/- 0.5 m change at >20 m from site	<10% change in average flow at 50 m from site	Temporary deterioration outside 400 day TTZ/SPZ	Temporary risk of contamination of minor watercourse
Neutral	No observable impact on use of function.			

The magnitude of flooding and runoff effects would be investigated and reported within the Flood Risk Assessment. For Environmental Statement purposes, the magnitude will either be classed as High if the Environment Agency does not accept the FRA or Neutral if the FRA is accepted.

4.11.8.3 Level of Significance

Each type of effect will be allocated a level of significance as shown in Table 4.40 below.

Table 4.40: Evaluation of Significance

Magnitude	Low Importance	Medium Importance	High Importance
Low	Not significant	Not significant/potentially significant	Potentially significant
Moderate	Not significant/potentially significant	Significant	Significant
High	Potentially significant	Significant	Significant

Where potentially significant effects arise there will be professional assessment as per the topic methodology to determine those effects which are deemed significant and these effects will be reported in the ES.

The assessment will also consider cumulative effects, where several types of effect act on the same resources and/or receptors. In some cases it may be that several “slight” effects may, individually, be insignificant but acting together may produce a significant effect on a sensitive water resource.

4.11.9 Mitigation and Significant Residual Effects

The initial effects on water quality, hydrogeology, hydrology and flood risk may be mitigated using a range of techniques. Mitigation measures may potentially include:

- prevention of sediment from entering watercourses during construction;
- floodplain storage compensation;
- maintain flood routes;
- maintenance of existing flood defences;
- groundwater monitoring programme;
- provision of additional groundwater drainage; and
- provision of an alternative source or supply of water.

These measures will seek to avoid or reduce the significance of effects; any remaining significant residual effects will be identified within the ES.

Appendices

Appendix A. Report References

A.1. General

Arup (November, 2007) Shaftholme Junction Remodelling – Options for the Shaftholme Flyover.

Network Rail (March, 2007) Freight Route Utilisation Strategy. Available at: http://www.networkrail.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/freight/freight%20rus.pdf

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Network Rail (April, 2009) Shaftholme Flyover TWA Design Development – Scope of Work

A.2. Ecology

Biodiversity Action Plan for Doncaster available at http://www.doncaster.gov.uk/living_in_doncaster/environment/biodiversity/biodiversity_action_plan/doncaster_biodiversity_action_plan.asp accessed October 2009.

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Multi-Agency Geographic Information for the Countryside Website. http://www.magic.gov.uk/ accessed October 2009

Natural England Website – Search for SSSI details http://www.english-nature.org.uk/Special/sssi/search.cfm accessed October 2009.

UK Biodiversity Action Plan. http://www.ukbap.org.uk accessed October 2009.

A.3. Electromagnetic Effects

1. Health Protection Agency http://www.hpa.org.uk

A.4. Geology and Soils

Mott MacDonald (November 2009) Shaftholme Flyover TWA Design Geotechnical and Geo-environmental Desk Study Report.

A.5. Noise and Vibration

1. http://www.defra.gov.uk/noisemapping

2. Draft Guidelines for Noise Impact Assessment. Institute of Acoustics and Institute of Environmental Management and Assessment. 2002.

3. Planning Policy Guidance PPG24: Planning and Noise. Department of the Environment, Transport and the Regions. 1994.

4. British Standard BS 4142 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas. 1997.

5. Calculation of Railway Noise. Department of Transport. 1995.

6. Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 HA 213/08 Noise and Vibration. 2008.

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8. British Standard BS 5228 Code of practice for noise and vibration control on construction and open sites. 2009.

9. Guidelines for Community Noise. World Health Organization. 1999.

10. British Standard BS 8233 Sound Insulation and Noise Reduction for Buildings. 1999.

11. Noise Insulation Regulations (Railways and Other Guided Systems) Regulations 1996 and Amendment. 1998.

12. British Standard BS 7385 Evaluation and Measurement for Vibration in Buildings – Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings. 1990.

13. British Standard BS 6472 Guide to Evaluation of Human Exposure to Vibration in Buildings. Part 1: Vibration sources other than Blasting. 2008.

