HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

M1 Junction 39-42 Managed Motorway

Environmental Assessment Report

Volume 1: Main Report

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Halcrow Hyder Joint Venture

Working on behalf of the Highways Agency

An executive agency of the Department for Transport

HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

Highways Agency

Project Support Framework

M1 Junction 39-42 Managed Motorways

Environmental Assessment Report – Volume 1:Main Report

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Non Technical Summary

A.1 Introduction

A.1.1 The M1 is a strategic route for local, regional, and international traffic, carrying in excess of 153,000 vehicles a day. Congestion is already a serious problem between Junctions 39 and 42 and, based on national road traffic forecasts, the extent and severity of congestion is expected to increase over the next 15 to 20 years.

A.1.2 The Highways Agency (HA) aims to increase capacity, reduce congestion and improve this busy section of the M1 by making use of the existing hard shoulder together with traffic monitoring and signalling technology to add extra capacity as an alternative to conventional motorway widening - known generically as Managed Motorways schemes.

A.1.3 The Halcrow Hyder Joint Venture (HHJV) has been commissioned by the HA to assist with the completion of the statutory procedures required to implement the scheme including the assessment of potential environmental impacts.

A.1.4 Statutory Environmental Impact Assessment (EIA) is only required for developments that exceed certain thresholds and are predicted to result in a significant environmental effect. The HA implements screening procedures to determine whether their trunk road and motorway developments will require formal EIA.

A.1.5 The proposed M1 Junction 39-42 scheme is deemed to be a relevant project under the EIA Regulations because the proposed works are over 1 hectare in size. Accordingly, the scheme has been subject to a non-statutory environmental assessment to identify its potential environmental effects and their significance in order to inform the decision on whether a statutory EIA under the EIA Regulations will be required.

A.1.6 This Environmental Assessment Report (EAR) presents the findings of the non-statutory environmental assessment and forms the basis for a Record of Determination (RoD) which recommends whether a statutory EIA is required. This is a legal requirement of the Secretary of State (SoS). A Notice of Determination (NoD) informing whether a statutory EIA would or would not be required will be published by the HA on behalf of the SoS in the London Gazette and the local press. The NoD is subject to a challenge period of a minimum of six weeks.

A.2 The Proposed Scheme

A.2.1 The Proposed Scheme involves converting the existing hard shoulder between junctions 39 and 42 of the M1 to a permanently open running lane 24 hours a day. This type of scheme is called Managed Motorways - All Lane Running (MM-ALR).

A.2.2 Managed motorways involves the use of monitoring and signalling technology, such as CCTV and matrix variable message signs, to manage and control traffic flows when an incident occurs (eg breakdown or accident) or traffic volumes reach a level such that flows are adversely affected.

A.2.3 The requirement for control technology leads to the need for more signs and gantries than are present for standard ‘non-managed’ motorway sections. These are provided through a combination of verge mounted ‘hockey-stick’ type signs and superspan gantries that extend across both carriageways.

A.2.4 In addition, MM-ALR adds extra physical capacity by converting the hard shoulder into a permanent running lane. Where MM-ALR is being operated and there is, therefore, no hard shoulder, dedicated emergency refuge areas (ERAs) with emergency telephones are provided at intervals in case of breakdown.

A.3 Land Use, Setting and Land Take

A.3.1 The M1 motorway between junctions 39 and 42 links the major urban settlements of Leeds and Wakefield. Leeds and Wakefield are high level service centres attracting visitors from the whole of the study area. A number of smaller settlements are located in a corridor approximately 5 km either side of the motorway, such as the villages of Kirkhamgate and Crigglestone to the east and the towns of Horbury and Ossett to the west. Many people living in the surrounding communities work in Leeds or Wakefield, and to a lesser extent the towns of Horbury and Ossett, and need to use the M1 to travel to work.

A.3.2 At the southern end of the proposed scheme, the motorway runs close to residential areas on the outskirts of Wakefield and crosses predominantly agricultural land towards the northern end of the scheme. The corridor is located almost entirely within Green Belt largely reflecting the value of the rural resource in this historically industrialised region.

A.3.3 The proposed works will be contained entirely within the existing HA owned land, leaving adjacent land uses unaffected by land-take.

A.4 Approach

A.4.1 This assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Interim Advice Note (IAN) 125/09: Supplementary guidance for users of DMRB Volume 11 and Interim Advice Note (IAN) 161/12: Managed Motorways – All Lane Running. The DMRB is a document produced by the HA to provide official standards and advice relating to the design, assessment and operation of trunk roads including motorways in the United Kingdom. Volume 11 relates to Environmental Assessment.

A.4.2 An Environmental Scoping Report was undertaken by WSP in 2011 on three proposed options for the Junction 39 to 42 scheme in order to identify those topics requiring consideration in the environmental assessment (and the appropriate level of assessment required).

A.4.3 Consultation with the statutory environmental bodies (SEBs); Environment Agency, Natural England and English Heritage, was undertaken at the scoping stage, again at the start of the assessment stage when the preferred scheme was identified and this draft EAR will also be sent to the SEBs for their final comments prior to publication of the RoD.

A.4.4 In addition to the SEBs consultation, Public Information Exhibitions (PIEs) were held in the local area on 1st, 2nd, 8th and 9th of February 2013. The aim of the PIEs was to raise awareness of the Proposed Scheme and give stakeholders the opportunity to express their views. Further PIE's will also be held in Summer 2013 prior to scheme construction to keep the public informed of the latest scheme details.

A.5 Impact Assessment

Air Quality

A.5.1 The assessment of potential local air quality effects has been undertaken in accordance with the DMRB Volume 11 Section 3, Part 1 – Air Quality (HA207/07). Detailed level assessment, which utilises dispersion modelling to more accurately estimate pollutant concentrations, has been undertaken.

A.5.2 In addition, regional air quality assessment has also been undertaken to consider changes in annual road transport emissions of oxides of nitrogen (NOx), particulates with a diameter of less than 10 µm (PM10) and Carbon (C) that may brought about by the scheme in the opening and design years.

A.5.3 The results of the regional air quality assessment show that there are only small overall levels of change anticipated in the study area and the majority of receptors modelled are anticipated to meet air quality objectives.

A.5.4 The public exposure predictions at the identified sensitive receptors along the scheme route and affected roads suggest that in 2015 air quality will meet annual average UK Government Air Quality Strategy and European Union limit values in the majority of locations for NO_2. Sensitive receptors are all locations where members of the public might be regularly exposed; these include the building façades of residential properties, schools, hospitals, care homes, etc

A.5.5 In those locations which do not currently meet air quality objectives, changes in air quality are generally small and these are unlikely to be observable within normal year to year variations in NO_2 concentrations. There are only six properties within the study area where concentrations are not predicted to drop below pre-scheme levels within 6 years of the scheme opening.

A.5.6 Air quality will also meet 1-hour NO_2, annual average PM10 and 24-hour PM10 air quality objectives at all receptors with or without the scheme.

A.5.7 Overall construction and operational air quality effects are considered to not be significant for the proposed scheme.

Landscape and Visual Impact

A.5.8 The landscape and visual impact assessment (LVIA) of the Proposed Scheme covers:

- Landscape Character Effects – these relate to the character and individual features that contribute to local and regional distinctiveness and the extent to which the Proposed Scheme proposals would alter the character and quality of the landscape as a resource; and
- Visual Effects – relating to changes in visual amenity experienced by people, or to changes in the visual aspects of the local setting of sensitive receptors, including residential and commercial areas, listed buildings and public rights of way (PRoW).

A.5.9 In addition, listed and historic buildings have been considered to ascertain the importance and significance of the historic landscape in relation to the Proposed Scheme. Views from

the road have also been considered in relation to the visual experience for travellers on the motorway.

A.5.10 The LVIA comprised desk studies, collecting baseline data and undertaking site surveys on the context, character and quality of the study area, followed by an evaluation of the landscape and an assessment of views from properties and local views potentially affected by the Proposed Scheme.

A.5.11 The assessment of landscape impacts identifies the likely nature and scale of changes to individual landscape elements and characteristics, focusing on:

- Existing land use;
- The pattern and scale of the landscape and the natural and built elements within it;
- Short or long term, temporary or permanent timescale;
- Visual openness or enclosure of views and the distribution of visual receptors; and
- The scope for mitigation and whether this would be in character and keeping with the existing landscape.

A.5.12 The purpose of mitigation is to avoid, reduce and where possible remedy or compensate for the impacts of the Proposed Scheme. It is recognized that landscape planting will not provide immediate mitigation, as time is required for it to become established to create an effective visual screen or help to integrate the Proposed Scheme into the local landscape.

A.5.13 The assessement concluded that the Proposed Scheme would have a negligible to slight impact on landscape character given that it concerns minor modifications along an established motorway corridor, which is already part of the local landscape fabric.

A.5.14 The visual impact assessment evaluates the impact of the Proposed Scheme on views from sensitive receptors. With a highways scheme, changes in visual impact can arise from the loss of existing components, such as existing vegetation, long distance views and consistent character, or by the introduction of new features such as earthworks, structures, gantries, lighting and alterations to the traffic flow.

A.5.15 The assessment concluded that the construction and operation of the Proposed Scheme will have a variety of temporary and longer term impacts on the views from receptors. The construction of the signs, gantries and ERAs will result in temporary alterations to the existing roadside verges with the loss of established vegetation in certain locations and changes to the profile of cuttings and embankments most notably where the Emergency Refuge Areas will be located. The mitigation proposals include for the making good vegetation lost or damaged during construction, which will reduce the landscape / visual impacts as the vegetation matures. As a result, the assessment has concluded that although there are nine locations where moderate or large adverse impacts are anticipated at scheme opening there would only be one location - houses at the northern end of the terrace at the junction of Lawns Lane and Lingwell Gate between Junctions 41 and 42 - that would still experience any adverse effect (reduced to slight) after 15 years.

A.5.16 With regard to the historic landscape the proposed works are entirely within the existing motorway boundaries and will have no direct impact on any historic features. The local landscape within the study area is generally of low historic value and will not be affected by

the Proposed Scheme. There will be minimal impact on the setting of listed buildings and conservation areas.

A.5.17 The assessment of the views from the road indicates that the visual experience of vehicle travellers will not be significantly affected by the proposed works. The major visual elements of the proposed works are limited to the new signs, gantries and loss of existing roadside vegetation in some locations. The key impact will be the new gantries which will increase the visual presence visibility of motorway infrastructure. However, they will not impact significantly on the existing views from the road as they do not interrupt existing sideways views of the surrounding landscape.

Ecology and Nature Conservation

A.5.18 A simple assessment of the ecology and nature conservation issues with regard to the Proposed Scheme was undertaken in accordance with the DMRB Volume 11 Section 3, Part 4, Ecology & Nature Conservation and IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment. The assessment has concentrated on the area immediately affected by the scheme and information gained from up to 2km from the scheme.

A.5.19 There are no statutory designated sites and three non-statutory designated sites with potential to be impacted on by the scheme. The habitat types present within the soft estate are plantation woodland, dense scrub, semi-improved neutral grassland, bare earth with ephemeral vegetation and running water. Species identified as potentially impacted are breeding birds, great crested newts (GCN) and reptiles.

A.5.20 Habitat loss is relatively minor, with negative, direct and permanent impacts predicted to scrub and plantation woodland habitats and semi-improved neutral grassland habitat. Mitigation for birds and GCN will be implemented to satisfy legal requirements, with an overall minor loss of habitat, which is considered neutral. All other potential impacts are predicted as neutral.

A.5.21 The construction of the scheme will result in a minor residual loss of habitats (estimated total residual habitat loss approximately 0.4ha) including semi-improved neutral grassland, plantation woodland and scrub. The effects of temporary loss of habitat are considered neutral following restoration of habitats after the works are complete; the minor overall loss of habitat is considered neutral, due to the minor area and existing low value of the habitat affected. Mitigation for birds and GCN will be implemented to satisfy legal requirements, with an overall minor loss of habitat, which is considered neutral. All other potential impacts are predicted as neutral.

A.5.22 Construction-related impacts will be controlled through the implementation of a Construction Environmental Management Plan (CEMP), which will include measures to prevent damage to designated sites, protected species and valuable habitats.

Materials

A.5.23 The environmental impacts of materials resources required and generation of waste arisings during construction of the proposed scheme have been assessed. Where impacts have been identified these will be addressed through ensuring that the construction of the scheme responds to national regulatory standards (i.e. Waste Regulations 2011 and the Site Waste

Management Plan Regulations), Highways Agency policy requirements and appropriate mitigation measures.

Noise and Vibration

A.5.24 A noise assessment was undertaken in accordance with the requirements of DMRB Volume 11 Section 3 Part 7 HD213/11 'Noise and Vibration' Detailed Assessment methodology.

A.5.25 The procedure for predicting the noise level from a road is described in the Department of Transport and Welsh Office technical memorandum Calculation of Road Traffic Noise (CRTN) (Department of Transport and Welsh Office, 1988). The prediction method takes into account factors such as the traffic flow, composition and speed, the alignment and distance of the road relative to receiving property, the road surface type, the nature of the intervening ground cover between the road and reflections from building facades in order to calculate the noise level.

A.5.26 The calculations undertaken within this assessment have been conducted using a computer based prediction program IMMI (produced by Wölfel Meßsysteme). The software package follows the procedures given in CRTN.

A.5.27 A survey of existing conditions was undertaken in March 2012 in order to provide an indication of the current nose climate. In accordance with the guidance contained in DMRB, locations were selected at various distances from the M1 and chosen to be representative of sensitive receptors. In total six locations were selected for spot measurements and one location was selected for a continuous 24-hour measurement.

A.5.28 Sensitive receptors for a noise and vibration assessment are considered to include dwellings, hospitals, schools, community facilities, designated areas (e.g. National Parks, Sites of Special Scientific Interest, Scheduled Monuments), and public rights of way.

A.5.29 The results of the assessment for the opening year of the scheme (2015) indicated that the majority of dwellings and other sensitive receptors are predicted to experience an increase in noise with the scheme. For the majority of these receptors the predicted increase would be negligible, although a minor increase in noise is predicted for 631 dwellings and 6 other sensitive receptors. However, over the assessment period to 2030, the magnitude of change would reduce, partially due to road resurfacing.

A.5.30 During the construction phase of the scheme there are not predicted to be significant impacts. It should be noted however, that the assessment of construction impacts has been undertaken by making assumptions of likely plant, and cannot be considered as definitive until the methods and equipment for construction are clearly defined.

Effects on All Travellers

A.5.31 The study area for the assessment of effects on all travellers is defined by the Proposed Scheme itself and includes the length of the proposed works and the associated traffic management.

A.5.32 The all travellers assessment in this report has concentrated on the impact of the Proposed Scheme on driver stress. Impacts of the scheme on travellers views from the road have been considered as part of the landscape assessment.

A.5.33 The assessment of drivers stress was based on three main factors:

- Frustration;
- Fear of Accidents; and
- Uncertainty of Route.

A.5.34 Overall during construction, traveller stress is anticipated to be moderate adverse due to the number of drivers likely to be affected during the construction period, although this would be temporary in nature.

A.5.35 Traffic data forecasts show that with the scheme in place, traffic flows per lane are expected to be lower in 2030 compared to existing conditions (use of the hard shoulder as a running lane spreads the traffic over 4 rather than 3 lanes). Average traffic speed is predicted to be slightly higher in 2030 with the scheme. This would result in slight reductions in driver stress. The percentage of HGVs is also predicted to reduce in 2030 with the Proposed Scheme in place resulting in slight beneficial effects on fear of accidents.

A.5.36 Improved directional signs, new gantry and cantilever message signs, and the dedicated merge-diverge lane between Junctions 41 and 42 northbound, together with a reduction in the percentage of HGVs by 2030 would help to alleviate congestion, improve certainty of route and improve driver comfort.

A.5.37 As a result, the overall impact on driver stress (incorporating frustration, fear of accidents and route uncertainty) resulting from the Proposed Scheme is anticipated to be slight beneficial.

Cumulative Effects

A.5.38 The Environmental Impact Assessment Regulations require an environmental assessment to identify the potential for, and where present, assess cumulative effects of a project. Cumulative effects can also be considered as effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed scheme.

A.5.39 Cumulative effects are the result of multiple actions on receptors or resources. There are principally two types of cumulative effect:

- Type 1 - Where different environmental impacts are acting on one receptor, but are the result of the proposed scheme; or
- Type 2 - Where environmental impacts are acting on one receptor, but are the result of multiple projects in combination (including the proposed scheme being assessed).

A.5.40 Five locations have been identified where Type 1 cumulative impacts are anticipated, all of them relating to a combination of landscape and noise impacts. These have been identified as moderate adverse impacts in the short term but reducing to minor adverse by 2030 as vegetation planted in mitigation becomes established.

A.5.41 Nine locations have been identified where Type 2 cumulative impacts are anticipated. Seven of these relate to landscape impacts which are anticipated to reduce from moderate adverse to minor adverse by 2030 as vegetation planted in mitigation becomes established as above.

Two relate to driver stress impacts during the overlapping periods of construction for the Proposed Scheme and the M62 Managed Motorways scheme and proposed improvement works at junctions 40 and 41. Although they are anticipated to have a moderate adverse impact on driver stress the impact will be temporary and short-term, only persisting for the duration of the parallel construction periods.

A.6 Construction Environmental Management Plan

A.6.1 An Outline Construction EMP has been prepared as part of the EAR and contains the high level information available at this time in relation to environmental commitments and actions to manage and mitigate the environmental effects during construction of the Proposed Scheme.

A.7 Summary

A.7.1 The environmental assessment undertaken for the Proposed Scheme has identified mainly negligible or slight impacts for most topics with only a very small number of moderate adverse and one large adverse impacts in the short term although these will all reduce to neutral or slight adverse by the design year. As such it is not considered that a statutory Environmental Impact Assessment will be required and it is not proposed that an Environmental Statement will be produced. This recommendation will be reported in the Record of Determination and Notice of Determination accordingly.

1 Introduction

1.1 Background to the report

1.1.1 The Halcrow Hyder Joint Venture (HHJV) has been commissioned by the Highways Agency to assist with the completion of statutory procedures for the proposed implementation of a new operational regime using Managed Motorways technology along the M1 between Junctions 39 and 42 near Wakefield in West Yorkshire. The location of the project is shown in Figure 1.1.

1.1.2 The Proposed Scheme involves converting the existing hard shoulder to a permanently open running lane 24 hours a day. This type of scheme is called Managed Motorways - All Lane Running (MM-ALR). The Proposed Scheme is described in detail in Section 2.3.

1.2 Purpose of the report

1.2.1 This Environmental Assessment Report (EAR) presents the findings of a non-statutory environmental assessment undertaken to identify and assess the potential environmental impacts that could arise from the Proposed Scheme and recommend mitigation measures to minimise these impacts in order to inform the planning and design process and satisfy legal obligations.

1.3 Scope and content

1.3.1 This assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Interim Advice Note (IAN) 125/09: Supplementary guidance for users of DMRB Volume 11 and Interim Advice Note (IAN) 161/12: Managed Motorways – All Lane Running.

1.3.2 The scope and content of this EAR have been informed by the M1 Junction 39 to 42 Managed Motorway – Environmental Scoping Report (Highways Agency, October 2011) (hereafter referred to as the Scoping Report). A Technical Note was subsequently produced (June 2012) confirming the preferred option and the scope of the EAR. The Statutory Environmental Bodies (SEBs) were consulted, initially on the Scoping Report and then again on the Technical Note.

1.3.3 DMRB states that there is no prescribed format for reporting EAR but suggests a structure which has been broadly followed in this report as follows:

- Chapter 2 describes the project, covering the need for the scheme, the regulatory framework for the environmental assessment, the Proposed Scheme, the study area, and issues concerning construction, operation and long term management.
- Chapter 3 describes the historical development of the scheme and alternatives that were considered during project development.
- Chapter 4 describes the environmental impact assessment methodology, including scoping, stakeholder consultations, approaches, the use of significance criteria and mitigation and enhancement.

- Chapters 5 to 11 present the details of the assessment for the topics which have been scoped into the environmental assessment, namely, air quality, landscape and visual impact assessment, ecology and nature conservation, materials, noise and vibration, all vehicle travellers, and the assessment of cumulative effects. The assessment covers impacts during construction and operation.
- Chapter 12 presents an outline Environmental Management Plan (EMP). Prior to the start of construction, the Delivery Partner will develop the EMP into a Construction Environmental Management Plan (CEMP).
- Chapter 13 presents the conclusions of the EAR.
- Abbreviations, references and glossary of technical terms are presented at the end of the main report.
- Supporting technical information is presented in appendices, numbered to reflect the relevant topic chapters.

2 The Project

2.1 The need for the scheme

2.1.1 The M1 is a strategic route for local, regional, and international traffic, carrying in excess of 153,000 vehicles a day. Congestion is already a serious problem between Junctions 39 and 42 and, based on national road traffic forecasts, the extent and severity of congestion is expected to increase over the next 15 to 20 years. Delays are experienced most weekdays during peak times, which severely affect journey time reliability. With a predicted rise in vehicle numbers of 19% by 2015 and 37% by 2025 from 2003 levels[1], this section of motorway has the potential to represent a major transport constraint.

2.1.2 The Highways Agency has developed a programme to deliver 11 Managed Motorway schemes which implement a technology driven approach to using motorways. The project aims to increase capacity, reduce congestion and improve this busy section of the M1 by adding additional capacity using managed motorway technology as an alternative to conventional motorway widening. Other Managed Motorways schemes in the vicinity of the proposed scheme are the M1 Junctions 28 to 31 (planned), M1 Junctions 32 to 35a (planned) and the M62 Junctions 25 to 30 (under construction, due for completion Autumn 2013).

2.1.3 The overall project objectives are as follows:

- To support the delivery of the Government's transport policy strategic objectives.
- To reduce congestion and develop solutions to provide additional capacity, ensuring the safe and economic operation of the motorway and the slip roads.
- Make best use of existing infrastructure and provide additional capacity within the existing highway boundary and, where possible, within the existing paved area.
- Outside of those works/infrastructure required for the effective operation of a managed motorway scheme, this project only includes the minimum improvements to the road superstructure (for example surfacing, vehicle restraint systems, environmental mitigation and drainage improvements) that would be required to achieve safe and legal operation of the scheme. The scheme is to be designed to suit the requirements of ongoing maintenance, the needs of Highways Agency Network Operations, and, within the constraints of the design guidance, minimise whole life costs.
- Provide high value for money against its whole of life costs in accordance with the Department for Transport's (DfT) WebTAG guidance.

2.2 Regulatory framework

2.2.1 In June 1985 the Council of the European Economic Community (EEC) determined that an Environmental Impact Assessment (EIA) should be prepared by the promoters of certain types of development prior to consent being granted. The requirements for inclusion within an EIA, and the process by which an EIA should be undertaken, are detailed within EC Directive 85/337/EEC as amended by EC Directive 97/11/EC, the Public Participation

[1] Source: National Transport Model – Road Transport Forecasts 2008

Directive 2003/38/EC and EC Directive 2009/31/EC - subsequently replaced in 2011 by Codified EIA Directive 2011/92/EU (collectively termed the EIA Directive).

2.2.2 In England and Wales, the requirements of the EIA Directive with regard to road schemes have been transposed into statute through Section 105 of the Highways Act 1980 as amended by the following regulations (collectively termed the EIA Regulations):

- the Highways (Assessment of Environmental Effects) Regulations 1988;
- the Highways (Assessment of Environmental Effects) Regulations 1994;
- the Highways (Assessment of Environmental Effects) Regulations 1999; and
- the Highways (Environmental Impact Assessment) Regulations 2007.

2.2.3 EIA only applies to developments that are deemed to exceed certain thresholds and predicted to result in a significant environmental effect. All developments listed under Annex I of the EIA Directive must be subject to EIA. Developments listed under Annex II may be subject to EIA depending on whether the proposal qualifies as a 'relevant project'. Determination of what constitutes a relevant project references set criteria and thresholds contained in Annex III, and the potential to generate significant environmental effects.

2.2.4 The Highways Agency implements screening procedures complaint with the requirements of the EIA Regulations to determine whether trunk road and motorway developments qualify for EIA. Under their procedures, Annex II relevant projects are subject in the first instance to non-statutory environmental assessment to establish whether significant environmental effects are likely to arise, in order to inform good planning, option choice design, construction and implementation.

2.2.5 The proposed M1 Junction 39-42 Managed Motorway Scheme (the Proposed Scheme) is deemed to be a relevant project under Annex II because the proposed works are over 1 hectare in size. Accordingly, the Proposed Scheme has been subject to a non-statutory environmental assessment to identify its potential environmental effects and their significance.

2.2.6 The environmental assessment has been conducted in accordance with the guidelines detailed in Volume 11 of the DMRB, IAN 125/09: Supplementary guidance for users of DMRB Volume 11 and IAN 161/12: Managed Motorways – All Lane Running, which provide a framework for taking into account environmental interests and assessing and reporting on the environmental impacts likely to result from implementation of schemes of the type proposed.

2.2.7 The conclusion of the non-statutory environmental assessment, as recorded in this EAR, will be summarised in a Record of Determination (RoD) which recommends whether a formal EIA is required under the EIA Regulations. This is a legal requirement of the Secretary of State. A Notice of Determination (NoD) informing whether a statutory EIA would or would not be required will be published by the Highways Agency on behalf of the Secretary of State in the London Gazette and the local press. The NoD is subject to a challenge period of a minimum of six weeks.

2.3 The Proposed Scheme

2.3.1 The Proposed Scheme, along the M1 between Junctions 39 and 42, is 10.2km (6.5miles) long and involves converting the existing hard shoulder to a permanently open running lane operating for 24 hours a day. This type of scheme is known as Managed Motorways -

All Lane Running (MM-ALR). The General Arrangement of the Proposed Scheme including the location of gantries, other signs and emergency refuge areas (ERAs) is shown in Figure 2.1.

2.3.2 Managed motorways involves the use of monitoring and signalling technology, such as CCTV and matrix variable message signs, to manage and control traffic flows when an incident occurs (eg breakdown or accident) or traffic volumes reach a level such that flows are adversely affected.

2.3.3 Traffic controls in the form of variable mandatory speed limits and or lane closures can be introduced to manage the flow dynamics in a safe manner. The requirement for control technology leads to the need for more signs and gantries than are present for standard 'non-managed' motorway sections. These are provided through a combination of verge mounted cantilever type signs and superspan gantries that extend across both carriageways.

2.3.4 In addition, MM-ALR adds extra physical capacity by converting the hard shoulder into a permanent running lane. Where MM-ALR is being operated and there is, therefore, no hard shoulder, dedicated emergency refuge areas (ERAs) with emergency telephones are provided at intervals in case of breakdown.

2.3.5 The Proposed Scheme comprises the following elements: carriageways, structures, ERAs, signs and gantries, drainage, lighting, and communications, cabling and ducting.

Carriageways

2.3.6 The Managed Motorway comprises four lane carriageways without hard shoulder in each direction (dual four lane carriageways). In general, the existing dual three lane carriageway with hard shoulder will be converted to dual four lanes within the existing paved area, except where described below.

2.3.7 The dual four lanes will be continued through the junctions (through junction running - TJR) on both the north and southbound carriageways. However, there will be no TJR at Junctions 39 and 42 at either end of the scheme, where the carriageway will revert to a standard configuration of dual three-lanes and hard shoulder.

2.3.8 Due to the proximity of Junctions 41 and 42 on the northbound carriageway, a conjoined Junction 41 merge to Junction 42 diverge will be provided in order to improve the junction layouts and reduce vehicle lane weaving conflicts. This will effectively result in a five lane northbound carriageway in this section, which will be accommodated within the existing highway boundary by narrowing the central reserve and widening by about 1m along the verge of the northbound carriageway. Where the central reserve is narrowed to accommodate the widened carriageway the current concrete barrier will be repositioned.

2.3.9 Junction entry and exit arrangements will be modified to accommodate the new motorway layout. Localised widening within the highway boundary will be required along the verges of the entry and exit slip roads at the following locations:

- northbound Junction 40 entry,
- northbound Junction 41 entry,
- northbound Junction 42 exit,
- southbound Junction 42 entry,

- southbound Junction 41 entry, and
- southbound Junction 40 entry.

2.3.10 The hardshoulder will be resurfaced to convert it into a running lane and where necessary, it will be modified to correct the camber on right hand bends.

Structures

2.3.11 Localised widening will be required in the central reserve to ensure that the traffic can pass under existing bridges at Snapethorpe Accommodation overbridge, Park Mill Lane overbridge, Brandy Carr footbridge and Carr Gate Beck overbridge, thereby avoiding the need to rebuild these structures. Where the central reserve has been narrowed to accommodate the widened carriageway in these locations the current steel safety fence will be replaced by a concrete safety barrier.

2.3.12 Localised widening will also be required in the central reserve to ensure that traffic can pass over existing bridges at Lawns Lane underbridge and White Hart railway underbridge, thereby avoiding the need to widen these structures in the verge. Where the central reserve is narrowed to accommodate the widened carriageway the current concrete safety barrier will be repositioned.

2.3.13 The southbound hardshoulder of the River Calder overbridge will be resurfaced to convert it into a running lane and the parapet will be adjusted to match to correct the camber on the right hand bend.

Emergency Refuge Areas

2.3.14 As there will be no hard should along the carriageways, ERAs with emergency telephones will be provided at about 2.5km spacing in accordance with IAN 161/12. ERAs will be provided within each link in both directions between Junctions 39 and 41. However, due to the short distance between Junctions 41 and 42 there will be no ERAs in this link although an additional emergency telephone will be located adjacent to the Junction 42 northbound exit slip.

Signs and Gantries

2.3.15 A mixture of cantilever and portal gantries will support the signs and signals required for the MM-ALR. After each junction entry, a gantry spanning carriageways will carry variable message signs and speed control signals, showing any restrictions imposed at that time. Cantilever gantry signals repeat the relevant information through to the next junction. The location of the individual signs / gantries and ERAs is set out in Table 2.1 below and shown in Figure 2.1. Typical gantry configurations are illustrated in Figure 2.2. The design, an iterative process, recognised environmental constraints and where possible gantry locations were changed to reduce impacts.

Table 2.1: Location of Gantries and ERAs

Northbound - A carriageway		Southbound - B carriageway	
Chainage	Feature	Chainage	Feature
289+350	J39 Conditioning VMS		
290+020	J39 Intra-junction VMS	290+260	J39 Termination VMS

Northbound - A carriageway		Southbound - B carriageway	
Chainage	Feature	Chainage	Feature
		290+551	J39 DS location (super-cantilever)
290+860	J39 Gateway gantry	290+860	VMS & footing of super-span
		291+396	ADS 1/2m (super-cantilever)
291+680	Emergency Refuge Area	291+779	J39 VMS before ADS 1/2m
291+776	J40 VMS before ADS 1m		
292+026	J40 ADS 1m	292+321	ADS 1m
		292+400	Emergency Refuge Area
		292+729	J39 VMS before ADS 1m
292+729	J40 VMS before ADS 1/2m	292+729	J40 Gateway gantry
292+831	J40 ADS 1/2m		
293+311	MS4		
293+636	J40 DS location		
293+920	J40 Continuity VMS	293+884	J41 Intra-junction VMS
294+520	J40 Intra-junction VMS	294+495	J40 Continuity VMS
		294+965	J40 DS location
295+340	J40 Gateway gantry	295+340	VMS & footing of super-span
295+882	J41 VMS before ADS 1m	295+770	J40 ADS 1/2m
296+082	J41 ADS 1m	295+970	J40 VMS before ADS 1/2m
296+155	Emergency Refuge Area		
296+567	J41 VMS before ADS 1/2m	296+640	J40 ADS 1m
		296+770	Emergency Refuge Area
296+887	J41 ADS 1/2m		

Northbound - A carriageway		Southbound - B carriageway	
Chainage	Feature	Chainage	Feature
297+290	MS4	297+040	J41 Gateway gantry (super-cantilever)
297+677	J41 DS location		
297+999	J41 Continuity VMS	297+930	J41 Intra-junction VMS
298+255	J42 ADS 1m		
298+395	Relocated 1st MS3	298+663	J41 Continuity VMS
298+950	J41 Gateway gantry & J42 ADS 1/2m	298+950	For footing of super-span
		298+978	J41 DS (super-cantilever)
299+222	Relocated 2nd MS3		
299+494	Lane AMIs= super-span	299+494	J42 Gateway gantry & J41 ADS 1/3m
299+875	J42 DS location footing of super-span	299+875	For footing of super-span
300+205	J42 Termination VMS		J41 VMS before ADS 1/2m
		300+250	J42 Intra-junction VMS
		300+708	J41 ADS 1m
		300+908	J41 VMS before ADS 1m
		301+580	J42 Conditioning VMS

2.3.16 On the northbound carriageway it is proposed to provide 17 gantries. The ½ mile Advance Direction Sign (ADS) and final Direction Sign (DS) will also be on gantries for Junction 42. It is intended to take down two existing strategic matrix variable message signs, and relocate them. An existing sign gantry between Junctions 41 and 42 at Ch299/874A will be removed as part of the proposed works.

2.3.17 On the southbound carriageway it is proposed to provide 18 gantries. The 1/3 mile ADS and final DS for Junction 41 and ½ mile ADS and final DS for Junction 39 will also be on gantries.

2.3.18 A complete list of the proposed sign and gantry (and ERA) locations is provided in Chapter 6, Landscape and Visual Impact.

2.3.19 A vehicle restraint system (VRS) will be installed in the verge to protect each gantry pier.

Drainage

2.3.20 The highway drainage will need to be modified, mostly in the central reserve to collect run-off where the camber is modified on bends and also new paved areas such as the ERAs. However, the design will be such that the rate of discharge will not change from existing, with additional storage capacity provided within the highway land by underground chambers and over-sized piping. There will be no change to the existing outfalls.

Lighting

2.3.21 Presently there is no lighting between Junctions 39 to 40, but it is present between Junctions 40 and 42. Most of the lighting between Junctions 40 to 42 will need to be taken down to construct the MM-ALR scheme. Overall, there is no economic or safety reason to replace it between Junctions 40 and 41, but benefits for road user safety have been identified for replacing it on the short Junction 41 to Junction 42 link.

Communication cabling and ducting

2.3.22 Ducting will be required along the entire length of the scheme, approximately 2m from the edge of the carriageway, for the installation of communication infrastructure. Other ducting, where necessary, will be required for power supplies. At signal sites associated cabinet areas are required. These are expected to be level with the verge to minimize the requirement for steps and handrails although the design would maximize reuse of existing steps and handrails where these are required. A vehicle restraint system (VRS) will be required in the verge at new signal sites to protect the gantries and associated cabinets. The cabinets will immediately follow the signal gantry/hockey stick and make that VRS approx 10m longer than if it had been without.

2.4 Land Use, Setting and Land Take

2.4.1 The M1 motorway between junctions 39 and 42 links the major urban settlements of Leeds and Wakefield. Leeds and Wakefield are high level service centres attracting visitors from the whole of the study area. A number of smaller settlements are located in a corridor approximately 5 km either side of the motorway, such as the villages of Kirkhamgate and Crigglestone to the east and the towns of Horbury and Ossett to the west. Many people living in the surrounding communities work in Leeds or Wakefield, and to a lesser extent the towns of Horbury and Ossett, and need to use the M1 to travel to work.

2.4.2 At the southern end of the Proposed Scheme, the motorway runs close to residential areas on the outskirts of Wakefield and crosses predominantly agricultural land towards the northern end of the scheme. The corridor is located almost entirely within Green Belt (see Figure 2.3 – Environmental Constraints Plan), largely reflecting the value of the rural resource in this historically industrialised region.

2.4.3 Northward from junction 39, the motorway runs on a 1.5km long embankment as it crosses the Calder River floodplain. The area also contains several small lakes and a railway line. To the east, and south of the river, lies an expanding commercial development whilst north of the river is the Wakefield Municipal golf course.

2.4.4 The settlements of Horbury and Lupset, lying to the west and east of M1 respectively, converge at the northern extent of the Calder River floodplain where they are separated by the motorway. Here, residential and commercial development has expanded to adjoin the motorway boundary along both sides of the carriageway.

2.4.5 West of the motorway, up to junction 40, lie the communities of Horbury and Ossett, with development restrictions in the Green Belt evident by the well-defined extent of the settlements. Between Horbury and Ossett, arable and pastoral fields to the west of M1 contrast with the open grasslands of the informal parkland and playing fields to the east of the motorway.

2.4.6 Around junction 40 the extensive built-up areas south of the junction give way to open countryside and arable and pastoral fields. With the exception of the village of Kirkhamgate, which lies immediately adjacent to the M1 southbound carriageway midway between junctions 40 and 41, the motorway crosses open countryside, with little woodland or other features to screen long distance views. From junction 41, the motorway continues in a north easterly direction for only 2 km to junction 42 and a major intersection with the east-west running M62. Farmland continues to border the motorway to the west up to the Leeds to Wakefield railway line. Immediately to the north of the railway line and close to junction 42, a new housing area is located at Lingwell Nook, a low lying area of land adjacent to the railway line. The motorway lies close to the eastern edge but is well screened by on site planting despite being on embankment. To the east, the motorway is bordered by the Wakefield Industrial Park at Lawns.

2.4.7 The proposed works will be contained entirely within the existing HA owned land, leaving adjacent land uses unaffected by land-take.

2.5 Construction, operation and long term maintenance

Construction

2.5.1 Construction is planned to commence in October 2013 for completion by February 2015, with a total construction period of 17 months. It is envisaged that the works would be undertaken as a single 10km section under traffic management with the central reserve work being undertaken first. Some total closures may be required for the erection of the over carriageway spanning gantries.

2.5.2 It is envisaged that all construction works would be undertaken within the existing highway boundary. Haul routes for materials and equipment would be routed along the existing motorway carriageways. The new gantries and ERAs would be installed from the hard shoulder. New cables would be installed within the highway road verge to connect the new

signage and at a few locations, new cables will be installed from the verge to the fence line to connect into the electricity grid.

2.5.3 The actual construction methods and equipment, locations of compounds and access routes would be developed by the Contractor for the works - Bam Morgan Sindall Joint Venture - primarily making use of the existing site office for the construction of the M62 managed motorway scheme for which they are also the Contractor. The key activities are expected to be:

- Conversion of the hard shoulder into a running lane,
- Installation of traffic signs and signals, some located in the verge and others on new gantries,
- Installation of communication infrastructure,
- Widening works northbound to provide a direct lane from Junction 41 to Junction 42,
- Improving slip road arrangements and associated widening works,
- Installation of emergency refuge areas (ERAs),
- Changes to the earthworks to accommodate the amended slip roads and ERAs,
- Correcting of lengths of existing hardshoulder to remove adverse camber on right hand bends, and with other locations, resurfacing of the hardshoulder,
- Installation of a surface water channel / linear drainage in the verge and associated drainage works,
- Installation of a surface water channel / linear drainage system in the central reserve where adverse camber has been corrected,

- Installation of buried surface water attenuation systems, comprising oversized pipes and underground chambers,
- Installation of a VRS in the verge to protect gantries,
- Installation of power supplies at the highway boundary, with presently no requirement for new easements, and
- Removal of road lighting between Junctions 40 and 41.

2.5.4 All works on site and within the Contractor's construction compound(s) would be undertaken in compliance with a Construction Environmental Management Plan (CEMP) to mitigate construction-related environmental impacts.

Operational Considerations

2.5.5 MM-ALR operates for 24 hours a day with Traffic Management (TM) introduced as appropriate for routine and emergency maintenance.

2.5.6 The key operational considerations are as follows:

- There is no hard shoulder so that previous space is no longer available to the maintenance teams which would result in more activities being carried out at night under TM,
- There would be safety implications for Traffic Officers and other suppliers working in an environment with heavy traffic flows seven days a week,
- MM-ALR requires increased resources at the Regional Control Centre (RCC), both in terms of operators and systems support staff,
- Increased Highways Agency Traffic Officer (HATO) involvement in MM-ALR incident control,
- Increased Technology Managing Agent Contractor (TechMac) cost,
- Increased impact of system failures.

Long Term Maintenance and Repair Strategy

2.5.7 The key maintenance and repair issues are as follows:

- The majority of routine maintenance work would be undertaken at night. There are exceptions, specifically soft estate maintenance and arboriculture activities, the nature of which would require such activities to be undertaken during hours of daylight (under TM).
- Some activities, including soft estate works and TechMAC maintenance of communications boxes currently take place from the hard shoulder. This would no longer be possible during the operation of MM-ALR and TM would generally be required for these works. It is possible that in certain areas, access could be gained from beyond the HA boundary where there are suitable tracks and the delivery team will identify such alternative means of access (if any) in the maintenance and repair methodology.
- Routine maintenance activities such as regular inspection would be extended to cover the additional assets for MM-ALR. Most inspections are undertaken from vehicles at normal traffic speeds, such as Pavement Condition Surveys and retro reflectivity for white lining. Other assets, such as drainage and the soft estate would require inspection on foot. In such cases the access would be either off-motorway or with TM. It should be ensured that, when MM-ALR is in operation, a safety zone is in place for operatives inspecting the asset.
- Due to MM-ALR being in operation 24 hours a day the management of access would need specific procedures for all responsive activities such as:
    - planned and responsive maintenance,
    - severe weather,
    - incidents,
    - critical/non-critical faults.

3 Alternatives Considered

3.1 History to the scheme

3.1.1 The South and West Yorkshire Multi-Modal Study (SWYMMS) was undertaken in 2002 by the DfT Government Office for Yorkshire and Humber to examine congestion on the strategic road network and seek solutions from all forms of transport. One of the recommendations from the study was that the M1 J39-42 should be widened to four lanes and that this capacity improvement should be protected by use of Active Traffic Management (ATM) and physical demand management measures to control traffic flows.

3.1.2 The SWYMMS proposals were rejected on cost grounds and in July 2003 the Secretary of State (SoS) tasked the Highways Agency to investigate means to increase capacity by making the best use of existing infrastructure on the M1 and M62 in South and West Yorkshire.

3.1.3 Proposals for widening the M1 J39-42 were added to the Programme of Major Improvements in December 2005. The strategy comprised a combination of full standard widening to dual four lane motorway (D4M) and permanent four lane running (P4L), supported by integrated demand management (IDM) initiatives. Public exhibitions of the motorway widening proposals along these sections were held in the summer of 2006.

3.1.4 In January 2009 the DfT document Britain's Transport Infrastructure Motorways and Major Trunk Roads concluded that Hard Shoulder Running (HSR) schemes provide the majority of benefits gained from conventional motorway widening, generally at a lower cost to the environment, resulting in higher value for money, while also providing benefits in terms of safety and reliability. Therefore, Ministers agreed that dynamic hard shoulder running (DHSR) a form of HSR should be pursued as an alternative to full widening between Junctions 39 and 42.

3.1.5 In March 2010 options were developed for delivering a managed motorway solution, which are described in more detail in Section 3.2 below.

3.1.6 At the end of October 2010, following the Comprehensive Spending Review, the SoS for Transport announced that he expected 14 major projects to enter construction within the following four years, including the M1 Junction 39 to 42 scheme.

3.2 Options considered

3.2.1 Three basic options were considered in the WSP Environmental Scoping Report, October 2011.

- Dual 4-Lane Motorway (D4M) Rapid Widening Option

This option was to provide four mainline lanes with a discontinuous hard shoulder to minimise the need to replace existing structures. As part of the works the existing merge/diverge layout would be upgraded in accordance with DMRB TD22/06 Layout of Grade Separated Junctions. Due to the nature of the link between Junction 41 and 42 northbound, a conjoined merge/diverge lane would be introduced effectively making this section D5M. This option was considered within the Scoping Report as a comparator scheme only - Ministers having agreed in 2009 that HSR schemes give better value for money solutions which are significantly more affordable than widening.

- Hybrid option 3-Lane Motorway Dynamic Hardshoulder Running Junction 39 to 41, Dual 3-Lane Motorway Controlled All Lane Running Junction 41 to 42 (MM DHS-DHS-CALR)

This option allows the use of the hardshoulder as a running lane during peak periods (Dynamic Hardshoulder Running - DHS) between Junction 39 and 40 and Junction 40 and 41. Between Junction 41 and 42, this option changes the use of the hardshoulder to a continuous 24 hour running lane (Controlled All Lane Running - CALR) providing four mainline lanes with no hardshoulder provision. However, feasibility work has identified that DHS is not a viable solution between Junctions 41 and 42 and this option has now been discounted.

- Managed Motorway Dual 3-Lane Motorway Controlled All Lane Running (MM D3M CALR) – including sub-options, with and without through junction running (TJR)

Under this option the hardshoulder is used as a continuous 24 hour running lane, providing four mainline lanes with no hardshoulder provision. This option has sub-options for through junction running (TJR), in which all four lanes are taken through the junctions, and non through junction running (NTJR) where only three lanes are provided through the junctions and the slip roads become lane gains and drops. With the introduction of IAN 161/12 this option has evolved into Managed Motorways All Lane Running (MM-ALR).

3.2.2 The Proposed Scheme, MM-ALR, is a development of the Controlled All Lane Running (CALR) option considered in the WSP Scoping Report - with through junction running (TJR) and a conjoined northbound Junction 41 merge to Junction 42 diverge lane.

4 Environmental Impact Assessment Methodology

4.1 Scoping

4.1.1 An extended scoping exercise was undertaken by WSP in 2011 on the three proposed options described in Section 3.2.1 above in order to identify those topics requiring consideration in the environmental assessment (and the appropriate level of assessment required). The results were presented in the Environmental Scoping Report (WSP, October 2011). The Report summarised the environmental baseline data gathered, the results of the scoping exercise, and the results of preliminary air quality and noise assessments. The report built upon the paper An Environmental Way Forward (WSP February 2011) which set out the work undertaken to date and the constraints at the time. Consultation was undertaken with the statutory bodies in September 2011 and their responses received in October 2011 (see Section 4.2 below) although not in time for incorporation into the Scoping Report.

4.1.2 During 2012, following development of the Proposed Scheme which varies slightly from the options assessed by WSP, the results of the Scoping Report were reviewed to determine whether they were still appropriate for the Proposed Scheme. The results of this review are summarised in Table 4.1 below.

Table 4.1: Reviewed Scoping Conclusions and Recommendations

Topic	Conclusions	Recommendations
Air Quality	The initial assessment, based on a qualitative assessment only, found that all options would cause increases in pollutant concentrations and in the case of nitrogen dioxide increases in existing exceedences of the EU thresholds. A quantitative assessment of the Hybrid option however found that it would cause an overall decrease in exceedence levels.	The next stage should include a detailed level DMRB assessment in accordance with HA 207/07 using the updated traffic data for the Proposed Scheme. Scoped In
Cultural Heritage	Provided no land-take is required beyond the existing highway boundary, it is concluded that there would be no impact on buried archaeological assets. There are no direct impacts on scheduled monuments, listed buildings, or conservation areas.	Visual impacts on the settings of designated heritage assets such as conservation areas and listed buildings should be assessed under the Landscape section. Scoped Out
Landscape	Changes to the existing motorway, including new earthworks, new infrastructure, loss of vegetation and a reduced area for replacement planting, will result in landscape and visual impacts.	Detailed level assessment in accordance with IAN 135/10 should be undertaken when the designs are available. Exploration of the optimum design to minimise adverse impacts should be

Topic	Conclusions	Recommendations
		undertaken. Scoped In
Nature Conservation	All options will result in the loss of existing habitat within the highway boundary. D4M would be likely to result in the greatest loss of habitat with the least potential for replacement due to the construction of an additional lane. The loss of this habitat may have direct impacts through reducing foraging, hibernating and refuge areas for great crested newts and reptiles, as well as potential breeding sites for reptiles.	Survey work for great crested newts and reptiles should be undertaken to inform the mitigation design. Pre-construction survey checks for badger and bat activity should also be undertaken, although there is insufficient data to support more detailed survey work at this time. Scoped In
Geology and Soils	There are remnant mining hazards and landfill sites in the area, some of which lie partially across the highway land. It is currently unclear whether there is a preferential option in terms of these features.	Further investigation of the mining hazards and landfill sites which directly affect land within the highway boundary should be undertaken to identify potential impacts. Further Investigation Required
Materials	It is currently unclear which option would have the least impact in terms of the Materials topic; however in generic terms it could be assumed that D4M would have the greatest impact due to the construction of an additional lane; and that the CALR options would have greater impacts than DHS options due to the greater number of gantries required.	In accordance with IAN 153/11 'Guidance on the Environmental Impact Assessment of Materials' which requires all schemes over £300,000 to have an assessment of Materials, a simple level materials assessment will be required. Scoped In
Noise and Vibration	None of the options would cause extensive impacts in the wider network; all options would generate perceptible impacts close to the motorway itself and its slip-roads. There are properties, which may experience a perceptible increase in noise levels, which would be of a similar level for whichever option is pursued. However, in broad terms the Hybrid option is likely to cause slightly smaller	Detailed level assessment in accordance with HD 213/11 is required to investigate fully the modelled changes in noise at sensitive receptors. Scoped In

Topic	Conclusions	Recommendations
	increases in noise.	
Effects on all Travellers	The only potential impacts on the non-motorised user network would be in terms of visual amenity and temporary changes during construction. For vehicle travellers, the construction period would cause delays but subsequently journey ambience should improve and driver stress should be reduced although it is unlikely that this will be perceptible in terms of the DMRB driver stress measurement.	The potential for driver stress to be reduced should be checked against the updated traffic figures when they are available. Visual impacts should be assessed under the Landscape topic. Scoped In
Community and Private Assets	The proposed works would be contained entirely within the existing highways boundary leaving adjacent land uses unaffected by the land-take. IAN 161/12 does not scope this topic in.	No assessment required. Scoped Out
Road Drainage and the Water Environment	According to IAN 161/12, assessment of discharge rates, water quality and flood risk are not normally required. There would be minimal change to impermeable surface area and any increase in run-off would be offset by attenuation to maintain current discharge rates.	No assessment required. Scoped Out

4.1.3 In response to the requirement for further investigation on geology and soils a Preliminary Sources Study Report (PSSR) was prepared (Halcrow, 2012). In this report a detailed review was undertaken of all geotechnical and geological features likely to have an impact on the scheme. The bullet points below summarise the findings in relation to landfills and mining hazards:

- Landfills - A review of the available data found up to 13 historical landfills located within 250m of the scheme alignment but none underlying the scheme itself. Given that the works proposed are confined to the existing motorway corridor and that any excavations will be limited in depth, it is not considered likely that the presence of those landfill sites will affect the scheme, or vice versa.

- Mining Hazards – The PSSR concluded that there is evidence to show that the entire route of the current M1 motorway between Junctions 39 and 42 has been constructed over areas that have been extensively undermined for a considerable amount of time. Up to 145 mine entries, both shafts and adits, have been identified along and in close proximity to the current motorway profile. It is therefore possible that the currently proposed structures may be affected by settlement caused by collapse of old workings. The PSSR contains a thorough Mining Hazard Assessment (Section 5.6) and Mitigation of Mining Hazard (Section 6.7) which includes recommendations for further ground investigations to determine the severity of the risk of settlement/collapse affecting the proposed structures in order that appropriate mitigation measures can be proposed.

4.1.4 It is considered that the detailed assessment work being carried out by the projects Geology and Soils specialists removes the need to replicate the assessment within the EAR.

4.2 Stakeholder consultations

4.2.1 Consultation with statutory environment bodies began in September 2011 following a lifting of the Government's restriction on external consultations which had been imposed in Spring 2010 in advance of the General Election and subsequent Comprehensive Spending Review (CSR). The following statutory and non-statutory bodies were approached for data in relation to the environmental baseline (WSP, October 2011).

- Environment Agency;
- AOne+;
- West Yorkshire Ecology;
- West Yorkshire Historic Environment Record; and
- Wakefield Metropolitan District Council (WMDC).

and the following statutory environmental bodies (SEBs) were contacted for their general comments on the options and any supplementary information:

- Natural England;
- English Heritage; and
- Environment Agency.

4.2.2 The three SEBs were contacted again in August 2012 to advise them that the Proposed Scheme being taken forward is now MM-ALR with TJR, and to invite comment on the scoping exercise as summarised in Table 4.1.

4.2.3 The responses from the SEBs to these consultation exercises are detailed in Table 4.2 below and have been taken into consideration in this EAR.

Table 4.2: Summary of SEB Consultation Responses

Consultee	Response
Natural England	Initial response received in October 2011. Stated that there were no objections to the proposed works. Advised that protected species need to be considered and to follow Natural

Consultee	Response
	England Standing Advice. Second consultation response received in September 2012. Stated that no change to their comments to the initial consultation.
English Heritage	Initial response received in October 2011. No comments or objections. Advised that Conservation Officers need to be contacted at the relevant planning authorities. Stated that they did not require to be consulted again on the scheme. Because of change in Proposed Scheme it was decided that EH should be still be consulted again. However, no response has been received to the second consultation.
Environment Agency	Initial Response received in October 2011. The Proposed Scheme falls within all three flood zone (1, 2 and 3). Any detailed drainage scheme should seek to ensure there is no increase in existing surface runoff from the proposals. If a new connection to a watercourse is proposed then flows must be attenuated to Greenfield rates, generally considered to be a maximum of 2.5 litres / second / hectare. Consultation with the Lead Local Flood Authority Drainage department should be undertaken. Consideration should be given to whether there are likely to be any impacts on groundwater abstractions. There are no objections from Environment Management in relation to water quality and water issues (so long as there is no significant change to the existing drainage arrangements). There is a requirement to consider any habitat lost as part of the scheme during the assessment to ensure habitats and species are adequately protected from impacts. Needs to be consideration of recommendations to compensate any losses on a like for like basis.
	Second consultation response received in August 2012 Stated that no change to their comments to the initial consultation.

4.2.4 A final round of statutory consultation was then carried out in May 2013 when a draft of this EAR document was sent to the SEB's and Wakefield and Leeds City Councils. All five organisations replied confirming that they are in agreement with the EAR conclusion that a statutory Environmental Impact Assessment is not required. Wakefield Council has, however, queried why no new noise mitigation measures are incorporated within the scheme design. In parallel with this, there has been a change in internal Highways Agency policy regarding noise mitigation. As such, further investigations are currently ongoing regarding possible measures to improve the existing noise environment that could be implemented as part of the scheme.

4.2.5 Public Information Exhibitions (PIEs) were held in the local area on 1st, 2nd, 8th and 9th of February 2013. The aim of the PIEs was to raise awareness of the Proposed Scheme and give stakeholders the opportunity to express their views. Key environmental issues discussed at these PIEs were concerns over noise and dust particularly during the construction phase and noise, air quality and visual impacts in the longer term.

4.2.6 Further public meetings are scheduled for summer 2013 in advance of the start of construction to keep residents and other interested parties fully informed of the construction programme and detailed mitigation proposals.

4.3 Surveys and predictive techniques, methods and constraints

4.3.1 Surveys, predictive techniques, methods and constraints have been defined within each specialist assessment topic in Chapters 5 to 10 of this EAR. The assessment methods used follow DMRB Volume 11 and other relevant best practice guidance. The structure of each specialist chapter is set out below which broadly follows the structure provided for non-statutory environmental impact assessment in DMRB Volume 11, Section 2, Part 6 (HD 48/08):

- Study area
- Methodology
- Baseline conditions
- Value (sensitivity) of resource
- Design, mitigation and enhancement measures
- Magnitude of impacts
- Significant effects
- Indication of any difficulties encountered
- Summary

4.4 Significance criteria

4.4.1 The significance of environmental impacts has been assigned either in accordance with DMRB Volume 11 Section 2 Part 5 which details the criteria for determining significance for the relevant DMRB topic or IAN guidance.

4.4.2 Significance has been measured and applied using the terms Neutral - Slight - Moderate - Large - Very Large to ensure consistency across all environmental topics (except where topic guidance indicates otherwise.)

4.4.3 The significance of any particular impact is typically assessed by applying the matrix given in Table 4.3 below (with the exception of noise and air quality).

Table 4.3: Significance of Environmental Effects

VALUE / SENSITIVITY	MAGNITUDE OF IMPACT				
	No change	Negligible	Minor	Moderate	Major
Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large

High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

4.4.4 General definitions for the significance criteria are summarised below.

- Large/Very Large – impacts that are likely to be important considerations at a range of scales, and if adverse, are potential concerns to the project. Mitigation measures and detailed design work are unlikely to remove all of these effects upon the affected communities or interests.
- Moderate – impacts that while important at a regional scale, are not likely to be key decision-making issues. However, cumulative effects of such issues may lead to an increase in the overall effects on a particular area or on a particular resource. They represent issues where impacts would be experienced but mitigation measures and detailed design work would ameliorate or enhance some of the consequences upon affected receptors. Some residual effects may still arise.
- Slight – impacts that may be raised as local issues but are unlikely to be of importance in the decision-making process. However, they are of relevance in enhancing the subsequent design of the proposed development and consideration of mitigation or compensation measures.
- Neutral – no impacts, or those that are beneath levels of perception, in normal bounds of variation or in the margin of forecasting error.

4.5 Mitigation and enhancement

4.5.1 Where relevant, mitigation measures have been identified and developed to reduce potentially significant adverse environmental effects and, if possible, offer enhancement. Such measures are discussed within the specific topic chapters as appropriate. The assessment of impacts is presented for the mitigated scheme.

5 Air Quality

5.1 Study area

5.1.1 The Proposed Scheme, along the M1 between Junctions 39 and 42 involves converting the existing hard shoulder to a permanently open running lane operating for 24 hours a day. A full description of the Scheme is provided in Chapter 2.

5.1.2 This air quality section considers operational air quality effects within two study areas. One operational study area relates to 'local air quality' and one relates to 'regional air quality'.

5.1.3 The local operational air quality study area also considers the scheme route and those routes considered to be affected by the scheme, as identified by comparing traffic data with (Do-Something) and without (Do-Minimum) the scheme against the local air quality screening criteria presented within the Design Manual for Roads and Bridges Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). These criteria are outlined below:

- Road alignment will change by 5 metres or more; or
- Daily traffic flows will change by 1,000 annual average daily traffic (AADT) flow or more; or
- Heavy Duty Vehicles (HDV) flows will change by 200 AADT or more; or
- Daily average speeds will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

5.1.4 Those links which meet the criteria for Local Affected Roads are shown on Figure 5.4 in red. Air quality monitoring data and sensitive receptors within 200m of the scheme and affected road network are considered in this EAR.

5.1.5 Selected additional links have also been included in the local operational air quality modelling. Additional links have been included where the additional emissions from these links are required to adequately describe pollutant concentrations at sensitive receptors located along either the scheme or affected routes (i.e. those routes which meet the criteria listed in Paragraph 5.1.3).

5.1.6 The regional air quality study area is based on the regional screening criteria as presented in HA207/07 (paragraph 3.20 of HA207/07).

5.1.7 Construction air quality is also discussed for the scheme route as required for locations within 200m (See paragraph 3.45 of HA207/07).

5.1.8 The proposed scheme corridor and affected road network runs through three local authorities:

- Wakefield Council;
- Leeds City Council; and
- Metropolitan Borough of Barnsley.

5.2 Methodology

5.2.1 The methodology for the air quality assessment is discussed below. The methodology has been divided into local operational assessment, plan level WebTAG assessment, regional and construction assessment methodologies. The plan level assessment is a part of the local air quality assessment.

Local Operational Assessment Methodology

5.2.2 This section describes the general approach utilised to assess air quality effects for the scheme. The assessment of potential air quality effects has been undertaken in accordance with the DMRB Volume 11 Section 3, Part 1 – Air Quality (HA207/07). This guidance follows a staged process of assessment. This guidance focuses on key road traffic pollutants such as nitrogen dioxide (NO_2) and particulates with a diameter of less than 10 µm (PM_{10}).

5.2.3 Where monitoring data indicates exceedences of an air quality objective are likely in the opening year of a scheme, or proposals cannot be properly assessed using the DMRB screening method spreadsheet, the assessment moves straight to a detailed level assessment. Otherwise, affected roads with relevant receptors within 200m should be taken to a simple level assessment or a detailed level of assessment.

5.2.4 A detailed level assessment utilises dispersion modelling to more accurately estimate the pollutant concentrations, taking into account additional variables that the DMRB Screening method does not. It is not necessary to conduct a detailed level assessment for an entire study area; it is possible to combine detailed modelling for 'hot-spot' or complex areas with simple assessments for the wider network.

5.2.5 For the M1 J39-42, a detailed level of assessment has been identified as necessary, due to the close proximity of receptors to the Scheme and areas of monitoring with NO_2 results above air quality objectives. The assessment has utilised the ADMS Roads dispersion model (version 3.1) to predict road pollutant road contributions at the identified sensitive receptors. Modelling has been undertaken for the baseline year (2009) and the opening year (2015) with and without the scheme.

5.2.6 The methodology outlined within Highways Agency Interim Advice Note 170/12 Updated air quality advice on the assessment of future NO_X and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality, on the assessment of future NO_X and NO_2 projections has also been used in this assessment. The IAN sets out a method to allow consideration of Defra's advice on long term trends in roadside NO_2 concentrations (Defra, 2011), which suggests that there is now a gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality as previously published in Defra's technical guidance and observed trends.

5.2.7 The methodology, known as Gap analysis, involved the completion of air quality modelling and verification in accordance with those methods outlined within HA 207/07 with reference to Defra's LAQM.TG(09) (Defra, 2009) guidance, to correct verified modelled total NO_2 concentrations. Then following verification of the modelled results, these are then adjusted to represent the observed long term trend (LTT) profile. This adjustment is completed using the IAN 170/12 HA LT Calculation spreadsheet as provided by the Highways Agency in support of the IAN. The adjusted results from this Gap analysis are

those presented in this report.

5.2.8 The determination of significance for the local operational air quality assessment has been undertaken using the IAN 174/13 'Updated air quality advice for evaluating significant effects; for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07)'. Significance has been determined on the basis of LTT information as this is currently considered to be the most reasonable representation of future air quality.

5.2.9 The determination of the scheme's compliance in respect of EU (2008/50/EC) has been undertaken in accordance with IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EU directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 'Air Quality''. As with the determination of significance, compliance has been determined based on LTT information.

5.2.1 Further details of the assessment methodology including the inputs used in ADMS-Roads (including meteorology data), model post-processing (e.g. NOx to NO_2 conversion) and the approach taken to model verification are presented in Appendix 5.1. A CD of traffic data is also provided in Appendix 5.1.

5.2.2 Traffic data has been provided by the project transport consultants for the baseline year of 2015 and future assessment year of 2030. The M1 J32-35a Managed Motorways scheme was included within the traffic model used to produce this traffic data. However, subsequent to the completion of the air quality assessment the possibility that this scheme would not be constructed to the programme that the model assumed has been identified. A sensitivity test has therefore been undertaken which removed this scheme from the traffic model in order to assess the effects on traffic flows and composition. Following this, an analysis was undertaken to determine whether these changes would be significant enough to require the air quality (and noise) impacts to be reassessed. This exercise concluded that no further assessment work would be required. Appendix 5.3 contains a Technical Note documenting this analysis.

Plan Level WebTAG Local Assessment Methodology

5.2.3 The DMRB air quality guidance document (HA207/07) sets out that assessments of air quality in relation to highways schemes should also report the results of local air quality Transport Analysis Guidance (TAG) appraisal (plan level), as completed in line with guidance set out by The Air Quality Sub Objective, TAG Unit 3.3.3 (Department for Transport, 2012).

5.2.4 The plan level methodology within the TAG guidance aims to quantify the change in exposure at properties in the opening year as a result of schemes, through the quantification of exposure for all DMRB local affected roads. The methodology follows a number of steps including:

- Identification of the affected road network, which is the same as the DMRB local air quality affected road network;
- Quantification of the number of properties within 0-50m, 50-100m,100-150m and 150-200m bands, from the affected roads.
- The calculation of concentrations within each band at 20m, 70m, 115m and 175m from the road centreline using the DMRB spreadsheet model.

- Calculation of property weighted NO_2 and PM_{10} concentrations.
- Calculation of the total numbers of properties that improve, worsen or stay the same.
- Calculation of an overall assessment score for NO_2 and PM_{10}.

5.2.5 An overall positive score indicates an overall worsening and an overall negative score indicates an overall improvement.

Regional Assessment Methodology

5.2.6 The regional assessment considers changes in annual road transport emissions of oxide of nitrogen (NOx), PM_{10} and Carbon (C) that may brought about by the scheme in the opening and design years.

5.2.7 The DMRB Air Quality spreadsheet has been used in the estimation of these emissions.

5.2.8 DMRB HA207/07 regional scoping criteria have been applied to opening year traffic data and the design year (i.e. 15 years after opening) to define the regional affected road network (different to that for local air quality).

5.2.9 Roads that meet the following criteria have been included within the regional affected road network:

- A change of more than 10% in AADT; or
- A change of more than 10% to the number of heavy duty vehicles; or
- A change in daily average speed of more than 20 km/hr.

5.2.10 The scenarios modelled include: the existing base case (the traffic model base case); and future Do Minimum and Do Something in the opening year and design year.

5.2.11 The results of the regional assessment (annual emissions, change in emissions with the scheme) have been presented in tabular format, together with interpretive text in Tables 5.11 and 5.12 in section 5.7.

Construction Assessment Methodology

5.2.12 Construction receptors along the scheme have been identified and a qualitative discussion of the significance of impacts with suitable mitigation measures presented.

5.3 Baseline conditions

AQMAs

5.3.1 There are three Air Quality Management Areas (AQMAs) identified within 200m of the proposed scheme and affected road network:

- Wakefield City AQMA - An area encompassing most of the Wakefield urban area;
- Wakefield M1 AQMA - An area along the entire M1 motorway within the Metropolitan District of Wakefield; and
- Barnsley AQMA No.1 - An area along the M1 between Junction 35a and Junction 38, including Haigh, Darton, Cawthorne Dike, Higham, Dodworth, Gilroyd, Rockley, Birdwell, and Tankersley. The area extends 100m either side of the central reservation.

5.3.2 There are no other AQMAs located along routes affected by the scheme.

5.3.3 All of the AQMAs are declared for exceedences of the annual mean nitrogen dioxide (NO_2) objective. The location of these AQMAs are shown in Figure 5.1.

Monitoring

5.3.4 This section summarises key monitoring for the scheme route.

5.3.5 Within 200m of the proposed scheme local authorities undertake monitoring of Nitrogen Dioxide (NO_2).

5.3.6 To supplement the NO_2 diffusion tube network managed by each local authority and existing continuous monitors within the vicinity of the proposed scheme, contractors working on behalf of the HA initiated an NO_2 diffusion tube monitoring programme from autumn 2009. Diffusion tubes were deployed in areas not covered by the local authorities and also at relevant receptors where exceedences of the Annual Mean NO_2 objective were possible. A total of 21 monitoring sites from this campaign have been used within the assessment, these sites were located in various locations across the study area, as shown on Figure 5.2. For the purpose of collating a dataset comparable to a baseline year of 2009, data collected from other years have been projected as appropriate to produce 2009 Annual Mean equivalent concentrations, following guidance within Box 2.1 of Defra's LAQM.TG(09) guidance document. Those sites subject to projection from short to long term periods include the M1 Specific monitoring campaign, where a data capture of 83.3% was achieved. The factor used to convert the short term monitoring to an annual mean was 0.92, which was obtained by the HA contractors completing the monitoring programme on behalf of the HA, from the Barnsley Gawber, Chesterfield and Sheffield Centre AURN sites. Details of the calculation of this factor can be found in the M1 J32 to 35a Managed Motorway Scheme Air Quality Monitoring Report (SGAR5), August 2012 1043388/ENV/001/002, and in Appendix 5.1.

5.3.7 Monitoring within 200m of the proposed scheme and affected roads has identified monitoring locations with exceedences of the Annual Mean NO_2 air quality objective of 40 $\mu g/m^3$. No exceedences of the Annual Mean PM_{10} objective of 40 $\mu g/m^3$ have been monitored.

5.3.8 Summaries of the NO_2 diffusion tube network results for 2009 for Local Authorities and the Highways Agency M1 specific monitoring campaign are shown in Table 5-1. Figure 5.2 presents all monitoring data within 200m of the scheme route and affected roads.

Table 5.1: Summary of existing NO_2 diffusion tube data

Diffusion Tube Data	Local Authority	Highways Agency M1 Campaign
Total Number of Locations	12	21
Min ($\mu g/m^3$)	32	23.4
Max ($\mu g/m^3$)	46	44.2
Number of Tubes with Data Capture above 75%	12	21
Number of Tubes with Data Capture 90% or above	12	15
Number of Exceeding Tubes	3	3

5.3.9 As shown in Table 5.1, 2009 diffusion tube monitoring data within the study area shows that the annual mean objective for NO_2 has been exceeded at only six locations of the 33 considered. This suggests that overall within the study area NO_2 concentrations are below

the annual mean objective, except for in a few hot spot locations.

5.3.10 Figure 5.3 shows those passive monitoring locations where exceedences of the Annual Mean NO_2 Objective of 40 µg/m^3 occur in 2009. These locations include three Highways Agency M1 campaign specific tubes, and three local authority tubes operated by Wakefield Council. Details of the site locations and results for these tubes are contained within Table 5-2.

Table 5.2: Local authority monitoring exceedences

Site ID	Site Location	X	Y	Annual Mean NO_2 Concentration (µg/m^3)
MO013	Horbury Road, Wakefield (East of the M1)	430650	419002	44.2
MO024	Huddersfield Road (East of the M1)	430875	409930	43.0
MO04	Lawns Lane, Wakefield	431830	425318	42.2
WA29	470 Denby Dale Road East, Durkar	431329	417162	41.0
WA35	2 Pleasant View, Lofthouse	431856	425354	46.0
WA80	112 Lennox Drive	430666	418849	41.0

5.3.11 Continuous monitoring data is available from the UK Air Quality Archive (UKAQA) (Defra, 2012) and local authorities for locations within the vicinity of the proposed scheme. There is one continuous monitoring unit within 200m of the scheme. Results for 2009 are shown in Table 5-3.

Table 5.3: Local authority continuous monitoring

Site ID	WK7A
Local Authority	Wakefield Council
Site Type	Kerbside
Annual Mean NO_2 Concentration (µg/m3)	57
NO_X Data Capture	85%
Annual Mean NO_X Concentration (µg/m3)	121.4
NO_X Data Capture	Unknown

5.3.12 Details of all monitoring sites considered as part of the assessment, including description of Bias Adjustments and Short to Long Term adjustments applied to data, are provided within Appendix 5.1.

Background Pollutant Concentrations

5.3.13 Annual mean background pollution estimates available from the UKAQA for 2009 and 2015 for the study area considered during this assessment, are shown in Table 5-4 below. A comparison of background monitoring data with the UKAQA data was considered, however it was found that insufficient background monitoring within the study area was available with which to make any adjustments to the UKAQA background mapping (i.e. no background sites outside of 200m of significant pollutant sources were identified which could be compared with background maps).

Table 5.4: UKAQA Background Map Pollution Estimates

Pollutant	NO_2 (µg/m^3)		PM_{10} (µg/m^3)	
Year	Min	Max	Min	Max
2009	14.5	28.5	15.6	20.7
2015	9.7	19.6	14.7	19.7

Receptors

5.3.14 Public exposure receptors (i.e. locations where members of the public may be reasonably be expected over the averaging period of an air quality objective) have been identified at worst case locations for the assessment, of which there were 87. Through initial model runs, those receptors which were predicted to exceed the air quality objective value were identified and 124 additional receptors were added to these areas considered to be at risk of exceeding the objective. This provided a final list of 211 receptors considered within the assessment, details of which can be found in Appendix 5.2.

5.3.15 All receptors have been modelled at property facades to identify the highest possible NO_2 and PM_{10} contributions.

5.3.16 Figures 5.4 – 5.19 show the location of all receptors modelled within 200m of the scheme routes and affected roads.

Baseline Modelling Results

5.3.17 Detailed dispersion model predictions have provided estimates of pollutant concentration for a 2009 Baseline year and for 2015 Opening Year both with and without the proposed scheme in place. The full baseline results for all receptors are presented in Appendix 5.2.

5.3.18 The baseline results for a selection of 17 receptors that are considered in detail in the Magnitude of Impacts Section 5.7.2 are presented below in Table 5-5. The results indicate that all receptors are either close to or above the annual average air quality objective for NO_2.

Table 5.5: Selected Annual Mean Nitrogen Dioxide Results

Receptor ID	2009 Baseline Concentration (µg/m³)	Location	Receptor Figure Number
R66	47.3	Rodillian Secondary Scool, Lofthouse.	5.8
R1	42.9	Lawns Lane/Lingwell Gate Lane.	5.9
R111	42.1	Lawns Lane/Lingwell Gate Lane.	5.9
R112	41.4	Lawns Lane/Lingwell Gate Lane.	5.9
R113	40.8	Lawns Lane/Lingwell Gate Lane.	5.9
R114	40.3	Lawns Lane/Lingwell Gate Lane.	5.9
R115	39.8	Lawns Lane/Lingwell Gate Lane.	5.9
R11	46.2	Horbury Road, Wakefield	5.14
R105	42.3	Horbury Road, Wakefield	5.14
R106	40.7	Horbury Road, Wakefield	5.14

Receptor ID	2009 Baseline Concentration (µg/m³)	Location	Receptor Figure Number
R260	54.8	Horbury Road, Wakefield	5.14
R261	47.1	Horbury Road, Wakefield	5.14
R262	45.9	Horbury Road, Wakefield	5.14
R263	44.4	Horbury Road, Wakefield	5.14
R264	42.7	Horbury Road, Wakefield	5.14
R265	40.8	Horbury Road, Wakefield	5.14
R266	40.0	Horbury Road, Wakefield	5.14

Note: These receptors are presented as these are locations identified to exceed the NO2 annual average objective in the Opening Year of the Scheme using LLTs.

Designated Sites

5.3.19 There are no nitrogen sensitive designated ecology sites within 200m of the proposed scheme route or affected roads. In accordance with DMRB guidance, a Simple Level Assessment of Ecologically Sensitive Areas is therefore not required for the scheme routes.

Other Sources

5.3.20 There are industrial sources of NO_2 and PM_{10} emissions within the vicinity of the proposed scheme. These industrial sources will generally be accounted for within the background concentration data.

5.4 Value (sensitivity) of resource

5.4.1 The air quality objective values for pollutants associated with road traffic have been set by the Expert Panel of Air Quality Standards at a level below the lowest concentration at which the more sensitive members of society have been observed to be adversely affected by exposure to each pollutant. Therefore all receptors that represent exposure of the public are of equal sensitivity as any member of the public could be present at those locations.

5.5 Regulatory / policy framework

5.5.1 Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (the CAFE Directive) and the Air Quality Standards Regulations 2010.

5.5.2 The Clean Air for Europe (CAFE) programme revisited the management of Air Quality within the EU and merged much of the existing air quality legislation into a single legal directive, the Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC (Council of European Communities, 2008). This act incorporated:

- The EU Framework Directive 96/62/EC on ambient air quality assessment and management;
- The associated Daughter Directives: 1999/30/EC, 2000/69/EC and 2002/3/EC which together set out objectives and long term target values for pollutant concentrations in ambient air; and
- Council Decision 97/1010/EC which established the exchange of information and data from networks and individual stations measuring ambient air pollution within member

states.

5.5.3 The new Directive 2008/50/EC also introduces the following:

- New air quality objectives for PM2.5 (fine particles) including the limit value and exposure related objectives – exposure concentration obligation and exposure reduction target;
- The possibility to discount natural sources of pollution when assessing compliance against limit values; and
- The possibility for time extensions of three years (PM_{10}) and for up to five years (NO_2, benzene) for complying with limit values, based on conditions and an assessment by the European Commission.

5.5.4 Directive 2008/50/EC is currently transcribed into UK legislation by the Air Quality Standards Regulations 2010 which came into force on 11th June 2010. Limit Values for the protection of human health are presented in Table 5-5.

5.5.5 Air Quality Strategy for England, Scotland, Wales and Northern Ireland and Air Quality (England) Regulations 2000 and Air Quality (England) (Amendment) Regulations 2002

5.5.6 The UK Government and the Devolved Administrations (DAs) published the latest Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) in July 2007 (Defra, 2007) defining both Standards and Objectives for each of a range of air pollutants.

5.5.7 The 'Objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The objectives are prescribed within The Air Quality (England) Regulations 2000 and The Air Quality (England) (Amendment) Regulations 2002 (together termed the 'Regulations'). Air Quality Objectives included in the Regulations and current legislation which are relevant to the study (nitrogen dioxide (NO_2) and particular matter (PM_{10})) are outlined in Table 5-6.

5.5.8 The UK's AQS objectives are equal to, or more stringent than, the EU Limit Values (no Member State may promulgate air quality standards that are weaker than the EU Limit Values). The CAFE Directive Limit Values are also included in Table 5-6.

Table 5.6: Air Quality Legislation

Pollutant	Objective/ Limit Value	Measured as	Date to be achieved by and maintained thereafter		
PM_{10}	50 µg/m^3 Not to be exceeded more than 35 times per year	24 Hour Mean	31-Dec-04	31-Dec-04	1-Jan-2005
	40 µg/m^3	Annual Mean	31-Dec-04	31-Dec-04	1-Jan-2005
NO_2	200 µg/m^3 Not to be exceeded more than 18 times per year	1 Hour Mean	31-Dec-05	31-Dec-05	1-Jan-2010

			Date to be achieved by and maintained thereafter		
	40 µg/m^3	Annual Mean	31-Dec-05	31-Dec-05	1-Jan-2010

5.5.9 The Air Quality Objectives only apply where members of the public are likely to be regularly present for the averaging time of the objective (i.e. where people will be exposed to pollutants). The annual mean objectives apply to all locations where members of the public might be regularly exposed; these include the building façades of residential properties, schools, hospitals, care homes, etc. The 24 hour mean objective applies to all locations where the annual mean objective would apply, together with hotels and gardens of residential properties1. The 1 hour mean objective also applies at these locations as well as at any outdoor location where a member of the public might reasonably be expected to stay for 1 hour or more, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

5.5.10 Measurements across the UK have shown that the 1 hour mean NO_2 objective is unlikely to be exceeded unless the annual mean NO_2 concentration is greater than 60 µg/m^3. Thus exceedences of 60 µg/m^3 as an annual mean NO_2 concentration are used as an indicator of potential exceedences of the 1 hour mean NO_2 objective.

5.5.11 Similarly, the guidance document LAQM.TG(03) (Defra, 2003) sets out the method by which the number of days in which the PM_{10} 24-hr objective is exceeded can be obtained based on a relationship with the predicted PM_{10} annual mean concentration. This same relationship is also presented in LAQM.TG(09).

The Environmental Protection Act 1990 (EPA)

5.5.12 Dust and air pollution can cause nuisance affecting properties and the public adjacent to a construction site and can also adversely affect other environmental receptors including watercourses and ecological receptors. In addition there are statutory objectives in relation to NO_2 and PM_{10} which have known health impacts.

5.5.13 The EPA, in part III, contains a definition of what constitutes a 'statutory nuisance' with regard to dust, and places a duty on Local Authorities to detect any such nuisances within their area. Section 79 of the Act further defines 'Best Practicable Means' (BPM) as "*reasonably practical having regard, among other things, to local conditions and circumstances, to the current state of technical knowledge and to the financial implications".*

5.5.14 It also defines a number of factors relating to dust and air pollution which constitute a statutory nuisance (Section 79). This includes:

- smoke emitted from premises so as to be prejudicial to health or a nuisance;
- fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;

[1] Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

- any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance; and
- any accumulation or deposit which is prejudicial to health or a nuisance.

5.5.15 To note that in the current assessment, "premises" are to be understood in the context of the "construction area" of the proposed scheme. These would be specific construction site locations or the entire area within the red line boundary[2].

5.5.16 Local Authorities have the power under Section 80, Chapter 43, Part III of the EPA (Summary Proceedings for Statutory Nuisances) to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

5.5.17 Dust arising from construction works could lead to statuary nuisance if it "interferes materially with the well-being of the residents, i.e. affects their well-being, even though it may not be prejudicial to health".

5.5.18 A typical example of statutory nuisance is dust produced by construction and demolition work, resulting from activities such as earthworks, the cutting of materials and in particular, vehicles using haul roads which results in re-suspension of deposited dust.

National Planning Policy Framework

5.5.19 The National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012) published in 2012 sets out the Government's planning policies for England and how these are expected to be applied. The NPPF revokes forty four planning documents including: Planning Policy Statement 23: Planning and Pollution Control.

5.5.20 The Conserving and enhancing the natural environment section (Section 11) of the NPPF considers air quality and pollution. In the NPPF pollution is described as:

'Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light.'

5.5.21 The following paragraphs (paragraphs: 109 bullet point 4, 110, 120 and 124) from NPPF Section 11 consider air quality and pollution:

'The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and'

'In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity value, where consistent with other policies in this Framework.'

'To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse

[2] Premises are land and buildings together.

effects from pollution, should be taken into account. ...'

'Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative effects on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.'

5.5.22 The NPPF is also accompanied by Technical Guidance to the National Planning Policy Framework (NPPF-TG) (Department for Communities and Local Government, 2012). This document does not include any specific guidance for the assessment of air quality effects from road schemes.

Regional Planning Policy

5.5.23 The "Yorkshire and Humber Plan Regional Spatial Strategy to 2026" (Government Office, 2008) sets out the regional priorities for Air Quality as listed in the following paragraphs:

5.5.24 Leeds City Region sub-area policy C Environment 7:

"Improve air quality, particularly close to motorways and major roads throughout the city region (based on Air Quality Management Areas)".

5.5.25 South Yorkshire sub-area policy C Environment 2:

"Improve air quality, particularly in Central Sheffield, parts of the Sub Regional Towns along the M1, A1 and M178 corridors (based on AQMAs).

5.5.26 Policy T1: Personal travel reduction and modal shift:

"A: The Region will aim to reduce travel demand, traffic growth and congestion, shift to modes with lower environmental impacts, and improve journey time reliability. This will require a range of complementary measures from land-use and transport policies through measures that discourage inappropriate car use, encourage the use of lower-emission vehicles, reduce energy consumption, secure air quality improvement, improve public transport and accessibility by non-car modes, and promote the highest standards of safety and personal security."

"C: Transport authorities should make best use of the existing highway network to address congestion and encourage model shift, with road space being actively managed to support movement by modes other than the private car".

5.5.27 On 6th July 2010, the Secretary of State announced the revocation of all Regional Strategies with immediate effect under new powers enacted in the Localism Act 2011. On the 24th of January 2013 the Government laid a Partial Revocation Order in Parliament to revoke parts of the Yorkshire and Humber Regional Strategy. This Order will come into force on the 22nd of February 2013 (H.M. Government, 2013).

Local Planning Policy

5.5.28 In addition to the overarching policy framework set out in the Yorkshire and Humber Spatial Strategy there are local planning documents. Namely; Barnsley Metropolitan Borough Council Local Development Framework, Leeds City Council Local Development Framework and Wakefield Metropolitan District Council Transport Strategy and Implementation Plan.

<u>Barnsley Metropolitan Borough Council</u>

5.5.29 In the Barnsley Core Strategy (Barnsley Metropolitan Borough Council, 2011) the council recognises that poor air quality is a growing problem and six AQMAs have been declared as a result of traffic pollution. Objectives relating to air quality include:

"Objective 2: To improve access, movement and connectivity with sustainable travel by: reducing the reliance on the private car and encouraging walking and cycling, improving public transport links between settlements within the borough and to Barnsley Town Centre, and reducing transport emissions of greenhouse gas emissions in order to tackle climate change and minimising other pollutants to improve air quality".

5.5.30 Barnsley's Transport Strategy Core Policy has policy solutions relating to air quality, these are described below (Barnsley Metropolitan Borough Council, 2011):

"Designating a broad based Accessibility Improvement Zone as the focus of future transport investment. Applying minimum parking standards for cycles, motorbikes, scooters, mopeds and disabled people and maximum car parking standards. Developing and implementing Air Quality Action Plans. Working with partners to improve efficiency of vehicles and goods delivery and reduce exhaust emissions".

"CSP 28 Reducing the Impact of Road Travel Barnsley Council will reduce the impact of road travel by: a) developing and implementing robust, evidence based Air Quality Action Plans to improve Air Quality, b) working with the council's sub regional partners, fleet and freight operators to improve the efficiency of vehicles and goods delivery, and reduce exhaust emissions, c) implementing measures to ensure the current road system is used efficiently."

Wakefield District Council

5.5.31 In the council's Local Development Framework there is no specific mention of air quality (Wakefield District Council, 2012). However, Wakefield's Transport Strategy mentions air quality, this section is outlined below:

"One of the contributors to poor air quality is road traffic emissions, resulting from traffic congestion. Within the Wakefield district there are currently eight local AQMAs, that have been declared by Defra, including corridors alongside parts of the M1, M62, and A1. The Highways Agency are responsible for the motorway network. Schemes to improve traffic flow and reduce congestion are programmed in the short and medium term on these strategic highways. The AQMAs will help to focus local air quality remedial activity of the transport strategy in these particular areas throughout the plan period (Wakefield District Council, 2011)."

5.5.32 In Wakefield's Core Planning policy attention is drawn to freight on the highway network (Wakefield District Council, 2009):

"The movement of freight by road causes problems of poor air quality. Therefore, planning conditions and obligations will be used to define and agree suitable traffic routes and the needs for other necessary environmental and traffic management controls".

Leeds City Council

5.5.33 The council's Local Development Framework Local Development scheme has no mention of air quality, monitoring or management (Leeds City Council, 2010). The council's Local Development Framework Core Strategy has no mention of air quality, monitoring or management (Leeds City Council, 2012).

5.5.34 Local Air Quality Management

5.5.35 Barnsley, Wakefield and Leeds have all completed Air Quality Action Plans. Policies relating to the M1 are highlighted below:

Barnsley Metropolitan Borough Council

"Directly Funded Local Transport Plan Air Quality Measures include the demolition of the properties within the M1 Motorway AQMA. Compulsory purchase was identified as a mechanism to achieve this proposal. This proposal was rejected as "wholesale compulsory purchase and demolition of all properties within an AQMA would be excessively costly and would not be feasible". The original plan further reported that "this option goes against the spirit of the legislation in that it removes public exposure, rather than tackling the problem", and that "the public would be unwilling to move from their current location. There may be perception of blight on properties just outside the area. Compulsory purchase could be resented and cause long legal arguments" (Barnsley Metropolitan Borough Council, 2010).

Wakefield District Council

"Congestion Reduction Measures: include priority lanes for heavy diesel vehicles and high occupancy vehicles; active traffic management (ATM) and intelligent demand management (IDM). ATM involves mandatory speed control using variable speed limits displayed on gantries at 1km intervals. IDM manages demand through access control; ramp metering on motorway slip roads; providing alternative freight transportation options; and variable or permanent speed limit reductions (Wakefield District Council, 2010)."

Leeds City Council

"Improvements to the highways network include: the East Leeds Link Road which will provide direct access to the A1/M1 Link, giving priority to HOVs/HGVs, by use of a dedicated lane. The East Leeds Link Road will act as a direct transport link to the A1/M1 and to allow the regeneration of the Lower Aire Valley. The ELLR will incorporate dedicated HOV/HGV lanes between the M1 and the Inner Ring Road (Leeds City Council, 2004).