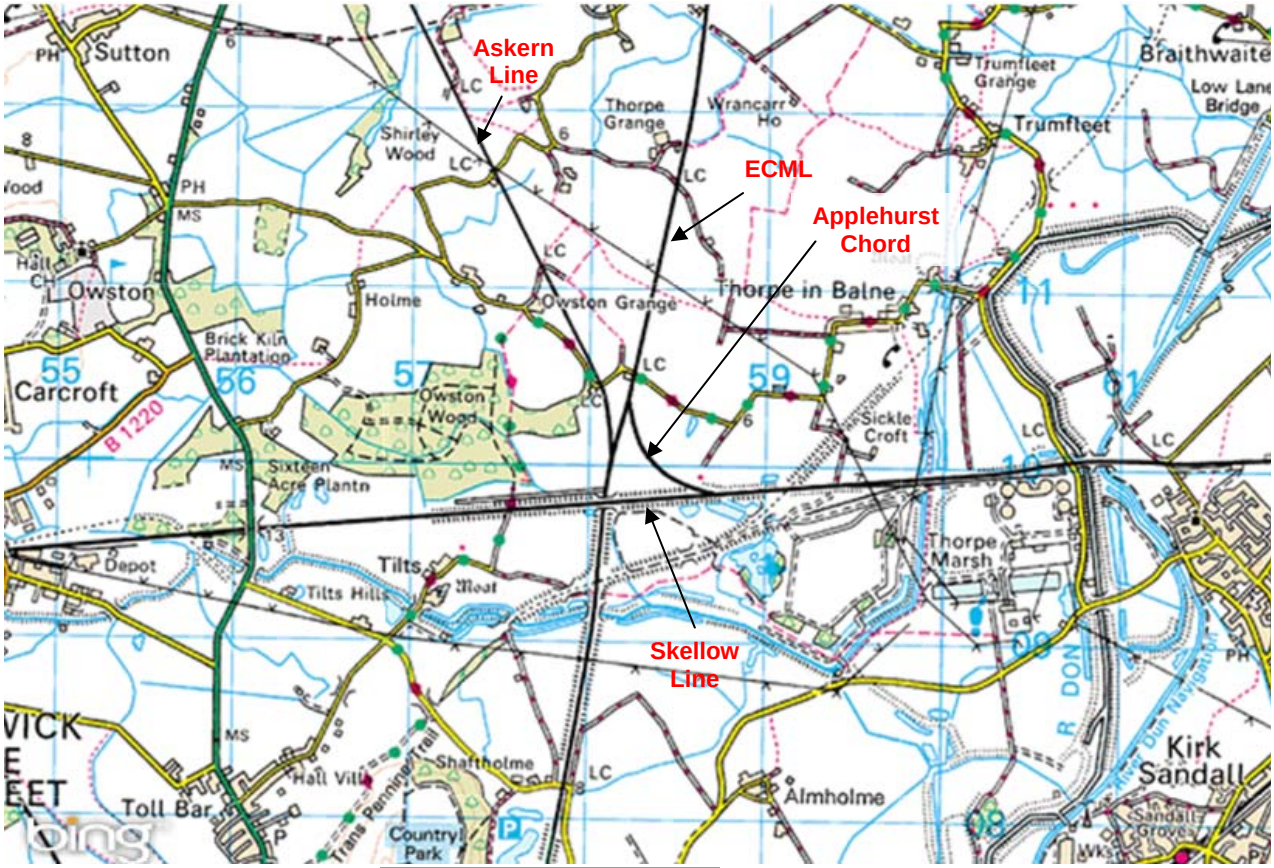
14. The Delivery Manual DEL04 – Environment (V8.02). Guide to Railway Investment Projects. Network Rail (2008)14

15. Control of Pollution Act – Part III Noise. HMSO.1974

Appendix B. Report Figures

B.1. Site Location

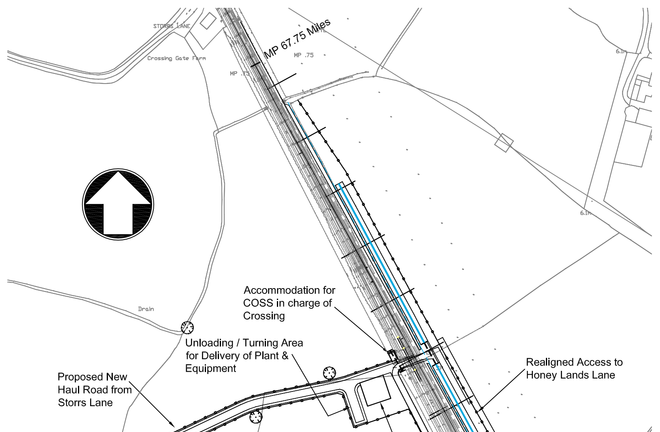
Figure B.1: Map showing the site location

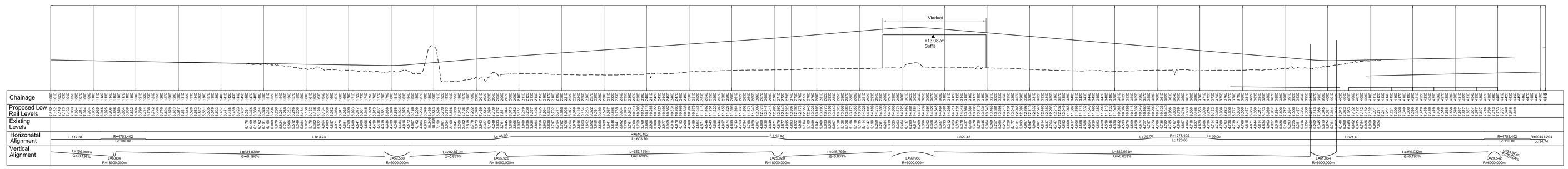


Source: Multimap, 2010 (http://www.multimap.com/maps/?qs=Doncaster&countryCode=GB#map=53.58323,-1.12249|14|4&dp=os&bd=useful_information&loc=GB:53.52328:-1.13359:14|Doncaster|Doncaster,%20South%20Yorkshire,%20England,%20DN1%201)