5.6 Design, mitigation and enhancement measures

5.6.1 Currently, there is no clear requirement for any mitigation measures to support the operation of the scheme in 2015. Outline mitigation measures for the construction of the scheme are presented in Sections 5.7.2 and 5.7.3.

5.7 Magnitude of impacts

Temporary Impacts: Construction

5.7.1 The scheme is anticipated to be constructed over a period of between 18 and 24 months. Therefore, during this period there is the potential for changes in air quality due to dust emissions along the route, emissions from site plant equipment and vehicles and also from changes in traffic flows along the scheme with traffic management in place.

5.7.2 The operational assessment has identified that there are sensitive receptors located within 200m of the scheme route. The areas located up to 200m from the scheme route which could be affected by construction activities are identified on Figures 5.5 to 5.19. This includes receptors as close as 20-25m from the scheme on Horbory Road to the East of the M1; on Batley Road to the North West and South East of the M1; and on Lawns Lane at the Junction with Lingwell Gate Lane to the South West of the M1. These receptors could be affected adversely by increases in dust generation or plant emissions. However,

these potential impacts can be controlled by the implementation of suitable mitigation measures in a Construction Environmental Management Plan (CEMP). Examples of likely control measures to minimise dust emissions include:

- Off-site vehicles should be sheeted;
- The wheels and bodies of site vehicles should be cleaned;
- Stockpiles should also be watered; where necessary they should be covered or enclosed to reduce effects of windblown dust;
- Haul routes should be located away from off-site sensitive properties and watered regularly (wet suppression of dust);
- Vehicles transporting earthworks materials to or from site should be sheeted;
- Vehicle speeds over unmade surfaces should be limited;
- The aggregate stocking area is to be located away from sensitive areas and residential properties;
- Drop heights should be minimised to discharge material close to where it is required;
- Bulking of wastes should be consolidated to minimise transportation and handling requirements; and
- A complaint and investigative response procedure should be operated.

5.7.3 Measures to minimise planet emissions should also be utilised during the construction phase. Examples of suitable mitigation measures include the following:

- Where possible, all non-road mobile machinery should use fuel equivalent to ultra-low sulphur diesel;
- Machinery with exhaust emissions should be placed as far from sensitive properties as practicable;
- Vehicles or plant should not be left idling unnecessarily;
- All vehicles and plant should be well maintained and regularly serviced according to manufacturers' recommendations; and
- Where possible haul routes should be located away from off-site sensitive properties.

5.7.4 As noted above changes in air quality could also result from the implementation of traffic management along the scheme routes. However, it is anticipated that traffic management would maintain three lanes of running traffic with a reduced speed limit. This should limit the potential for re-routing traffic by allowing similar volumes of traffic through the scheme route. The reduction in speed along the scheme route may result in some temporary improvement in air quality.

5.7.5 Overall, with mitigation in place, construction related air quality impacts are anticipated to not be significant for the scheme.

Permanent Impacts: Local Air Quality

5.7.6 Detailed dispersion model predictions have provided estimates of pollutant concentration both with and without the proposed scheme in place in 2015.

5.7.7 Full results for the baseline year and opening year with (Do-something) and without (Do-

Minimum) the scheme are provided for all individual receptors in Appendix 5.2.

5.7.8 The results described herein are based on gap analysis calculations. These are conservative predictions based on the assumption that the small rates of air quality improvement observed in monitoring across large areas of the UK in recent years persist in the operation of the scheme

NO_2: Annual Average Concentrations

5.7.9 The NO_2 annual average results suggest that there may be some exceedances of the annual mean NO_2 objective in 2015 along the scheme routes and near affected roads at 58 of 216 receptors. All other receptors (158) are predicted to meet the annual average NO_2 air quality objective. Those receptors which are predicted to meet the annual average air quality objective are shown on Figures 5.4 to 5.19 in green shading with cross hatching.

5.7.10 At the majority of these 58 receptors NO_2 concentrations are predicted to change by less than 0.4 µg/m³ (41 receptors). Those receptors which are predicted to exceed the annual average air quality objective with a change of less than 0.4µg/m³ are shown on Figures 5.4 to 5.19 in green shading.

5.7.11 Therefore, air quality at the majority of receptors considered is either below the air annual average quality objective or only very small changes in annual average NO_2 concentrations are anticipated.

5.7.12 However, the predictions show that at 17 receptors the NO_2 annual average exceedances are predicted to worsen by more than 0.4 µg/m³. Three are predicted to have a worsening of between 0.4 and 1 µg/m³, whilst 13 receptors are predicted to worsen by between 1 and 2 µg/m³ and only 1 receptor is predicted to deteriorate by more than 2 µg/m³ (R260). Details of the changes at each of these 17 receptors are presented in Table 5-7. The relevant Figure on which each of the 17 receptors is also presented in Table 5-7.

Table 5.7: Selected Annual Mean Nitrogen Dioxide Results

Receptor ID	*2015 Do-Minimum Concentration (µg/m³)*	2015 Do-Something Concentration (µg/m³)	*Change µg/m³)*	*Figure Number*
R66	*44.6*	*46.4*	*1.8*	*5.8*
R1	*41.9*	*43.7*	*1.8*	*5.9*
R111	*41.0*	*42.7*	*1.7*	*5.9*
R112	*40.4*	*42.0*	*1.6*	*5.9*
R113	*39.7*	*41.3*	*1.6*	*5.9*
R114	*39.2*	*40.6*	*1.4*	*5.9*
R115	*38.7*	*40.2*	*1.4*	*5.9*
R11	*45.6*	*47.3*	*1.7*	*5.14*
R105	*41.8*	*43.0*	*1.2*	*5.14*
R106	*40.2*	*41.3*	*1.1*	*5.14*
R260	*54.2*	*56.3*	*2.1*	*5.14*
R261	*46.6*	*48.0*	*1.5*	*5.14*
R262	*45.6*	*46.8*	*1.2*	*5.14*
R263	*44.1*	*45.1*	*1.1*	*5.14*
R264	*42.4*	*43.4*	*0.9*	*5.14*
R265	*40.6*	*41.4*	*0.8*	*5.14*
R266	*39.8*	*40.6*	*0.8*	*5.14*

5.7.13 The largest change in concentration in the 1 and 2 µg/m³ band is located on Lawns Lane (R1), to the West of the M1 (approximately 25m from the hard shoulder). The predicted change in concentration at this location is associated with increases in traffic flow of approximately 2,200 AADT with the proposed scheme.

5.7.14 The one location with a change of more than 2 µg/m³ is located at the Church Of Jesus Christ Of Latter Day Saints on Horbury Road (R260, located in a hill climb verification zone approximately 40m from the hard shoulder). This change in concentration is also associated with increases in traffic flow, of approximately 1,700 AADT with the proposed scheme.

5.7.15 There are no receptors with a change in concentration in the greater than 4 µg/m³ concentration band (Table 5-7).

5.7.16 In the Wakefield City AQMA, all predicted concentrations are below the annual mean objective, with change at these receptors ranging from -0.6 to +0.6 µg/m³.

5.7.17 Within Wakefield's M1 AQMA, 62 receptors have been considered, of these 16 receptors are predicted to experience concentrations above the annual mean objective. In these 16 locations the change in concentration with the scheme ranges from 0.8 to 2.1 µg/m³.

5.7.18 In Barnsley's AQMA No. 1, all predicted concentrations are below the annual mean objective, with the change at these receptors ranging from -0.4 to +0.1 µg/m³.

PM_{10}: Annual Average Concentrations

5.7.19 Predicted PM_{10} concentrations suggest that the air quality Objective for PM_{10} will not be exceeded at any location in 2015 with or without the proposed scheme in operation. Additionally, the change in concentration predicted with the scheme is less than or equal to 0.4 µg/m³ at all the sensitive receptors modelled.

NO_2 and PM_{10}: Short Term Concentrations

5.7.20 The results do not identify any receptors with predicted annual average concentrations of more than 60 µg/m³. Therefore, no 1-hour exceedances are anticipated.

5.7.21 Additionally, the 24-hour air quality objective is not predicted to be exceeded more than the permissible thirty five days at any receptor. Small changes in the number of days which exceed the 50 µg/m³ 24-hour air quality objective are predicted with a maximum increase of less than 0.5 a day.

Plan Level WebTAG Results

5.7.22 A Plan Level WebTAG appraisal has been completed in respect of PM_{10} and NO_2 exposure. This assessment has been developed using the WebTAG methodology which considers individual links in isolation. The results of this assessment are provided as required by DMRB guidance, in Table 5-8 and Table 5-9 below.

5.7.23 The results show that for PM_{10} there is a net overall deterioration with a positive score (71.25). A total of 2,140 properties are predicted to experience an improvement in concentrations, whilst 462 are predicted to experience no change and 699 a deterioration.

Table 5.8: Plan Level Results for PM_{10}

The Aggregated Table	0-50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+iii+iv)
Total properties across all routes (min)	343	811	1073	1074	3301
Total properties across all routes (some)	344	810	1073	1074	3301
Do-minimum PM_{10} assessment across all routes	6166.73	14303.89	18975.90	19000.03	Total assessment PM_{10} (I): 58446.55
Do-something PM_{10} assessment across all routes	6202.72	14315.27	18997.03	19002.78	Total assessment PM_{10} (II): 58517.80
Net total assessment for PM_{10}, all routes (II-I)					71.25
Number of properties with an improvement					2140
Number of properties with no change					462
Number of properties with a deterioration					699

5.7.24 The results show that for NO_2 there is a net deterioration overall with a positive score (7.32). A total of 2,168 properties are predicted to experience an improvement in air quality, whilst 437 properties are predicted to experience no change and 696 properties are predicted to have a deterioration with the scheme.

Table 5.9: Plan Level Results for NO_2

The Aggregated Table	0-50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+iii+iv)
Total properties across all routes (min)	343	811	1073	1074	3301
Total properties across all routes (some)	344	810	1073	1074	3301
Do-minimum NO_2 assessment across all routes	6914.55	13206.84	16182.01	15695.58	Total assessment NO_2 (I): 51998.98
Do-something NO_2 assessment across all routes	6907.23	13204.95	16197.89	15696.23	Total assessment NO_2 (II): 52006.30
Net total assessment for NO_2, all routes (II-I)					7.32
Number of properties with an improvement					2168
Number of properties with no change					437
Number of properties with a deterioration					696

Permanent Impacts: Regional Air Quality

5.7.25 This section outlines the results of the regional air quality assessment for the opening year and design year for NOx, PM_{10} and C.

5.7.26 The results indicate that reduced emissions of NOx and PM_{10} are anticipated between the present or baseline situation and the opening year without the scheme (See Table 5-10). This is because of the anticipated improvements in vehicle emissions over time. Increases in emissions are anticipated in the opening year with the scheme compared to the without scheme situation. This is primarily because of the increased traffic flows predicted with the scheme.

5.7.27 The same pattern for NOx and PM_{10} is also predicted for the design year (See Table 5-11), albeit with bigger emission tonnages and bigger changes in tonnages. This is because of the increased size of the study area in the design year.

Table 5.10: Opening Year Regional Assessment

Pollutant	Present (2009) (tonnes)	Without Scheme Opening Year (tonnes)	With Scheme Opening Year (tonnes)	With-scheme compared with	
				Present Without Scheme (tonnes)	Future Without Scheme (tonnes)
NO_X	93.6	68.9	90.3	-3.3	+21.4
PM_{10}	2.9	2.1	2.9	-0.1	+0.8
C	8,560	8,575	11,239	+2,679	+2,664

Table 5.11: Design Year Regional Assessment

Pollutant	Present (2009) (tonnes)	Without Scheme Opening Year (tonnes)	With Scheme Opening Year (tonnes)	With-scheme compared with	
				Present Without Scheme (tonnes)	Future Without Scheme (tonnes)
NO_X	369.4	283.7	347.1	-22.3	+63.3
PM_{10}	11.9	8.9	11.7	-0.1	+2.8
C	33,013	37,393	46,048	+13,035	+4,380

5.7.28 The emissions for C increase between the present situation and future with or without the scheme. The emissions of C also increase between the without and with scheme scenarios. These increases reflect the increases in traffic anticipated in future years and the increases in traffic expected with the scheme, which are not offset by any reductions in improved vehicle emissions.

5.8 Significant effects

5.8.1 The HA has provided an Interim Advice Note (IAN 174/13) in relation to evaluating significant effects of scheme impacts on air quality. The IAN provides advice on how to determine whether the impacts of a road scheme are significant on air quality. The significance of the impacts is based on consideration of receptors which exceed EU Limit Values/AQS objectives as a result of the implementation of the scheme.

5.8.2 The HA's approach to assessing the magnitude of impact is also based on change in the pollutant concentrations due to the introduction of the scheme.

5.8.3 Professional judgment is applied to determine whether the impacts of the scheme are significant. The HA has provided a checklist to help shape the judgment based on EU advice on evaluating the significance of environmental effects, presented in Annex A of IAN 174/13. The overall significance of the scheme is determined with reference to this guidance.

5.8.4 In those locations which currently exceed air quality objectives, changes in air quality are generally imperceptible (i.e. less than 0.4 µg/m³) and these are unlikely to be observable within normal year to year variations in NO_2 concentrations. Any receptors where the change in annual average NO_2 is <0.4 µg/m^3 have been scoped out of the judgement on significance.

5.8.5 According to section 2.4 of IAN 174/13, changes that are greater than imperceptible should be compared to the guideline bands as set out in Table 5-12. The guideline band ranges set the upper level of likely non-signficance and the lower level of likely significance. Between the upper and lower limit for each band are the ranges where significance is more uncertain, and therefore greater consideration of professional judgement is necessary.

Table 5.12: Guideline to Number of Properties Constituting a Significant Effect

Magnitude of Change in NO_2 (µg/m³)	Number of Receptors with:	
	Worsening of air quality objective already above objective or creation of a new exceedence	Improvement of an air quality objective already above objective or the removal of an existing exceedence
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (>0.4 to 2)	30 to 60	30 to 60

5.8.6 Table 5.13 details the number and magnitude of change of local air quality receptors informing significance for the assessed scheme.

Table 5.13: Local Air Quality Receptors Informing Scheme Significance

Magnitude of Change in NO_2 (µg/m³)	Number of Receptors with:	
	Worsening of air quality objective already above objective or creation of a new exceedence	Improvement of an air quality objective already above objective or the removal of an existing exceedence
Large (>4)	0	0
Medium (>2 to 4)	1	0
Small (>0.4 to 2)	16	0

5.8.7 Table 5.13 indicates that the overall effect of the scheme is to worsen concentrations experienced at those receptors exceeding the annual average NO_2 AQS Objective. The number of receptors in each band is below the lower limit of likely non-significance as detailed in Table 2.3 of HA IAN 174/13 and Table 5.12.

5.8.8 IAN 174/13 requires that the judgement on significance should be supported by a statement setting out how that judgement was arrived at, together with the supporting evidence. Table 5.14 provides the key criteria questions from the IAN and also the answers to each question in relation to the impacts of the scheme. An overall view of significance is then presented.

Table 5.14: Overall Evaluation of Local Air Quality Significance

Question	Key Criteria Questions	Yes/No
1	Is there a risk that environmental standards will be breached?	Yes – Annual mean AQS Objectives/EU Limit Values for NO_2 will be breached at approximately a quarter of the assessed receptors.
2	Will there be a large change in environmental conditions?	No – The largest change is 2.1µg/m³, the remainder of the change is small or imperceptible.
3	Will the effect continue for a long time?	No – The largest change of 2.1µg/m³, would be expected to return to pre scheme levels in six years. However, the change at the remainder of the receptors would return to pre scheme levels within six years.
4	Will many people be affected?	No – the number of receptors in each band is below the lower limit of likely non-significance as detailed in Table 2.3 of HA IAN 174/13.
5	Is there a risk that designated sites, areas or features will be affected?	No - There are no designated ecosystems within 200m of the scheme routes or affected roads.
6	Will it be difficult to avoid, or reduce or repair or compensate for the effect?	Mitigation not required as changes resulting from the scheme are assessed to be small and not significant.
	On Balance is the Overall Effect Significant?	**Based on the information outlined in this table it is considered that the schemes impact on air quality is not significant, given the relatively small number of receptors affected by the scheme and the majority of receptors which are predicted to exceed the AQS Objectives in the opening year experience a small change in annual mean NO_2.**

5.8.9 In addition to the information discussed in table 5.14 it was found that the scheme is a low risk in terms of compliance with the EU directive on Ambient Air Quality (2008/50/EC) and no Scheme Air Quality Action Plan is required for the purpose of scheme mitigation.

5.8.10 Based on the answers provided above and the outcome of the compliance risk assessment, it is considered that the scheme's impacts on air quality are **not significant**.

5.8.11 No exceedences of the annual average PM_{10} threshold were predicted in either of the DM or DS scenarios; therefore in terms of PM_{10} there is no significant impact.

5.9 Indication of difficulties encountered

5.9.1 No significant limitations have been encountered in the preparation of the air quality assessment.

5.10 Summary

5.10.1 There are sensitive receptors identified within 200m of the proposed scheme and affected roads.

5.10.2 There are three AQMAs identified within 200m of the proposed scheme and affected roads.

5.10.3 There are no designated ecosystems within 200m of the scheme routes or affected roads (e.g. SSSI, SPA, RAMSAR or SAC).

5.10.4 A plan level TAG assessment suggest that overall air quality for NO_2 and PM_{10} will worsen and the regional assessment also indicates an overall increase in emissions (e.g. NOx and PM_{10}).

5.10.5 The public exposure predictions at the identified sensitive receptors along the scheme route and affected roads suggest that in 2015 air quality will meet annual average AQS and EU Limit Values in the majority of locations for NO_2 (158 receptors).

5.10.6 In those locations which do not currently meet air quality objectives, changes in air quality are generally small (i.e. less than 0.4 µg/m³) and these are unlikely to be observable within normal year to year variations in NO_2 concentrations. There are only six properties within the study area whose concentrations are not predicted to drop below pre-scheme levels within six years of the scheme opening based on current Long term trend factors.

5.10.7 Air quality will also meet 1-hour NO_2, annual average PM_{10} and 24-hour PM_{10} air quality objectives at all receptors with or without the scheme.

5.10.8 Construction air quality impacts have been discussed and appropriate mitigation measures recommended to avoid adverse temporary effects.

5.10.9 Overall construction and operational air quality effects are considered to not be significant for the scheme.

6 Landscape and Visual Impact Assessment

6.1 Study area

6.1.1 The study area for the landscape and visual impact assessment (LVIA) is defined by the Zone of Visual Influence (ZVI) which extends at least 2 kilometres either side of the carriageway and further where distant views are possible of the Proposed Scheme. The ZVI is illustrated in Figure 6.1, together with the locations of the principal visual receptors, that is, locations from where there is a view of the Proposed Scheme

6.1.2 The area is made up of a variety of landscape types including arable and grazing land, woodland, hedgerows, a river course, a railway line and residential and commercial properties bordering or overlooking the motorway corridor.

6.1.3 The surrounding landscape has also been studied over a wider area to provide context for the description and evaluation of the local landscape character, visual envelope and viewpoints. Listed and historic buildings have been considered to ascertain their importance and significance in relation to the Proposed Scheme and impacts upon setting. The views from the road and potential effects on visual amenity from the Proposed Scheme on vehicle travellers have also been included within this chapter.

6.1.4 This chapter present the results of the landscape and visual impact assessment (LVIA) of the Proposed Scheme, covering:

- Landscape Character Effects – these relate to the character and individual features that contribute to local and regional distinctiveness and the extent to which the Proposed Scheme proposals would alter the character and quality of landscape as a resource; and
- Visual Effects – relating to changes in visual amenity experienced by people, or to changes in the visual aspects of the local setting of sensitive receptors, including residential and commercial areas, listed buildings and public rights of way (PRoW).

6.1.5 The LVIA takes into account the mitigation developed as part of the design process and features of the scheme such as planting, signs, fencing, retaining walls, lighting and traffic.

6.2 Methodology

General approach

6.2.1 The LVIA comprised desk studies, collecting baseline data and undertaking site surveys on the context, character and quality of the study area, followed by an evaluation of the landscape and an assessment of views from properties and local views potentially affected by the Proposed Scheme. The assessment informed the design of appropriate mitigation measures to reduce potential adverse effects and to enhance the potential benefits.

6.2.2 The LVIA has been carried out in accordance with the following guidance:

- Interim Advice Note (IAN) 135/10, Landscape and Visual Effects Assessment
- Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB)
- Volume 11, Section 3, Part 2 of the DMRB Cultural Heritage
- Volume 11, Section 3, Part 9 of the DMRB Vehicle Travellers
- Guidelines for Landscape and Visual Impact Assessment Second Edition (GLVIA) by the Institute of Environmental Management and Assessment and the Landscape Institute (2002).

6.2.3 The following data sources were used for the LVIA and cultural heritage review:

- Environmental Scoping Report (October 2011, WSP) containing the landscape/ townscape character baseline and visual baseline survey
- Leeds Landscape Assessment, 1994, Arable Fringe Farmland, Landscape Unit LCM6, East Ardsley Fringe
- Countryside Agency Character Area 38 Nottingham, Derbyshire & Yorkshire Coalfield
- Development Plans
    - Leeds Unitary Development Plan (UDP) Review adopted July 2006, and
    - Wakefield Council Local Development Framework (LDF) adopted 2009;
- 1:25,000 scale Explorer Ordnance Survey Map o. 278, Sheffield and Barnsley an Map No. 289 Leeds
- The National Heritage List for England

6.2.4 The assessment process can be summarised as follows:

- A description of aspects of the proposals that would be influential in terms of landscape and visual amenity.
- Providing the baseline information on the existing landscape surrounding the Proposed Scheme and context including value and sensitivity to change
- Providing the baseline information on the visibility of the Proposed Scheme. A schedule of visual effects [VES] has been produced identifying all the key visual receptors, together with a drawing illustrating the potential visual effects.[VED]
- Identifying the source and magnitude of the landscape and visual effects during construction, during winter one year after completion and in summer after 15 years.

6.2.5 The quality of the existing landscape and surroundings without the Proposed Scheme (Do Minimum) has been compared to the landscape and views for the Proposed Scheme (Do Something)

Methodology for the landscape impact assessment

6.2.6 Landscape commonly refers to the appearance or view of the land. In fact, landscape is a combination of both physical and cultural components and characteristics, which result in patterns that are distinctive to particular localities and help to define ‘the sense of place’. The landscape cannot simply be seen as a visual phenomenon, but relies upon other

major influences including land use, topography, vegetation, ecology and historical and cultural associations.

6.2.7 A desktop study was undertaken to identify potential landscape character types and areas within the study area. The character types have been classified in relation to broad land-uses and landforms. Site visits were undertaken to verify the desktop study, with representative photographs taken in each character area and as assessment made as to the quality, value and sensitivity to change of the character area, in accordance with guidance provided in IAN 135/10 and the GLVIA (2002). The site visits were undertaken in March 2012 in bright weather becoming overcast and early December 2012 in gloomy overcast weather.

6.2.8 The baseline information from the desktop study and site visits were combined to describe the character of the landscape within the study area. Each area was evaluated in relation to its quality, value and sensitivity to change, in accordance with the criteria contained in Tables 6.1 to 6.4 to assess the relative significance of the landscape effects associated with the Proposed Scheme.

6.2.9 The magnitude of the impact is defined by a combination of the scale, extent and duration of an impact for each of the assessment scenarios The assessment of landscape impacts identifies the likely nature and scale of changes to individual landscape elements and characteristics, focusing on:

- Existing land use;
- The pattern and scale of the landscape and the natural and built elements within it;
- Short or long term, temporary or permanent timescale;
- Visual openness or enclosure of views and the distribution of visual receptors; and
- The scope for mitigation and whether this would be in character and keeping with the existing landscape.

6.2.10 The purpose of mitigation is to avoid, reduce and where possible remedy or compensate for the impacts of the Proposed Scheme. It is recognized that landscape planting will not provide immediate mitigation, as time is required for it to become established to create an effective visual screen or help to integrate the Proposed Scheme into the local landscape.

6.2.11 Landscape sensitivity (to change) is dependent on the character of the receiving landscape, the nature of the Proposed Scheme and the type of change. Guidance on identifying the sensitivity of the landscape to change is presented in Table 6.1.

Table 6.1: Landscape Sensitivity and Typical Values

Sensitivity	Typical Descriptors and Examples
High	Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically these would be: • Of high quality with distinctive elements and features making a positive contribution to character and sense of place • Likely to be designated, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale • Areas of special recognised value through use, perception or historic and cultural associations

Sensitivity	Typical Descriptors and Examples
	• Likely to contain features and elements that are rate and could not be replaced
Moderate	Landscapes which by nature of their character would be able to accommodate in part change of the type proposed. Typically these would be: Comprised of commonplace elements and features creating generally unremarkable character but with some sense of place. • Locally designated, other value may be expressed through non-statutory local publications • Containing some features of value through use, perception or historic and cultural associations • Likely to contain some features and elements that could not be replaced
Low	Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically these would be: • Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place • Not designated • Containing few, if any, features of value through use, perception or historic and cultural associations • Likely to contain few, if any, features and elements that could not be replaced.

6.2.12 The criteria to evaluate the magnitude of impacts on the landscape character are given in Table 6.2

Table 6.2: Magnitude and nature of landscape impact and typical descriptors

Magnitude of Impact	Typical Criteria Descriptors
Major adverse	Total loss or large scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements
Moderate Adverse	Partial loss or noticeable damage to existing character, or distinctive features and elements, and/of the addition of new but uncharacteristic noticeable features 'and elements
Minor Adverse	Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic, features and elements
Negligible Adverse	Barely noticeable loss or damage to existing character or features and elements and/or the addition of new but uncharacteristic features and elements
No Change	No noticeable loss, damage or alteration to character, features or elements
Negligible Beneficial	Barely noticeable improvement of character by the restoration of existing features and elements and/or the removal of

Magnitude of Impact	Typical Criteria Descriptors
	uncharacteristic features and elements, or by the addition of new characteristic elements
Minor Beneficial	Slight improvement of character by the restoration of existing features and elements and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements
Moderate Beneficial	Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
Major Beneficial	Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.

6.2.13 The significance of the effect of the Proposed Scheme on the landscape is derived from the combination of the magnitude of the impact and the sensitivity of the landscape to change as shown in Table 6.3

Table 6.3: Criteria to describe the significance of the effect of the Proposed Scheme on landscape

		MAGNITUDE OF IMPACT				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
LANDSCAPE SENSITIVITY	**High**	Neutral	Slight	Slight / Moderate	Moderate / Large	Large / Very Large
	Moderate	Neutral	Neutral / Slight	Slight	Moderate	Moderate / Large
	Low	Neutral	Neutral / Slight	Neutral / Slight	Slight	Slight / Moderate

6.2.14 Significance of effect is an indicator of how well a particular area can accommodate change arising from the Proposed Scheme. Table 6.4 describes the significance categories.

Table 6.4: Typical descriptors of significance of effect categories

Significance Category		Typical Descriptors of Effect
1	Very Large Beneficial (Positive) Effect	The project would: • Greatly enhance the character (including quality and value) of the landscape • Create an iconic high quality feature and/or series of elements • Enable a sense of place to be created or greatly enhanced.
2	Large Beneficial (Positive) Effect	The project would: • Enhance the character (including quality and value) of the landscape • Enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development • Enable a sense of place to be enhanced.
3	Moderate Beneficial (Positive) Effect	The project would: • Improve the character (including quality and value) of the landscape • Enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development • Enable a sense of place to be restored.
4	Slight Beneficial (Positive) Effect	The project would: • Complement the character (including quality and value) of the landscape • Maintain or enhance characteristic features and elements • Enable some sense of place to be restored.
5	Neutral Effect	The project would: • Maintain the character (including quality and value) of the landscape • Blend in with characteristic features and elements • Enable a sense of place to be retained.

Significance Category		Typical Descriptors of Effect
6	Slight Adverse (Negative) Effect	The project would: • Not quite fit the character (including quality and value} of the landscape • Be at variance with characteristic features and elements • Detract from a sense of place.
7	Moderate Adverse (Negative) Effect	The project would: • Conflict with the character (including quality and value) of the landscape • Have an adverse impact on characteristic features or elements • Diminish a sense of place.
8	Large Adverse (Negative) Effect	The project would: • Be at considerable variance with the character (including quality and value) of the landscape • Degrade or diminish the integrity of a range of characteristic features and elements • Damage a sense of place.
9	Very Large Adverse (Negative) Effect	The project would: • Be at complete variance with the character (including quality and value) of the landscape • Cause the integrity of characteristic features and elements to be lost • Cause a sense of place to be lost.

Methodology for the visual impact assessment

6.2.15 Visual impact assessment evaluates the impact of the Proposed Scheme on views from sensitive receptors. With a highways scheme, changes in visual impact can arise from the loss of existing components, such as existing vegetation, long distance views and consistent character, or by the introduction of new features such as earthworks, structures, gantries, lighting and alterations to the traffic flow.

6.2.16 The visual impact assessment:

- Describes the view in relation to the nature and type of viewer (such as private views from residences and public views from public rights of way and open spaces).
- Determines the magnitude of change, including the loss of existing elements from views of the Proposed Scheme and the introduction of new features, and comment on the numbers of people who would experience them; and
- Considers whether changes in views are beneficial or adverse.

6.2.17 The first stage in the identification of receptors is to determine the overall zone of visual influence, which is the area or areas over which views of the Proposed Scheme would be expected to influence people's perception of their surroundings. The actual visibility of the changes due to the Proposed Scheme may extend beyond the ZVI, but not in an influential way. The ZVI has been determined through desk studies examining land cover and landform on plans and aerial photographs and verification on site (Figure 6.1)

6.2.18 The visual impact assessment has taken account of all aspects of the Proposed Scheme including structures, lighting and committed mitigation within the highway boundary.

6.2.19 The sensitivity of the potential visual receptors to changes in views is based on a three point scale, high, moderate or low, as defined in Table 6.5.

Table 6.5: Visual Sensitivity and Typical Descriptors

Sensitivity	Typical Descriptors and Examples
High	• Residential properties • Users of Public Rights of Way or other recreational trails (e.g. National Trails, footpaths, bridleways, etc) • Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust or other access land, etc.).
Moderate	• Outdoor workers • Users of scenic roads, railways or waterways or users of designated tourist routes • Schools and other institutional buildings and their outdoor areas

Sensitivity	Typical Descriptors and Examples
Low	• Indoor workers • Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes • Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities)

6.2.20 The magnitude of the visual impacts on receptors is evaluated suing the criteria presented in Table 6.6. These impacts can be adverse or beneficial.

Table 6.6: Magnitude of visual impact and typical descriptors

Magnitude of Impact	Typical criteria descriptors
Major	Part or all of the project would become the dominant feature or focal point of the view.
Moderate	Part or all of the project would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	Part or all of the project would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Only a very small part of the project would be discernible, or lies at such a distance, that it would form a barely noticeable feature or element of the view.
No change	No part of the project, or work or activity-associated with it, is discernible

6.2.21 The significance of the effects of the Proposed Scheme on views is determined by combining the sensitivity of the receptor and the magnitude of the impact (Table 6.7).

	MAGNITUDE OF IMPACT					
	No change		**Negligible**	**Minor**	**Moderate**	**Major**
VISUAL SENSITIVITY	**High**	Neutral	Slight	Slight/Moderate	Moderate/Large	Large/Very Large
	Moderate	Neutral	Neutral/Slight	Slight	Moderate	Moderate/Large
	Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/Moderate

Table 6.7: Significance of effect categories

6.2.22 Typical descriptors of the significance of effects are provided in Table 6.8

Table 6.8: Typical descriptors of the significance of effect categories

Significance	Typical Descriptors of Effect
Very large Beneficial	The project would create an iconic new feature that would greatly enhance the view.
Large Beneficial	The project would lead to a major improvement in a view from a highly sensitive receptor.
Moderate Beneficial	The proposals would cause obvious improvement to a view from a moderately sensitive receptor, or perceptible improvement to a view from a more sensitive receptor.
Slight Beneficial	The project would cause limited improvement to a view from a receptor of moderate sensitivity or would cause greater improvement to a view from a receptor of low sensitivity.
Neutral	No perceptible change in the view.
Slight Adverse	The project would cause limited deterioration to a view from a receptor of moderate sensitivity, or cause greater deterioration to a view from a receptor of low sensitivity.
Moderate Adverse	The project would cause obvious deterioration to a view from a moderately sensitive receptor, or perceptible damage to a view from a more sensitive receptor.
Large Adverse	The project would cause major deterioration to a view from a highly sensitive receptor, and would constitute a major discordant element in the view.
Very Large Adverse	The project would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.

Methodology for the views from the road assessment

6.2.23 The assessment is based on methodology adapted from Chapter 2 of DMRB Vol 11 Section 3 Part 9 Vehicle Travellers. The baseline existing view from the road is assessed in terms of:

- Types of landscape
- Extent of views
- Quality of the landscape
- Features of particular interest

6.2.24 The impact of the Proposed Scheme on the views is then set out in general terms with any specific impacts on particular views identified.

6.3 Baseline conditions

Key resources and receptors

6.3.1 The major rural, landscape and townscape designations in the vicinity of the Proposed Scheme are identified below and illustrated in Figure 6.2:

- Green Belt. The motorway corridor runs through the Green Belt.

- A Special Landscape Area (SLA) is located in the countryside lying to the west of the M1 near Junction 41, south of East Ardsley and east of West Ardsley
- Pugneys Country Park lies 1km to the east of the motorway and south of Wakefield, on the right hand bank of the River Calder. The park comprises two lakes and a water sports centre.
- Four local nature reserves (see Chapter 7 for more information)
- Horbury Lagoons, Wakefield nature Area (WNA) 47, located on the left hand bank of the River Calder and found on both sides of the M2
- Lupset Golf course, WNA 38, located between the southbound carriageway and the railway line and southwest of Wakefield
- Roundwood WNA 43, adjoining the southbound carriageway, south of Junction 40, and
- Lofthouse Colliery, Outwood, Wakefield WNA 35, located to the south east of Junction 42.
- Conservation Areas are located in Horbury and Ossett, both to the west of the motorway between Junctions 39 and 40

6.3.2 The following listed buildings are located within the ZVI:

- Grade 11* listed Lupset Hall (now the clubhouse for the City of Wakefield Golf Course);
- Grade 11* listed East Ardsley Old Hall (private residence)
- The derelict Grade 11 listed Carr Lodge in Horbury; and
- Grade 11 listed Melbourne House (an office building)

Landscape character baseline

6.3.3 Natural England (through its predecessor The Countryside Agency) carried out a nationwide assessment of landscape character in 1997. The National Character Areas describe the character of the English landscape in 159 broad landscape character areas.

- Junction 39 to Junction 42 of the M1 passes through one character area, the Nottingham, Derbyshire and Yorkshire Coalfield Character Area (CA 38). The key characteristics of this Character Area are:
- “widespread evidence of industrial activity including mine buildings, former spoil tips and iron and steel plants”.
- “complex mix of built-up areas, industrial land, dereliction and farmed open country”.
- “many areas affected by urban fringe pressures creating fragmented and downgraded landscapes”.
- “substantial areas of intact agricultural land in both arable and pastoral use”.
- “small, fragmented remnants of pre-industrial landscape and semi-natural vegetation, including many areas of woodland, river valley habitats, subsistence flashes and other relict habitats”.

- "ever-present urban influences from major cities, smaller, industrial towns and mining villages".
- "widespread influences of transport routes, including canal, road (M1 and M62) and rail, with ribbon developments emphasising the urban influence in the landscape".
- "rolling landforms with hills, escarpments and broad valleys".
- "local variation in landscape character reflecting variations in underlying geology"; and
- "strong cultural identify arising from a history of coal mining and other heavy industry".

6.3.4 The Natural England Countryside Agency landscape character assessments states that:

"There has been a constant change and development in the character area since the industrial revolution when there was rapid expansion of housing, transport networks and industry of many types. The result is a complex intermingling of rural and urban areas and of modern commerce [such as Calder Park] and industrial dereliction [such as in the Horbury Junction area] the whole creating a mosaic of disparate land uses and land cover".

"Recent developments for engineering, manufacturing and light industrial uses, as well as for commercial and retail development, have extended out from urban areas". The large Wakefield 41 Industrial Park to the east of the M1 between Junction 41 and Junction 42 as an example. "They often follow the main road corridors adding ribbon development and its impact on the landscape to the complex mosaic of land uses. The ensuing dense network of roads, along with major transport routes such as the M1, M62 and the main railways, all compound the urbanization of the area "Rivers, such as the Calder, cross the area but they tend to be obscured by the industrial development that has grown up around them.

"There are significant urban fringe pressures affecting the countryside around towns and cities". There are some poor standards of maintenance, for example, with field boundaries and poor quality pasture used for horse grazing. "Some rural buildings are sold off, usually for conversion to residential use, which results in a degree of suburbanisation of the countryside".

Green Belt

6.3.5 A large proportion of the study area is located within the Green Belt as defined by the relevant local planning authorities. The purpose of Green Belt is to safeguard open land from urban sprawl, including the maintenance of their open character seeking "to retain attractive landscapes and enhance landscape near to where people live". The Proposed Scheme is located within the existing highway corridor and would result in no further loss of Green Belt land, therefore the Scheme does not conflict directly with the policy. However, the assessment will consider the significance of any landscape character and visual effects upon the recreational value and amenity of the Green Belt.

West Ardsley Special Landscape Area

6.3.6 Leeds City Council has designated West Ardsley as a Special Landscape Area (SLA) in the Leeds Unitary Development Plan (UDP) review, adopted July 2006. In these designated areas development will be acceptable provided it would not seriously harm the character and appearance of the landscape. The west Ardsley SLA lies to the west of

Junction 41. At its closest, near Kirkhamgate, the boundary of the designated area is approximately 100 m from the motorway.

Local Landscape Character

6.3.7 The Proposed Scheme runs through the West Wakefield Urban Fringe LLCA between Junctions 39 and 40 and the Leeds / Wakefield Arable Fringe LLA between Junctions 40 and 42. The Proposed Scheme passes 0.5km east of the East Ardsley Residential Wooded Ridgetops LLCA at its northern extent (see Figure 6.2).

6.3.8 LLCAs are defined by Local Planning Authorities and describe the intrinsic properties of a landscape that contribute to and make up that character, from historical and geological perspectives to the more present day activities such as settlement development and agricultural land use. All of these affect the landscape of an area and assessments and mitigation proposals must respect the nature of these character areas.

6.3.9 The following text describes the LLCAs in more detail, illustrated with photographs (see Figure 6.3 for the photograph locations and Figure 6.4 for the photographs numbered 1 to 18).

West Wakefield Urban Fridge LLCA No. 13

6.3.10 The Proposed Scheme crosses the West Wakefield Urban Fringe LLCA between Junctions 39 and Junction 40. The LLCA is dominated by the River Calder valley bottom and associated wetlands, particularly Crigglestone, Horbury and Southern facing areas of Upset are influenced by elevated sections of the motorway as it passes over the river and nearby railway line. The settlements are separated by arable and pastoral fields north of the river as the motorway runs along the western side of a north-south running ridge, affording views up to the motorway from Horbury to the west and the expanding Calder Park commercial area to the east.

6.3.11 Intermittent motorway planting in the Calder Valley only provides limited screening due to the elevated nature of the carriageway (View 2). The existing motorway infrastructure of gantries and lights is widely visible.

6.3.12 The City of Wakefield municipal golf course at Upset Hall adjoins the motorway to the east with screen planting on the course and in front of the listed clubhouse (View 3). Nearby, individual properties in Lupset located below the carriageway embankment in the Lennox Drive and Cleveland Grove area are partially screened by motorway planting and are the closest residential properties (approximately 70m from the carriageway) with views of the motorway between Junction 39 and Junction 40 (View 4).

6.3.13 As the carriageway crosses Horbury Road (A642) and approaches Snapethorpe overbridge, the motorway enters a shallow cutting with extensive roadside planting. To the west, commercial offices on Bennett Avenue are close to the carriageway with the brick offices clearly visible from the motorway (View 5). Immediately to the north, residential properties on Rochester Drive are screened by a combination of cutting, on-site planting and a concrete wall. To the east, nothing is visible beyond the cut slope and on-site planting.

6.3.14 Travelling northwards, the carriageway is shielded from the eastern residential areas of Lupset as the elevated landform hides the motorway. Those properties that do face westwards (in the Dacre Avenue area), look over the motorway to South Ossett and even

Walkers on the nearby public footpaths are only aware of the noise from the passing vehicles below them (View 9).

6.3.15 On the opposite western side of the motorway, the carriageway is on an embankment and visible to residents and walkers on Hags Hill and in Ossett Spa, although intervening blocks of woodland and roadside planting provide screening. This is particularly true in the vicinity of residential properties in Haggs Hill which are closest to the motorway. Residents of Hall Cliffe (the northern residential streets of Horbury) look down on the motorway as it passes Ossett Spa to the north, with its scattering of farm buildings, old industrial units and fields. They can also see the motorway as it rises up to Junction 40.

6.3.16 The motorway changes in character on the approach to Junction 40 as the carriageways split with the southbound carriageway at a lower level. The carriageway rises up to Junction 40 (which is at a high point), with a small grassed hill to the east providing a local landmark. A line of pylons crosses the motorway at this point. The open grazing continues to the east, with the Leeds Wakefield Holiday Inn Hotel located at the top of the ridge on Queens Drive.

6.3.17 Two traffic free cycle routes are located in the Calder Valley both crossing under the motorway. One follows the northern bank of the River Calder and the other is directly to the north following the northern side of the railway line (National Cycle Route 69 from Morecombe to Grimsby)

6.3.18 Public footpaths follow a similar alignment under the motorway. To the north, on the approach to Junction 40, a public footpath crosses under the motorway connecting Hags Hill to the western edge of Lupset. Other public footpaths are located in the vicinity running parallel to the motorway.

Leeds / Wakefield Arable Fringe LLCA 14

6.3.19 The Leeds / Wakefield Arable Fringe LLCA is a farmed landscape comprising a mixture of pastoral and arable fields. The Proposed Scheme passes through this LLCA between Junctions 40 and 42. The motorway sweeps downhill from Junction 40 to cross Bushy Beck on embankment, with open countryside either side of the carriageway and an east-west ridge framing views to the north. West Ardsley is visi9ble on the western horizon and Kirkhamgate lies on the ridgeline to the east close to the motorway (View 11).

6.3.20 Park Mill Lane overbridge is located a short distance to the north of Junction 40 with a layby and footpath leading into the open fields to the west of the motorway (View 10). Field boundaries are defined by hedges, planting along the watercourses of Bushy Beck and Alverthorpe Beck, copses, individual trees and natural woodland. Hedgerows tend to be gappy with fencing forming the boundaries of many arable fields. Settlements are more dispersed than further south; however, these locations do have quite extensive views o the motorway across the generally undulating landscape (View 12). To the west in the Bushy Beck valley a series of individual form properties are located, accessed along unpaved roads. To the east lie a golf course at Low Laithes and converted farm properties on PRK Mill Lane.

6.3.21 Kirkhamgate is a village located immediately to the east of the motorway on the east west ridge with extensive views of the motorway to the north and south from individual properties (View 13). Jaw Hill is a small collection of properties to the west of the motorway on the ridge connected to the village of Kirkhamgate by Batley Road overbridge (View 14).

6.3.22 The motorway passes through a cutting under the Batley Road overbridge and then enters more open countryside on embankment, curving in a north easterly direction, with residential and farm buildings located along Woodhouse Lane to the west in close proximity to the motorway (View 16 from Woodhouse Lane). The village of East Ardsley becomes visible on the ridgeline to the north.

6.3.23 To the east, open fields are bordered by individual properties on Brandy Carr Lane running between Kirkhamgate and A650 (View 15). At the northern end of the road is Melbourne House occupied by Kcom, a large, former residential property with a modern office extension facing south west. Nearby, Melbourne Mews have been converted as residential units. All of these properties look down over the valley towards and over the motorway.

6.3.24 Just south of Junction 41, a line of pylons crosses the motorway and continues across country in a westerly direction running parallel and close to the motorway on the eastern side up to Junction 42.

6.3.25 From Junction 41, the motorway continues in a north easterly direction for only 2 km to Junction 42 and a major intersection with the east-west running M62. Farmland continues to border the motorway to the west up to the Leeds to Wakefield railway line. The terraced housing in The Fall is visible on higher ground to the north-west and East Ardsley is visible to travellers on the southbound carriageway.

6.3.26 Immediately to the north of the Leeds to Wakefield railway line and close to Junction 42, a new housing area is located at Lingwell Nook, a low lying area of land adjacent to the railway line. The motorway is close to its eastern edge but is well screened by on site planting despite being on embankment. Lingwell Nook Lane passes under the railway and motorway with a terrace of housing immediately adjacent to the carriageway on the eastern side. Slightly north and also on the eastern side is a collection of houses at Lingwell Gate on Lingwell Gate Lane set back from the motorway but with views of the carriageway on embankment as it approaches Junction 42.

6.3.27 The motorway corridor changes subtly in character between Junction 41 and Junction 42 being more enclosed. On site planting is well established being especially dense to the east, providing thick screening of the large nearby Wakefield 41 Industrial Park containing a number of large warehouses. Planting to the west provides glimpses of the farmland and settlements beyond. A concrete safety barrier in the central reserve replaces the open box beam steel safety barrier and lighting columns are located in both verges.

6.3.28 Although located within Green Belt, considerable development pressure is evident throughout the area with urban fringe influences of degraded horse pasture being particularly noticeable.

6.3.29 Public access is widely available along this length of motorway with a series of public footpaths and bridleways. Access across the motorway is available along overbridges and underpasses which are either on public roads or on the footpath and bridleway network.

LLCA 15 East Ardsley Residential Wooded Ridgetops

6.3.30 The East Ardsley Residential Wooded Ridgetops Character Area lies approximately 0.5 km to the west of the motorway at the northern limits of the Proposed Scheme, lying alongside a north-south ridgeline and dominated by residential development in East Ardsley and The Fall. These predominantly traditional stone properties are separated from the motorway by arable and pastoral fields (View 17) and have views northwards to the

corridor and beyond to Junction 42 and the M62 and long views to the south of the corridor. Several footpaths extend eastwards from East Ardsley across the arable fields towards the motorway.

Night time motorway character

6.3.31 The motorway corridor takes on its own character at night, passing through contrasting urban and more rural settings. A night time view of the motorway can, from certain angles such as View 14 from Jaw Hill on Batley Road, look directly along the motorway and be dominated by the stream of vehicle lights. From other angles, the motorway sits within a well lit night time panorama of housing, factories and general urban glow as the built up nature of West Yorkshire is highlighted at night.

6.3.32 At present, this section of the motorway is only lit between Junctions 40 and 42. Lighting columns are located in the verges of the slip roads at Junction 40 and northwards up to Park Mill Lane overbridge. The motorway is lit from the central reserve northwards from Park Mill Lane overbridge to Junction 41. Lighting columns are located in the verge on the approach and slip roads at Junction 41 and they continue northwards up to Junction 42. There is no lighting on the slip roads at Junction 39 extending up to the carriageway.

6.3.33 Under the Proposed Scheme, the existing lighting between Junction 40 and 41 will be removed. When in operation, both of the MS3 gantries located on the northbound carriageway within the Junction 41 cutting and in the side barrier at the end of the on slip just before Carr Gate Beck overbridge will provide additional lighting.

6.3.34 Other motorway features that are visible at night time include the sign boards which stand out due to their luminescence including the large A frame gantry over the northbound carriageway at ch299+850 just before Junction 42.

Historic landscape

6.3.35 There are no designated historic landscapes within the study area. There are four historic listed buildings/artefacts within 500m of the motorway, namely:

- Milestone Lock marker stone. Circa 1838 (date of Calder and Hebble Navigation Horbury Cut). Stone post with rounded top
- Durkar Hall Farm Barn. Mid C16 and late C17
- Denby Dale road Farmhouse Late C17 or early C18
- Woodhouse Lane Gate Lodge Mid C19

6.3.36 The buildings are all extant and occupied, so presumed to be in good condition

6.3.37 There are various listed buildings at a greater distance from the motorway but these buildings and their settings will not be impacted by the proposals due to the distance from the motorway

6.3.38 There are two conservation areas are located in Horbury and Ossett, both to the west of the motorway between Junctions 39 and 40. Both are over 1km from the motorway and outwith the ZVI.

6.3.39 There has been significant urban expansion locally in the last 150 years and much of the local landscape has changed significantly. Despite the incremental urban and industrial expansion, in areas that have remained agricultural much of the field patterns remain as shown on 1850 maps. There has been some consolidation of fields and loss of

boundaries. However there is little of value in terms of historic landscape features within the study area.

Visibility Baseline

6.3.40 This section describes views from residential properties, bridleways and public footpaths, businesses and public receptors to the motorway corridor between Junction 39 and Junction 42. Photographs of views from sensitive receptors to the existing motorway are provided in Figure 6.4 and the photo viewpoints, numbered 1 to 18 are referenced in the text below. A summary of the key visual receptors is presented in Table 6.9. The visual effects are summarised in Figure 5.

Junction 39 to Junction 40

6.3.41 To the south of Junction 39, residents of Crigglestone, in its most elevated areas, have wide views of the motorway junction and carriageway crossing the Calder Valley (View 1) in the distance.

6.3.42 Durkar lies close to the M1, to the east of Junction 39. Properties on the northern edge of the settlement have views northward to the sparsely planted embankments crossing the Calder Valley (View 2). The local topography is relatively flat; therefore the majority of properties in Durkar are screened by other properties and garden and roadside planting.

6.3.43 Calder Park Business Park is located on an open site between Durkar and the River Calder, with views of the motorway on embankment from several buildings.

6.3.44 Calder Grove also lies close to the motorway to the west of Junction 39. In a similar manner to properties in Durkar, dwellings on the northern fringe of the residential area experience views northward to the elevated length of motorway although there is considerable intervening vegetation in the fields. Cedar Court Hotel is located in the south west corner of Junction 39 with views of the southern areas of motorway Junction. Immediately to the west along Denby Dale Road is a modern two storey office campus with one unit facing northwards over the Calder Valley. (The view from Denby Dale rd west is shown in view ??)

6.3.45 Horbury lies half a kilometre west of the motorway and is located on land that gently rises as it faces the motorway to the south over the Calder Valley. Therefore, properties on the edge of the village, south of Northfield Lane (A642) and those further up the hillside experience uninterrupted winter views of the motorway on embankment over the flat playing fields and allotments (View 6).

6.3.46 Carr Lodge, a Grade II listed, property in parkland on Wakefield Road in Horbury is currently boarded up and surrounded by protective fencing. The building has views towards the motorway with the large modern Horbury School in the view beyond its parkland.

6.3.47 Elevated properties along the northern fringe of Horbury, in the Hall Cliffe area, experience views of the motorway as it rises up to Junction 40 (View 8 is taken from road below Hall Cliffe).

6.3.48 On the eastern side of the motorway, golfers on the City of Wakefield Golf Course and walkers on the public footpath which crosses the course have filtered views of the motorway as it approaches Junction 39 and of the motorway incline to the south of the junction (View 3). Screen planting around the golf course and clubhouse hides as much of the motorway as possible.

6.3.49 A group of offices is located on the western side of the motorway to the north of Horbury Road (A642) on Bennett Avenue with clear views of the carriageway (Views 5 and 7).

6.3.50 Cyclists and walkers on the public footpaths and National Cycle Route 69 beside the canal and railway have open views of the motorway and its associated infrastructure on the embankment crossing the Calder Valley.

6.3.51 Lupset lies to the east of the motorway opposite Horbury, with residential areas north of the golf course and to the south of Horbury Road (A642) adjacent to the motorway boundary. These houses, on Lennox Drive, Cleveland Garth and Cleveland Grove, are located at the bottom of the motorway embankment, with well-established on-site planting providing invaluable screening in the summer months. Passing vehicles were visible during the winter site visit (View 4).

6.3.52 The most elevated areas of Lupset lie just to the north centred on Lindsay Avenue and Airedale Heights. A public footpath leads into the open fields with elevated views southwards along the motorway corridor towards Junction 39. Some houses, without garden planting, face in this direction with views of the motorway in the distance. A band of woodland encloses the western facing properties which together with the elevated landform screens the motorway (View 9).

6.3.53 Properties along the southern and northern edges of Ossett (west of the motorway) experience views towards the motorway together with some glimpsed views of Junction 40 which is located at a high point with the motorway sweeping away from it to the north and south. However, properties closest to the motorway on the east of the town in Low Common and Haggs Hill are well screened by on and off-site planting.

6.3.54 The Holiday Inn Hotel and industrial areas to the east of the motorway on Queen's Drive experience limited views of the corridor and Junction 40. The Junction itself is particularly well screened by on-site planting.

Junction 40 to Junction 41

6.3.55 This section of the motorway is currently lit so there is greater night-time visual impact. However, it is proposed that here the lighting is decommissioned and removed.

6.3.56 The public footpath beside Park Mill Lane overbridge (View 10) has wide open views across the shallow valley with the motorway travelling in a northerly direction. Gawthorpe Lane (a public bridleway, View 12), connecting Gawthorpe to Kirkhamgate (with an underpass under the M1), runs across the middle of the valley.

6.3.57 Individual properties are located within the visual envelope in this open landscape including Lodge Hill Farm, New Park Grange, Lower Park Farm and Woodhouse Hall Farm to the west of the motorway and Park Mill Farm and Low Laithes Farm to the east.

6.3.58 Kirkhamgate adjoins the motorway to the east (View 10). The settlement is elevated and properties experience views of the corridor to the north and south (View 13). Immediately to the west of the village the motorway is in a deep cutting and is well screened by maturing on-site planting.

6.3.59 Properties north of Kirkhamgate, such as those on Brandy Carr Lane (View 15) are in open countryside with more expansive views as the motorway runs on embankment across a broad shallow valley.

6.3.60 Woodhouse Lane runs parallel to and within 0.5 km west of the motorway on higher ground with several properties orientated towards the motorway (View 16).

6.3.61 Further north, East Ardsley lies 0.5km west of the motorway on elevated ground (View 11) and experiences views south and eastward to the M1, Junction 41, and the M62/Junction 42.

6.3.62 Numerous public rights of way cross the countryside between Junction 40 and 41 with some routes passing over and under the motorway.

Junction 41 to Junction 42

6.3.63 The motorway in this area is largely enclosed by thick on site planting on its eastern side, screening views from the motorway of the large Wakefield Industrial Park at Lawns, which spreads over a wide area, and the line of pylons which runs parallel to the motorway.

6.3.64 A gap in the eastern on-site planting at Ch299+500 opens up views of a terrace of houses at the junction of Lawns Lane and Lingwell Gate Lane which are very close to the motorway (View 18) although they have views over a short stretch of the motorway. These houses are the closest residential buildings to the motorway along the entire length of the scheme and do have existing views of the motorway together with the existing lights and gantries. Further to the north, a cluster of properties on Lingwell Nook Lane (off Castle Head Lane) has views of the motorway on embankment although substantial planting provides screening even in winter.

6.3.65 To the east, East Ardsley is located along the ridgeline, connecting to The Falls to the north with its distinctive terraced housing visible from the motorway. There are also individual properties and small clusters of houses within the visual envelope such as along Cave Lane (View 17). Properties to the west, close to the motorway, such as those on Lingwell Gate Lane, west of the M1 are well screened by on and off-site planting.

6.3.66 The new residential development at Lingwell Nook close to the motorway and just south of Junction 42 is well screened by on-site planting, although northerly views exist towards the junction.

Table 6.9: Summary of the key visual receptors

Location and description West (W) or (E) of motorway	Distance from motorway	Existing view
Crigglestone – houses on Cliffe Rd / Hollin Lane (E) – VIEW 1	750m	Elevated view north over Calder Valley and motorway corridor

Location and description West (W) or (E) of motorway	Distance from motorway	Existing view
Durkar – houses on northern edge of settlement (E)	500m	Views north to sparsely planted motorway embankment
Calder Grove houses on northern edge of settlement and Cedar Grove Hotel (W)	250m	Filtered views of motorway on embankment
Calder Park Business Park (E)	250m	Views of motorway on embankment from some buildings
City of Wakefield Golf Course and listed Club House (E) – VIEW 2	1.5 km	Filtered views of motorway in the distance through on site planting
Cyclist and walkers on National Cycle Route 69 and public footpaths following railway and River Calder (W + E)	n/a	View of motorway on embankment with river and railway bridges
Residents of Horbury south of A642 and users of playing fields and public footpaths (W) – VIEW 6	500m	Views of motorway on embankment with some intervening vegetation filtering views
Carr Lodge Grade II listed building (currently unoccupied and boarded up) (W)	1.2km	Filtered views with school and housing in foreground across Calder Valley with motorway visible on embankment
Lupset – houses on Lennox Avenue, Cleveland Grove and Cleveland Garth (E) – VIEW 4	50m	Filtered views of nearby motorway on embankment
Lupset – houses on Airedale Heights facing south and walkers on nearby public footpath (E) – VIEW 5 + 7	1km	Distant filtered views of motorway crossing Calder Valley
Offices on Bennett Avenue, Horbury (W)	20m	Direct view of carriageway from upper office windows – some screening from on site planting
Horbury - houses facing north in Hall Cliffe area (W)	1km	View of motorway as carriageway rises up to Junction 40

Location and description West (W) or (E) of motorway	Distance from motorway	Existing view
Ossett Spa - houses on Spa Street / Spring End (W) – VIEW 8	250m	Filtered views of motorway on embankment
Haggs Hill – houses on Baptist Lane, Roundwood Road and Teall Court (W)	100 – 150m	Filtered views of motorway through woodland thickets
Holiday Inn Hotel on Queen's Drive (E)	250m	Views down slope to motorway at Junction 40
Walkers on footpath leading off Park Mill Lane overbridge (W) – VIEW 10	50m	Wide panorama of valley to north containing motorway
Lodge Hill Farm, Lower Park Farm, New Park Grange (W)	750 – 1km	View eastwards across valley containing motorway
Walkers on footpaths to west of motorway	n/a	Views eastwards across valley containing motorway
House at Golden Elders on Batley Road, Jaw Hill (W) – VIEW 14	500m	View south along alignment of motorway
Park Mill Farm and Low Laithes Farm (E)	300 – 400m	Filtered views of motorway crossing valley
Kirkhamgate – houses along Batley Road facing south west (E) – VIEW 13	75 – 750m	Open view across valley containing motorway
Kirkhamgate – houses and public footpath off Brandy Carr Road including Kirkham Avenue, Hawthorne Close (E)	200 – 300m	Filtered view of motorway with on site planting
Houses on Woodhouse Lane including Woodhouse Hall Farm (W) – VIEW 16	250 – 600m	Views from higher ground towards motorway in mid distance of view. Some intervening vegetation
Brandy Carr – houses on Brandy Carr Lane (E) – VIEW 15	600m	Views across valley to motorway with intervening vegetation
Footpaths from Brandy Carr Lane towards motorway	n/a	Views across valley to motorway with intervening vegetation
Properties at Melbourne Mews on Brandy Carr Road (E)	1.2km	View across valley to motorway with intervening vegetation

Location and description West (W) or (E) of motorway	Distance from motorway	Existing view
Offices at Melbourne House (E)	1km	View across valley to motorway with intervening vegetation
East Ardsley – houses on eastern edge beside Main Street / Fall Lane including Grade II* listed East Ardsley Hall (W)	700m	Views from higher ground with motorway in middle distance in foreground of Wakefield 41 Industrial Park
Cave Lane – houses along dead end lane off Fall Lane (W) – VIEW 17	400 – 700m	Lane slopes downhill towards motorway with views to east
Public footpaths eastwards from East Ardsley (W)	n/a	Views over open farmland towards motorway and further eastward
The Fall - terraced houses in parallel street pattern (W)	600m	Views to south east to motorway with partial screening
Lingwell Nook housing area (W)	250m	Views towards motorway on embankment, heavily screened by on site planting
Terraced houses at junction of Lawns Lane and Lingwell Gate (E) – VIEW 18	10 – 20m	Close views of southbound carriageway from rear of properties including large road sign
Lingwell Gate – houses on Lingwell Nook Lane (E)	200m	Motorway on embankment with established on site planting

Views from the road baseline

6.3.67 Between junctions 39 and 42 there are a range of views from the motorway. They are similar when travelling northbound or southbound on the M1.

6.3.68 Immediately north of junction 39 the motorway is on a high embankment. Vehicle travelers have views both east and west over the valley of the River Calder. To the east the view is attractive, well wooded with large waterbodies. However, the skyline is dominated by the residential development of Horbury. The business park to the east is not particularly attractive however the wider view of the wooded skyline and the golf course is positive. As the motorway approaches the bridge over the A642 there is dense woodland planting on the embankment verges which limit the views of the suburban housing. North of this the motorway goes into cutting with mature planting so there are no wider views other than at chainage 292400 where there is a glimpsed view of grazing fields with Hall Cliffe on the horizon. At Ossett Spa the motorway is cut into slope allowing views to the west of trees

and suburban housing. The slope to the east precludes any extensive views. As travellers approach junction 40 the motorway goes into cutting.

6.3.69 North of junction 40 and Park Mill Lane the views open up and expansive views east and west are visible. These are attractive with rolling farmland. At Kirkhamgate the road goes briefly into a wooded cutting beyond which the views open out again with attractive farmland and isolated farmsteads.

6.3.70 At the approach to junction 41 the electricity transmission line crosses the motorway and then turns north to run parallel - the pylons are a dominant part of the view. The road goes into cutting at the junction.

Between junction 41 and 42 the road is at grade. The major industrial units to the east are screened by dense woodland; however the farmland to the east is attractive. As travellers approach junction 42 the road is on embankment but views are screened by verge

6.3.71 woodland. Motorway infrastructure - gantries lights and overbridges dominate the visual experience.

6.3.72 The views of travellers moving south are very similar to the northbound as the key views are sideways from the motorway rather than along it.

6.4 Value (Sensitivity) of the resource

6.4.1 Landscape sensitivity is assessed for the character areas as set out in paragraph 6.2.11.

- The West Wakefield Urban Fringe character area is assessed as having a moderate sensitivity to change. The landscape, by nature of its character, would be able to accommodate change of the type proposed.
- The Leeds Wakefield Urban Fringe character area has a moderate sensitivity to change. The landscape, by nature of its character, would be able to accommodate change of the type proposed.
- The East Ardsley Residential Wooded Ridgetops character area has a moderate sensitivity to change.

6.4.2 The sensitivity of the visual receptors is established in accordance with the criteria set out in Table 6.5 and is shown for each receptor in the visual effects schedule Table 6.10.

6.5 Regulatory / policy framework

6.5.1 The main regulatory framework is set by the following legal and planning instruments.

- The assessment of landscape and visual effects arises within the EIA process through Article 3 of the 1997 Directive (Council Directive 97/11/EC);
- Development Plans
- Leeds Unitary Development Plan (UDP) Review adopted July 2006 and
- Wakefield Council Local Development Framework (LDF) adopted 2009.
- Green Belt – the corridor lies within the Green Belt (with the exception of the areas of residential, commercial and industrial development) as designated in the Leeds UDP and Wakefield Council LDF.

The scheme incorporates the appropriate guidelines and recommendations from these plans and frameworks.

6.5.2 The relevant landscape and planning designations are shown in Figure 6.2.

6.6 Design, mitigation and enhancement measures

Mitigation measures during construction

6.6.1 During construction the most important mitigation is to ensure that existing vegetation is protected from the works and that clearance is carefully controlled to ensure minimal removal. All areas of vegetation to be retained would be protected by fencing during construction in accordance with current best practice and in line with the Construction Environmental Management Plan (CEMP).

6.6.2 Where land would be used temporarily, such as for compounds, re-grading areas etc, then this land would be returned to a condition suitable for the continuation of the original use. This would include replanting trees, hedgerows, shrubs and grass where these have had to be removed.

6.6.3 **Mitigation measures during operation**

6.6.4 Mitigation measures for landscape and visual impacts for a MM-ALR scheme are: localised adjustments to the location of new features such as gantry signs and new planting within the highway boundary. Off-site planting is not an option for MM-ALR schemes as all works are within the highway boundary.

6.6.5 The positioning of features such as gantry and verge mounted signs are primarily determined by highway design standards. However, there is some scope for small scale variations in location of a few tens of metres.

6.6.6 The approach to the development of mitigation measures is an iterative process, involving the exchange of information between the engineering design team and landscape architects. During the development of the proposals, the location of several elements of the scheme were challenged; the key one being the Location of Gantry Sign No 20

6.6.7 The double span gantry at site 20 was visually intrusive for residents of properties on Lawns Lane, due to the size of the gantry, its proximity of, initially, about 180m, and the angle of the housing which would provide oblique views of the gantry.

6.6.8 The options for adjusting the location of this gantry have been considered, and during the design process the gantry has been moved approximately 54m south to reduce potential impacts. There is little or no scope for moving the location of the gantry any further south without compromising the road safety requirements of the scheme. A significant alteration in position – some 50m or so further south would be required to reduce the visual effect.

6.6.9 The following text identifies the new features to be incorporated into the Proposed Scheme and the planting mitigation proposed to address the landscape and visual impacts. The locations are shown in Figure 6.5.

Location	**1**	Ch 289+350
Sign		Verge side MS4
Impact		Existing woodland vegetation on verges limits views from Crigglestone / Calder Grove west to Kirkdale Drive and east to Howard Crescent.
Mitigation		No mitigation required.

Location	**2**	Ch290+020
Sign		Verge side MS4
Impact		Sign screened from the west by existing trees.
Mitigation		No mitigation required.

Location	**3**	Ch290+260
Sign		Verge side MS4
Impact		No receptors to the north, but rear of sign will be visible from A636 and Denby dale.
Mitigation		Extend woodland/tree planting on verge between exit land and southbound carriageway.

Location	**4**	Ch290+551
Sign		MS4 on cantilevered gantry
Impact		Limited views from business park.
Mitigation		No mitigation.

Location	**5**	Ch290+860
Sign		MS4 on super span gantry
Impact		Clear views of illuminated face from the edge of Horbury to the north west.
Mitigation		Woodland/tree planting on west verge.

Location	**6**	Ch291+396
Sign		Verge side MS4
Impact		Views from nearby residential properties screened by existing woodland/trees.
Mitigation		No mitigation required.

Location	**7**	Ch291+776/779
Sign		Verge side MS4 on super span gantry
Impact		Views from nearby housing limited by existing vegetation
Mitigation		No mitigation required

Location	**8**	Ch292+729
Sign		MS4 on super span gantry
Impact		Views east and west screened by embankments and woodland/tree planting. Potential view of illuminated face from the south – Rochester Drive.
Mitigation		Woodland/tree planting on west verge south of the sign at ~ Ch292+500

Location	**9**	Ch293+311
Sign		Verge side MS4
Impact		Limited views from houses on the south west.
Mitigation		Woodland/tree planting on west verge.

Location	**10**	Ch293+884
Sign		Verge side MS4
Impact		Distant views only from the south-west - Ossett and northwest - Shepherd Hill.
Mitigation		Woodland planting on exit ramp verge [west side] would reduce impact on views from northwest of the illuminated face of the sign.

Location	**11**	Ch294+495/520
Sign		Verge side MS4
Impact		This location is in a cutting – very limited visual impact.
Mitigation		No mitigation required.

Location	**12**	Ch295+340
Sign		MS4 on super span gantry
Impact		Highly exposed site but with limited receptors – nearby Lodge Hill Farm and Tufty Farm to the southwest and distant views from the northwest Gawthorpe.
Mitigation		Woodland/tree planting on west + east embankment slope.

Location	**13**	Ch 295+882 and Ch 295+970
Sign		2 no Verge side MS4
Impact		Limited visibility from west but views from houses on Batley Rd Kirkhamgate.
Mitigation		Very limited space on eastern verge for planting but a line of trees would reduce visibility of the illuminated face of the MS4 next to the southbound carriageway.

Location	**14**	Ch296+567
Sign		Verge side MS4
Impact		This location is screened by trees and embankment – very limited visual impact.
Mitigation		No mitigation required

Location	**15**	Ch297+040
Sign		MS4 on gantry over southbound carriageway
Impact		Highly exposed site but with limited receptors. Some distant views from northeast and northwest.
Mitigation		Woodland/tree planting on east + west embankment slope.

Location	**16**	Ch297+290
Sign		Verge side MS4
Impact		Some limited views of rear of sign from northwest.
Mitigation		Woodland/tree planting on west side embankment slope.

Location	**17**	Ch297+999/930
Sign		Verge side MS4
Impact		This location is screened by trees and embankment – very limited visual impact.
Mitigation		No mitigation required.

Location	**18**	Ch298+663
Sign		Verge side MS4
Impact		This location has very limited visual impact.
Mitigation		No mitigation required.

Location	**19**	Ch298+950 and Ch298+978
Sign		Super span gantry and gateway gantry on southbound carriageway
Impact		This location is in cutting – very limited visual impact.
Mitigation		No mitigation required.

Location	**20**	Ch299+494
Sign		Lane signals on super span gantry
Impact		Views of illuminated faces from nearby housing on Lawns Lane 230m away.
Mitigation		Woodland/tree planting on east verge but available area is very limited.

Location	**21**	Ch299+875
Sign		Super span gantry
Impact		This location replaces an existing gantry. Very limited visual impact.
Mitigation		No mitigation required.

Location	**22**	Ch300+205
Sign		Verge side MS4
Impact		This location has very limited visual impact – existing trees screen views.
Mitigation		No mitigation required.

Location	**23**	Ch300+908
Sign		Verge side MS4
Impact		This location has very limited visual impact – within cutting.
Mitigation		No mitigation required.

Location	**24**	Ch301+580
Sign		Verge side MS4
Impact		This location is open but has limited visual receptors.
Mitigation		No mitigation required.

6.6.10 The landscape proposals are based on established good practice and include the use of native plants to reflect the distinctive local character. Dense native tree and shrub planting on and adjacent to highway embankments will be used as appropriate to break up the scale of the MM-ALR and to screen structures and help integrate the Proposed Scheme into the existing landscape fabric.

6.7 Magnitude of the Impact

6.7.1 The construction and operation of the Proposed Scheme will have a variety of temporary and longer term impacts on the landscape quality and views from receptors. The construction of the signs, gantries and ERAs will result in temporary alterations to the existing roadside verges with the loss of established vegetation in certain locations and changes to the profile of cuttings and embankments most notably where the ERAs will be located. However the effect of this vegetation loss will only be slight. Simple mitigation proposals include minimizing construction land take and making good of vegetation lost or damaged during construction, which will reduce any slight landscape/visual impacts as the vegetation matures.

6.7.2 The MS4 VMS signs are approximately 8m high and the gantries extend up to 14.5m [including signs] and will have a much greater potential impact on landscape and views. The lighting of directional signs can have an impact at night. The removal of lighting between Junctions 40 and 41 will also offer a benefit to nighttime views.

Magnitude of impact on Landscape character resource

6.7.3 The magnitude of the impact of the Proposed Scheme on the landscape character is assessed as set out in paragraph 6.2.12. The magnitude of the changes for all the character areas are assessed as negligible adverse which is defined as "Barely noticeable loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements".

Magnitude of impact on Visual receptors

6.7.4 The magnitude of change in the existing view for each receptor is set out in the visual effects schedule Table 6.10.

Landscape and visual effects

6.7.5 The significance of the effects is assessed as set out in paragraph 6.2.13, combining the sensitivity and magnitude to produce a combined effect.

Landscape effects

Overall

6.7.6 For all areas and all scenarios the effect on landscape is negligible to slight adverse. Given the impact of the existing motorway and the relatively minor changes proposed this result is reasonable. The significance of this is that the project is:

- Not entirely in keeping with the character (including quality and value) of the landscape
- Be at variance with characteristic features and elements
- Detract slightly from a sense of place.

6.7.7 However these effects would minor and would not significantly alter the local landscape experience. The proposed mitigation would reduce the impact and the effects on the local landscape character.

Temporary effects on local landscape character areas

6.7.8 The following short term construction effects on local landscape character will be common to all the character areas:

- Vegetation clearance along the roadside will be undertaken early in the contract however this will have limited impact on the wider local landscape character adjacent to the motorway
- The presence of construction materials and plant undertaking the works

6.7.9 Operational effects of the scheme on local landscape character areas:

6.7.10 West Wakefield Urban Fringe LLCA No. 13. The sensitivity of this LLCA is considered to be low and the magnitude of impact on this character area is assessed as negligible adverse. The motorway is an existing feature running through this character area. The Proposed Scheme will introduce MM-ALR and new structures however some will be hidden by existing cuttings (Ch292+100 to Ch292+200) or by established roadside planting such as over Junction 39. The significance of effects on the character areas is assessed as negligible to slight as the Proposed Scheme will introduce new structures on the River Calder motorway

6.7.11 Embankment and the infrastructure element of the existing landscape character will become slightly more dominant.

- Leeds / Wakefield Arable Fringe LLCA No. 14. The sensitivity of this LLCA is considered to be moderate and the magnitude of impact on this character area is assessed as negligible adverse. Again the motorway is an existing feature running through this character area but the landscape surrounding the motorway between Junction 40 and Junction 41 has a rural character. The significance of effects on the character area is assessed as negligible to slight adverse. The Proposed Scheme will introduce MM-ALR and new structures across the shallow valley landscape to the north and south of Kirkhamgate, some of which is on embankment and will slightly increase the motorways impact on the existing local landscape character.
- East Ardsley Residential Wooded Ridgetops LLCA No. 15. The sensitivity of this LLCA is assessed to be moderate and the magnitude of impact on this character area is assessed as negligible adverse. The motorway is an existing dominant feature running close to this character area. The significance of effects on the character areas is assessed as negligible to slight adverse as the Proposed Scheme will generally blend in with the characteristic features and elements and enable sense of place to be restored.

Effect on Historic Landscapes

6.7.12 The proposed works are entirely within the existing motorway boundaries and will have no direct impact on any historic features. The local landscape within the study area is generally of low historic value and will not be affected by the Proposed Scheme. There will be minimal impact on the setting of the listed buildings and conservation areas.

6.8 Visual effects

6.8.1 The significance of the effects of the Proposed Scheme on visual receptors is described below for (a) temporary effects during construction, (b) permanent effects on the landscape character, and (c) permanent visual impacts from sensitive receptors.

Temporary effects during construction

The construction activities likely to give rise to landscape and visual effects are:

- Clearance of trees, shrubs and grass within highway land and along the motorway verge
- Movement of construction plant
- Construction plant including use of cranes
- Any temporary lighting needed for the works
- Stockpiles for soil and materials
- The contractor's compounds, especially when lit during winter working, including the offices, storage of construction material, parking of vehicles and welfare facilities. The works compound is likely to re-use the existing MM compound near J28 on the M62.

6.8.2 Construction activities would result in short term, temporary, adverse effects on landscape character and views from the surrounding properties, businesses, public rights of way and

other public receptors. A description of these effects is described below and summarised in Table 6.10.The most noticeable visual effects during the construction phase are listed below:

Junction 39 – Junction 40

6.8.3 Moderate adverse effects will occur for:

- Cyclists and walkers on National Cycle Route 69 and public footpaths parallel to the River Calder and the railway line; residents of Horbury south of the A642 and users of playing fields and public footpaths.

6.8.4 Slight adverse effects will occur for:

- Houses in Crigglestone; house on the northern edge of Durkar; Calder Business Park; Carr Lodge in Horbury; houses in Lupset around Lennox Avenue and Airedale Heights; offices on Bennett Avenue; houses facing north in Hall Cliffe area of Horbury; houses in Ossett Spa on Spa Street and Spring End; Haggs Hill; and Holiday Inn Hotel on Queen's Drive.

6.8.5 Other locations are considered to be neutral as described in the VES in Table 6.10.

Junction 40 – Junction 41

6.8.6 Moderate adverse effects will occur for:

- Walkers on footpath leading off Park Mill Lane overbridge and other footpaths west and east of motorway; Lodge Hill Farm, Lower Park Farm and New Park Grange; and the house at Golden Elders.

6.8.7 Slight adverse effects will occur for:

- Park Mill Farm and Low Laithes Farm; houses along Batley Road in Kirkhamgate facing south west and off Brandy Carr Road facing north west; houses on Woodhouse Lane; houses on Brandy Carr Lane; properties at Melbourne Mews and offices at Melbourne House.

Junction 41 - Junction 42

6.8.8 Moderate adverse effects will occur for:

- Walkers on footpaths east of East Ardsley; and
- The terrace houses at the junction of Lawns Lane and Lingwell Gate.

6.8.9 Slight adverse effects will occur for:

- Houses on the eastern edge of East Ardsley, along Cave Lane and in The Fall.

6.8.10 Other locations are considered to be neutral as described in the VES in Table 6.10.

Permanent visual effects

6.8.11 The significance of the permanent visual effects are assessed for the winter of Year 1 and the summer of Year 15 following on site planting, to take into consideration the improvement in the screening potential of new planting as the vegetation matures. The results are described below and summarised in the VES in Table 6.10.

Junction 39 – Junction 40: Winter Year 1

6.8.12 Moderate adverse effects will occur for:

- Cyclists and walkers on National Cycle Route 69 and public footpaths parallel to River Calder and the railway line; residents of Horbury south of A642 and users of playing fields and public footpaths.

6.8.13 Slight adverse effects will occur for:

- Houses in Lupset around Lennox Avenue and Airedale Heights; offices on Bennett Avenue; houses facing north in Hall Cliffe area of Horbury; houses in Ossett Spa on Spa Street and Spring End; Haggs Hill and Holiday Inn Hotel on Queen's Drive.

6.8.14 Other locations are considered to be neutral.

Summer Year 15

6.8.15 There are no permanent visual effects as the mitigating planting will mature and screen the new construction.

Junction 40 – Junction 41: Winter Year 1

6.8.16 Moderate adverse effects will occur for:

- Walkers on footpath leading off Park Mill Lane overbridge and other footpaths west and east of motorway; Lodge Hill Farm, Lower Park Farm and New Park Grange; and house at Golden Elders.

6.8.17 Slight adverse effects will occur for:

- Park Mill Farm and Low Laithes Farm; houses along Batley Road in Kirkhamgate facing south west and off Brandy Carr Road facing north west; houses on Woodhouse Lane; houses on Brandy Carr Lane; properties at Melbourne Mews and offices at Melbourne House.

Summer Year 15

6.8.18 There are no permanent visual effects as the mitigating planting will mature and screen the new construction.

Junction 41 - Junction 42: Winter Year 1

6.8.19 Large adverse effects will occur for the houses at the northern end of the terrace at the junction of Lawns Lane and Lingwell Gate.

6.8.20 Moderate adverse effects will occur for walkers on footpaths east of East Ardsley.

6.8.21 Slight adverse effects will occur for houses on the eastern edge of East Ardsley, along Cave Lane and in The Fall.

6.8.22 Other locations are considered to be neutral.

Summer Year 15

6.8.23 With the exception of a slight adverse impact on houses at the northern end of the terrace at the junction of Lawns Lane and Lingwell Gate there are no permanent visual effects as the mitigating planting will mature and screen the new construction.

Night time effects

6.8.24 The VMS and gantry signs are internally illuminated and will be visible at night from those receptors with views of the front face of the signs. Greater emphasis has therefore been given to the potential impacts on those receptors on the "upstream" side of these signs. The motorway between Junctions 41 and 42 within this study is lit with high lighting columns so the impact of illuminated signs on visual receptors will be much less than where the motorway was not lit.

6.8.25 Between Junctions 40 and 41, the motorway is currently lit but the lamp columns are being removed so this section will become darker. Whilst the new illuminated signs will be clearly apparent, the overall light levels in this section will significantly decrease.

6.8.26 The reflected glare from externally illuminated directional signs can be significant. The receptors on the southside of signs for the northbound carriageway and on the northside of signs for the southbound carriageway may experience night time visual effects even at some distance from the sign. The proposed mitigation planting will reduce these effects over time.

6.8.27 The signs on the gantry at ch 299+494 near Lawns Lane are facing north so there could be night time impacts for the receptor in this location. The existing woodland partially screens the view so only the northernmost properties in the row of housing at Lawns lane would experience significant views. The proposed mitigation would help reduce this impact in time.

Views from the road effects

6.8.28 The major visual elements of the proposed works are limited to the new signs, gantries and loss of existing roadside vegetation in some locations. The key impact will be the new gantries which will increase the visual presence visibility of motorway infrastructure. However, they will not impact significantly on the existing views from the road as they do not interrupt existing sideways views of the surrounding landscape.

Table 6.10:Visual Effects Schedule (VES)

The VES sets out the full details and breakdown of the visual effects and how they are established – the explanation of the terms and the justification for the values allocated are given in the text.

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
Junction 39 – Junction 40				N = northbound carriageway S = southbound carriageway				
Crigglestone – houses on Cliffe Rd / Hollin Lane (E) 2no – VIEW 1	750m [from start of scheme]	High	Elevated view north over Calder Valley and motorway corridor	View of conditioning VMS (N), termination VMS (S) and termination signs at J39	Minor	Slight adverse	Neutral	Neutral
Durkar – houses on northern edge of settlement (E) 35no	500m	High	Views north to sparsely planted motorway embankment	Back of termination VMS (S) may be visible	Minor	Slight adverse	Neutral	Neutral
Calder Grove houses on northern edge of settlement and Cedar Grove Hotel (W) 8no	250M	High	Filtered views of motorway on embankment	No change - existing planting at J39 will screen structures	No change	Neutral	Neutral	Neutral
Calder Park Business Park (E)	250M	Low	Views of motorway on embankment from some buildings	Oblique views of termination VMS (S) and gateway gantry (N)	Negligible	Slight adverse	Neutral	Neutral

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
City of Wakefield Golf Course and listed Club House (E) – VIEW 2	1.5KM	Low	Filtered views of motorway in distance through one site planting	Distant view of LED on termination VMS (S) at J39	No Change	Neutral	Neutral	Neutral
Cyclist and walkers on National Cycle Route 69 and public footpaths following railway and River Calder (W + E)	n/a	High	View of motorway on embankment with river and railway bridges	Oblique view of LED on termination VMS (S) at J39	Minor	Moderate adverse	Moderate adverse	Neutral
Residents of Horbury south of A642 and users of playing fields and public footpaths (W) [42no] – VIEW 6	500m	High	Views of motorway on embankment with some intervening vegetation filtering views	Oblique view of back of gateway gantry (N)	Moderate	Moderate adverse	Moderate adverse	Neutral
Carr Lodge Grade II listed building -currently unoccupied (boarded up) (W)	1.2km	Low	Filtered views with school and housing in foreground across Calder Valley with motorway visible on embankment	Partial oblique view of rear of gateway gantry (N)	Moderate	Slight adverse	Neutral	Neutral
Lupset – houses on Lennox Drive, Cleveland Grove and Cleveland Garth (E) [14no] – VIEW 4	50m	High	Filtered views of nearby motorway on embankment	Possible view of top of VMS (N)	Minor	Slight adverse	Slight adverse	Neutral

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
Lupset – houses on Airedale Heights facing south [13 no]and walkers on nearby public footpath (E) – VIEW 5 + 7	1km	High	Distant filtered views of motorway crossing Calder Valley	Possible long distance view of termination VMS at J39	Negligible	Slight adverse	Slight adverse	Neutral
Offices on Bennett Avenue, Horbury (W)	20m	Low	Direct view of carriageway from upper office windows – some screening from on site planting	Closer view of vehicles following MM-ALR	Moderate	Slight adverse	Slight adverse	Neutral
Horbury - houses facing north in Hall Cliffe area [25no](W)	1km	High	View of motorway as carriageway rises up to Junction 40	Views of LED on conditioning VMS (N) at J40	Negligible	Slight adverse	Slight adverse	Neutral
Ossett Spa - houses on Spa Street / Spring End (W)[19no] – VIEW 8	250m	High	Filtered views of motorway on embankment	Oblique view of VMS (N) where gaps in on - site planting	Minor	Slight adverse	Slight adverse	Neutral
Haggs Hill – houses on Baptist Lane, Roundwood Road and Teall Court (W)[27no]	100 – 150m	High	Filtered views of motorway through woodland thickets	Possible view of top of gateway gantry (S)	Minor	Slight adverse	Slight adverse	Neutral
Holiday Inn Hotel on Queen's Drive (E)	250m	Low	Views down slope to motorway at Junction 40	Side view of conditioning VMS (N) at J40	Moderate	Slight adverse	Slight adverse	Neutral
Junction 40 – Junction 41								

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
Walkers on footpath leading off Park Mill Lane overbridge (W) – VIEW 10	50m	High	Wide panorama of valley to north containing motorway	Gateway gantry LED (N) with VMS (N) beyond. ERA (N) may be visible	Moderate	Moderate adverse	Moderate adverse	Neutral
Lodge Hill Farm, Lower Park Farm, New Park Grange (W)	750 – 1km	Moderate	View eastwards across valley containing motorway	Oblique views of gateway gantry LED (N), VMS (N) and VMS (S). ERA (N) may be visible	Moderate	Moderate adverse	Moderate adverse	Neutral
Walkers on footpaths to west of motorway	n/a	High	Views eastwards across valley containing motorway	Oblique views of gateway gantry LED (N), VMS (N) and VMS (S). ERA (N) may be visible	Minor	Moderate adverse	Moderate adverse	Neutral
House at Golden Elders on Batley Road, Jaw Hill (W) – VIEW 14	500m	High	View south along alignment of motorway	Rear view of VMS (N) and gateway gantry (N)	Moderate	Moderate adverse	Moderate adverse	Neutral
Park Mill Farm and Low Laithes Farm (E)	300 – 400m	Moderate	Filtered views of motorway crossing valley	Filtered oblique views of gateway gantry (N) and VMS (N) and VMS (S)	Minor	Slight adverse	Slight adverse	Neutral
Kirkhamgate – houses along Batley Road facing south west (E) [51no] – VIEW 13	75 – 750m	High	Open view across valley containing motorway	Oblique views of VMS (S) including LED and rear oblique views of VMS (N) and gateway gantry (N)	Minor	Slight adverse	Slight adverse	Neutral

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
Kirkhamgate – houses and public footpath off Brandy Carr Road including Kirkham Avenue, Hawthorne Close (E)[15no]	200 – 300m	High	Filtered view of motorway with on site planting	Possible view of ERS (S) and rear view of gateway gantry (S)	Minor	Slight adverse	Slight adverse	Neutral
Houses on Woodhouse Lane including Woodhouse Hall Farm (W) [21no]– VIEW 16	250 – 600m	High	Views from higher ground towards motorway in mid distance of view. Some intervening vegetation	Oblique view of gateway gantry (S)	Minor	Slight adverse	Slight adverse	Neutral
Brandy Carr – houses on Brandy Carr Lane (E)[31no] – VIEW 15	600m	High	Views across valley to motorway with intervening vegetation	ERA (S) visible from certain angles. Oblique view of gateway gantry (S)	Minor	Slight adverse	Slight adverse	Neutral
Footpaths from Brandy Carr Lane towards motorway	n/a	High	Views across valley to motorway with intervening vegetation	ERA (S) visible from certain angles. Oblique view of gateway gantry	Negligible	Slight adverse	Slight adverse	Neutral
Properties at Melbourne Mews on Brandy Carr Road (E) [10no]	1.2km	High	View across valley to motorway with intervening vegetation	Oblique view of gateway gantry (S) possible through intervening vegetation	Negligible	Slight adverse	Slight adverse	Neutral
Offices at Melbourne House (E)	1km	Low	View across valley to motorway with intervening vegetation	Oblique view of gateway gantry (S) possible through intervening vegetation	Negligible	Slight adverse	Slight adverse	Neutral
Junction 41 – Junction 42								

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
East Ardsley – houses on eastern edge beside Main Street / Fall Lane including Grade II* listed East Ardsley Hall (W) [29no]	700m	High	Views from higher ground with motorway in middle distance in foreground of Wakefield 41 Industrial Park	Oblique view of gateway gantry (S) is possible through intervening vegetation	Negligible	Slight adverse	Slight adverse	Neutral
Cave Lane – houses along dead end lane off Fall Lane (W) [11 no] – VIEW 17	400 – 700m	High	Lane slopes downhill towards motorway with views to east	Oblique view of gateway gantry (S) is possible through intervening vegetation	Negligible	Slight adverse	Slight adverse	Neutral
Public footpaths eastwards from East Ardsley (W)	n/a	High	Views over open farmland towards motorway and further eastward	Oblique view of gateway gantry (S) is possible through intervening vegetation	Minor	Moderate adverse	Moderate adverse	Neutral
The Fall - terraced houses in parallel street pattern (W) approx 26no with views	600m	High	Views to south east to motorway with partial screening	Oblique view of gateway gantry (S) is possible through intervening vegetation	Negligible	Slight adverse	Slight adverse	Neutral
Lingwell Nook housing area (W) [5no]	250m	High	Views towards motorway on embankment, heavily screened by on site planting	No change	No change	Neutral	Neutral	Neutral
Northern section of terraced houses at junction of Lawns Lane and Lingwell Gate (E) – VIEW 18 [9 no]	10 – 20m	High	Close views of southbound carriageway from rear of properties including large road sign	Partial view of new superspan gantry. Closer view of vehicles following MM-ALR	Moderate	Moderate adverse	Large adverse	Slight adverse

Location and description West (W) or (E) of motorway	Distance from motorway	Sensitivity / Value	Existing view	Change in view resulting from Scheme	Magnitude of impact	Level of visual effects Construction	Winter Y 1	Summer Y 15
Lingwell Gate – houses on Lingwell Nook Lane (E) [14no]	200m	High	Motorway on embankment with established on site planting	No change	No change	Neutral	Neutral	Neutral

6.9 Indication of difficulties encountered

6.9.1 No significant difficulties were encountered.

6.10 Summary

6.10.1 The Proposed Scheme concerns minor modifications along an established motorway corridor, which is already part of the local landscape fabric.