B.2. Site Layout

Figure B.2: Drawing of the proposed project footprint





Vertical Long Section Down Flyover

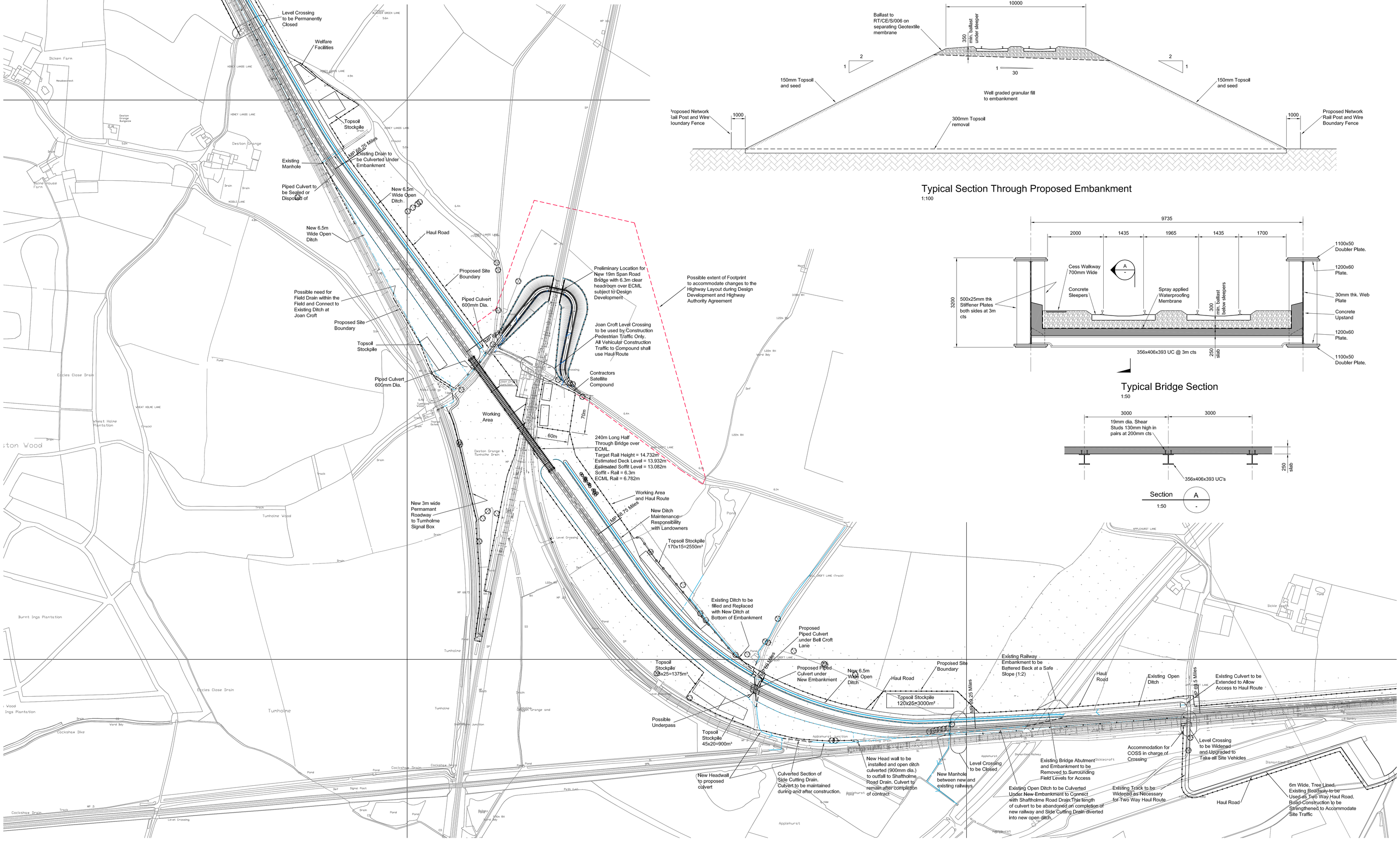
H = 4000 V = 400

Typical Section Through Proposed Embankment

1:100

Typical Bridge Section

1:50



I:\ikshef\c07\projects\York\Railways\Projects\261980 - Shaftholme TWA Design Dev\08 Drawings\Consultative Design Stage\Footprint\MMD-261980-Z-DR-00-XX-0020-P3.dwg May 18, 2010 - 3:39PM rhs33982

Notes

Steelwork Notes

1. All steelwork to be grade S355J2G3 to BS EN 10025
2. All concrete to be grade C32/40 BS8500.
3. All reinforcement to be grade 500B to BS4449
4. All welds to be minimum 8mm fillet welds unless noted otherwise.
5. Rail sections to be CEN56E1 through new junctions.
6. Rail sections to be CEN60E1 excluding new junctions.

Key to symbols

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P3	18.05.10	TJR	New Road Bridge over ECML added at Joan Croft Level Crossing	GS	-
P2	05.03.10	TJR	Sections added.	GS	-
P1	22.01.10	TJR	Preliminary Issue	GS	-

Mott MacDonald
Provincial House
2a Low Ouse Gate
York, YO1 9QJ
United Kingdom
T +44 (0)1904 652479
F +44 (0)1904 656747
W www.mottmac.com

Client: Network Rail

George Stephenson House, Toft Green, York, YO1 6JT

Title: Shaftholme Flyover
Design and Development - GRIP 4
Consultative Design Phase
Proposed Footprint - 246m Multi-Span Viaduct

Designed	G Simpson	GS	Eng check	-	-
Drawn	T Rhodes	TJR	Coordination	G Simpson	GS
Dwg check	G Simpson	GS	Approved	-	-

Scale at A0: 1:2500 | Status: PRE | Rev: P3

Drawing Number: MMD-261980-Z-DR-00-XX-0020

B.3. Proposed Site Access Routes

Figure B.3: Drawing showing the proposed site access routes

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Notes

Key to symbols

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	26.10.09	TJR	Preliminary issue	GS	-

Mott MacDonald

Provincial House
2a Low Ouse Gate
York, YO1 9QU
United Kingdom
T +44 (0)1904 652479
F +44 (0)1904 656747
W www.mottmac.com