6.10.2 The West Wakefield Urban Fringe LLCA will be able to accommodate several of the new structures as they are located in cutting and well screened at Junction 39. A gateway gantry and termination VMS will be located on the motorway embankment across the Calder Valley and these will alter the existing character locally albeit only slightly.

6.10.3 The Leeds Wakefield Arable Fringe LLCA will be slightly altered north and south of Kirkhamgate between Junctions 40 and Junction 41 by the introduction of new gateway gantries, signage, VMS and ERAs into the rural landscape.

6.10.4 The visual effects of the scheme will be lessened due to the current levels of on-site planting offering good screening of the motorway corridor for properties close to the route, as well as for those with more distant views. The one exception is the houses at the northern end of the terrace at the junction of Lawns Lane and Lingwell Gate between Junctions 41 and 42 which will experience a large adverse effect in winter year 1. The semi-mature nature of the planting results in good screening in many locations, but this is reduced during winter. Additional planting will be undertaken following construction works to infill any gaps and also to screen new structures from sensitive receptors where existing planting is insufficient. The outline proposals for this mitigation planting are shown in Figure 6.5.

6.10.5 The only impact identified in Year 15 is a slight adverse visual impact for the northernmost houses at the junction of Lawns Lane and Lingwell Gate. These houses are very close to the motorway and the existing gantry at Ch299+875. While roadside planting is proposed, and would reduce the visual impact of the new gantry at Ch 299 + 494, the land available for planting is limited and will not screen it entirely. The existing motorway and existing gantry form a significant part of existing views from these houses and it is considered that the new gantry, 230m away, will not greatly reduce the overall amenity of these residential properties.

6.10.6 The assessment of the view from the road indicates that the visual experience of vehicle travellers will not be significantly affected by the proposed works.

7 Ecology and Nature Conservation

7.1 Study area

7.1.1 The study area for this assessment has been defined by determining a zone of influence encompassing all predicted adverse ecological effects of the scheme, including those which occur by direct land-take and habitat loss and those which occur through disturbance, such as noise.

7.1.2 The search areas for gathering information for the desk study were based on the following distances either side of the carriageway:

- 10km for international statutory designations (eg Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites);
- 2km for national statutory designations (eg Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs); and
- 500m for local site designations (eg Local Nature Reserves (LNRs) and Local Authority or Wildlife Trust non-statutory sites), protected or notable species and ponds that could offer the potential to support great crested newts (GCNs).

7.1.3 The soft estate boundary, plus at least 250m either side of the carriageway, was surveyed during the extended Phase 1 habitat survey, where accessible. The study area for GCN extended to 500m either side of the motorway. Additional surveys are detailed within each of the individual reports, provided in Appendix 7.

7.2 Methodology

7.2.1 The methodology follows the guidance set out in the *Design Manual for Roads and Bridges* (DMRB*) Volume 11, Section 3, Part 4 – Ecology and Nature Conservation*, which provides the framework for assessment of potential impacts of roads projects on nature conservation resources. IAN 130/10 *Ecology and Nature Conservation: Criteria for Impact Assessment* is now used, as part of DMRB, as guidance for the criteria for assessment and it advises that it should be used on all projects for the assessment, design, construction, operation and maintenance of motorway and all-purpose trunk roads.

7.2.2 IAN 130/10 *Ecology and Nature Conservation: Criteria for Impact Assessment* provides an approach to the valuation of resources/receptors (Table 7.1) and the significance of the effects (Table 7.2) to accord with other DMRB topic areas as well as the guidance provided by the Institute of Ecology and Environmental Management (IEEM, 2006).

Table 7.1: Guidance on Describing the Nature Conservation Value of Features

Value	Examples
International or European	Special Protection Areas (SPAs), potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate or possible SACs (cSACs or pSACs); Wetlands of International Importance (Ramsar sites) and resident, or regularly occurring, populations of species which may be considered at an International or European level.
UK or National	Designated sites including: Sites of Special Scientific Interest (SSSIs); Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNRs). Areas of key/priority habitats identified in the UK Biodiversity Action Plan (BAP), areas of Ancient Woodland and resident, or regularly occurring, populations of species which may be considered at a UK or National level.
Regional	Areas of key/priority habitats identified in the Regional BAP (where available); areas that have been identified by regional plans or strategies as areas for restoration or re-creation of priority habitats. Species whose loss of a population would adversely affect the conservation status or distribution of the species at this scale or the population forms a critical part of a wider population.
County or Unitary Authority Area	Designated sites such as Regional Wildlife Sites (RWS) and Local Nature Reserves (LNRs). Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key/priority habitats identified in the Local BAP. Species whose loss of a population would adversely affect the conservation status or distribution of the species at this scale or the population forms a critical part of a wider population.
Local	LNRs and areas of habitat; or populations/ communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.

7.2.3 Where receptors are considered to be of less that local value, then the terminology has been used in accordance with *Transport Analysis Guidance 3.3.10 The Biodiversity Sub-Objective*, where 'Negligible' is used to value receptors of very low importance and rarity at the local scale, which have little or no biodiversity interest.

7.2.4 The potential impacts of the Proposed Scheme on ecological receptors is described and assessed in detail, using the following criteria:

- Positive or Negative;
- Probability of occurring: Certain, Probable, Unlikely;
- Complexity: Direct, Indirect, Cumulative;

- Extent: Area measures and percentage of total;
- Size: Description of level of severity (eg complete loss, numbers of animals affected;
- Reversibility: Reversible or Not Reversible;
- Duration: Permanent or Temporary; and
- Timing and Frequency: Important seasonal and/or life-cycle constraints and any relationship with frequency considered.

7.2.5 Table 7.2 sets out the criteria for the assessment of the overall significance of potential effects to the existing ecological resource, based on professional judgement.

Table 7.2: Significance of Effects

Significance Category	Typical Descriptors of Effect
Very Large	An impact on one or more receptor(s) of International, European, UK or National value. NOTE: only adverse effects are normally assigned this level of significance. They should be considered to represent key factors in the decision-making process.
Large	An impact on one or more receptor(s) of Regional value. NOTE: these effects are considered to be very important considerations and are likely to be material in the decision-making process.)
Moderate	An impact on one or more receptor(s) of County or Unitary Authority Area Value. NOTE: these effects may be important, but are not likely to be key decision-making factors.
Slight	An impact on one or more receptor(s) of Local value. NOTE: these effects are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project
Neutral	No significant impacts on key nature conservation receptors. NOTE: absence of effects, or those that are beneath levels of perception

7.3 Baseline conditions

7.3.1 To inform an appraisal of the nature conservation value, the study area of the Proposed Scheme was surveyed in June 2010 by WSP (Appendix 7.1). The habitats were classified and mapped, and dominant plant species were recorded and presented in the standard extended Phase 1 habitat survey format (JNCC, 2010[1]). Note was taken of the more conspicuous fauna, and any evidence of, or potential for the presence of protected, notable or Biodiversity Action Plan (BAP) species was recorded within and immediately adjacent to the study area. Ecological

[1] Joint Nature Conservation Committee (2010) *Handbook for Phase I Habitat Survey – a Technique for Environmental Audit*, reprinted 2010, JNCC, Peterborough

data to confirm the locations of statutory and non-statutory designations were received from West Yorkshire Ecology (WYE), Environment Agency, AOne+ (the Managing Agent Contractor for this area for the Highways Agency), North, East and West Yorkshire Amphibian and Reptile Group (NEW Yorks ARG) and the *Multi-Agency Geographical Information for the Countryside* (MAGIC) website[2].

7.3.2 Establishment of baseline conditions involved a review of the available data and the extended Phase 1 habitat survey. Additional field surveys were carried out where the Phase 1 survey and desk study data indicated that there was a potential for significant ecological impacts as a result of the scheme, in particular where there was the potential for rare or protected species or habitats to be impacted. Full methodologies and results for each of the surveys carried out are provided in Appendix 7.

Designated Sites

7.3.1 An Assessment of the Implications on European Sites (AIES) has beenundertaken (HHJV, 2013). The assessment concluded that there is no risk of potential impacts on European sites from this project. This conclusion is supported by Natural England.

7.3.2 There is one European statutory designation within 10km of the study area, namely, Denby Grange Ponds SAC which is located 4km west of the scheme. The primary reason for the designation of this site is the presence of GCNs.

7.3.3 There are four non-statutory designated sites located within 500m of the Proposed Scheme. The terminology used for non-statutory sites varies between metropolitan districts – the Wakefield local plan refers to these as Wakefield Nature Areas (WNA). These are, from south to north:

- Horbury Lagoons WNA 47. These are wetland features associated with the River Calder and located adjacent to the soft estate on both sides of the M1 north of Junction 39.
- Lupset Golf Course Ponds WNA 38. This site is located between the southbound carriageway and the railway line, and southwest of Wakefield.
- Roundwood WNA 43. This is an area of grassland, scrub and bracken located adjacent to the soft estate south of Junction 40.
- Lofthouse Colliery WNA 35. This is an area of wetlands, grassland and heathland located about 180m east of Junction 42.
-

7.3.4 The locations of designated sites within the study area are shown on Figure 2.3 – Environmental Constraints Plan.

Habitats

7.3.5 Habitats present within the soft estate comprise: semi-improved neutral grassland, plantation woodland, dense / continuous and scattered scrub, bare ground and ephemeral vegetation, and running water.

[2] *Multi-Agency Geographical Information for the Countryside*. Available at: http://magic.defra.gov.uk/

7.3.6 *Semi-improved neutral grassland*. The majority of the land on both the northbound and southbound carriageways, particularly between Junctions 40 and 41, comprises species-poor semi-improved neutral grassland, which is maintained by the Highways Agency. Species present include perennial rye grass *Lolium perenne*, tufted hair-grass *Deschampsia cespitosa*, cock's-foot *Dactylis glomerata*, ribwort plantain *Plantago lanceolata*, hogweed *Heracleum sphondylium*, creeping thistle *Cirsium arvense* and broad-leaved dock *Rumex obtusifolius*.

7.3.7 *Plantation Woodland*. Areas of plantation woodland are present throughout the entire length of the site, especially immediately north of the River Calder, north of Junction 41 and immediately adjacent to Junctions 39, 40 and 41. The main species present are sycamore *Acer pseudoplatanus*, silver birch *Betula pendula*, *beech Fagus sylvatica*, lime *Tilia* sp. and poplar *Populus* sp. Ground flora in this habitat is generally sparse due to the dense tree canopy blocking light. Species present here include wood avens *Geum urbanum*, holly *Ilex* sp., hogweed, bramble *Rubus fruticosus* agg., lesser celandine *Ranunculus ficaria*, herb robert *Geranium robertianum* and willowherb *Epilobium* sp.

7.3.8 *Dense / continuous and scattered scrub*. Areas of dense and scattered scrub are present throughout the entire length of the site, including adjacent to Ponds 10 and 11, south of Junction 40 and between Junctions 40 and 41. The abundant species are bramble, common nettle *Urtica dioica*, willow *Salix* sp., elder *Sambucus nigra*, hawthorn Crataegus monogyna and silver birch.

7.3.9 *Bare ground and ephemeral vegetation*. Areas of bare earth with developing ephemeral vegetation are present between Junctions 39 and 42. Species include bird's-foot trefoil *Lotus corniculatus*, cat's-ear *Hypochaeris radicata*, black medick *Medicago lupulina* and coltsfoot *Tussilago farfara*.

7.3.10 *Running water*. The River Calder flows under the M1 north of Junction 39. This river is approximately 10m wide and supports a diverse range of aquatic vegetation. The river provides potentially suitable habitat for water vole *Arvicola amphibious*, otter *Lutra lutra*, and foraging and commuting bats.

7.3.11 A number of other smaller streams flow under the carriageway of the motorway. Within the Highways Agency land these have all been culverted.

7.3.12 Additionally, adjacent habitats up to 250m from the highway boundary comprise:

- Broad-leaved semi-natural woodland;
- Improved grassland;
- Semi-improved neutral grassland;
- Arable;
- Urban areas; and
- Aquatic habitats (ditches, standing and running water).

Non-native Invasive Species

7.3.13 One non-native invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is present within the highway boundary, namely Himalayan balsam

Impatiens glandulifera. No evidence of other non native invasive species was noted during the surveys.

7.3.14 The locations of the recorded Himalayan balsam are between junctions 39 and 40 from junction 39 to MP 297/1 on the north and southbound verges. Stands are concentrated around water features, close to the lagoons, the River Calder and an unnamed land drain. It is an offence to plant these species or otherwise cause them to grow in the wild.

Protected and Notable Species

7.3.15 The study area has the potential to support badgers, bats, breeding birds, great crested newts and reptiles. Table 7.3 summarises the surveys for protected species that have been undertaken. The potential for other protected or notable species to occur in the area was scoped out of further assessment.

Table 7.3: Protected Species Surveys

Survey	Methodology	Date	Results and Conclusions
Badgers	Search for setts, latrines, tracks and signs of foraging activity as part of extended Phase I habitat survey.	June 2010[3] (WSP)	No evidence of badger activity was recorded within or adjacent to the site. The networks of habitats present adjacent to HA land provide potentially good habitat for badgers. Suitable habitat within the soft estate exists.
Bat Roost Potential	An inspection of the external features of individual structures and trees as part of an extended Phase I habitat survey.	June 2010 (WSP)	Bridges within the scheme have low or negligible potential to support roosting bats. All of the trees have low or negligible potential. There are limited areas of suitable foraging habitat present. There are no identified roosts within the site boundary.
Breeding Birds	Assessed as part of extended Phase I habitat survey.	June 2010 (WSP)	Common birds have been recorded and are possibly nesting within the soft estate. The scrub and plantation woodland within the soft estate provide suitable habitat for a variety of common bird species. Other bird species are all considered highly unlikely to be nesting within the soft verges.
Great Crested Newts	Ponds within 500m of the scheme were assessed using Oldham *et al* (2001) Evaluating the suitability of habitat for Great Crested Newt.	March 2012 (Halcrow)	Habitat suitability index assessments (HSI) of 20 water bodies identified 6 to be suitable for GCNs and 14 that were unsuitable for GCNs.
	Presence/absence surveys of the ponds	March – June 2012	Populations of GCNs were found in two water bodies. A

[3] It is considered that all surveys undertaken in 2010 are still highly likely to be valid and robust indicators of current status and suitable for use in this assessment, as site conditions have not changed significantly since that time. Where surveys may be required to update these prior to start of construction then recommendations are made within this assessment.

Survey	Methodology	Date	Results and Conclusions
	were carried out in line with English Nature's Great Crested Newt Mitigation Guidelines (English Nature, 2001).	(Halcrow)	medium breeding population was recorded in Pond 12 and a small population in Pond 6. Full survey methods and results including detailed maps are given in Appendix 7. The habitats present in the soft estate within 500m of the ponds provide suitable terrestrial habitat for GCNs and have good connectivity. There is, therefore, potential for GCN presence within the soft estate.
Otter	Assessed as part of extended Phase I habitat survey.	June 2010 (WSP)	Much of the habitat close to the motorway is considered unsuitable for holt building. However, otters may use ditches and the River Calder for movement and foraging.
Reptiles	In accordance with recognised methods and guidelines as described in the *Herpetofauna Worker's Manual* (Gent and Gibson, 1998).	May – August 2012 (Halcrow)	A presence / absence reptile survey did not record any reptiles, although there remains potential for low numbers of grass snake in suitable areas. Full survey methods and results including detailed maps are presented in Appendix 7.
Water Vole	Assessed as part of extended Phase I habitat survey.	June 2010 (WSP)	None of the watercourses close to the motorway were considered suitable for water vole

7.4 Value sensitivity of resource

7.4.1 Tables 7.4 and 7.5 summarise the value of designated sites and habitants and species found within or adjacent to the highway boundary.

Table 7.4: Value of Designated Sites

Site Name	Distance from the Proposed Scheme	Value
Denby Grange Colliery Ponds SAC	4km from Junction 39	European
Horbury Lagoons WNA 47	Adjacent to soft estate north of Junction 39	Unitary Authority

Site Name	Distance from the Proposed Scheme	Value
Lupsett Golf Course Ponds WNA 38	Adjacent to soft estate north of Junction 39	Unitary Authority
Roundwood WNA 43	Adjacent to the soft estate south of Junction 40	Unitary Authority
Lofthouse Colliery WNA 35	180m east of Junction 42	Unitary Authority

Table 7.5: Value of Habitats and Species within the Highways Agency Boundary

Habitat	Justification	Value
Semi-improved neutral grassland	The site represents a very small percentage of the total habitat available in the surrounding landscape. This habitat type is species-poor.	Negligible
Plantation woodland	Plantation woodland is young, species poor and common within the local landscape.	Negligible
Dense / continuous and scattered scrub	Scrub is species poor and common within local landscape.	Negligible
Bare ground and tall ruderal vegetation	This habitat is species poor and common within the local landscape.	Negligible
Running water	The River Calder provides a significant wildlife corridor as well as providing potential habitat opportunities for valued species.	Local
	A number of other smaller streams flow under the carriageway of the motorway. Within the HA land these have all been culverted.	Negligible
Badger	No setts recorded within the HA soft estate	Negligible – but potential for sett-building prior to construction date.
Bats	Lack of suitable roosting habitat on site. Limited potential for foraging over the site.	Negligible
Breeding birds	Habitats including woodland, scrub, hedgerows, trees and rough grassland, throughout the scheme area are suitable for common breeding birds.	Negligible - however potential presence of breeding birds, therefore mitigation required to satisfy legal

Habitat	Justification	Value
		requirements
Great Crested Newt	The habitats present in the soft estate within 500m of GCN breeding ponds provide suitable terrestrial habitat for GCNs and have good connectivity.	Local
Otter	Watercourses close to the motorway are considered unsuitable for holt building but otters may use ditches and the River Calder for movement and foraging.	Negligible
Reptiles	The reptile survey did not record any reptiles.	Negligible
Water vole	None of the watercourses close to the motorway were considered suitable for water vole.	Negligible

7.5 Regulatory/policy framework

7.5.1 The presence of a species or habitat that is protected by legislation is a material consideration in determining development proposals. The following statutes, regulations, policies and plans are relevant.

- The Natural Environment White Paper *Natural Choice: securing the value of nature*, June 2011. The White Paper outlines the government's proposals for the natural environment including: halting overall biodiversity loss, supporting healthy well-functioning ecosystems and establishing coherent ecological networks; enabling partnerships of local authorities, local communities and landowners, the private sector and conservation organisations to establish new Nature Improvement Areas (NIAs) and planning for low carbon infrastructure.
- The Conservation of Habitats and Species Regulations 2010 (as amended): The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the Conservation (Natural Habitats) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law. The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.
- Wildlife and Countryside Act 1981 (as amended): consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive) in Great Britain. It is complemented by the Wildlife and Countryside (Service of Notices) Act 1985, which relates to notices served under the 1981 Act, and the Conservation of Habitats and Species Regulations 2010.
- The Protection of Badgers Act 1992: consolidates and improved previous legislation,

including the Badgers (Further Protection) Act 1991. It is an offence to kill, injure, take, possess or cruelly ill-treat a badger, or to damage or interfere with a sett unless a licence is obtained from a statutory authority. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it.

- Natural Environment and Rural Communities Act 2006: The act extended the biodiversity duty set out in the Countryside and Rights of Way (CRoW) Act to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity. The Duty is set out in Section 40 of the Act and states that: "*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*".

- The government published the National Planning Policy Framework (NPPF) on 27 March 2012. This sets out new guidance for local authorities, focusing on helping to produce planning policies that are clear and easier to understand. The NPPF is effective immediately; however the local plans are still valid, for the time being, even if they have been produced prior to the NPPF. There is emphasis on the need for economic growth through designing planning policies which are in favour of development but this will not be achieved in isolation from social and environmental development. Section 11 sets out the requirements for conserving and enhancing the natural environment. Land previously used for development (brownfield sites) should be favoured as long as they are not considered to be of high environmental value. Of particular note is paragraph 152 of the Plan-Making Section which states, "*Local planning authorities should seek opportunities to achieve each of the economic, social and environmental dimensions of sustainable development, and net gains across all three. Significant adverse impacts on any of these dimensions should be avoided and, wherever possible, alternative options which reduce or eliminate such impacts should be pursued. Where adverse impacts are unavoidable, measures to mitigate the impact should be considered. Where adequate mitigation measures are not possible, compensatory measures may be appropriate*".

7.5.2 The study area falls under both the Wakefield and Leeds Development Frameworks. In accordance with the HA Environment Strategy[4] to "*recognise and respond to our legal responsibilities as well as relevant nature conservation or biodiversity policies, strategies, plans and frameworks" and to support the "development, delivery and promotion of relevant cross-Government biodiversity targets*", the policies of relevance to nature conservation are:

- Wakefield Development Framework
    - Policy D4 – Sites Designated for Biological or Geological Conservation: "*Where the Council considers that any designated site or any species of principal importance for conservation may be affected by a development proposal, an ecological assessment will be required to be submitted with the planning application*".
    - Policy D5 - Ecological Protection of Watercourses and Water Bodies: "*Development on or adjacent to watercourses and water bodies will not be permitted unless it can clearly be demonstrated that there will be no*

[4] Highways Agency, 2011, *Managing our approach to environmental performance: Supporting our Environment Strategy*.

significant harm to any ecological features. Where development is permitted proposals shall include: a. environmentally sensitive engineering methods; b. appropriate wetland features and landscaping; and c. appropriate management schemes for the planning and use of areas of water."

- Policy D6 – Wildlife Habitat Network: "*Development that would adversely affect the integrity and value of the Wildlife Habitat Network across the district or the movement of flora and/or fauna species will only be permitted if it can be demonstrated that reasons of public interest for the development clearly outweigh any significant harm*".
- Policy D7 – Protection of Trees and Woodland: "*Where the Council considers that trees or woodland may be affected by a development proposal, it will require an appropriate tree survey to be submitted with the planning application*".
- Local Development Framework Site Specific Policies include LNR1- LNR16 Local Nature Reserves; and LWS1 – LWS86 Local Wildlife Sites

- Leeds Development Framework
  - Policy N9 – "*All development proposals should respect and where possible enhance the intrinsic value of land in fulfilling a corridor function in terms of access, recreation, nature conservation and visual amenity*."
  - Policy N49: "*Development will not normally be permitted which threatens significant net depletion or impoverishment of the district's wildlife or habitat resources, geological features or landforms design of new development, including landscaping, should minimise its potential adverse impact*."
  - Policy N50: "*Development will not be permitted which would seriously harm, either directly or indirectly, through any means, a SSSI, SEGI [Site of Geological or Geographic Importance] or LNR*."
  - Policy N51: "*The design of new development, including landscaping, should wherever possible enhance existing wildlife habitats and provide new areas for wildlife as opportunities arise where new development is proposed adjacent to an area of existing nature conservation interest, a buffer zone will be required*."

- Biodiversity Action Plans: Following the Convention on Biological Diversity (1992), the UK Biodiversity Action Plan (UKBAP) was published in 1994 (updated 2007[5]) to guide national strategy for the conservation of biodiversity through Species Action Plans (SAPs) and Habitat Action Plans (HAPs), which set conservation targets and objectives. The UKBAP was superseded in July 2012 by the *UK post-2010 Biodiversity Framework* (JNCC and Defra, 2012[6]). The UK list of priority species remains as a reference source and has been used to help draw up statutory lists of priorities. Most areas (including West Yorkshire[7]) now possess a local Biodiversity Action Plan (BAP) to complement the national strategy where priority habitats and species are identified and targets set for their conservation. BAPs are the key nature

[5] http://jncc.defra.gov.uk/default.aspx?page=5155

[6] JNCC and Defra (on behalf of the Four Countries' Biodiversity Group) 2012. *UK Post-2010 Biodiversity Framework*. July 2012. JNCC, Peterborough.

[7] West Yorkshire Biodiversity Action Plan. Available at: http://ukbars.defra.gov.uk/archive/plans/map_county.asp?X=%7B4F74E280-1D20-48D2-B767-EEE177229D9F%7D&CTRY=%7B7C884413-1AC7-48B6-ADCD-23CBA1482CD6%7D&WES=

conservation initiative in the UK, working at national, regional and local levels. The priority habitats and species within both the UKBAP and West Yorkshire Local BAP are relevant to the scheme proposals.

7.6 Design, mitigation and enhancement measures

Construction

Designated Sites and Habitats

7.6.1 In order to minimise any potential effects caused by the construction works, the following best practice methodology will be followed for all construction operations:

- The Contractor will be required to prepare a Construction Environmental Management Plan (CEMP) to include detailed method statements where required for protecting habitats and species, or where measures to mitigate for the presence of invasive species are required;
- The CEMP will specify all measures to prevent accidental spillage or leakage of chemicals and fuels in accordance with the Environment Agency Pollution Prevention Guidelines (PPG);
- Best practice is to be followed in all construction operations to minimise temporary disturbance to land outside the highway boundary (such as noise, run-off, dust, and damage to verges);
- All works in the vicinity of trees to be retained are to be protected in accordance with British Standard *BS5837:2012 - Trees in relation to design, demolition and construction*.
- All construction staff are to receive training on environmental protection such as a Toolbox Talk to be given by Project Environmental Co-ordinator or Project Ecologist prior to the commencement of works on site;
- Construction areas to be clearly defined prior to commencement of works on site and no construction activity, to include temporary storage of materials or vehicles, to be allowed outside these areas;
- Accidental damage to trees and shrubs, for instance caused by construction traffic, will be treated immediately with damaged branches cut-back using hand tools to leave a clean cut; and
- Any habitats and vegetation of areas of high ecological sensitivity to be retained will be fenced off from construction activities.

7.6.2 Semi-natural habitat that is damaged during construction will be re-instated to provide mitigation in the medium to long-term. The re-instatement of semi-improved grassland will be agreed with the project ecologist and landscape architect and would involve the use of a native seed mix, such as British Seed Houses WFG4 Neutral Soils on the road verges, which is considered appropriate considering the nature of the soil and the pre-existing vegetation composition (in some locations a seed-mix such as WFG5 Calcareous Soils may be appropriate). Where the re-seeding is adjacent to existing scrub and woodland a shade-tolerant grassland species mix would be appropriate (eg British Seed Houses WFG8 Shaded Areas). For habitat re-instatement proposals also refer to Chapter 6, Landscape.

Non-native Invasive Species

7.6.3 In order to prevent the spread of Himalayan balsam during construction, control measures will be carried out within the working area. The ideal time for treatment is spring when the plant is small and actively growing and should be carried out before June for maximum effectiveness. Chemical control near water will be carried out using an appropriate herbicide.

7.6.4 The full extent of invasive species within the scheme requiring mitigation prior to site clearance will be resurveyed before construction to ensure that no new stands of Himalayan balsam have appeared. This re-survey will be undertaken in summer 2013 and invasive species will be dealt with appropriately in accordance with best practice[8]. Where there is potential for works to affect non-native invasive species an appropriate working method will be included as part of the CEMP.

Protected and Notable Species

Badgers

7.6.5 Although no badger setts were recorded during the surveys, as a precaution, a badger pre-construction survey will be undertaken along the soft estate and within 30m of the working area. The purpose of this survey will be to ensure that no new setts have been built within the working areas.

Breeding Birds

7.6.6 All works which will involve the removal or disturbance of features, which can be used by breeding birds, will be undertaken outside the main bird breeding season, which is generally March to August inclusive. Where habitat removal is required during the bird breeding season there will be prior consultation with the Project Ecologist to determine appropriate action. The current programme assumes a start of construction works in October 2013 so habitat removal during the bird breeding season is unlikely.

Great Crested Newts

7.6.7 Pond 6 lies 370m from a proposed new MS4 gantry across the carriageway at chainage 290+880. The Horbury Junction Railway, which passes under the M1 at chainage 291+000, lies between Pond 6 and the works, but the railway line is unlikely to present a barrier to GCN dispersal, as, although unsuitable habitat it can be crossed by GCN as trains only pass intermittently . Given the small scale of the construction site (24m^2) for the MS4 gantry and the small population of GCN at Pond 6, it is considered highly unlikely that the species would be impacted by construction works and a European Protected Species Licence (EPSL) will not be required. However, as GCN are known to have a dispersal distance of up to 500m from ponds, there remains a risk that low numbers of GCN could be present on the soft estate within the working area.

7.6.8 As a result, a Precautionary Method of Working (PMW) will be implemented at this location to ensure that an offence is not committed. This is likely to include vegetation stripping and destructive hand searches under an ecological watching brief. If a GCN is found within the works area then works in that location will cease and the situation reviewed to determine

[8] Environment Agency (2010). *Managing Invasive Non-native Plants.* Available at: http://cdn.environment-agency.gov.uk/geho0410bsbr-e-e.pdf

whether an EPSL is required before works can continue. The exact extent and nature of the PMW will be considered by a suitably qualified ecologist once the Detailed Design has been issued.

7.6.9 A proposed ERA lies between 291+620 and 291+710 on the M1, some 516m from Pond 6. Given that this is greater than the 500m GCN dispersal distance, the small scale of works (720m^2), and the small population of GCN at Pond 6, it is considered highly unlikely that the species would be impacted. No further mitigation will be required.

7.6.10 Pond 12 lies about 508m from a proposed new Advanced Directional Sign (ADS). The construction area required for installing the ADS is small at 24m^2. It is considered highly unlikely that GCN would be impacted and, therefore, neither an EPSL nor further mitigation will be required.

7.6.11 In addition to the works detailed above, temporary habitat impacts will arise from cable ducting which will be installed along the entire length of the scheme within a trench 3m from the edge of the carriageway. Disturbance of vegetation is anticipated within this 3m wide strip of verge. At its closest point the ducting will be 291m from Pond 6 and 533m from Pond 12.

7.6.12 It is considered highly unlikely that GCN would be impacted as a result of this cabling work. The approximate area of habitat loss or disturbance >250m from Pond 6 is 833m x 3m, i.e. 0.25ha. In accordance with the Natural England Rapid Risk Assessment Tool[9], this loss/disturbance is considered highly unlikely to result in an offence being committed.

7.6.13 The GCN population in Pond 6 is small (a single GCN was recorded), and with the implementation of non-licensed avoidance measures, the risk of GCNs being disturbed, injured or killed is considered highly unlikely. Therefore, an EPSL will not be required. Measures likely to be included in a non-licensed PMW are provided below. The exact extent and nature of the PMW will be considered by a suitably qualified ecologist once the Detailed Design has been issued, but is likely to include:

- Timing of works to minimise potential for impacts (e.g. vegetation and topsoil will be stripped in these areas in October 2013, when works begin on site. This will be done under the supervision of an ecological watching brief and will ensure the habitat is made unsuitable for hibernating/overwintering GCN);
- Location of the works to avoid potential GCN terrestrial habitat;
- Cutting back of vegetation to ground level during the hibernation period for GCN (November-February inclusive) to discourage use of the habitat;
- Destructive search prior to site clearance; and
- Infill excavations before nightfall when GCN become more active.

7.6.14 Pond 12 is over 500m from the works. It is therefore considered highly unlikely that GCN will be impacted on through cabling works along the southbound side of the M1 in the vicinity of Pond 12. Therefore, an EPSL will not be required. The mitigation proposed here is based on construction works within the existing highway boundary and would need to be reviewed if there are significant changes to the scheme design or the need for temporary off site construction areas.

[9] Natural England. (2012). *Template for Method Statement to Support Application for Licence under Regulation 53(2)(e) in respect of Great Crested Newt*. Form WML-A14-2. Version: August 2012.

Reptiles

7.6.15 Some of the survey areas are near waterbodies (1, 2, 3 and 7 (see Appendix 7.3 for details)) and contained toad and common frogs. Grass snake is an active predator of amphibians and is a good swimmer and often found close to ponds, lakes and rivers. Therefore, reptiles, in particular grass snake, may be present in low numbers within the soft estate. Although the Proposed Scheme will largely retain those habitats which are suitable for reptiles and only small localised areas of vegetation will be affected, without appropriate mitigation, reptiles may present a potential constraint.

7.6.16 It is therefore possible, despite negative results for reptiles during the surveys, that grass snake could be present in low numbers but an extensive translocation exercise is not required. It is recommended that a precautionary clearance of survey areas 1, 2, 3 and 7 should be undertaken. The following measures should be implemented:

- All construction workers will be briefed as to the requirements of the law with respect to reptiles and other protected species. All construction personnel will be briefed as to the species likely to be encountered, the significance of their presence, the statutory protection they are afforded, where they are likely to be encountered, identification features, and what to do if any are found during works;
- Any areas for location of scheme infrastructure will be subject to inspection by an experienced ecologist prior to any works on site. If deemed suitable for reptiles, any piles of rubble, debris, log piles etc. will be dismantled by hand. Vegetation in these locations will be strimmed to a length of less than 300mm and cleared under supervision of the ecologist;
- Site works will avoid the incidental creation of reptile refuges, e.g. piles of cut vegetation. All arisings will be removed from Site.

Operation

7.6.17 Landscape proposals include new woodland screening strips adjoining the new gantries. This woodland habitat will require management in the early stages to ensure establishment (in accordance with Manual of Contract Documents for Highway Works, Volume 1, Series 300[10]. Details of the operation stage requirements for the woodland are included within Chapter 6, Landscape.

7.7 Magnitude of impacts

Construction

Designated Sites

7.7.1 There are no designated sites on the soft estate within the scheme. Therefore, there will be no direct impacts through permanent or temporary habitat loss to designated sites as all works will be within the soft estate.

7.7.2 Denby Grange Colliery Ponds SAC is 4km west of the scheme and GCNs are listed as the qualifying feature. GCNs will move between ponds up to about 1km apart and, therefore, it

[10] DfT *Manual of Contract Documents for Highway Works - Specification for Highway Works*, Volume 1, Series 300. Available at : http://www.dft.gov.uk/ha/standards/mchw/vol1/pdfs/series_3000.pdf

is considered highly unlikely for the scheme to impact the SAC qualifying feature.

7.7.3 Three local wildlife sites lie adjacent to the soft estate. The potential for adverse indirect impacts to these sites is unlikely, although the potential for temporary construction dust to affect nearby areas of the sites and for construction and operation phase run-off to affect water quality will be fully mitigated. For example, by fencing off the construction area to avoid damage to adjoining land, intercepting site run-off in the existing drainage system, and using best practice to minimise dust creation and dispersal. Temporary impacts from construction noise and vibration are not likely to be significantly greater than existing road conditions.

Habitats

7.7.4 Construction working areas associated with installation of ERAs, gantry legs, cabinets and other features will result in some permanent habitat loss. The permanent and negative, direct loss of habitats is likely to comprise semi-improved neutral grassland, plantation woodland and scrub. However the areas affected will be limited in extent (each ERA area impacted will be approximately 500m^2; each gantry working area of approximately 50m^2 and cabinets just a few square metres each, which totals approximately 0.4ha) and, therefore, relatively minor. Working areas will be re-instated after construction and will therefore only be temporary (currently proposed construction period October 2013 to February 2015). In addition, temporary habitat impacts will arise from cable ducting which will be installed along the entire length of the scheme within a trench 2m from the edge of the carriageway. The habitat affected comprises the verge (approximately 3m from the edge of the carriageway) and the working width is small (approximately 2m wide).

Protected and Notable Species

Breeding Birds

7.7.5 All breeding bird species are protected, while nesting, by the Wildlife and Countryside Act of 1981 (as amended). Species recorded were common and widespread and may be breeding within the soft estate. Negative impacts may arise where vegetation clearance is undertaken during the bird breeding season (March to August inclusive). These impacts may be direct and perma^{n}ent (loss of habitat) or indirect and temporary (construction disturbance that may lead to abandonment of a nest) and are probable on a small number of common bird species. Mitigation will satisfy legal requirements and therefore the impact to breeding birds is considered negative, but unlikely to occur.

Great Crested Newts

7.7.6 No ponds are to be directly lost through the scheme. There will be permanent and temporary losses of habitat within the verges which have the potential to support GCN (primarily grassland, scrub and woodland). This potential habitat is connected to two ponds with known GCN populations. However, it is considered that both temporary and permanent loss of habitat, as part of the scheme, is highly unlikely to affect GCN populations in the local area. This is due to the small population sizes recorded, the presence of abundant alternative habitat close to the ponds, the extent of the works (the permanent and temporary loss of potential GCN terrestrial habitat within the soft estate will be small) and the location of proposed ground works.

7.7.7 To avoid incidental injury or mortality to individual newts, mitigation works (as outlined in 7.6 above) will be implemented.

7.7.8 Overall, construction phase impacts of the scheme on GCNs are considered to be negative but unlikely to occur.

Operation

Designated Sites

7.7.9 No direct operation phase impacts to designated sites are predicted and potential indirect impacts from noise are considered to be negligible (refer to Chapter 9, Noise). Air quality

objectives will be met in the majority of locations, with small overall levels of change anticipated and operational air quality effects not significant (refer to Chapter 5, Air Quality), which is therefore considered negligible to designated sites.

Habitats

7.7.10 No operation phase impacts to habitats are predicted and potential indirect impacts from air quality are considered to be negligible (refer to Chapter 5, Air Quality).

Protected and Notable Species

7.7.11 No operation phase impacts to species are predicted and potential indirect impacts from noise and air quality are considered to be negligible (refer to Chapters 5 Air Quality and 9, Noise).

7.8 Significant effects

Designated Sites

7.8.1 All potential construction and operation effects to designated sites are predicted as neutral as there are no direct impacts, with the potential indirect impacts from operational run-off, dust and noise considered minor and not significant.

Habitats

7.8.2 The construction of the scheme will result in a minor residual loss of habitats (it is estimated that total residual habitat loss will be approximately 0.4ha) including semi-improved neutral grassland, plantation woodland and scrub. The effects of temporary loss of habitat are considered neutral following restoration of habitats after the works are complete; the minor overall loss of habitat is considered neutral, due to the minor area and existing low value of the habitat affected. Operation effects to habitats are also predicted as neutral.

Protected and Notable Species

Breeding Birds

7.8.3 The habitats within the scheme have been shown to be of negligible value for breeding birds and, therefore, following the implementation of mitigation measures in accordance with legal requirements the construction and operation effects are considered neutral.

Great Crested Newts

7.8.4 Following the implementation of mitigation measures in accordance with legal requirements the construction and operation effects on GCNs are considered neutral.

Reptiles

7.8.5 Despite negative results for reptiles during the surveys, grass snake could be present in low numbers within survey areas 1,2,3 and 7 (see Appendix 7.3) and it is recommended that a precautionary clearance of these areas should be undertaken following the procedures detailed in section 7.6.14 above and in the CEMP.

Other Species

7.8.6 Significant effects to other species,are not predicted. However, to ensure that impacts are minimised, construction will be undertaken in accordance with procedures detailed in the

CEMP.

7.9 Compliance with Legislation, Policies and Plans

7.9.1 The proposed works need to be compliant with the relevant legislation, and national and local level policies and plans.

- The Conservation of Habitats and Species Regulations 2010 (as amended): Any works that could adversely impact great crested newts could contravene the Act. Therefore, the proposals will need to include measures, outlined above for mitigation to ensure that the relevant legislation is complied with.
- Wildlife and Countryside Act 1981 (as amended): Any works that could adversely impact breeding birds or reptiles could contravene the Act. Therefore, the proposals will need to include measures, outlined above for mitigation to ensure that the relevant legislation is complied with.
- Natural Environment and Rural Communities Act 2006: The Overseeing Organisation needs to ensure that their obligations as a public authority, to biodiversity, are complied with under this Act.
- The Wakefield Development Framework policies D5, D6, D7, LNR1-LNR6 and LWS1-LWS86: The Proposed Scheme has been tested against these policies for the effects to protected species and protection of locally designated sites and is in accordance with these policies.
- The Leeds Development Framework Policies N9, N49, N50 and N51: The Proposed Scheme has been tested against these policies for the effects to protected species and protection of locally designated sites and is in accordance with these policies.
- Biodiversity Action Plans: The Proposed Scheme will not impact habitats and species listed within the UKBAP that are reasonably considered likely to be present. However, there will be a minor impact on two West Yorkshire BAP habitats (neutral grassland, transport corridors) and Highways Agency BAP (boundary, woodland). The Proposed Scheme with the mitigation and habitat restoration proposed is in accordance with the policies and targets within these documents.

7.10 Indication of difficulties encountered

7.10.1 No difficulties likely to affect the outcome of this assessment have been encountered.

7.11 Summary

7.11.1 A simple assessment of the ecology issues with regard to the M1 Junctions 39 to 42 MM-ALR scheme was undertaken. The impact assessment method is based on the requirements set out in the DMRB *Volume 11 Section 3, Part 4, Ecology & Nature Conservation* and IAN 130/10 *Ecology and Nature Conservation: Criteria for Impact Assessment*. The assessment has concentrated on the area immediately affected by the scheme and information gained from up to 2km from the scheme.

7.11.2 There are no statutory designated sites and three non-statutory designated sites with potential to be impacted on by the scheme. The habitat types present within the soft estate are plantation woodland, dense scrub, semi-improved neutral grassland, bare earth with

ephemeral vegetation and running water. Species identified as potentially impacted are breeding birds and GCNs.

7.11.3 Overall, the ecological values of the receptors which will be potentially impacted by the scheme are of up to unitary authority value. Impacts considered are those relating to loss and fragmentation of habitats and disturbance to protected species, both during construction and operation.

7.11.4 Construction-related impacts will be controlled through the implementation of a CEMP, which will include measures to prevent damage to designated sites, protected species and valuable habitats.

7.11.5 Habitat loss is relatively minor, with negative, direct and permanent impacts predicted to scrub and plantation woodland habitats and semi-improved neutral grassland habitat. Mitigation for birds and GCN will be implemented to satisfy legal requirements, with an overall minor loss of habitat, which is considered neutral. All other potential impacts are predicted as neutral.

8 Materials

8.1 Study area

8.1.1 This section provides a 'Simple Assessment' of the potential environmental impacts associated with material resource use and waste during the construction of the Proposed Scheme in accordance with the Highways Agency Interim Advice Note (IAN) 153/11 'Guidance on the Environmental Assessment of Material Resources'.

8.1.2 Material resource use and waste generation during the operational maintenance of the completed scheme is likely to be negligible (by type, duration and volume). Operational materials use and waste have therefore been scoped out of this assessment. The assessment of any environmental impacts associated with material resource use and waste, during any subsequent maintenance or improvement works, will be reported by the Managing Agent Contractor (MAC) in accordance with the requirements of DMRB Volume 11.

8.1.3 For the purposes of this assessment, the definition of materials encompasses the following.

- The use of 'Material Resources'. The definition of material resources, included in IAN 153/11, encompasses the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Material resources include primary raw materials such as aggregates and minerals, and manufactured construction products. Many material resources will originate off site, purchased as construction products, and some will arise on-site such as excavated soils or recycled road planings.
- The generation and management of 'Waste'. Waste is defined in Article 1(a) of the European Waste Framework Directive 2008/98/EC as "any substance or object in the categories set out in Annex I which the holder discards or intends to discard or is required to discard". The term 'holder' is defined as the producer of the waste or the person who is in possession of it and 'producer' is defined as anyone whose activities produce waste. Waste can be further classified as hazardous, non-hazardous or inert.

8.2 Methodology

8.2.1 IAN 153/11 states that for the purposes of assessing the effects associated with materials use and waste the Simple Assessment is a qualitative exercise which should aim to identify the following:

- The materials required for the project and where information is available, the quantities;
- The anticipated waste arisings from the project, and where information is available, the quantities and type (eg hazardous);
- The impacts that will arise from the issues identified in the Scoping exercise in relation to materials and waste;
- The results of any consultation; and

- A conclusion about whether this level of assessment is sufficient to understand the effects of the project or whether Detailed Assessment is necessary.

8.2.2 In reporting the outputs from the Simple Assessment the following project specific information should be identified:

- Description of the current site and whether the project concerns construction, improvement or major maintenance;
- Information about construction methods and techniques (where this information is available at the time of assessment);
- Statutory requirements, such as the need for a Site Waste Management Plan (SWMP) and any other relevant legislation and statutory targets influencing materials resource use and waste management;
- The high level policy and strategy targets influencing materials resource use and waste management; and
- An assessment of the available waste management infrastructure.

8.2.3 IAN 153/11 advises that the data on material resource use and waste should be reported using a Simple Assessment Reporting Matrix. IAN 153/11 also advises that where impacts identified at the Simple Assessment level can be addressed without the need for Detailed Assessment the mitigation measures should be identified using a Mitigation Measures Matrix.

8.2.4 **Value of the resource, magnitude of impact and significance of effect**

8.2.5 Determination of the significance of an environmental effect is derived as a measure of the magnitude and nature of the impact and an understanding of the importance/sensitivity of the affected resource/receptor. For material resource use and waste there is currently no accepted methodology/thresholds for defining impacts and determining the threshold of significance. In these circumstances the following approach to predicting significance has been applied to this assessment.

8.2.6 For material resource use, the potential environmental effects are associated with the extraction and transport of primary raw materials, the manufacture of products, and their subsequent transport to and use on construction sites. Construction projects will consume large quantities of materials and hence may have permanent and direct effects on the environment. For example, effects will occur as a result of the depletion of natural resources and the embodied energy associated with the manufacture and transport of materials. The sensitivity of the resource will be ascertained through a review of the available regional supply of primary aggregates (chosen as a surrogate indicator of the local/regional capacity for natural resources).

8.2.7 For surplus materials and waste, the potential environmental effects are associated with the disposal of arisings from the construction site on the available waste management infrastructure. The sensitivity of the receptor has been ascertained through a review of the regional waste management capacity.

8.2.8 Significant environmental impacts are likely to arise from those materials which are used in the largest quantities, wastes which arise in the largest quantities or which have hazardous properties. Progress can be also made in identifying which impacts are permanent rather

than temporary. Equally it is clear that identifying quantities of materials to be used and waste forecast to be produced provides the basis for assessment of magnitude of change.

8.2.9 The use of materials including the management of waste may also give rise to other impacts which might include, for example, detrimental impacts on air quality and increased noise. However, these associated impacts are covered in their respective sections and therefore scoped out of the impact assessment of material resources.

8.3 Baseline conditions

8.3.1 M1 Junctions 39-42

8.3.2 Waste produced during the maintenance and renewal of this section of the Strategic Road Network, is likely to include soft estate maintenance arisings, gully arisings, oil separator waste, animal by-products, litter and plannings. Material resources used during renewal works are likely to include primary raw materials such as aggregates and manufactured construction products such as asphalt.

8.3.3 **Supply of Primary Aggregates**

8.3.4 Minerals Policy Statement 1 (Planning and Minerals) states that "Mineral Planning Authorities should use the length of the land bank in its area as an indicator of when new permissions for aggregates extraction are likely to be needed. The land bank indicators are at least 7 years for sand and gravel and at least 10 years for crushed rock."

8.3.5 The most up-to-date figures available for primary aggregate production are for 2009. These data are provided in the Yorkshire and Humber Regional Aggregates Working Party (RAWP) Annual Report 2009 (RAWMP, 2009). RAWMP (2009) confirms that as of the 31st of December 2009 the Yorkshire and Humber Region had the following remaining land banks of primary aggregates:

- Sand and Gravel 27.2 years; and
- Crushed Rock 119 years.

8.3.6 **Waste Management Capacity**

8.3.7 The conurbation nature of West Yorkshire means that this area effectively operates as a sub-regional waste management market within the wider Yorkshire and Humber region.

8.3.8 Landfill is currently the predominant way in which waste is managed in the area. Leeds City Council (LCC, 2011) confirms that there are four active landfill sites currently serving Leeds: Skelton Grange landfill (1.5 million m3 of remaining capacity), Peckfield landfill (3 million m3 of remaining capacity), Calverley/Woodhall landfill (250,000 m3 of remaining capacity) and Athington quarry (600,000 m3 of remaining capacity). There are also a number of other sites which have extant planning permission for landfilling including Howley Park Quarries (estimated 6 million m3 of capacity), Britannia Quarry (estimated 2 million m3 of capacity) and Swillington Quarry (estimated 500,000 m3 of capacity). LCC (2011) also confirms that there is significant remaining landfill capacity in both West Yorkshire and North Yorkshire, particularly at Welbeck Landfill Site, in Normanton (Wakefield Metropolitan District Council), which has 12 million m3 of capacity. LCC (2011) further confirms that there are a number of other landfill sites in West Yorkshire which have a large amount of remaining unimplemented capacity.

8.4 Value (sensitivity) of resource

8.4.1 The baseline review has identified that the Yorkshire and Humber region has satisfactory reserves of primary aggregates and that there is sufficient waste management capacity in the West Yorkshire Waste Planning Area. In addition, policy, strategic and legislative drivers are likely to support the on-going provision of sufficient capacity.

8.5 Regulatory / policy framework

8.5.1 Current legislation and policies which are relevant to this assessment and to the sustainable design and construction of the Proposed Scheme are listed below:

- Waste Framework Directive, 2008;
- Government Review of Waste Policy in England, 2011;
- Waste (England and Wales) Regulations 2011;
- Site Waste Management Plans Regulations 2008;
- Waste Strategy for England, 2007;
- Highways Agency Strategic Plan, 2010 – 2015
- Highways Agency Environment Strategy, 2010 – 2015;
- Highways Agency Sustainable Development Plan, 2012 – 2015; and
- Highways Agency Procurement Strategy, 2009.

8.5.2 The review of legislation and policy has indentified the following statutory and policy requirements, influencing materials resource use and waste management, applicable to the Proposed Scheme:

Table 8.1: Applicable statutory and policy requirements

Requirements	Reference
Take all reasonable steps to apply the following waste management hierarchy when transferring waste: (a) prevention; (b) preparing for re-use; (c) recycling; (d) other recovery (for example energy recovery); (e) disposal.	Waste (England and Wales) Regulations
Preparation of a Statutory Site Waste Management Plan	Site Waste Management Plan Regulations
25% (minimum) of products used in construction projects to be from schemes recognised for responsible (sustainable) sourcing by 2012	HA Procurement Strategy
50% reduction of waste to landfill from construction and demolition activities by 2012 (compared with 2008)	HA Environment Strategy; HA Procurement Strategy; Waste Strategy for England.
By 2020, the recovery of non-hazardous construction and demolition waste shall be increased to a minimum of 70 % by weight.	Government Review of Waste Policy in England; HA Procurement Strategy; Waste Framework Directive.

8.6 Design, mitigation and enhancement measures

8.6.1 Material resource use

8.6.2 Materials selection and procurement will be delivered using a Materials Procurement Plan. This will cover all materials used in the construction of the Proposed Scheme. Specification and procurement of materials will favour those that are locally sourced; can use local skilled labour to install; are low in carbon, environmental and user health impact; durable; include recycled materials; and are responsibly sourced.

8.6.3 For the Proposed Scheme, it is envisaged that at least 25% of products used during construction will be derived from schemes recognised for responsible (sustainable) sourcing in order to support the Highways Agency's procurement aspirations.

8.6.4 The generation and management of waste

8.6.5 In order to reduce excavation arisings priority will be given to defining the site profiles to minimise excavated materials. All excavated fill will be re-used on-site where geotechnically and geochemically suitable for use (subject to regulatory controls). Where direct re-use on-site is not possible, or appropriate, the materials will be sent off site for recovery or re-use subject to the appropriate legislative controls. Consideration will be given firstly to the recovery processes. Disposal will only be considered if there are no other options available. Off-site recovery and/or disposal facilities will be sought in close proximity to the application site to prevent further environmental impacts as a result of transportation.

8.6.6 The construction programme may present opportunities for more effective on-site waste management, allowing on-site storage and segregation and re-use of fill material in subsequent stages. Phasing will be considered in the development of the SWMP.

8.6.7 To minimise waste production during the construction phase, the proposed development will, where possible, employ Modern Methods of Construction such as pre-fabrication of units and products off-site as described in the WRAP publication 'Designing out Waste: A Design Team Guide for Civil Engineering Projects'.

8.6.8 Careful quality control during the construction phase will be made to control and minimise waste through limiting over-ordering and materials spoilage; and maximising use of any surplus or 'off-cut' materials. A number of potential actions for reducing waste on site will be considered by the principal contractor. The following solutions are readily available and many are common practice on construction sites:

- Establish an approach to quality control to avoid wastage and rework;
- Minimising stock held through supplier call off arrangements;
- Just-in-time delivery to reduce over-ordering;
- Specify reusable or reduced packaging;
- Provide dedicated storage areas (for new materials) with protection from weather and accidental damage;
- Using packaging materials to protect construction materials;
- Requiring suppliers to take-back packaging not required for on site transit or storage;
- Negotiating reduced wastage rates with sub-contractors;

- Negotiate a 'take back' arrangement with the supplier for unused materials;
- Provide site operatives with training (toolbox talks) on material management, handling and waste reduction;
- Establish dedicated cutting station(s) to avoid wastage;
- Store off-cuts for reuse.

8.6.9 A SWMP will be prepared and implemented in a manner to suit the requirements of the project, in order to ensure: compliance with the Site Waste Management Plans Regulations and that each potential waste stream is evaluated against the waste hierarchy of prevention, prepare for reuse, recycling, recovery, and disposal to derive management options that reflect the highest possible level within the hierarchy.

8.6.10 The most appropriate guidance is that developed by WRAP, which also includes a SWMP template and other resources such as Toolbox Talks on SWMPs for site/project managers, waste champions and site operatives. The Template and Guidance Documents available from WRAP will be used.

8.6.11 The SWMP will contain project targets applicable to the Proposed Scheme (i.e. waste to landfill). Project targets are not a statutory requirement of the SWMP Regulations. However, at least 70% by weight of non-hazardous construction waste generated by the project will need to be diverted from landfill in order to reflect the Highways Agency's aspirations, current government policy and industry good practice.

8.6.12 Overall responsibility for writing and implementing the plan will lie either with the Client or Principal Contractor, depending on the stage of the project. More specifically, the Client will be responsible for ensuring that the plan is prepared before construction work begins. The plan will then be passed to the Principal Contractor, who will be required to update it as work progresses and ensure that workers on the site are aware of the plan and cooperate with it.

8.6.13 To ensure that waste minimisation and management is kept in focus throughout the construction phase, a Waste Management Champion will be appointed (from the Principal Contractor staff) to be responsible for implementing the plan and ensuring that the SWMP is drafted, revised and followed during the construction works. In addition, the Waste Champion will be responsible for on-site waste training of all operatives who may generate waste, to ensure the effectiveness of waste segregation measures and, ultimately, waste reduction. Temporary on-site waste management centre

8.6.14 A dedicated waste management centre will be defined on-site to maximise the potential for the reuse, recovery and recycling of waste materials generated during the construction works phase. In addition, the dedicated area will contribute to a clean and tidy site, making a safer working environment.

8.6.15 In most cases, sorting materials on-site is the most effective way to achieve higher reuse and recycling rates and, by avoiding transport of materials off-site to be sorted by a waste management contractor, assists in reducing costs and the volume of waste disposed to landfill.

8.6.16 Sorting materials on-site requires detailed planning and information gathered. The preparation of the pre-construction phase SWMP will assist in this process. Implementing the sorting and segregation procedures on-site will also ensure compliance with the

requirements of the Landfill Regulations for the pre-treatment of waste destined for landfill, as segregation of waste materials is considered a form of pre-treatment.

8.6.17 Facilitating effective segregation of waste materials will require clear communication with contractors, sub-contractors and site operatives. Communication is also a key implementation step of the SWMP.

8.6.18 In addition, clear signage can help facilitate effective segregation of waste materials to maximise recycling and recovery rates and to reduce contamination of recyclables materials. A clearly signed system for segregating different waste streams arising during the construction phase will be implemented on-site. This will be identified in the SWMP and implemented in conjunction with the waste management contractor. Information prepared as part of the waste audit to identify the types and quantities of waste arising will be used to determine the number and type of containers required to store the different waste streams. This will contribute to maximising the amount of waste that can be segregated and recovered and will help to minimise the amount of waste disposed to landfill. Again, this is a key step in preparing the SWMP and it will be carried out concurrently with the SWMP.

8.6.19 The Principal Contractor will be required to ensure that all necessary permits are in place prior to starting work and that they are relevant to the work being undertaken.

8.6.20 **Mitigation measures reporting matrix**

8.6.21 Table 8.2 details the potential impacts associated with material resource use / waste arisings, a description of mitigation measures and how these measures will be implemented, measured and monitored during construction.

Table 8.2: Mitigation Measures Reporting Matrix

Project Activity	Potential impacts associated with material resource use / waste management	Description of mitigation measures	How the measures will be implemented, measured and monitored
Site Construction	For material resource use, permanent environmental impacts are likely to occur as a result of the use / depletion of natural resources and the embodied energy associated with the manufacture and transport of materials, as identified in Table 8.3 to the construction site.	Specification and procurement of materials will favour those that are locally sourced; can use local skilled labour to install; are low in carbon, environmental and user health impact; durable; include recycled materials; and are responsibly sourced; 25% (minimum) of products to be from schemes recognised for responsible (sustainable) sourcing.	Contract documents; Construction Environmental Management Plan (CEMP); Materials Procurement Plan.

Project Activity	Potential impacts associated with material resource use / waste management	Description of mitigation measures	How the measures will be implemented, measured and monitored
Enabling works / site construction	The generation of waste from the proposed works will give rise to a number of permanent impacts, most notably on the waste management capacity available to accept, treat and dispose of the waste streams identified in Table 8.4	Production of a SWMP (incorporating all the good practice outlined in this report); Minimise excavated materials; All excavated arisings to be reused on-site where condition allow; Employ Modern Methods of Construction (where possible); Careful quality control during the construction phase; Operate a temporary on-site waste management centre with a clearly signed system for segregating waste; Appoint a Waste Champion; Recover 70% (minimum) of non-hazardous construction and demolition waste from landfill.	Contract documents; CEMP; Principal Contractors Site Waste Management Plan.

8.7 Magnitude of impacts

8.7.1 Material resource use

8.7.2 Table 8.3 identifies the materials required for the Proposed Scheme and where information is available, the estimated quantities based on the Manchester Managed Motorways Design Stage Bill of Quantities (WBS 07 August 2012)1.

[1] Please refer to Section 8.8 Indication of difficulties encountered.

Table 8.3: Simple assessment reporting matrix - materials resource use

Project activity	Material resources required for the project	Quantities of material resources required	Additional information on material resources
Site construction	Imported acoustic fence panelling (timber)	This information was unavailable at the time of assessment	Information on material sourcing was unavailable at the time of assessment
	Imported N2 steel safety barriers		
	Imported H1 steel safety barriers		
	Imported concrete step barriers		
	Imported combined kerb drainage units		
	Imported concrete slot drains		
	Imported concrete drainage pipes		
	Imported structural fill for embankment		
	Imported granular fill for piling mat		
	Imported capping material		
	Imported structural fill to sheet piled		
	Imported asphalt for various applications		
	Imported pre-cast concrete kerbs/edgings		
	Imported metal signage		
	Imported barrier mounted marker post		
	Steel road lighting columns		
	Cabling (plus joints, terminations and cabinets)		
	Imported concrete		
	Steel bar reinforcement		
	Imported timber formwork to concrete		
	Imported steel cantilever gantries		
	Imported steel sheet piles		
	Imported granular fill material		
	Imported reinforced concrete capping to sheet pile wall		
	Imported pedestrian guard rail		

8.7.3 **Waste**

8.7.4 Table 8.4 identifies the anticipated waste arisings from each scheme, and where information is available, the estimated type (eg hazardous) based on the Manchester Managed Motorways Design Stage Bill of Quantities (WBS 07 August 2012).

Table 8.4: Simple assessment reporting matrix – waste arisings

Project activity	Waste arisings from the project classification	Quantities of waste arisings	Additional information on waste (indicative waste classification)
Site preparation	Vegetation and scrub arisings	This information was unavailable at the time of assessment.	Non-hazardous
Earthworks	Excavation arisings from ERA's and MHS construction		Inert or non-hazardous
Earthworks	Excavated material for embankment strengthening works		Inert or non-hazardous
Earthworks	Piling mat to gantry bases		Inert or non-
Earthworks	Disposal of acceptable material excluding Class 5A		Inert or non-hazardous
Earthworks	Arisings from cast in place piles		Inert or non-hazardous
Site construction	Power / communication cables (non-hazardous)		Non-hazardous

8.8 Significant effects

8.8.1 Material resource use

8.8.2 The quantities and sources of materials required during the construction of the Proposed Scheme were unknown at the time of writing. Nevertheless, following the implementation of mitigation measures the environmental impacts of the use of material resources have been qualitatively assessed as having a Neutral to Slight Adverse Significant Effect i.e. a change to environmental conditions may occur but is unlikely to have a measurable impact in terms of the depletion of natural resources and the embodied energy associated with the manufacture and transport of materials.

8.8.3 Waste arisings

8.8.4 The quantities of waste likely to be generated during the construction of the Proposed Scheme were unknown at the time of writing. Nevertheless, following the implementation of mitigation measures the environmental impacts of waste from the construction of the Proposed Scheme have been qualitatively assessed as having a Neutral to Slight Adverse Significant Effect, i.e. a change to environmental conditions may occur but is unlikely to have a measurable impact on the capacity of the available waste management infrastructure.

8.9 Indication of difficulties encountered

8.9.1 The likely material use and waste generation has been identified on the basis of the Manchester Managed Motorways Bill of Quantities (BoQ) due to the BoQ for the M1 Managed Motorways scheme being unavailable at the time of assessment. As such, the information given is only a broad indication of material use and waste generation for this type of scheme.

8.9.2 Defra has confirmed its intention to repeal the SWMP Regulations 2008, by October 2013 subject to public consultation, as the industry consensus is that businesses would meet the general requirements of the Regulations regardless of their existence but that getting rid of

them would save businesses the associated administrative burden. Although the regulatory requirements for SWMPs are under review, it is likely that the Highways Agency and other major construction bodies will continue to use the WRAP SWMP template (or equivalent) as it provides a consistent and accurate approach to the recording and retrieval of waste related information and will assist with the review and reporting of environmental performance of both the Client and Principal Contractor.

8.10 Summary

8.10.1 This section has assessed the environmental impacts of material resources during the construction of the Proposed Scheme. Where impacts have been identified these will be addressed through ensuring that the construction of the scheme responds to national regulatory standards (i.e. Waste Regulations 2011 and the Site Waste Management Plan Regulations), Highways Agency policy requirements (as defined in Table 8.1) and good mitigation measures (as reported in Section 8.5 and summarised in Table 8.2).

8.10.2 It is the conclusion of this assessment that the Simple Assessment is sufficient to understand the effects of the scheme and therefore a Detailed Assessment is not required.

9 Noise and Vibration

9.1 Study area

9.1.1 The study area is derived in accordance with the requirements of DMRB Volume 11 Section 3 Part 7 HD213/11 'Noise and Vibration' Detailed Assessment methodology (HD213/11).

9.1.2 It is necessary to first define the 'project boundary'. This identifies the start and end points of the physical works associated with the project, the existing routes that are being bypassed or improved, together with any proposed new routes between the start and end points. The project boundary is the line around the carriageway edges of these routes. A 1km zone is then defined from the project boundary. For this scheme, there are no new routes, or routes to be bypassed.

9.1.3 The next step is to identify the 'affected routes' from the traffic data. An affected route is one where there is the possibility of a change of 1dB(A) or more between the Do-Minimum and Do-Something scenarios in the short-term or 3dB(A) or more in the long-term. The traffic data has been interrogated, and those links that have been identified as 'affected routes' are indicated in Figure 9.1. The majority of the 'affected routes' lie within the 'project boundary', although there are two road links that are outside of 1km from the project boundary, and are indicated in sheet 6 of Figure 9.1.

9.1.4 A 600m boundary is then defined around all affected routes within the 1km zone around the project boundary. This is the 'calculation area' within which the detailed noise modelling exercise is undertaken. This detailed calculation study area is indicated by a solid pink line in Figure 9.1.

9.1.5 For those affected routes outside of the 1km zone around the project boundary, a 50m boundary is defined, and this is the 'basic noise level (BNL) study area' (as indicated by the dashed blue linie on Sheet 6 of Figure 9.1) where more simplified road traffic noise calculations of the change in (BNL) are undertaken.

9.2 Methodology

9.2.1 This section describes the methodology being adopted for this assessment. The Preliminary Noise Assessment undertaken in 2011 concluded that an Assessment should either be undertaken at Simple or Detailed level as specified in HD213/11. Subsequent communications with the Highways Agency indicated that the assessment of a scheme such as this should be undertaken at Detailed level.

9.2.2 Predictions of Road Traffic Noise

9.2.3 The procedure for predicting the noise level from a road is described in the Department of Transport and Welsh Office technical memorandum Calculation of Road Traffic Noise (CRTN) (Department of Transport and Welsh Office, 1988). The prediction method takes into account factors such as the traffic flow, composition and speed, the alignment and distance of the road relative to receiving property, the road surface type, the nature of the intervening ground cover between the road and reflections from building facades in order to calculate the $L_{A10,18\text{-}hr}$ dB noise level.

9.2.4 Traffic and the level of noise it generates fluctuate in intensity hourly, daily and seasonally and so the impact of traffic noise is assessed in terms of a time-averaged indicator. In the

UK, traffic noise is normally assessed using $L_{A10,18hr}$ index, defined as the arithmetic mean of the dB(A) noise levels exceeded for 10% of the time in each of the 18, one-hour periods between 06:00-00:00 on a typical weekday. This takes account of the diurnal variation in traffic noise. Annual average weekday traffic (AAWT) flows, speeds and percentage of heavy vehicles is used to allow for seasonal variations.

9.2.5 The calculations undertaken within the 'calculation area' of this assessment have been conducted using a computer based prediction program IMMI (produced by Wölfel Meßsysteme). The software package follows the procedures given in CRTN.

9.2.6 The BNL calculations in the 'BNL study area' have been undertaken following CRTN procedures using calculation spreadsheets alongside scaled OS mapping.

9.2.7 Receptor heights for dwellings and other sensitive receptors have been assumed to be 4m height. For blocks of flats, it has not been possible to determine the internal layout of each flat, and so a 4m height has been assumed. For external spaces, within the group of other sensitive receptors, a height of 1.5m is assumed.

9.2.1 Traffic data has been provided by the project transport consultants for the baseline year of 2015 and future assessment year of 2030. The M1 J32-35a Managed Motorways scheme was included within the traffic model used to produce this traffic data. However, subsequent to the completion of the noise assessment the possibility that this scheme would not be constructed to the programme that the model assumed has been identified. A sensitivity test has therefore been undertaken which removed this scheme from the traffic model in order to assess the effects on traffic flows and composition. Following this, an analysis was undertaken to determine whether these changes would be significant enough to require the noise (and air quality) impacts to be reassessed. This exercise concluded that no further assessment work would be required. Appendix 5.3 contains a Technical Note documenting this analysis.

9.2.2 Other model inputs include mapping data, height contours, scheme design drawings and address point data. The mapping product that has been used is the OS Master map product, which has been used to allow the spatial position of features such as buildings, road kerb-lines, areas of different ground types to be identified. Height contours of the calculation area have allowed for the vertical of both the Do-Minimum and Do-Something situations to be modelled, with the scheme drawings used to inform the vertical alignment of the Scheme in the Do-Something situation. In addition, address point data has been used to identify residential dwellings, and other sensitive receptors, within the study area.

9.2.3 Details of the existing road surface have been obtained from pavement surveys, and these have been assumed as the surfaces in the baseline year of 2015. These are listed in Table 9.1, together with the assumed future year (2030) surfaces and corrections. It is assumed that whether this scheme goes ahead or not, that the M1 would be re-surfaced between 2015 and 2030 as a result of routine maintenance requirements. It is currently HA policy that all resurfacing works provide a Low Noise Thin Surface. As such, a Low Noise Surface correction of -3.5dB applies in 2030 for both the Do-Minimum and Do-something scenarios.

Table 9.1: Road Surface Correction Assumptions

Scenario	Surface (Correction applied, dB)	
	J39 – 41	J41 - 42
DM 2015	Low noise (-2.5)	Hot rolled Asphalt (0)
DS 2015	Low noise (-2.5)	Hot rolled Asphalt (0)
DM 2030	Low noise (-3.5)	Low noise (-3.5)
DS 2030	Low noise (-3.5)	Low noise (-3.5)

9.2.4 **Magnitude of Impact (Road Traffic Noise)**

9.2.5 HD213/11 provides classification for the magnitude of changes in road traffic noise. A change in road traffic noise of 1dB(A) in the short term (Do-Minimum to Do-Something in the baseline year) is the smallest that is considered perceptible.

9.2.6 In the long term (Do-Minimum in the baseline year to Do-Something in the future assessment year) a 3dB(A) change is considered to be perceptible. The magnitudes of impact in the short and long term are therefore considered to be different. For road traffic noise the classification of magnitude of change is reproduced from HD213/11 in Table 9.2 and 9.3 for the short and long term respectively.

Table 9.2: Classification of magnitude of noise impacts in the short term

Noise Change $L_{A10,18\text{-hour}}$ dB	Magnitude of Impact
0	No Change
0.1-0.9	Negligible
1-2.9	Minor
3-4.9	Moderate
5+	Major

Table 9.3: Classification of magnitude of noise impacts in the long term

Noise Change $_{LA10,18\text{-hour}}$ dB	Magnitude of Impact
0	No Change
0.1-2.9	Negligible
3-4.9	Minor
5-9.9	Moderate
10+	Major

Night-time Noise

9.2.7 The assessment of impacts from night-time noise identifies those dwellings and other sensitive receptors in the study area that meet the following night-time noise criteria over the long term;

- Where the introduction of the project results in a sensitive receptor being exposed to night-time noise levels in excess of 55dB Lnight, outside where it is currently below that level; and
- Where a receptor is exposed to pre-existing Lnight, outside in excess of 55dB and this is predicted to increase.

9.2.8 The prediction of Lnight, outside has used guidance provide in the TRL report 'Converting the UK traffic noise index $L_{A10,18\text{-}hr}$ to EU noise indices for noise mapping' (2002). This report provides three methods for the prediction of Lnight, depending on the traffic data that is available.

9.2.9 Method 1 is the preferred approach, and can be used where traffic data for each separate hour over the 24-hour period is available for each road link. Values of $L_{A10,1\text{-}hour}$ are calculated using CRTN, which can then be converted to $L_{Aeq,1hour}$ values, and subsequently Lden values, using the relationships provided in the report.

9.2.10 Method 2 can be used where detailed hourly traffic data is not available but traffic data is known for the relevant Lden time periods. The value of $L_{A10,18\text{-}hour}$ is calculated using CRTN, and converted to Lden time periods using the relationships provided.

9.2.11 Method 3 is used where detailed hourly traffic data is not available. An 'end-correction' is applied to the CRTN calculated levels of $L_{A10,18\text{-}hour}$ to convert to Lday, Levening and Lnight as required.

9.2.12 For this project Method 2 has been used, as traffic data is available by road link for the night-time period 23:00-07:00, but not for each individual 1-hour over the 24-hour period. The relationship that is used to convert the calculated $L_{A10,18\text{-}hour}$ at each receptor to Lnight is presented in Equation 1.

Equation 1:

$$Lnight = 0.99 \times L_{A10,18hour} + 10 \times log10\left(\frac{[p8 \times N8 \times V8]^2}{[p18 \times N18 \times V18]^2}\right) + 1.75\ dB$$

9.2.13 Where pt is the percentage of heavy good vehicles in the time period t hours (8 or 18hours), Nt is the total traffic flow in the time period t hours and Vt is the mean traffic speed in the time period t.

Road Traffic Nuisance

9.2.14 The assessment of traffic nuisance is undertaken following the procedures provided within HD213/11, based on the calculations of road traffic noise at each receptor. The increases and decreases in the number of people bothered by noise is tabulated in percentage points in defined bands; <10%, 10<20%, 20<30%, 30<40% and >40%. The following assessments should be undertaken;

- Do-Minimum scenario in the baseline year against the Do-Minimum scenario in the future assessment year.

- Do-Minimum scenario in the baseline year against Do-Something in the future assessment year.

9.2.15 The noise levels and noise changes are used to establish the percentage of people bothered very much or quite a lot by traffic noise using the HD213/11 procedures.

9.2.16 The Do-Minimum assessment calculates the noise nuisance level for a steady state situation, i.e. when there would not be an abrupt change in noise, from Figure A6.1 (HD213/11) for the Do-Minimum in the opening year (2015) and also the future year (2030). The difference between the percentage of people bothered very much or quite a lot in the Do-Minimum scenarios is then calculated.

9.2.17 In the Do-Something assessment, the noise nuisance level for a steady state situation just prior to the scheme opening is compared firstly to the resultant level of noise nuisance just after the scheme opening, and secondly to the steady state position at the end of the 15 year design period. The maximum level of noise nuisance change with the scheme, i.e. either after opening or after 15 years is used to determine the change to the percentage numbers of people affected for the Do-Something assessment.

Road Traffic Induced Vibration

9.2.18 Future levels of vibration cannot be measured but methods are available to predict the expected levels of vibration as a result of the development (Watts, 1990). However, this method requires detailed knowledge of the ground type that can only be determined through ground surveys.

9.2.19 Vibration is measured in terms of Peak Particle Velocity (PPV), which is the maximum speed of movement of a point in the ground during the passage of a source of vibration.

9.2.20 For vibration from traffic, a PPV of 0.3 mm/s measured in the vertical direction is considered to be perceptible, and structural damage to buildings can occur when levels are above 10 mm/s.

9.2.21 Where PPV from road traffic will rise above a level of 0.3mm/s, or existing levels above 0.3mm/s are predicted to increase are predicted, then this should be considered as an adverse impact from vibration.

9.2.22 The method for the assessment of airborne vibration nuisance as provided within HD213/11 has been used here, and is restricted to dwellings within 40m of the carriageway where there are no barriers to road traffic noise.

9.2.23 The relationship between the percentage of people bothered by largely airborne vibration is similar to those bothered by exposure to noise (as measured by the $L_{A10,18\text{-hour}}$ index), except that the percentage bothered by vibration is lower at all exposure levels. For a given level of noise exposure, the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for noise nuisance.

9.2.24 The assessment of vibration impacts is undertaken following guidance given within HD213/11. For all dwellings within 40m of the M1 between J39-42 the $L_{A10,18\text{-hour}}$ is predicted for the Do-Minimum and Do-Something situations. The percentage of people bothered very much or quite a lot by noise exposure is calculated for each property using graphs given within the HD213/11, and the percentage of people bothered very much or quite a lot by vibration is considered to be 10% lower than for noise. For those dwellings at noise exposure levels below $L_{A10,18\text{-hour}}$ 58 dB zero per cent change in those bothered by vibration should be assumed.

9.3 Baseline conditions

9.3.1 A survey of existing conditions was undertaken in March 2012 in order to provide an indication of the current nose climate. In accordance with the guidance contained in HD213/11, locations were selected at various distances from the M1 and chosen to representative of sensitive receptors. In total six locations were selected for spot measurements and one location was selected for a continuous 24-hour measurement, in liaison with the HA Noise Adviser. The 24-hour measurement location enables the capture of data that indicates differences between day and night-time road traffic noise.

9.3.2 The Sound Level Meter was configured during the survey to collect A-weighted L10, L90 and Lmax noise level data with a 'fast' time response. The microphone was mounted on a tripod at a height of approximately 1.5 metres above ground level in free-field conditions at each location. An acoustic consultant was on-site during all spot measurements to make observations of noise sources and levels.

9.3.3 The weather conditions on all days were dry and sunny with light wind speeds in any direction less than 5m/s, and therefore considered acceptable for environmental noise measurements. At all locations the traffic noise from the motorway was audible. Measurements at some locations contained additional noise sources such as bird song, traffic using other roads, and barking dogs.

9.3.4 Table 9.4 presents the summary results from the 15-minute spot measurements, see Figure 9.1 for the measurement locations.

Table 9.4: Survey results from 15-minute spot measurements

Location	Date	Time	Noise level, dB(A)		
			L_{10}	L_{90}	L_{max}
A	22/03/12	09:00	57.8	55.6	62.7
	22/03/12	13:40	58.5	55.6	66.7
	23/03/12	09:00	58.4	56.0	64.2
B	22/03/12	09:25	57.1	53.0	73.3
	22/03/12	14:05	54.1	50.9	60.8
	23/03/12	09:25	57.8	53.0	63.5
C	22/03/12	11:30	53.4	49.3	81.0
	22/03/12	15:25	55.6	51.2	69.3
	23/03/12	09:10	57.9	54.6	64.4
D	22/03/12	14:30	82.8	76.6	85.6
F	22/03/12	12:25	49.1	46.8	59.5
	22/03/12	15:20	53.2	49.6	60.6
	23/03/12	08:50	59.7	54.8	77.3
G	22/03/12	10:35	66.2	61.9	74.1

Location	Date	Time	Noise level, dB(A)		
	22/03/12	11:05	67.0	61.5	70.6
	22/03/12	12:40	65.8	61.3	65.8
H	21/03/12	16:05	58.3	54.4	63.2
	22/03/12	11:55	59.1	56.1	81.2
	23/03/12	10:05	58.4	55.3	66.7

9.3.5 Table 9.5 presents the summary results from the continuous 24-hour measurement.

Table 9.5: Survey results from the continuous 24-hour measurements

Location	Date	Time	Noise level, dB(A)		
			L_{10}	L_{90}	L_{max}
E	21/03/12	14:25 – 23:00	67.3	61.1	82.9
	21/03/12	23:00 – 07:00	66.8	54.6	72.1
	22/03/12	07:00 – 14:25	68.9	64.9	75.0

9.3.6 In addition to the survey, information from Defra's strategic-level noise maps of the road network also show the noise climate in the area surrounding the scheme. However, due to the strategic nature of the noise maps they cannot be used to determine the main noise source at any individual location. The noise map containing this area (i.e. Map No.3 of the English Road Network, see Appendix 9.1) indicates the immediate area surrounding the entire route is subject to noise levels of above 75 dB(A) Lden. This would generally be considered to be a high level of road traffic noise.

9.3.7 Further work by Defra has assigned some areas alongside the road network with the status of 'Important Areas' (IA's) and also 'Important Areas with First Priority Locations' (IA with FPL). These are locations where there are dwellings subject to noise levels considered high enough that further investigation should be undertaken. Within the study area there are five IA's with FPLs and a single IA which is jointly owned by the HA and the local authority. This means that the noise source is from the M1 and also a local authority controlled road. The noise map containing these is No. 98 of the 'major sources tiles', and this is shown in Appendix 9.2.

9.3.8 All Important Areas with First Priority Locations have been investigated by the Highways Agency as part of the noise action planning investigation process. Possible noise mitigation measures have been investigated and suitable budgets are to be sought where possible. The remaining Important Areas are currently being investigated. At present there are no 'ring-fenced' budgets for noise mitigation works identified from the noise action planning investigation process.

9.4 Value (sensitivity) of resource

9.4.1 HD213/11 provides a scale indicating various magnitudes of impact from changes in noise at sensitive receptors. These are provided for the short and long term, and are also used as 'threshold values' to determine an affected route. These 'threshold values' are a permanent change of 1 dB(A) or more in the short term, and 3 dB(A) or more for the long

term. Values for changes in vibration that may cause an adverse impact are also provided within HD213/11.

9.4.2 No guidance is provided on the value of noise sensitive resources and therefore no overall significance of impact can be evaluated.

9.4.3 Sensitive receptors for a noise and vibration assessment are considered to include dwellings, hospitals, schools, community facilities, designated areas (e.g. AONB, National Park, SAC, SPA, SSSI, SAM), and public rights of way.

9.4.4 Dwellings and other noise sensitive receptors are identified in Figure 9.1. There are 5864 identified residential dwellings. There are also 32 identified other sensitive receptors, including community facilities, open space and points on public rights of way within the Calculation Area. Table 9.6 provides a list of the other sensitive receptors against the numbered points in Figure 9.1.

Table 9.6: Other sensitive receptors that may be subject to changes in noise level (see Figure 9.1)

No.	Receptor Name	No.	Receptor Name
1	Mackie Hill Junior & Infant School	17	Cemetery, Manor Road
2	Crigglestone Community Centre	18	Burial Ground
3	Crigglestone Nursery School	19	Footpaths
4	St. James CofE Junior & Infant School	20	South Ossett Baptist Church
5	St John's Church	21	Playing fields
6	Durkar Chapel	22	Silkwood Park
7	Footpaths, north of J39 and West of M1	23	Flushdyke Primary School
8	Footpaths, north of J39 and East of M1	24	Footpaths, west of M1 and N of J40
9	Recreation Ground, Forsythia Avenue	25	Bridleway No.50
10	Playing Fields, Oakwood Grove	26	Playing Field, New Row
11	Inwood Residential Home	27	Kirkhamgate, Junior & Infant School
12	Footpaths, west of M1 between J39-J40	28	Kirkhamgate church
13	Lupset Community Centre	29	Footpaths, east of M1 between J40-J41
14	St. Georges Church Hall	30	Footpaths, west of M1 between J40-J41
15	Snapethorpe Primary School	31	Footpaths, west of M1 between J41-J42
16	Playing Fields at Snapethorpe Primary	32	Playing Fields, Longthorpe Lane

9.5 Regulatory / policy framework

9.5.1 The section describes the policy and guidance surrounding the assessment of noise and vibration.

Noise Policy Statement for England (NPSE) 2011

9.5.2 In March 2011, Defra published the Noise Policy Statement for England (NPSE). This document was a strategic overview of Government policy relating to environmental noise. It contains the vision to "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development". While no specific policies are put in place by the NPSE, it contains the following aims:

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

9.5.3 In addition to the NPSE Defra also published a Noise Action Plan Major Roads. This contains an overview of policy on traffic noise and states the process by which the competent authority will address areas that have been identified as requiring further assessment. Those requiring further assessment are then examined to consider what solutions are available to control, or reduce the noise level. Investigations on possible solutions to control or reduce the noise level at these locations are currently being undertaken by Defra as part of the Noise Action Plan Major Roads.

The Environmental Noise (England) Regulations 2006 (as amended)

9.5.4 The Environmental Noise Regulations have been introduced into the UK to implement the Assessment and Management of Environmental Noise Directive 2002/49/EC. This Directive relates to the assessment and management of environmental noise in EU member states.

9.5.5 The production of strategic noise maps and action plans are legal requirements set out in Environmental Noise (England) Regulations. From these noise maps certain areas alongside the Highways Agency Strategic Road Network have been identified as 'Important Areas' (IA's) and also 'Important Areas with First Priority Locations' (IA with FPL). These are locations where there are dwellings subject to noise levels considered high enough that further investigation should be undertaken.

9.5.6 The Highways Agency has a legal obligation to investigate the Important Areas and First Priority Locations and consider if mitigation is feasible. The investigation of the IA with FPL has been completed and is currently out for consultation. The investigation of the IA's is currently being undertaken.

Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 (HD213/11)

9.5.7 HD213/11 provides guidance on the assessment of impacts that road projects (new construction, improvements and maintenance) may have on levels of noise and vibration. The guidance describes different levels of assessment and for this scheme a detailed assessment is required.

9.5.8 The detailed assessment is largely comprised of a desk-based exercise, supplemented with on-site collected information, which includes a noise measurement survey.

9.5.9 This stage of assessment is primarily concerned with potential impacts at the dwellings and other noise-sensitive receptors. The main steps are summarised below:

- Identify 'affected road links' (those that may be subject to a perceptible change in noise)

and derive the Study Area

- Undertake noise calculations for all dwellings and other sensitive receptors (examples include hospitals, schools, community facilities, designated areas and pubic rights of way) identified within the main study area. Calculations should be undertaken in accordance with the procedures given in Calculation of Road Traffic Noise (CRTN) and those relevant additional procedures identified within HD213/11.
- The noise levels calculated should be façade levels, unless the receptor is an open space where free-field levels should be calculated. All levels should be calculated as $L_{A10,18\text{-hour}}$ dB at a default height of 1.5m above ground level. For dwellings with a first floor, the noise level should be calculated at 4m above ground.
- Complete assessment tables showing the changes in noise levels over the short-term and long-term, using the following comparisons;
    - Do-Minimum scenario in the baseline year against Do-Minimum scenario in the future assessment year.
    - Do-Minimum scenario in the baseline year against Do-Something scenario in the baseline year.
    - Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year.
- Calculations of the basic noise level (BNL) should be reported for each of the affected routes identified in the outer study area. A count of the number of dwellings and other sensitive receptors within 50m of the centreline of the affected routes should also be undertaken. The same comparisons as identified above for the detailed modelling should also be undertaken and presented.
- Where a building is predicted to experience different changes on different facades, the least beneficial change in noise level should be reported.
- For sensitive receptors that are within 1km of the project boundary, but are not within the main study area, a qualitative assessment should be undertaken.
- A map shall then be prepared that shows the study area and the dwellings and other sensitive receptors that are included in the assessment. For each of the comparisons identified above noise difference contour plots that indicate the levels of noise change at each dwelling and other sensitive receptor at 1dB intervals shall be prepared.
- A list of predicted noise levels for all sensitive receptors in the main study area shall be provided.
- Consideration of the need for an assessment of night-time noise where levels of Lnight,outside are predicted to be greater than 55dB in any scenario.
- Assess the permanent traffic nuisance impacts in the main study area by calculating the number of people bothered by noise from procedures provided in HD213/11. The following assessments should be undertaken;
    - Do-Minimum scenario in the baseline year against Do-Minimum scenario in the future assessment year.
    - Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year.
- Consideration of any permanent traffic induced vibration impacts where PPV from road

traffic will rise above a level of 0.3mm/s, or existing levels above 0.3mm/s are predicted to increase.