Client

Network Rail

George Stephenson House, Toft Green, York, YO1 6JT

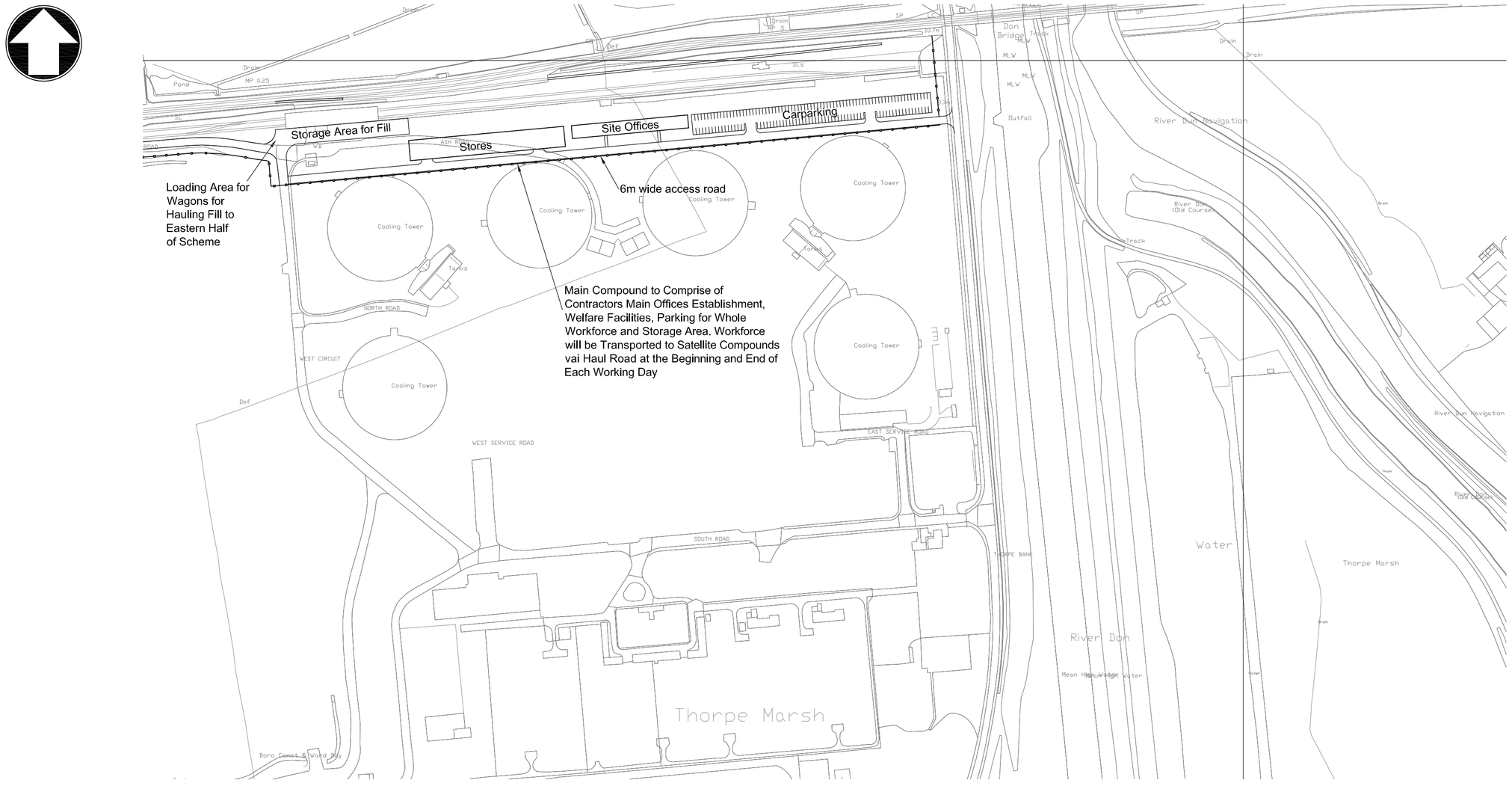
Title

Shaftholme Flyover TWA
Design and Development - GRIP 4
Initial Design Phase
Proposed Footprint - West

Designed	G Simpson	GS	Eng check	-	-
Drawn	T Rhodes	TJR	Coordination	G Simpson	GS
Dwg check	G Simpson	GS	Approved	-	-

Scale at A0	Status	Rev
1:2500	PRE	P1

Drawing Number
MMD-261980-Z-DR-00-XX-0001



Proposed Contractors Compound

1:2500 0 125m 250m

P:\York\Railways\Projects\261980 - Shaftholme TWA Design Dev\08 Drawings\Intial Design Stage\Footprint\MMD-261980-Z-DR-00-XX-0006-P1.dwg
Mar 8, 2010 - 2:05PM rho33982

Notes

Key to symbols

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	01.12.09	TJR	Preliminary Issue	GS	-

Mott MacDonald
Provincial House
2a Low Ouse Gate
York, Y01 9QU
United Kingdom
T +44 (0)1904 652479
F +44 (0)1904 656747
W www.mottmac.com

Client

Network Rail

George Stephenson House, Toft Green, York, YO1 6JT

Title

Shaftholme Flyover TWA
Design and Development - GRIP 4
Initial Design Phase
Contractors Compound

Designed	G Simpson	GS	Eng check	-	-
Drawn	T Rhodes	TJR	Coordination	G Simpson	GS
Dwg check	G Simpson	GS	Approved	-	-
Scale at A1 1:2500		Status PRE		Rev P1	

Drawing Number
MMD-261980-Z-DR-00-XX-0006