- Evaluate any cumulative noise and vibration impacts.

Noise Insulation Regulations 1975 (amended 1988)

9.5.10 Where alterations are made to a highway, the Noise Insulation Regulations (1975) may apply. Specific circumstances need to be present for the Regulations to apply, and where there is an 'additional carriageway' then the authority has a duty to carry out insulation work or to make grants. For an 'altered highway', the authority has a power to carry out insulation work or to make grants.

9.5.11 It is understood the applicability of the Regulations to this type of Managed Motorway scheme is still to be determined.

British Standard 5228:2009

9.5.12 BS 5228 2009 "Code of practice for noise and vibration control on construction and open sites" provides recommendations for basic methods of noise and vibration control relating to construction and open sites.

9.5.13 Part 1: Noise provides guidance and recommendations on methods for the calculation of construction noise and the consequential assessment of its impact on those exposed to it. In addition the Standard makes reference to the legislative background regarding noise control on construction sites, and gives recommendations for basic methods of noise control.

9.5.14 The standard provides suitable methods for the calculation of noise from construction activities, including information regarding noise levels from a range of construction equipment.

9.5.15 BS 5228 2009, Part 2: Vibration provides guidance in relation to the effects of construction vibration upon the surroundings. Vibration, even of a very low magnitude, can be perceptible to people. Vibration nuisance is frequently associated with the assumption that, if vibration can be felt, then damage is inevitable. However, considerably greater levels of vibration are required to cause damage to buildings and structures. Typically levels of 0.3mm/s may just be perceptible, and levels above 10mm/s may result in cosmetic damage to buildings.

9.6 Design, mitigation and enhancement measures

9.6.1 Mitigation measures to address noise impacts during construction are as follows:

- Production and submission of an application under Section 61 of Part III of The Control of Pollution Act 1974 for submission to the Local Authority Environmental Health Department in whose area the works are to take place. Once approved any conditions applied to the approval shall be complied with.
- The adoption of Best Practicable Means as defined in the Control of Pollution Act 1974, which is usually the most effective means of controlling noise from construction sites;
- Programming and phasing the works over a number of stages to restrict impacts within any one area to the minimum time;
- Using reduced noise piling equipment;

- Keeping local residents and property owners fully informed about the nature and timing of the works, including compound locations and traffic controls, via such means as newsletters and public meetings;
- The contractor undertaking measures as part of the Considerate Contractors Scheme and having a representative available on site during working hours to answer queries or address any concerns expressed;
- Careful selection of equipment, for example any compressors brought to site will be super-silenced or sound reduced models fitted with acoustic enclosures or any pneumatic tools will be fitted with silencers or mufflers wherever practicable;
- Careful consideration will be made of the site layout in order that any noise impact at nearby sensitive properties is minimised;
- Localised use of hoardings, portable barriers and acoustic sheds will be erected as necessary to shield particularly noisy activities;
- All plant and equipment will be properly maintained and operated in accordance with manufacturers' recommendations and in such a manner as to avoid causing excessive noise;
- Equipment will be shut down when not in use for a period longer than 5 minutes;
- No vehicles will wait or queue on public highways with engines running;
- Deliveries will only arrive during daytime hours, preferably during the working hours of the sites and will be routed so as to minimise disturbance to local residents; care will be taken when unloading deliveries and vehicles will be prohibited from waiting on site with their engines running; &,
- Regular noise monitoring to be undertaken on a four weekly basis to ensure compliance with the levels noted in the Section 61 application.

9.6.2 The initial scheme design does not contain any specific noise mitigation measures. However, if following the assessment it is determined that mitigation and / or further monitoring is required, then this will be considered.

9.7 Magnitude of impacts

Construction

9.7.1 Predictions of the construction noise impacts from the proposed works have been undertaken for areas out to 300m from the Motorway utilising the calculation methods contained within BS5228:2009 "Code of practice for noise and vibration control on construction and open sites" Part 1 Noise.

9.7.2 An indication of the plant and equipment complement that may be used for each phase of the construction works is presented in Table 9.7, including the number of items of specific types of plant and equipment, and the Acoustic 'On-Time' and the Sound Power Level of the sources.

9.7.3 Acoustic On-Time can be derived, as stated in BS5228:2009-1 as the period of time that the equipment is operating within 3dB of its maximum. In laymans terms this can be defined as the period of time a maximum engine power and maximum load. The Sound Power Level of an item of plant can be defined as the acoustic power of the source (in this

case an item of plant), relative to a reference source, which is 10^{-12} watts (or a picowatt). It is the total acoustic power produced by the source in all directions.

Table 9.7: Indicative construction equipment complement

Phase of Construction	Plant Description	No. of each item	Sound Power Level (L_{WA}) dB	On Time
Site Clearance	Tracked excavator (22t) 107 kW	1	99.0	40%
	Lorry (4-axle wagon)	2	111.0	30%
	Brushcutter	1	117.0	20%
	Chainsaw	1	117.0	20%
	Chipper	1	125.0	50%
Earthworks	Lorry (4-axle wagon)	2	111.0	30%
	Tracked excavator (22t) 107 kW	1	99.0	40%
	Dumper 81 kW (7t)	2	107.0	30%
	Wheeled excavator 90 kW (18t)	1	94.0	40%
Reserve Construction	Crawler mounted rig (35t) 150 kW	1	107.0	20%
	Tracked excavator (inserting cylindrical metal cage) (20t)	1	102.0	40%
	Concrete pump + cement mixer truck (discharging) 223 kW (8t/350bar)	1	95.0	20%
	Concrete mixer truck	1	107.0	20%
	Poker vibrator	1	106.0	10%
	Diesel generator 15 kW	1	93.0	50%
Gantry Foundations	Crawler mounted rig (35t) 150 kW	1	107.0	20%
	Tracked excavator (inserting cylindrical metal cage) (20t)	1	102.0	30%
	Concrete pump + cement mixer truck (discharging) 223 kW (8t/350bar)	1	95.0	20%
	Concrete mixer truck	1	107.0	20%
	Poker vibrator	1	106.0	10%
	Diesel generator 15 kW	1	93.0	50%
Gantry Erection	Lorry 254kW 32t	2	110.0	30%
	Tracked mobile crane (idling) 390 kW (600t/125m)	1	94.0	20%
	Tracked excavator (22t) 107 kW	1	99.0	40%
	Diesel generator 15 kW	1	93.0	50%
Surfacing	Lorry (4-axle wagon)	1	108.0	10%
	Asphalt paver (+ tipper lorry) 94 18 t	1	105.0	30%

Phase of Construction	Plant Description	No. of each item	Sound Power Level (L_{WA}) dB	On Time
	Road roller 95 kW 22 t	1	108.0	20%
	Hand-held circular saw (cutting paving slabs) 1.5 7.6 kg / 235 mm diameter	1	112.0	10%
	Compressor for hand-held pneumatic breaker 1 t	1	93.0	40%
	Road breaker (hand-held pneumatic)	1	110.0	20%

9.7.4 A full list of the calculated construction noise levels at distances from 50m to 300m for each phase of the works are provided in Table 9.8. These assume flat, acoustically hard ground between the source and receptor and therefore can be considered to be a worst case.

Table 9.8: Indicative construction noise impacts, $L_{Aeq,12\text{-}hour}$ dB

Phase of Construction	Distance to Receptor					
	50m	100m	150m	200m	250m	300m
Site Clearance	79.8	73.8	70.3	67.8	65.9	64.3
Earthworks	64.8	58.8	55.3	52.8	50.8	49.2
Reserve Construction	62.3	56.3	52.7	50.2	48.3	46.7
Gantry Foundations	62.1	56.0	52.5	50.0	48.1	46.5
Gantry Erection	62.6	56.6	53.1	50.6	48.7	47.1
Surfacing	65.4	59.3	55.8	53.3	51.4	49.8

9.7.5 From a review of the available data that has been used for the operational noise assessment, Table 9.9 shows the following number of dwellings lie within the distances noted above from the motorway.

Table 9.9: Indicative number of dwellings within each distance band

	Distance to Receptor					
	50m	100m	150m	200m	250m	300m
Number of Properties	80	303	328	364	485	567

9.7.6 Construction noise levels will be higher for those receptors that are located closest to works, and noise levels decrease with increased distance from the road.

9.7.7 Most of the works noted above will take place during the day, with the possibility that short-term works such as gantry erection and final surfacing works may take place at night for a relatively short duration.

- It should be noted that the calculations should be considered to be worst case, as they consider no topographical effects or intervening barriers. Nonetheless it is appropriate to consider potential mitigation measures that could be applied to minimize the impacts of the operations. The mitigation measures that could be employed are described in section 9.6.1.

9.7.8 The use of such mitigation measures should minimise the noise impacts from the proposed works, and calculation for specific sites, taking into account local topography or other features

9.7.9 In relation to the potential vibration impacts, Table 9.10 below details the distances at which certain activities give rise to a just perceptible level of vibration; these figures are based on historical field measurements, with some emanating from the research contained in the TRRL Supplementary Report 328 'Ground vibrations caused by road construction operations'.

Table 9.10: Distances at which vibration may just be perceptible

Construction Activity	Distance from activity when vibration may just be perceptible (metres)
Excavation	10 to 15
Heavy Vehicles (e.g. dump trucks)	5 to 10
Hydraulic Breaker	15 to 20
Auger Piling (e.g. CFA piling)	15 to 20

9.7.10 Whilst this research is not recent, its results are still considered valid in the terms of reference of this study. Therefore, unless there are works within 20m of a residential property, no construction works are likely to be perceptible in terms of impacts upon local residents.

9.7.11 As the human body is more susceptible to vibration inputs than buildings, it is unlikely that any vibration generated by the construction works will result in vibration impacts upon buildings further away than 20m from the construction works.

Operational Road Traffic Noise

9.7.12 Predictions of road traffic noise have been undertaken for 5860 residential dwellings and 32 other sensitive receptors within the Calculation Area.

9.7.13 A full list of the calculated road traffic noise levels at each receptor has been produced and is available from the overseeing organisation if required. Noise change contours for the comparisons assessed in accordance with HD213/11 are presented in Figures 9.2, 9.3 and 9.4, as outlined below;

- Do-Minimum scenario in the baseline year against Do-Minimum scenario in the future assessment year.

- Do-Minimum scenario in the baseline year against Do-Something scenario in the baseline year.
- Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year.

9.7.14 Table 9.11 presents the changes in road traffic noise in a comparison of the Do-Minimum scenario in the baseline year (2015) with the Do-Minimum scenario in the future assessment year (2030).

9.7.15 There are 111 dwellings where a night-time noise level of 55dB Lnight is predicted. The level of noise change for these receptors is also presented in Table 9.14.

Table 9.11: Long term traffic noise change Do-Minimum 2015 to Do-Minimum 2030

Change in Noise Level		Daytime Number of Dwellings $L_{A10,18\text{-}hr}$ dB	Daytime Number of Other Sensitive Receptors $L_{A10,18\text{-}hr}$ dB	Night-time Number of Dwellings L_{night} dB
Increase	0.1-2.9	1,168	5	59
	3-4.9			
	5-9.9			
	10+			
No Change		123		2
Decrease	0.1-2.9	4,567	26	50
	3-4.9	2	1	
	5-9.9			
	10+			

9.7.16 A comparison is made between the Do-Minimum situations in the opening year (2015) and future assessment year (2030) in order to appreciate how road traffic noise levels would change at receptors over time without the implementation of the Scheme. This assessment comparison indicates that there would be no change in road traffic noise levels at 123 dwellings, a negligible noise increase of +0.1 to +2.9dB at 1,168 dwellings, a negligible noise decrease of -0.1 to -2.9dB at 4,567 dwellings and a Minor noise decrease of -3 to -4.9dB at two residential dwellings.

9.7.17 Similarly, the assessment of Other Sensitive Receptors indicates 5 negligible increase in road traffic noise of <3dB(A), 26 with a negligible decrease in toad traffic noise of <-3dB(A) and one with a Minor noise decrease of -3 to -4.9dB.

9.7.18 The night-time noise assessment indicates that there are 59 dwellings predicted to experience a negligible increase in road traffic noise, 50 dwellings predicted to experience a negligible decrease in road traffic noise and two dwellings with no change.

9.7.19 There is a general increase in road traffic flows over time, which leads to negligible increases in road traffic noise on most roads, both on and off the Motorway network, between 2015 and 2030. This is offset for the M1 mainline as a result of resurfacing works that would take place as a result of routine maintenance between the opening year (2015)

and future year (2030). The outcome is that there would be more receptors predicted to experience a decrease in noise than an increase over the long term, without the implementation of this Scheme.

9.7.20 Table 9.12 shows the changes in road traffic noise in a comparison of the Do-Minimum scenario in the baseline year (2015) with the Do-Something scenario in the baseline year (2015).

Table 9.12: Short term traffic noise change Do-Minimum 2015 to Do-Something 2015

Change in Noise Level, $L_{A10,18\text{-}hr}$ dB		Daytime Number of Dwellings	Daytime Number of Other Sensitive Receptors
Increase	0.1-0.9	4,630	24
	1-2.9	631	6
	3-4.9		
	5+		
No Change		537	2
Decrease	0.1-0.9	62	
	1-2.9		
	3-4.9		
	5+		

9.7.21 A comparison is made between the Do-Minimum and Do-Something situations in the opening year (2015) in order to consider what the abrupt change would be upon the scheme opening. In the daytime there are 5261 dwellings predicted to experience a noise increase. The majority of these (4630) fall within the negligible noise change band of +0.1 to +0.9 dB, where the change would not be perceptible. In contrast, there are 62 dwellings predicted to experience a noise decrease, all of which fall within the negligible noise change band of -0.1 to -0.9 dB. There are also 537 dwellings predicted to experience no-change in road traffic noise.

9.7.22 There are 631 dwellings predicted to experience greater than 1dB decrease in noise, all of which fall in the minor noise change band of +1 to +2.9dB.

9.7.23 The comparison of the opening year situation with and without the Scheme indicates that more dwellings are predicted to experience increases in road traffic noise levels than decreases.

9.7.24 Noise level increases are due to a combination of predicted changes in road traffic flows with the scheme, and in some locations due to the edge of the nearside traffic stream moving closer to receptors when using the hard shoulder. The 631 dwellings predicted to experience a 'minor' noise increase with the scheme are located in various places along the scheme, and are indicated in Figure 9.3.

9.7.25 The assessment of Other Sensitive receptors indicates that there would be two with no change, 24 with a negligible increase in road traffic noise of <1dB(A) and six with a minor increase in road traffic noise of +1 to +2.9dB.

9.7.26 There are more other sensitive receptors predicted to experience an increase than a

decrease in road traffic noise levels.

9.7.27 The highest noise increase at dwellings is of +2.8dB in the opening year (2015) for a group of three dwellings located at 250, 252 and 254 Lingwell Gate Lane, close to the M1 north-bound off slip at J42. The largest change at other sensitive receptors is +2.0dB for footpaths west of M1 between J41-J42 (Receptor 32 in Figure 9.1).

9.7.28 Table 9.13 presents the changes in road traffic noise in a comparison of the Do-Minimum scenario in the baseline year (2015) with the Do-Something scenario in the future assessment year (2030).

9.7.29 There are 83 dwellings where a night-time noise level of 55dB Lnight or higher is predicted. The level of noise change for these receptors is also presented in Table 9.13.

Table 9.13: Long term traffic noise change Do-Minimum 2015 to Do-Something 2030

Change in Noise Level		Daytime Number of Dwellings $L_{A10,18\text{-}hr}$ dB	Daytime Number of Other Sensitive Receptors $L_{A10,18\text{-}hr}$ dB	Night-time Number of Dwellings L_{night} dB
Increase	0.1-2.9	4,012	23	65
	3-4.9			
	5-9.9			
	10+			
No Change		108	1	
Decrease	0.1-2.9	1,740	8	18
	3-4.9			
	5-9.9			
	10+			

9.7.30 The comparison between the Do-Minimum situation in the opening year (2015) and Do-Something in the future assessment year (2030) provides an appreciation of the long-term noise impact of the scheme. The results from this comparison can be considered against the Do-Minimum comparison (Table 9.11) in order to understand the potential difference between the With and Without scheme results over the long term. In the future year day-time Do-Something situation, 4,012 dwellings are predicted to experience a noise increase, all of which fall within the negligible noise change band of +0.1 to +2.9 dB, where the change would not be perceptible over the longer term. In contrast, there are 1,740 dwellings predicted to experience a noise decrease, all of which fall within the negligible noise change band of -0.1 to -2.9 dB. There are also 108 dwellings where no-change in road traffic noise levels is predicted.

9.7.31 The night-time noise assessment indicates that there are 65 dwellings predicted to experience an increase in night-time road traffic noise, and 18 dwellings predicted to experience a decrease. All changes are of a negligible magnitude, being of less than 3dB either increase or decrease.

9.7.32 Similarly, the assessment of other sensitive receptors in the daytime period predicts

negligible changes in road traffic noise at 31 locations, 23 increases and 8 decreases, and 1 location where there would be no-change in road traffic noise.

9.7.33 The assessment of the scheme in the long term indicates that there would be negligible, or no-change, in road traffic noise at all receptors in both day and night time.

9.7.34 For those receptors that are within 1km of the project boundary, but are not within the calculation area, there are no predicted changes in noise of more than 1 dB.

Operational Road Traffic Nuisance

Table 9.14 presents the assessment of road traffic noise nuisance.

Table 9.14: Change in traffic noise nuisance

Change in Nuisance Level		Number of Dwellings Do-Minimum	Number of Dwellings Do-Something
Increase	<10%	1,010	1,495
	10<20%		3,264
	20<30%		765
	30<40%		
	>40%		
No Change		14	270
Decrease	<10%	4,840	70
	10<20%		
	20<30%		
	30<40%		
	>40%		

9.7.35 The noise levels and noise changes have been used to establish the percentage of people bothered very much or quite a lot by traffic noise using the HD213/11 procedures.

9.7.36 In the Do-Minimum situation, there are 1,010 dwellings predicted to experience a <10% increase in nuisance, 4,840 dwellings predicted to experience a <10% decrease in nuisance and 14 predicted to experience no change in the percentage of people bothered very much or quite a lot by road traffic noise.

9.7.37 In the Do-Something assessment, there are predicted to be 5,524 dwellings where there would be an increase in noise nuisance. Of these 765 are predicted to experience an increase in the percentage of people bothered very much or quite a lot in the +20<30% band, 3,264 dwellings in the +10<20% band and 1,495 dwellings with an increase of <+10%. There are also 70 dwellings where a decrease of <-10% in the number of people bothered is predicted, and 270 with no change.

9.7.38 The introduction of the Scheme results in an overall increase in the number of people who would be bothered by road traffic noise nuisance. The results from the nuisance assessment alone are not used to determine if mitigation should be considered. The need to consider mitigation in a scheme is determined from the results of the assessment in

changes in noise, as described in HD213/11. Any proposed mitigation following that assessment would also cause changes to the nuisance assessment.

Operational Traffic Airborne Vibration

9.7.39 Table 9.15 Indicates changes in airborne traffic vibration nuisance in the opening year, for the 33 receptors within 40m of the M1 between J39-42.

Table 9.15: Change in traffic vibration nuisance

Change in Nuisance Level,		Number of Dwellings Do-Minimum	Number of Dwellings Do-Something
Increase	<10%		
	10<20%		6
	20<30%		1
	30<40%		
	>40%		
No Change		26	26
Decrease	<10%	7	
	10<20%		
	20<30%		
	30<40%		
	>40%		

9.7.40 In the Do-Minimum situation, there no dwellings predicted to experience a <+10% increase in nuisance, seven dwellings predicted to experience a <-10% decrease in nuisance and 26 predicted to experience no change in the percentage of people bothered very much or quite a lot by road traffic noise induces vibration.

9.7.41 In the Do-Something assessment, there are predicted to be six dwellings where there would be an increase in airborne vibration nuisance of +10<20% and one dwelling where there would be an increase of +20<30%. There are also 26 dwellings where there would be no change in the number of people bothered by road traffic induced vibration.

9.7.42 The introduction of the Scheme results in an overall increase in the number of people who would be bothered by road traffic induces air-borne vibration. The results from the traffic vibration nuisance assessment alone are not used to determine if mitigation should be considered. The need to consider mitigation in a scheme is determined from the results of the assessment in changes in noise, as described in HD213/11. Any proposed mitigation following that assessment would also cause changes to the traffic vibration nuisance assessment.

BNL

9.7.43 Beyond the main Calculation Area, an assessment of the Basic Noise Level (BNL) is undertaken for all dwellings and other sensitive receptors within 50 meters of each affected route. The same comparisons as carried out for the main Calculation Area are undertaken.

9.7.44 The BNL calculations have been undertaken following CRTN procedures, using calculation spreadsheets alongside scaled OS mapping, address point data and project traffic data. All affected routes have been assumed to have zero gradient and no obstructions are assumed between each road and receptors. These assumptions remain constant between scenarios.

9.7.45 Table 9.16 indicates the calculated BNL at a reference 10m distance from each of the affected routes and not for each individual receptor. A receptor height of 4m above ground is assumed. The number of dwellings within 50m of each route is also indicated. No other sensitive receptors were identified within 50m of the affected routes. The location of the affected routes are indicated in sheet 6 of Figure 9.1.

9.7.46 A comparison of the BNL results for each road link enables an understanding of the magnitude of the change in road traffic noise from changes in traffic flows for the receptors identified within 50m of each road link. The noise levels presented in the Table 9.16 are not predictions of road traffic noise for the receptors identified in the 50m boundaries.

Table 9.16: Basic Noise Level results, $L_{A10,18\text{-}hour}$ dB

Affected Route	No. Dwellings within 50m (Figure 9.1 sheet 6)	DM2015	DM3030	DS2015	DS2030
Moor Road, between M621 J5 and Balm Road	171	58.2	67.8	58.3	67.9
Beza Street, between M621 J5 and Church Street	0	61.4	68.6	61.4	68.7

9.7.47 The results presented in Table 9.16 are compared in the same way as the detailed calculation results in the main Calculation Area. Table 9.17 shows the comparison results.

Table 9.17: Magnitude of noise impact for BNL assessment

Change in Noise Level, $L_{A10,18\text{-}hr}$ dB		DM2015 v DM2030	DM2015 v DS2030	Change in Noise Level, $L_{A10,18\text{-}hr}$ dB	DM2015 v DS2015
Increase	0.1-2.9			0.1-0.9	171
	3-4.9			1-2.9	
	5-9.9	171	171	3-4.9	
	10+			5+	
No Change				No Change	
Decrease	0.1-2.9			0.1-0.9	
	3-4.9			1-2.9	
	5-9.9			3-4.9	
	10+			5+	

9.7.48 The Do-Minimum assessment between the opening and future assessment years indicate 'Moderate' noise increases of +5 to +9.9dB at all 171 dwellings.

9.7.49 In the Do-Something assessment in the future year, there would be 'Moderate' noise increases of +5 to +9.9dB at all 171 dwellings, while in the opening year 'negligible' increases of +01-0.9dB are predicted.

9.7.50 The predicted increases in noise for these dwellings occur as a result of predicted increases in road traffic on this route between 2015 and 2030, in both Do-Minimum and Do-Something scenarios. The change in road traffic noise upon the Scheme opening in 2015 is negligible.

9.7.51 The predicted increases in road traffic are as a result of a large increase in planned employment at Stourton, Leeds of approximately 5,150 additional jobs. The results indicate that the 'Moderate' noise increases for these 171 dwellings are likely to occur independent of the M1 scheme, as the 'Do-Something' assessment in the opening year of 2015 indicates 'Negligible' noise increases of less than 1dB. It is assumed that these impacts have been identified by an appropriate assessment for the scheme / development that causes the increase in jobs at Stourton, and that if considered appropriate the assessment also includes any agreed mitigation. However, this is unknown at present and so cannot be included within this assessment.

Summary of Impacts

9.7.52 The numbers of dwelling facades experiencing changes in noise level and noise and vibration nuisance are given in Tables 9.11 through to 9.17.

9.7.53 In the Do-Minimum scenario, between the opening year and the future assessment year, there are a number of dwellings and other sensitive receptors predicted to experience both increases and decreases in noise and noise nuisance. Overall, there are over four times as many dwellings predicted to experience a decrease as an increase, and approximately a sixth of the number of other sensitive receptors are predicted to experience an increase, and the remainder a decrease in road traffic noise. Considering night-time noise, similar numbers of dwellings are predicted to experience negligible increases and decrease in road traffic noise.

9.7.54 In the Do-Something assessment in the opening year (2015) the majority of dwellings, and other sensitive receptors, are predicted to experience an increase in noise with the scheme than a decrease. For the majority of receptors the predicted increase would be negligible, although a minor increase in noise is predicted for 631 dwellings and 6 other sensitive receptors. These 631 dwellings are located in various places along the scheme, and are indicated in Figure 9.3.

9.7.55 The Do-Something assessment of the future year (2030) indicates that there are more dwellings and other sensitive receptors predicted to experience an increase in both day and night-time noise with the scheme than a decrease. All predicted changes in road traffic day and night-time noise are predicted to be of a 'Negligible' magnitude.

9.7.56 The assessment of road traffic noise nuisance indicates that in the Do-Minimum scenario there are predicted to be more dwellings that would experience a decrease in noise nuisance than an increase. With the introduction, the Do-Something scenario, there are predicted to be more dwellings with an increase in traffic noise nuisance than a decrease. These changes in the level of nuisance are caused by changes to the overall noise level.

Mitigation has not been considered following the assessment of changes in the overall noise level and therefore the impacts from traffic nuisance are not reduced.

9.7.57 The assessment of airborne vibration nuisance indicates that the majority of dwellings within 40m of the M1 would not experience any change. There would be seven dwellings in the Do-Minimum predicted to experience a decrease in airborne vibration nuisance, and seven dwellings predicted to experience an increase with the introduction of the Scheme. These changes in the level of traffic vibration nuisance are caused by changes to the overall noise level. Mitigation has not been considered following the assessment of changes in the overall noise level and therefore the impacts from traffic vibration nuisance are not reduced.

9.7.58 The immediate change between the Do-Minimum and Do-Something scenarios in the opening year is increases in road traffic noise, with greater numbers of receptors predicted to experience noise increase than decrease. The changes in road traffic noise are due to changes in road traffic flows and also as a result of the traffic stream moving close to the receptors as the hard shoulder is utilised. However, over the assessment period to 2030, the magnitude of change will reduce, which is largely due to road resurfacing by 2030.

9.8 Significant effects

9.8.1 During the construction phase of the scheme there are not predicted to be significant impacts. It should be noted again however, that the assessment of construction impacts has been undertaken by making assumptions of likely plant, and cannot be considered as definitive until the methods and equipment for construction are clearly defined.

9.8.2 In the short term there are 637 sensitive receptors where there are predicted to be minor increases (1 – 2.9 dB) in noise. At all other sensitive receptors there is predicted to be a negligible increase in noise, no change, or a negligible decrease in noise. In the long term all the impacts are predicted to be negligible (increase and decreases) or no change. Due to the low magnitude of impacts it is not considered necessary to propose mitigation measures.

9.8.3 Due to an increase in planned employment at Stourton, Leeds, there are forecast to be moderate adverse increases in noise in the long term at locations outside of the main calculation area. As these increases are forecast to occur regardless of the implementation of the Management Motorway scheme it is not possible to consider mitigation as they are outside the control of the Highways Agency.

9.9 Indication of difficulties encountered

9.9.1 No difficulties have been encountered in the undertaking of this assessment.

9.10 Summary

9.10.1 A noise assessment in accordance with the Detailed Methodology in HD213/11 has been undertaken for the M1 J39 to 42 Managed Motorway.

9.10.2 The assessment of construction (temporary) impacts has shown that significant impacts are unlikely, although at this stage of only indicative calculations can be undertaken.

9.10.3 In the short term (i.e. on opening) there are predicted to be some minor increases in noise. The long term noise impacts are all predicted to be negligible.

9.10.4 Since completing the assessment, a Major Projects Instruction titled ‘Policy positions on

noise and application to major improvement schemes' has been issued by the Highways Agency. This is applicable to Managed Motorway Schemes and describes the approach to adopt where the Scheme contains 'Important Areas' and 'Important Areas with First Priority Locations'. The instruction is:

Consideration should be given to improving the noise environment in these locations where possible, even if the scheme itself does not cause a worsening of the impact in these, as per the Government's legal responsibility to consider such opportunities under the NERC Act 2006.

9.10.5 The environmental assessment did not predict that the introduction of the scheme would lead to changes in noise levels that required specific mitigation. However the Major Project Instruction describes a different approach to that adopted for this assessment and the implications of this are currently being examined with respect to possible mitigation measures that could, where feasible, be included within the Scheme to improve the existing noise environment.

10 Effects on All Travellers

10.1 Study area

10.1.1 The study area for the assessment of effects on all travellers is defined by the Proposed Scheme itself and includes the length of the proposed works and the associated traffic management.

10.2 Methodology

10.2.1 The assessment of effects on all travellers has been prepared in accordance with guidance in HA200/08 and IAN 125/09 which merges the former chapters for Pedestrians, Cyclists, Equestrians and Community Effects (DMRB Volume 11, Section 3, Part 9) and Vehicle Travellers (DMRB Volume 11, Section 3, Part 8) into a combined Effects on All Travellers chapter.

10.2.2 The assessment outlined below follows DMRB guidance current as of March 2013 and IAN 161/12 for MM-ALR. The Environmental Scoping Report (WSP, October 2011) concluded that the only potential impacts on the non-motorised user network would be in terms of visual amenity and temporary changes during construction. For vehicle travellers, the construction period would cause delays but subsequent journey ambience should improve and driver stress should be reduced although it is unlikely that this will be perceptible in terms of DMRB driver stress measurement. The Scoping Report recommended that the potential for driver stress to be reduced should be checked against the updated traffic data. It also recommended that the visual impacts are considered as part of the landscape assessment.

10.2.3 IAN 161/12 considers that there is potential for a degree of “urbanisation of the motorway corridor as perceived by vehicle travellers and there is potential stress relief through improved lane discipline, journey time reliability and improved traffic management at incidents.”

10.2.4 With this guidance in mind, the effects of the scheme on non-motorised users and communities are scoped out of this EAR as there is no land-take associated with the scheme and non-motorised users will not use the motorway. The chapter focuses on driver stress (i.e. frustration, fear of accidents and uncertainty of route). Potential effects concerning the change in amenity are assessed under other headings such as, landscape, noise, and air quality.

10.2.5 The assessment of drivers stress was based on three main factors:

- Frustration.
- Fear of Accidents.
- Uncertainty of Route.

10.2.6 For the purposes of this assessment relative levels of value (sensitivity) have not been assigned to the receptors (vehicle travellers) and all drivers on the motorway are considered to have the same sensitivity in relation to driver stress.

Frustration

10.2.7 Frustration is caused by a driver's inability to drive at a speed consistent with his or her own wishes in relation to the general standard of the road. It increases as speed falls in

relation to expectations and may be due to high flow levels, intersections, roadworks, or to difficulties in overtaking slower moving traffic. Congestion can lead to frustration by creating a situation in which the driver does not feel in control, especially when he or she wishes to arrive at a destination by a particular time, but is held up by traffic congestion whose duration cannot be determined.

10.2.8 The main factors contributing towards driver frustration along the motorway relate to the existing carrying capacity of the carriageway. Vehicles are forced to reduce speed considerably during peak traffic flows. Congestion can become acute when an accident or breakdown closes one or more lanes.

10.2.9 As an indicator of driver stress/frustration, DMRB tabulates the relationship between average peak hourly flow per lane and average journey speed, in order to describe the category of driver stress on a three point scale: low; moderate and high:

Table 10.1: Driver Stress/Frustration Categories

Average Peak Hourly Flow per lane, in Flow units/hr	Average Journey Speed km/hr		
	Under 75	75-95	Over 95
Under 1,200	High	Moderate	Low
1,200-1,600	High	Moderate	Moderate
Over 1,600	High	High	High

10.2.10 Data on AADT flows and traffic speeds from the traffic model were used to assess the degree of driver stress as a result of the Proposed Scheme.

10.2.11 In accordance with DMRB, an assessment of driver stress is made for the worst year in the first fifteen years after opening (the Design Year). The following are used for the assessment:

- 2010 - Base Year
- 2030 - Do-Minimum
- 2030 - Do-Something

Fear of Accidents

10.2.12 The main factors leading to fear are the presence of other vehicles, inadequate sight distances and the likelihood of pedestrians, particularly children, stepping into the road. Other factors include inadequate lighting, narrow roads, roadworks, poorly maintained road surfaces. Fear is highest when speeds, flows and the proportion of heavy vehicles are all high. All these factors become more important in adverse weather conditions. A road scheme may increase driver fear to some extent because it will increase traffic speeds and, by diverting traffic from a number of existing roads, may also increase flows. However, this increased perception of danger is likely to be more than offset in most cases by the superior design standards to which a new scheme is built (for example, longer sight distances, footbridges for pedestrians, good lighting, and a new road surface).

10.2.13 The fear of accidents can become particularly acute when driving in adverse weather conditions when spray from vehicles reduces visibility. Adverse weather conditions coupled with the limited sight distances caused by the scale and mass of HGVs, makes driving and overtaking more stressful and risky, and therefore increases the fear of accidents.

10.2.14 The assessment reviews the average percentage of HGVs on the motorway between Junction 39 and 42 for the 2030 Do-Minimum and 2030 Do-Something.

Uncertainty of Route

10.2.15 Route uncertainty is caused primarily by inadequate signing. This assessment considers the adequacy of existing signage and proposed signage as part of the Proposed Scheme.

Driver Stress Overall Significance of Effect

10.2.16 A judgement as to the overall significance of effect for driver stress is then made in accordance with Table 10.2, which incorporates consideration of the categories of stress from Table 10.1. These significance criteria have been used in the environmental assessments undertaken for other Highways Agency Managed Motorways schemes.

Table 10.2: Significance Criteria to Describe the Level of Driver Stress

Significance of Effect	Description
Very large beneficial or adverse	Where there would be a very major increase/reduction in driver stress resulting from the Proposed Scheme compared to the Do-Minimum.
Large beneficial or adverse	Where there is a major increase/reduction in driver stress resulting from the Proposed Scheme compared to the Do-Minimum.
Moderate beneficial or adverse	Where there is a moderate increase/reduction in driver stress resulting from the Proposed Scheme compared to the Do-Minimum.
Slight beneficial or adverse	Where there is a minor increase/reduction in driver stress resulting from the Proposed Scheme compared to the base year and Do-Minimum.
Neutral	Where no effects on driver stress is anticipated from the Proposed Scheme, or where the beneficial and adverse effects are considered balanced.

10.3 Baseline conditions

10.3.1 The M1 is a strategic route for local, regional and international traffic, carrying in excess of 153,000 vehicles a day. Congestion is already a serious problem and, based on national road traffic forecasts, the extent and severity of congestion is expected to increase significantly over the next 15 to 20 years. Delays are experienced most weekdays during peak times and this severely affects journey time reliability. With a predicted rise in vehicle numbers of 19% by 2015 and 37% by 2025 from 2003 levels (Source: National Transport Model – Road Transport Forecasts 2008), this section of motorway has the potential to

represent a major transport constraint. Added to this, the short weaving lane between Junctions 41 and 42 poses difficulties for drivers getting into the appropriate lane, especially during peak periods.

10.3.2 Existing levels of driver stress on the M1 between Junction 39 and 42 is a combination of:

- Frustration.
- Fear of accidents.
- Uncertainty of route.

Frustration

10.3.3 Traffic data for the base year of 2010 between Junctions 39 and 42 (northbound and southbound) was used to assess the degree of driver stress/frustration under existing conditions. Table 10.3 presents the average peak hourly flow rate and average speed which are to assess the stress.

Table 10.3: Base Year 2010 Traffic Data

Base Year	Northbound			Southbound		
	AADT	Average Peak Hourly Flow/ Lane	Average Peak Speed (km/hr)	AADT	Average Peak Hourly Flow/ Lane	Average Peak Speed (km/hr)
J39-40	53,057	1,500	102	57,563	1,581	100
J40-41	58,595	1,643	98	62,563	1,733	96
J41-42	63,192	1,760	95	65,919	1,802	95
Average	58,281	1,634	98	62,015	1,705	97

10.3.4 The average peak hourly flow rate per lane is over 1,600 and the average speed remains under 100 km/hour. As a result, drivers travelling both northbound and southbound currently experience high levels of stress as defined in Table 10.1.

Fear of Accidents

10.3.5 The fear of accidents can become particularly acute when driving in adverse weather conditions when spray from vehicles reduces visibility. Adverse weather conditions coupled with the limited sight distances caused by the scale and mass of HGVs, makes driving and overtaking more stressful and risky, and therefore increases the fear of accidents. HGVs currently make up approximately 6.2% of traffic flow on the motorway between Junction 39 and 42.

10.3.6 Accident rates for the whole scheme J39-42 are 11.29 per 108 vehicle miles, of which 0.26 are fatal, 0.65 are serious and 10.39 are slight. The total accident rate for J39-42 is approximately 35% lower than the 2010 England motorway average of 17.14 and 45% lower than the Area 12 motorway average of 19.87. The accident rate for M1 J41-42 is 11.27 per 108 vehicle miles all in the slight category, indicating low speed shunts associated with the short weaving lanes rather than fatal or serious accidents.

Uncertainty of Route

10.3.7 Under the existing conditions, motorway users are unlikely to experience uncertainty of route and the junctions and destinations are adequately sign posted. However, the short distances between Junctions 41 and 42, may cause difficulty for drivers to manoeuvre into the appropriate lanes.

Summary of Existing Driver Stress Levels

10.3.8 Based on existing baseline traffic flows, driver stress between Junctions 39 and 42 travelling both northbound and southbound is considered to be high due to the existing traffic flows, the average journey speeds, and short weaving lanes between Junctions 41 and 42.

10.4 Value (sensitivity) of resource

10.4.1 As stated above it is not proposed to assign relative levels of sensitivity to the receptors, in this case drivers, as there is little to distinguish between the types of vehicle users and they are considered to have the same sensitivity to change.

10.5 Regulatory / policy framework

National Policy

National Planning Policy Framework, Adopted March 2012

10.5.1 On 27 March 2012 the government published the National Planning Policy Framework (NPPF) to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. The NPPF, now adopted, replaces the Planning Policy Guidance Notes and Planning Policy Statements, as outlined in Annex 3 of the NPPF.

10.5.2 The NPPF does not contain specific policies for nationally significant infrastructure projects for which particular considerations apply. These are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements for major infrastructure, as well as any other matters that are considered both important and relevant (which may include the NPPF).

10.5.3 National policy statements form part of the overall framework of national planning policy, and are a material consideration in decisions on planning applications.

10.5.4 At the heart of the NPPF is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking.

10.5.5 For decision-taking this means approving development proposals that accord with the development plan without delay; and where the development plan is absent, silent or relevant policies are out-of-date, the presumption is in favour of granting planning permission unless:

- any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or
- specific policies in this Framework indicate development should be restricted.

10.5.6 In terms of transport infrastructure, the national policy driver is to promote sustainable transport modes - any efficient, safe and accessible means of transport with overall low impact on the environment, including walking and cycling, low and ultra low emission

vehicles, car sharing and public transport. Whilst this Proposed Scheme is essentially a managed motorway, with the emphasis on vehicular transport, increasing capacity through using hard shoulder running in the existing highway boundary can be considered a sustainable use and management of existing highway networks.

Regional Policy

10.5.7 The Government has committed to revoking the Regional Spatial Strategies under the provisions of the Localism Bill (2011) (Clause 89 and Schedule 8). Now that the Localism Bill has received Royal Assent and has become the Localism Act, 2012, Regional Spatial Strategies no longer form part of the development plan for the purposes of determining planning applications.

Local Policy

Wakefield Development Plan 2012 - Local Development Framework Development Policies

10.5.8 Policy D14 relates to Access and Highway Safety. The policy primarily relates to development activities rather than highway improvements. However it does state that highway safety, road traffic congestion, and the impact of vehicles on environmental quality and amenity are increasingly of concern within the district.

Leeds Unitary Development Plan 2006

10.5.9 There are no polices relevant to effects on all travellers.

10.6 Design, mitigation and enhancement measures

10.6.1 The following aspects of the Proposed Scheme would assist in helping to reduce driver stress;

- it will satisfy current design standards;
- the new gantries will manage traffic flows;
- the use of the hard shoulder will provide additional carrying capacity; and
- the dedicated merge and diverge lane between Junctions 41 and 42 will ease traffic flow on this short section of the motorway and reduce the need for lane weaving.

10.7 Magnitude of impacts

Frustration

10.7.1 The traffic data indicates that the motorway is used by a large number of road users. Driver stress would be increased during construction which is likely to require traffic management including narrow lanes, speed control and potentially night-time working and lane closures.

10.7.2 Driver stress/frustration has been calculated for design year (2030) which is forecast to have the highest traffic flows within fifteen years after the Proposed Scheme opens and therefore lead to the greatest levels of driver stress.

10.7.3 Tables 10.4 and 10.5 illustrate the average peak hourly flow per lane and average weighted speed for the year 2030 without the Proposed Scheme in place (Do-Minimum) and the year 2030 with the Proposed Scheme in place (Do-Something) scenarios.

Table 10.4: 2030 Do Minimum Traffic Data

2030 Do-Minimum	Northbound			Southbound		
	AADT	Average Peak Hourly Flow/ Lane	Average Peak Speed (km/hr)	AADT	Average Peak Hourly Flow/ Lane	Average Peak Speed (km/hr)
J39-40	68,452	1,839	94	79,540	2,083	87
J40-41	75,666	1,992	89	81,045	2,128	86
J41-42	79,111	2,050	88	84,291	2,201	83
Average	74,410	1,960	90	81,625	2,138	85

Table 10.5: 2030 Do Something Traffic Data

2030 Do-Something	Northbound			Southbound		
	AADT	Average Peak Hourly Flow/ Lane	Average Peak Speed (km/hr)	AADT	Average Peak Hourly Flow/ Lane	Average Peak Speed (km/hr)
J39-40	71,950	1,476	103	86,383	1,735	96
J40-41	82,966	1,694	96	91,350	1,846	92
J41-42	89,391	1,441	92	94,676	1,898	91
Average	81,436	1,537	97	90,803	1,826	93

10.7.4 The predicted average peak hourly flow in 2030 without the Proposed Scheme (Do-Minimum) would be 1,960 vehicles per lane with an average speed of 90km/hr on the northbound carriageway and 2,138 vehicles per lane with an average speed of 85km/hr on the southbound carriageway (Table 10.4). These flows and average speeds would result in high levels of driver stress (Table 10.1).

10.7.5 The average peak hourly flow on the northbound carriageway of the Proposed Scheme (Do-Something) in 2030 is 1,537 vehicles per lane with an average journey speed of 97 km/hr (Table 10.5), resulting in moderate levels of driver stress (Table 10.1). Driver stress levels remain high for the southbound carriageway.

10.7.6 The traffic data forecasts show that traffic volumes are expected to increase in 2030, compared to existing conditions. Traffic flow averages are predicted to be lower on average in 2030 with the Proposed Scheme in place because of the additional lane provision. Therefore, between Do-Minimum and Do-Something scenarios, the effects of

driver stress reduces from high to moderate/high resulting in an overall reduction in driver stress with the Proposed Scheme in place.

10.7.7 The conclusion of a reduction in driver stress is consistent with the findings from the M42 pilot scheme which was the first trial of managed motorway technology. Although the scheme design is not the same as the proposals for the M1, the pilot included hard shoulder running, provision of ERAs, and the installation of gantries with signals and VMSs. The ATM Monitoring and Evaluation Report (Highways Agency, 2008) which looked at the scheme after the first twelve months, reported the following findings from consultation surveys:

- users felt that the M42 was better than other motorways;
- the perceived levels of congestion were reduced; and
- there was a reduction in the number of users who agreed with the statement that 'using the M42 increases anxiety due to a concern for safety'.

Fear of Accidents

10.7.8 Table 10.6 provides the percentage of HGVs in 2030 with and without the Proposed Scheme.

Table 10.6: Percentage HGVs on the M1 Junctions 39-42 in 2030 for the Do Minimum and Do Something Northbound (NB) and Southbound (SB)

Junction	2030 Do-Minimum %HGV	2030 Do-Something %HGV
Junction 39-40	NB: 6.4% SB: 6.7%	NB: 6.2% SB: 6.6%
Junction 40-41	NB: 5.8% SB: 6.4%	NB: 5.7% SB: 6.2%
Junction 41-42	NB: 5.9% SB: 6.0%	NB: 5.6% SB: 5.9%
Average	NB: 6.0% SB: 6.4%	NB: 5.8% SB: 6.2%

10.7.9 The average percentage of HGVs on the motorway is predicted to be 6% northbound and 6.4% southbound in 2030 without the Proposed Scheme (Do-Minimum) and 5.8% northbound and 6.2% southbound in 2030 with the Proposed Scheme in place (Do-Something). Therefore, there will be a slight reduction in the percentage of HGVs using this section of the M1 and the overall fear of accidents, which contributes to driver stress, will be reduced.

Route Uncertainty

10.7.10 The Proposed Scheme would incorporate improved directional signs; gantry and cantilever message signs. Route uncertainty is not currently a problem, however the improved level of information on these signs would result in slight beneficial effects.

10.8 Significant effects

Driver Stress

10.8.1 Overall during construction, traveller stress is anticipated to be moderate adverse due to the number of drivers likely to be affected during the construction period, although this would be temporary in nature.

10.8.2 Traffic data forecasts show that with the scheme in place, traffic flows per lane are expected to be lower in 2030 compared to existing conditions and the 2030 Do-Minimum. Average traffic speed is predicted to be slightly higher for the 2030 Do-Something compared with the 2030 Do-Minimum. This would result in slight reductions in driver stress. The percentage of HGVs is also predicted to reduce in 2030 with the Proposed Scheme in place resulting in slight beneficial significance of effects on fear of accidents.

10.8.3 In addition, the improved directional signs, new gantry and cantilever message signs, and the dedicated merge-diverge lane between Junctions 41 and 42 northbound, together with a reduction in the percentage of HGVs by 2030 would help to alleviate congestion, improve certainty of route and improve driver comfort.

10.8.4 As a result, the overall impact on driver stress (incorporating frustration, fear of accidents and route uncertainty) resulting from the Proposed Scheme is anticipated to be slight beneficial.

Effects on Policies and Plans

10.8.5 The Proposed Scheme would not significantly affect any of the national, regional or local planning policies as described. The Proposed Scheme will improve journey time reliability and reduce traveller stress. As a result, the Proposed Scheme would generally have beneficial effects.

10.9 Indication of difficulties encountered

10.9.1 No significant difficulties were encountered during this assessment.

10.10 Summary

10.10.1 The overall assessment of permanent, long term effects on all travellers through driver stress is considered to be slight beneficial.

11 Assessment of Cumulative Effects

11.1 Study area

11.1.1 The study area, and thus receptors, for the assessment of cumulative effects has been informed by the study areas of the specialist environmental assessments - primarily the biodiversity and landscape study areas, as these had the largest study areas, and hence the largest zone of influence of the proposed scheme. See Chapters 6 and 7 for more information.

11.2 Methodology

11.2.1 The EIA Regulations require an Environmental Assessment to identify the potential for, and where present assess, cumulative effects of a project. Cumulative effects can also be considered as effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed scheme. 'Reasonably foreseeable' is interpreted to include other projects that are 'committed'. These should include (but not necessarily be limited to):

- Trunk road and motorway projects that have been confirmed (i.e. gone through the statutory processes).
- Development projects with valid planning permissions as granted by the Local Planning Authority, and for which formal EIA is a requirement or for which non-statutory environmental impact assessment has been undertaken.

11.2.2 Cumulative effects are the result of multiple actions on receptors or resources. There are principally two types of cumulative effect:

- Type 1 - Where different environmental impacts are acting on one receptor, but are the result of the proposed scheme; or
- Type 2 - Where environmental impacts are acting on one receptor, but are the result of multiple projects in combination (including the proposed scheme being assessed).

11.2.3 This assessment of cumulative impacts has been undertaken in accordance with DMRB Volume 11, Section 2, Part 5, Interim Advice Note 125/09 (IAN 125/09) and a supplementary Major Project's Instruction on Cumulative Assessment requirements (January 2013).

11.2.4 The methodologies for determining the effects of the proposed scheme are detailed in the specialist chapters; 5 to 10 of this report.

11.2.5 The assessment of Type 1 cumulative effects considered where receptors were likely to experience multiple effects from the proposed scheme, for example noise and visual impacts. The assessment focused on effects that were significant, therefore only receptors experiencing moderate or larger effects were included in the assessment. Table 11.1 below shows the approach taken.

Table 11.1: Effects of the Proposed Scheme included in the Cumulative Effects Assessment

Significance of effect					
Significance of effect		Large	Moderate	Minor	Negligible
	Large	Included	Included	Included	Not included
	Moderate	Included	Included	Included	Not included
	Minor	Included	Included	Not included	Not included
	Negligible	Not included	Not included	Not included	Not included

11.2.6 When considering the Type 2 cumulative effects, the receptors experiencing effects of a moderate or large significance were assessed to understand how they would be affected by other proposed development projects. A two stage approach initially considered whether the receptors affected by the proposed scheme would be affected by the other developments and projects. Following this, the second stage identified the significance of the cumulative impacts.

11.2.7 There is no statutory definition for significance. The various specialist environmental chapters of this report describe how significance is determined for each topic. However, when these individual topic effects are considered in combination, the overall result may be significant. HA205/08 recommends that the following should be considered in determining the significance of cumulative effects:

- Which receptors/resources are affected?
- How will the activity or activities affect the condition of the receptor/resource?
- What are the probabilities of such effects occurring?
- What ability does the receptor/resource have to absorb further effects before change becomes irreversible?

11.2.8 The significance of cumulative effects have been determined using the criteria shown in Table 11.2 which is taken from DMRB Volume 11, Section 2, Part 5.

Table 11.2: Determining Significance of Cumulative Effects

Significance	Effect
Severe	Effects that the decision-maker must take into account as the receptor/resource is irretrievably compromised.
Major	Effects that may become key decision-making issue.
Moderate	Effects that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve on current performance.
Minor	Effects that are locally significant.
Not Significant	Effects that are beyond the current forecasting ability or are within the ability of the resource to absorb such change.

11.3 Baseline conditions

11.3.1 Baseline conditions are as described in the relevant specialist environmental chapters of this report. The sensitive receptors, i.e. those experiencing moderate or large adverse impacts as a consequence of the proposed scheme are listed below. The impacts experienced by the receptors are discussed in detail in the relevant specialist environmental chapter (5-10).

1. Cyclist and walkers on National Cycle Route 69 and public footpaths following the railway and River Calder (Landscape and Visual effects).
2. Residents of Horbury south of A642 and users of playing fields and public footpaths (Landscape and Visual effects).
3. Walkers on footpath leading off Park Mill Lane overbridge (Landscape and Visual effects).
4. Lodge Hill Farm, Lower Park Farm, New Park Grange (Landscape and Visual effects).
5. Walkers on footpaths to west of motorway (Landscape and Visual effects).
6. House at Golden Elders on Batley Road, Jaw Hill (Landscape and Visual effects).
7. Footpaths from Brandy Carr Lane towards motorway (Landscape and Visual effects).
8. Public footpaths eastwards from East Ardsley (Landscape and Visual effects).
9. Terraced houses at junction of Lawns Lane and Lingwell Gate (Landscape and Visual effects).
10. Church Of Jesus Christ Of Latter Day Saints on Horbury Road (Air Quality).
11. Vehicle travellers on M1.

11.3.2 The traffic model that was prepared for the proposed scheme identified a number of planned highway schemes and other proposed developments and projects which fall within the study area. Where relevant, the potential traffic effects of these schemes were included within the traffic model to ensure that it reflected the most likely year 2030 scenarios. Consequently, the noise, air quality and driver stress (post construction) assessments which use the data from the traffic model, are considered to be inherently cumulative i.e. they already consider the effects of these projects. The M1 J32-35a and the M1 J28-J31 Managed Motorways schemes have both been included within the Do Minimum and the Do Something scenarios. It is currently understood that these schemes will have been constructed by Opening Year of the Proposed Scheme.

11.3.3 The list of developments and projects that were included within the traffic model was reviewed and filtered according to size of development and location. The developments and projects that were assessed for their cumulative impacts are those located within the study areas, as defined by the landscape and ecology assessments and were either greater than 0.5ha for office or industrial developments or more than 10 residential properties. These developments and their type and size are listed in Table 11.3. Other schemes, such as the M1 J32-35a and the M1 J28-J31 Managed Motorways schemes have been included within the traffic model and hence within the Air Quality and Noise assessments, as these are inherently cumulative. They have not been included further within the cumulative assessment as they fall outside of the study area.

Table 11.3: Other developments and projects located within the study area

Ref. no.	Name/ location	Type & Size
1	Rear of Daw Green Avenue, Crigglestone, Wakefield	Residential - 34 dwellings
2	Land off Barnsley Road, New Millerdam, Wakefield	Residential - 38 dwellings
3	Land North of Standbridge Lane, Kettlethorpe	Residential - 72 dwellings

Ref. no.	Name/ location	Type & Size
4	Durkar Lane, Crigglestone	Residential - 24 dwellings
5	Land West of Durkar Low Lane, Wakefield	Residential - 35 dwellings
6	Calder Park Junction 39	Residential - 134 dwellings Office - 874 SQM
7	Victoria Mills, Horbury Road / Storrs Hill Road, Ossett	Residential - 48 dwellings
8	Land at Ossett Spa, Ossett	Residential - 67 dwellings Industrial - 2436 SQM
9	Land at Dewsbury Road	Residential - 111 dwellings
10	Silkwood Business Park	Residential - 24 dwellings Industrial - 623 SQM
11	Woolin Crescent, West Ardsley	Residential - 28 dwellings
12	Haigh Moor Road - Jude's Point, West Ardsley	Residential - 64 dwellings
13	Ardsley Common, Bradford Road	Residential - 13 dwellings
14	Land at Lingwell Gate Lane, Wakefield	Residential - 31 dwellings
15	Fall Lane - East Ardsley PS	Residential - 122 dwellings
16	Ardsley Sidings, East Ardsley	Residential - 224 dwellings
17	Lingwell Gate Lane, Thorpe	Residential - 53 dwellings
18	Former Brick Works Lingwell Gate Lane, Thorpe	Industrial - 5144 SQM
19	Thorpe Hall Thorpe Lane Thorpe	Office - 43,050 SQM
20	Jarvis Walk, Robin Hood	Residential - 32 dwellings
21	Main Street and Pitfield Road, Carlton, Wakefield	Residential - 140 dwellings
22	Main Street, Carlton	Residential - 15 dwellings
23	Matty Lane, Robin Hood	Residential - 25 dwellings
24	Milner Lane, Robin Hood	Residential - 60 dwellings
25	Towcester Avenue	Residential - 30 dwellings
26	Sharp Lane	Residential - 886 dwellings
27	Highways Agency Pinch Point Scheme - M1 Junction 40	Widening of approaches and circulatory carriageway from two lanes to three
28	Highways Agency Pinch Point Scheme - M1 Junction 41	Widening of approaches and circulatory carriageway from two lanes to three
29	Highways Agency M62 J25 to J30 Managed Motorways	Hard shoulder running between J26-28 and J29-30 Eastbound. CALR between J25-26 and J30-29 Westbound

11.4 Value (sensitivity) of resource

11.4.1 The value of the receptors is as described in detail in Chapters 5 to 10 of this report.

11.5 Regulatory / policy framework

11.5.1 The assessment of cumulative effects is required at project level in EIAs by the European Community Directive 'The Assessment of the Effects of Certain Public and Private Projects on the Environment' (85/337/EEC) as amended by the Council Directive 97/11/EC. This Directive is translated in UK law by Section 105 of the Highways Act 1980 as amended.

11.6 Design, mitigation and enhancement measures

11.6.1 Mitigation measures are those that are proposed and recommended within the individual specialist environmental chapters (5-10) of this report. No additional mitigation measures have been proposed.

11.7 Magnitude of impacts

Cumulative Effects of the Project (Type 1)

11.7.1 Individual receptors that would be affected by different environmental topics, as a result of the Proposed Scheme, have been identified in Table 11.4 and the cumulative effect assessed.

Table 11.4: Type 1 Cumulative Effects

Cumulative Effects from other Planned Developments (Type 2)

Receptor	Project Effects	Notes	Cumulative Effect
Cyclists and walkers on National Cycle Route 69 and public footpaths following railway and River Calder	Visual impacts – moderate adverse Noise – minor increase	Adverse visual effects on users of footpaths and cycle route are likely during construction and in Year 1 during the winter, but following establishment of mitigation will reduce to negligible. Noise impacts will be negligible by 2030.	Moderate adverse in short term, improving to negligible by 2030
Residents of Horbury south of A642 and users of playing fields and public footpaths	Visual impacts – moderate adverse Noise – minor increase	Adverse visual effects on properties and users of playing fields and footpaths are likely during construction and in Year 1 during the winter, but following establishment of mitigation will reduce to negligible. Noise impacts will be negligible by 2030.	Moderate adverse in short term, improving to negligible by 2030
House at Golden Elders on Batley Road, Jaw Hill	Visual impacts – moderate adverse Noise – minor increase	Adverse visual effects on property are likely during construction and in Year 1 during the winter, but following establishment of mitigation will reduce to negligible. Noise impacts will be negligible by 2030.	Moderate adverse in short term, improving to negligible by 2030
Footpaths from Brandy Carr Lane towards motorway	Visual impacts – moderate adverse Noise – minor increase	Adverse visual effects on users of footpaths are likely during construction and in Year 1 during the winter, but following establishment of mitigation will reduce to negligible. Noise impacts will be negligible by 2030.	Moderate adverse in short term, improving to negligible by 2030
Public footpaths eastwards from East Ardsley Footpaths, west of M1 between J41-J42	Visual impacts – moderate adverse Noise – minor increase	Adverse visual effects on users of footpaths are likely during construction and in Year 1 during the winter, but following establishment of mitigation will reduce to negligible. Noise impacts will be negligible by 2030.	Moderate adverse in short term, improving to negligible by 2030
Terraced houses at junction of Lawns Lane and Lingwell Gate	Visual impacts – large adverse Air Quality – exceedence of air quality objective with a slight worsening	Adverse visual effects on property are likely during construction (moderate) and in Year 1 during the winter (large), but following establishment of mitigation will reduce to slight adverse. Worsening of air quality by more than 0.4µg/m2 but would return to pre scheme levels within six years.	Large adverse in short term, improving to slight adverse by 2030

11.7.2 The potential for the other projects and developments within the study area to affect the sensitive receptors are shown in Table 11.5.

11.7.3 It is anticipated that the proposed residential and office development at Calder Park near to Junction 39 would have cumulative landscape and visual effects on receptors on National Cycle Route 69, public footpaths following the railway and River Calder, residents of Horbury south of A642 and users of playing fields and public footpaths. The proposed office and residential development is relatively small and is located within an area already influenced by similar developments. It is understood that the development is proposed to be completed prior to the completion of the proposed scheme. Cumulatively it is anticipated that the effects will be moderate adverse, reducing to minor adverse in Year 15.

11.7.4 The proposed residential and industrial development at Silkwood Business Park would have cumulative landscape and visual effects on walkers on the footpath leading off Park Mill Lane overbridge, footpaths to the west of the motorway and Lodge Hill Farm, Lower Park Farm and New Park Grange. The proposed industrial and residential development is comparatively small within an area of similar developments. It is understood that the development is proposed to be completed prior to the completion of the proposed scheme. Cumulatively it is anticipated that the effects will be moderate adverse, reducing to minor adverse in Year 15.

11.7.5 The proposed residential development at Land at Lingwell Gate Lane would have cumulative landscape and visual effects on walkers on the public footpaths eastwards from East Ardsley and Terraced houses at junction of Lawns Lane and Lingwell Gate. The proposed residential development is located within an area of similar developments. It is understood that the development is proposed to be completed prior to the completion of the proposed scheme. Cumulatively it is anticipated that the effects will be moderate adverse, reducing to minor adverse in Year 15.

11.7.6 The proposed residential development at Ardsley Sidings, East Ardsley would have cumulative landscape and visual effects on walkers on the public footpaths eastwards from East Ardsley. The proposed residential development is located within an area of other new residential developments. It is understood that the development is proposed to be completed prior to the completion of the proposed scheme. Cumulatively it is anticipated that the effects will be moderate adverse during and immediately following construction, reducing to minor adverse in Year 15.

11.7.7 The proposed Highways Agency scheme to improve Junction 40 would have cumulative effects on walkers on the footpath leading off Park Mill Lane overbridge. The works will take place at the same time as the proposed scheme. Views from this receptor are primarily to the north, therefore views of the junction improvements to the south will be minimal. Cumulatively it is anticipated that the effects will be moderate adverse during and immediately following construction, reducing to minor adverse in Year 15.

11.7.8 The proposed Highways Agency scheme to improve Junction 41 would have cumulative effects on walkers on footpaths from Brandy Carr Lane towards motorway and eastwards from East Ardsley. The works will take place at the same time as the proposed scheme. Cumulatively it is anticipated that the effects will be moderate adverse during and immediately following construction, reducing to minor adverse in Year 15.

11.7.9 In addition to the landscape effects of the Junction 40 and 41 improvements there would be cumulative driver stress effects during construction as a result of the increased congestion. The

traffic management requirements would be prepared to address all schemes in parallel and therefore it is anticipated that the effects would be moderate adverse.

11.7.10 The Highways Agency Managed Motorways scheme on the M62 between Junctions 25 and 30 would have cumulative landscape effects on walkers on public footpaths eastwards from East Ardsley. Where views exist towards the M62, these may be interrupted by new gantry and speed limit signs, although impacts are minor due to the distance from the receptors. Cumulatively it is anticipated that the effects will be moderate adverse during and immediately following construction, reducing to minor adverse in Year 15.

11.7.11 There will be some overlap of the construction periods, as this scheme is anticipated to be completed during Autumn 2013. This may result in an increase in driver stress for vehicle travelers. This is anticipated to be moderate adverse for the duration when both schemes are in construction.

Table 11.5: Type 2 Cumulative Effects

Development Ref. No.	Sensitive Receptors										
	Landscape and Visual Impacts									Air Quality	Vehicle Travellers
	Users of National Cycle Route 69 and public footpaths following railway and River Calder	Residents of Horbury south of A642 and users of playing fields and public footpaths	Walkers on footpath leading off Park Mill Lane overbridge	Lodge Hill Farm, Lower Park Farm, New Park Grange	Walkers on footpaths to west of motorway	House at Golden Elders on Batley Road, Jaw Hill	Footpaths from Brandy Carr Lane towards motorway	Public footpaths eastwards from East Ardsley	Terraced houses at junction of Lawns Lane and Lingwell Gate	Church Of Jesus Christ Of Latter Day Saints on Horbury Road	Vehicle Travellers on M1
1	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
2	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
3	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
4	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
5	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
6	●	●	∅	∅	∅	∅	∅	∅	∅	∅	∅
7	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
8	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
9	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
10	∅	∅	●	●	●	∅	∅	∅	∅	∅	∅
11	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
12	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
13	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
14	∅	∅	∅	∅	∅	∅	∅	●	●	∅	∅

Development Ref. No.	Sensitive Receptors										
	Landscape and Visual Impacts									Air Quality	Vehicle Travellers
	Users of National Cycle Route 69 and public footpaths following railway and River Calder	Residents of Horbury south of A642 and users of playing fields and public footpaths	Walkers on footpath leading off Park Mill Lane overbridge	Lodge Hill Farm, Lower Park Farm, New Park Grange	Walkers on footpaths to west of motorway	House at Golden Elders on Batley Road, Jaw Hill	Footpaths from Brandy Carr Lane towards motorway	Public footpaths eastwards from East Ardsley	Terraced houses at junction of Lawns Lane and Lingwell Gate	Church Of Jesus Christ Of Latter Day Saints on Horbury Road	Vehicle Travellers on M1
15	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
16	∅	∅	∅	∅	∅	∅	∅	●	●	∅	∅
17	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
18	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
19	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
20	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
21	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
22	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
23	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
24	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
25	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
26	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
27	∅	∅	●	∅	∅	∅	∅	∅	∅	∅	●
28	∅	∅	∅	∅	∅	∅	●	●	∅	∅	●
29	∅	∅	∅	∅	∅	∅	∅	●	∅	∅	●

Key: ● Adverse effect ∅ Neutral effect * Positive effect

11.8 Significant effects

11.8.1 The proposed scheme would result in the cumulative impacts on the identified receptors shown in Table 11.6.

Table 11.6: Cumulative Effects

Receptor	Significance	Source and Type of Impact
Cyclists and walkers on National Cycle Route 69 and public footpaths following railway and River Calder	Moderate adverse (reducing to minor adverse)	Proposed scheme (Landscape and Visual & Noise impacts)
		Calder Park development (Landscape and Visual impact)
Residents of Horbury south of A642 and users of playing fields and public footpaths	Moderate adverse (reducing to minor adverse)	Proposed scheme (Landscape and Visual & Noise impacts)
		Calder Park development (Landscape and Visual impact)
House at Golden Elders on Batley Road, Jaw Hill	Moderate adverse (reducing to minor adverse)	Proposed scheme (Landscape and Visual & Noise impacts)
Footpaths from Brandy Carr Lane towards motorway	Moderate adverse (reducing to minor adverse)	Proposed scheme (Landscape and Visual & Noise impacts)
		J41 Improvement Scheme (Landscape and Visual impact)
Public footpaths eastwards from East Ardsley	Moderate adverse (reducing to minor adverse)	Proposed scheme (Landscape and Visual & Noise impacts)
		Land at Lingwell Gate Lane (Landscape and Visual impact)
		Ardsley Sidings, East Ardsley (Landscape and Visual impact)
		J41 Improvement Scheme (Landscape and Visual impact)
		M62 Managed Motorways (Landscape and Visual impact)
Walkers on footpath leading off Park Mill Lane overbridge	Moderate adverse (reducing to minor adverse)	Silkwood Business Park (Landscape and Visual impact)
		J40 Improvement Scheme (Landscape and Visual impact)
Lodge Hill Farm, Lower Park Farm, New Park Grange	Moderate adverse (reducing to minor adverse)	Silkwood Business Park (Landscape and Visual impact)
Terraced houses at junction of Lawns Lane and Lingwell Gate	Large adverse (reducing to minor adverse)	Proposed scheme (Landscape and Visual Impact & Air Quality)
		Land at Lingwell Gate Lane (Landscape and Visual impact)
Vehicle travellers	Moderate adverse during construction	Proposed scheme (Driver stress)
		J40 Improvement Scheme (Driver stress)
		J41 Improvement Scheme (Driver stress)
		M62 Managed Motorways (Driver stress)

11.8.2 As shown in the Table 11.6 some receptors will experience a number of moderate and minor adverse impacts as a result of the proposed scheme and other developments and projects. One receptor will experience a large adverse impact. The majority of these impacts are short term and on transient receptors, e.g. users of footpaths and public rights of way. In accordance with the significance criteria in Table 11.2 it is considered that overall the cumulative impacts of the proposed scheme are moderate adverse reducing to minor adverse.

11.9 Indication of difficulties encountered

11.9.1 No difficulties were encountered in undertaking the cumulative assessment.

11.10 Summary

11.10.1 The overall assessment of cumulative effects is moderate adverse during construction and in the short term, reducing to minor adverse by Year 15.

12 Outline Construction Environmental Management Plan

12.1 Introduction

12.1.1 The M1 is a strategic route for local, regional, and international traffic, carrying in excess of 153,000 vehicles a day, of which 25% are heavy goods vehicles (HGVs). Congestion is already a serious problem between Junctions 39 and 42 and, based on national road traffic forecasts, the extent and severity of congestion is expected to increase over the next 15 to 20 years. Delays are experienced most weekdays during peak times, which severely affect journey time reliability. With a predicted rise in vehicle numbers of 19% by 2015 and 37% by 2025 from 2003 levels, this section of motorway has the potential to represent a major transport constraint.

12.1.2 The project aims to increase capacity, reduce congestion and improve this busy section of the M1 by adding additional capacity using managed motorway technology as an alternative to conventional motorway widening. The Proposed Scheme involves converting the existing hard shoulder to a permanently open running lane operating for 24 hours a day. This type of scheme is known as Managed Motorways - All Lane Running (MM-ALR).

12.1.3 The overall project objectives are as follows:

- To support the delivery of the Government's transport policy strategic objectives.
- To reduce congestion and develop solutions to provide additional capacity, ensuring the safe and economic operation of the motorway and the slip roads.
- Make best use of existing infrastructure and provide additional capacity within the existing highway boundary and, where possible, within the existing paved area.
- Outside of those works/infrastructure required for the effective operation of a managed motorway scheme, this project only includes the minimum improvements to the road superstructure (for example surfacing, vehicle restraint systems, environmental mitigation and drainage improvements) that would be required to achieve safe and legal operation of the scheme. The scheme is to be designed to suit the requirements of ongoing maintenance, the needs of Highways Agency Network Operations, and, within the constraints of the design guidance, minimise whole life costs.
- Provide high value for money against its whole of life costs in accordance with the Department for Transport's (DfT) WebTAG guidance.

12.2 Purpose

12.2.1 The purpose of an Environmental Management Plan (EMP) is to manage the environmental effects of the project. Over the life time of the project the EMP will be built upon to manage the environmental effects of the project during the construction and maintenance and operation phases of the scheme. Throughout the phases the EMP will be used to:

- Act as a continuous link for environmental issues between the design, construction and the maintenance and operation stages of a project;

- Record the environmental commitments and actions that should be implemented;
- Record the appropriate dates for the implementation of the environmental commitments and actions;
- Record the environmental risks and appropriate management actions in response to these risks;
- Record a summary of the relevant legislation, policy and good practice that influences the project, maintenance or operational activity;
- Identify the key personnel and communication requirements associated with the delivery of the project/ maintenance or operational activities;
- Record the implementation of the requirements set out in the EMP;
- Record the future management requirements associated with the specific project, maintenance or operational activity.

12.2.2 This Outline Construction EMP has been prepared as part of the Environmental Assessment Report (EAR) and contains the high level information available at the time in relation to environmental commitments and actions to manage and mitigate the environmental effects during construction of the proposed scheme. This document contains a number of headings where the information cannot be completed at this time, However the headings should be used as prompts during the development of the EMP for the construction phase.

12.3 Project Team Roles and Responsibilities

12.3.1 To be completed in the Construction EMP (CEMP).

12.4 Consents, commitments and permissions

12.4.1 Natural England has confirmed that they are satisfied with the Assessment of Implications on European Sites (AIES) and the conclusion of no significant effects.

12.5 Project specific environmental legislation

12.5.1 None relevant at this stage. They will be developed and included within the CEMP.

12.6 Protection of sensitive areas

12.6.1 The following sensitive areas have been identified and will need to be managed during construction.

- Horbury Lagoons Local Nature Reserve. These are wetland features associated with the River Calder and located adjacent to the soft estate on both sides of the M1 north of Junction 39.
- Lupsett Golf Course Ponds Local Nature Reserve This site is located between the southbound carriageway and the railway line, and southwest of Wakefield.
- Roundwood Local Nature Reserve. This is an area of grassland, scrub and bracken located adjacent to the soft estate south of Junction 40.
- Badger setts if identified prior to construction

12.7 Environmental commitments and actions

12.7.1 Table 12.1 contains the relevant project specific environmental commitments and actions that have been identified. This table will be revised and updated at key stages throughout the life of project with actions updated and signed off as required.

12.8 Environmental risk assessments

12.8.1 None prepared at this stage. They will be developed and included within the CEMP.

12.9 Environmental method statements

12.9.1 Environmental method statements have not been prepared at this stage. It is anticipated that the following will be required:

- Protection of vegetation during construction;
- Prevention of accidental spillage or leakage of chemicals and fuels in accordance with the Environment Agency Pollution Prevention Guidelines (PPG);
- Treatment of Invasive Species; and
- Precautionary Method of Working (PMW) for Great Crested Newts.

12.10 Environmental monitoring requirements

12.10.1 No monitoring requirements have been identified at this stage. If necessary the requirements will be developed and incorporated into the CEMP.

12.11 Procedures for monitoring and reviewing environmental compliance

12.11.1 These procedures have not been developed at this stage. They will be developed and included within the CEMP.

12.12 Summary of procedures: to be followed in the event of an environmental emergency or breaching of EMP measures

12.12.1 These procedures have not been developed at this stage. They will be developed and included within the CEMP.

12.13 Annexes

12.13.1 Annexes that will be contained within the CEMP include:

- References to and storage location of Site Waste Management Plans, Landscape Management Plans and any other management plans relating to the works;
- References to and storage location of other relevant information, such as the construction programme, project completion report, design drawings, details of consultation and communication, meeting minutes, reports, technical notes etc;
- Record of management actions undertaken during construction and implementation and the outcomes;

- Environmentally significant changes: detailing procedures to be followed if any significant changes are encountered once a project commences and the grounds which would result in a change to the EMP, e.g. the use of alternative construction methods or design. This should also detail who has responsibility for overseeing and assessing the environmental and compliance implications of changes and managing any changes to existing agreements or commitments;
- Record of environmental monitoring undertaken during construction; and
- Record of environmental incidents.

12.13.2 Environmental commitments and actions as identified in the EAR have been included within the table below. At this stage it is only possible to indicate in outline the persons responsible and the timings associated with these. When the CEMP is prepared further commitments and actions will be added and more specific responsibilities attributed and timings identified.

Table 12.1 - Environmental commitments and actions

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
GENERAL										
1.1	Toolbox talks or other training to be provided to site staff on relevant environmental issues	Contractor		Prior to construction and as relevant during construction						
AIR QUALITY										
2.1	Off-site vehicles should be sheeted	Contractor		During construction						
2.2	The wheels and bodies of site vehicles should be cleaned	Contractor		During construction						
2.3	Stockpiles should also be watered; where necessary they should be covered or enclosed to reduce effects of windblown dust	Contractor		During construction						
2.4	Haul routes should be located away from off-site sensitive properties and watered regularly (wet suppression of	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	dust)									
2.5	Vehicles transporting earthworks materials to or from site should be sheeted	Contractor		During construction						
2.6	Vehicle speeds over unmade surfaces should be limited	Contractor		During construction						
2.7	The aggregate stocking area is to be located away from sensitive areas and residential properties	Contractor		During construction						
2.8	Drop heights should be minimised to discharge material close to where it is required	Contractor		During construction						
2.9	Bulking of wastes should be consolidated to minimise transportation and handling requirements	Contractor		During construction						
2.10	A complaint and investigative response procedure should be operated	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
2.11	Where possible, all non-road mobile machinery should use fuel equivalent to ultra-low sulphur diesel	Contractor		During construction						
2.12	Machinery with exhaust emissions should be placed as far from sensitive properties as practicable	Contractor		During construction						
2.13	Vehicles or plant should not be left idling unnecessarily	Contractor		During construction						
2.14	All vehicles and plant should be well maintained and regularly serviced according to manufacturers' recommendations	Contractor		During construction						
2.15	Where possible haul routes should be located away from off-site sensitive properties	Contractor		During construction						
LANDSCAPE AND VISUAL IMPACT										
3.1	Existing vegetation to	Contractor		During						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	be protected from the works and clearance carefully controlled to ensure minimal removal			construction						
3.2	All areas of vegetation to be retained to be protected by fencing during construction in accordance with method statement	Contractor		During construction						
3.3	Land used temporarily to be returned to a condition suitable for the continuation of the original use	Contractor		Prior to handover						
3.4	Mitigation planting to be delivered in accordance with detailed design planting plans	Contractor		During construction						
3.5	Communications Plan to be updated and actions implemented to communicate and manage the impacts of the proposed scheme	Project Manager/ Contractor		Prior to and during construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	on visually sensitive properties									
3.6	Works to be programmed and phased over a number of stages to restrict impacts within any one sensitive location to the minimum time	Contractor		During construction						
ECOLOGY AND NATURE CONSERVATION										
4.1	All works in the vicinity of trees to be retained are to be protected in accordance with British Standard BS5837:2012 - Trees in relation to design, demolition and construction	Contractor		During construction						
4.2	All construction staff are to receive training on environmental protection e.g. Toolbox Talks	Project Environmental Co-ordinator/ Project Ecologist		Prior to construction and as relevant during construction						
4.3	Construction areas to be clearly defined and	Contractor		Prior to construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	no construction activity, to include temporary storage of materials or vehicles, to be allowed outside these areas									
4.4	Accidental damage to trees and shrubs will be treated immediately with damaged branches cut-back using hand tools to leave a clean cut	Contractor		During construction						
4.5	Any habitats and vegetation of areas of high ecological sensitivity to be retained will be fenced off from construction activities	Contractor		Prior to construction						
4.6	Semi-natural habitat that is damaged during construction will be re-instated to provide mitigation in the medium to long-term	Contractor		Prior to handover						
4.7	Re-instatement of	Contractor		During						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	semi-improved grassland will be agreed with the project ecologist and landscape architect and would involve the use of a native seed mix, such as British Seed Houses WFG4 Neutral Soils on the road verges			construction						
4.8	The full extent of invasive species within the scheme requiring mitigation to be resurveyed before construction to ensure that no new stands of Himalayan balsam have appeared	Project Ecologist		Prior to construction						
4.9	Identified invasive species to be dealt with in accordance with best practice and method statement	Contractor		Prior to construction and as relevant during construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
4.10	A precautionary a badger survey to be undertaken along the soft estate and within 30m of the working area	Project Ecologist		Prior to construction						
4.11	All works which will involve the removal or disturbance of features which can be used by breeding birds, to be undertaken outside the main bird breeding season (March to August inclusive) as far as possible	Contractor		Prior to construction						
4.12	If habitat removal is required during the bird breeding season, prior consultation to be undertaken with the Project Ecologist to determine appropriate action	Contractor		Prior to construction and as relevant during construction						
4.13	Precautionary Method of Working (PMW) for	Contractor		Prior to construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	Great Crested Newts to be followed			and as relevant during construction						
4.14	Site runoff to be intercepted to prevent it joining the existing drainage system	Contractor		During construction						
4.15	Best practice measures to be implemented to minimise dust creation and dispersal	Contractor		During construction						
4.16	All construction workers will be briefed as to the requirements of the law with respect to reptiles and other protected species.	Project Environmental Co-ordinator/ Project Ecologist		Prior to construction and as relevant during construction						
4.17	All construction personnel to be briefed as to the species likely to be encountered, the significance of their presence, the statutory protection they are afforded, where they	Project Environmental Co-ordinator/ Project Ecologist		Prior to construction and as relevant during construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	are likely to be encountered, identification features, and what to do if any are found during works									
4.18	Any areas for location of scheme infrastructure to be subject to inspection by an experienced ecologist prior to any works on site. If deemed suitable for reptiles, any piles of rubble, debris, log piles etc. will be dismantled by hand. Vegetation in these locations will be strimmed to a length of less than 300mm and cleared under supervision of the ecologist	Project Ecologist		Prior to construction						
4.19	Site works will avoid the incidental creation of reptile refuges, e.g.	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	piles of cut vegetation. All arisings will be removed from Site									
MATERIALS										
5.1	Materials Procurement Plan to be prepared for use when selecting and procuring materials prior to and during construction	Contractor		Prior to construction						
5.2	Site profiles to be designed to minimise excavated materials	Contractor		During detailed design						
5.3	All excavated fill to be re-used on-site where geotechnically and geochemically suitable for use	Contractor		During construction						
5.4	Where direct re-use on-site is not possible, or appropriate, materials to be sent off site for recovery or re-use	Contractor		During construction						
5.5	Off-site recovery and/or disposal facilities to be sought in close	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	proximity to the application site									
5.6	A SWMP to be prepared and implemented	Contractor		Prior to and during construction						
5.7	Careful quality control to be implemented to control and minimise waste through limiting over-ordering and materials spoilage; and maximising use of any surplus or 'off-cut' materials	Contractor		During construction						
5.8	A Waste Management Champion to be appointed to be responsible for the SWMP	Contractor		Prior to construction						
5.9	The Waste Management Champion to be responsible for on-site waste training of all relevant operatives to ensure the	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	effectiveness of waste segregation measures and waste reduction									
5.10	A dedicated waste management centre to be defined on-site to maximise the potential for the reuse, recovery and recycling of waste materials generated	Contractor		Prior to construction						
NOISE										
6.1	Produce and submit an application under Section 61 of Part III of The Control of Pollution Act 1974 to the Local Authority Environmental Health Department in whose area the works are to take place. Once approved any conditions applied to the approval to be complied with	Project Environmental Co-ordinator		Prior to construction						
6.2	The Best Practicable	Contractor		During						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	Means as defined in the Control of Pollution Act 1974 to be adopted			construction						
6.3	Works to be programmed and phased over a number of stages to restrict impacts within any one area to the minimum time	Contractor		During construction						
6.4	Reduced noise piling equipment to be used	Contractor		During construction						
6.5	Local residents and property owners to be kept fully informed about the nature and timing of the works, including compound locations and traffic controls, via such means as newsletters and public meetings	Contractor		Prior to and during construction						
6.6	Contractor to be part of the Considerate Contractors Scheme and have a	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	representative available on site during working hours to answer queries or address any concerns expressed									
6.7	Equipment to be carefully selected e.g. compressors to be super-silenced or sound reduced models fitted with acoustic enclosures or pneumatic tools to be fitted with silencers or mufflers wherever practicable	Contractor		During construction						
6.8	Site layout to be carefully considered to minimise noise impact at nearby sensitive properties	Contractor		Prior to and during construction						
6.9	Hoardings, portable barriers and acoustic sheds to be erected as necessary to shield particularly noisy	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
	activities									
6.10	All plant and equipment to be properly maintained and operated in accordance with manufacturers' recommendations and in such a manner as to avoid causing excessive noise	Contractor		During construction						
6.11	Equipment to be shut down when not in use for a period longer than 5 minutes;	Contractor		During construction						
6.12	No vehicles will wait or queue on public highways with engines running	Contractor		During construction						
6.13	Deliveries to only arrive during daytime hours, preferably during the working hours of the sites and to be routed so as to minimise disturbance to local residents	Contractor		During construction						

Ref. no.	Commitment/ action	Persons responsible	Risks (e.g. from non-delivery)	Timing	Design drawing reference	Details of what the matter relates to (i.e. legislation etc.)	Completion status	Details of further action required (e.g. new actions/ commitments)	References to supporting documentation	Comments
6.14	Care to be taken when unloading deliveries and vehicles to be prohibited from waiting on site with their engines running	Contractor		During construction						
6.15	Regular noise monitoring to be undertaken on a four weekly basis to ensure compliance with the levels noted in the Section 61 application.	Contractor		During construction						

13 Conclusions

13.1 Summary of Significant Effects

13.1.1 This environmental assessment has been carried out for the Proposed Scheme to provide MM-ALR on the M1 between Junction 39 and 42. The scope and content of the assessment was informed by the Environmental Scoping Report prepared by WSP in October 2011. In addition, Statutory Environmental Bodies (SEBs) have been consulted on the scope of the assessment.

13.1.2 The assessment has been reported on a topic by topic basis so that the Proposed Scheme is reviewed under each distinct topic Chapter. This allows for the effects of the Proposed Scheme on a particular environmental resource to be identified and where significant adverse effects have been identified appropriate mitigation measures have been recommended for consideration at the Detailed Design stage of the assessment process. A summary of the key conclusions of each environmental topic is outlined below.

13.2 Air Quality

13.2.1 There are sensitive receptors identified within 200m of the proposed scheme and affected roads. There are three AQMAs identified within 200m of the proposed scheme and affected roads. There are no designated ecosystems within 200m of the scheme routes or affected roads (e.g. SSSI, SPA, RAMSAR or SAC).

13.2.2 The public exposure predictions at the identified sensitive receptors along the scheme route and affected roads suggest that in 2015 air quality will meet annual average AQS and EU Limit Values in the majority of locations for NO2.

13.2.3 In those locations which do not currently meet air quality objectives, changes in air quality are generally small and these are unlikely to be observable within normal year to year variations in NO2 concentrations. There are only six properties within the study area whose concentrations are not predicted to drop below pre-scheme levels within 6 years of the scheme opening based on current Long term trend factors.

13.2.4 Air quality will also meet 1-hour NO2, annual average PM10 and 24-hour PM10 air quality objectives at all receptors with or without the scheme.

13.2.5 Construction air quality impacts have been identified and appropriate mitigation measures recommended to avoid adverse temporary effects.

13.2.6 Overall construction and operational air quality effects are considered to not be significant for the scheme.

13.3 Landscape and Visual Impact Assessment

13.3.1 The Proposed Scheme concerns minor modifications along an established motorway corridor, which is already part of the local landscape fabric.

13.3.2 The West Wakefield Urban Fringe LLCA will be able to accommodate several of the new structures as they are located in cutting and well screened at Junction 39. A gateway gantry and termination VMS will be located on the motorway embankment across the Calder Valley and these will alter the existing character locally albeit only slightly.

13.3.3 The Leeds Wakefield Arable Fringe LLCA will be slightly altered north and south of Kirkhamgate between Junctions 40 and Junction 41 by the introduction of new gateway gantries, signage, VMS and ERAs into the rural landscape.

13.3.4 The visual effects of the scheme will be lessened due to the current levels of on-site planting offering good screening of the motorway corridor for properties close to the route, as well as for those with more distant views. The one exception is the houses at the northern end of the terrace at the junction of Lawns Lane and Lingwell Gate between Junctions 41 and 42 which will experience a large adverse effect in winter year 1. The semi-mature nature of the planting results in good screening in many locations, but this is reduced during winter. Additional planting will be undertaken following construction works to infill any gaps and also to screen new structures from sensitive receptors where existing planting is insufficient.

13.3.5 The only impact identified in Year 15 is a slight adverse visual impact for the northernmost houses at the junction of Lawns Lane and Lingwell Gate. These houses are very close to the motorway and the existing gantry at Ch299+870. While roadside planting is proposed, and would reduce the visual impact of the new gantry at Ch 299 + 494, the land available for planting is limited and will not screen it entirely. The existing motorway and existing gantry form a significant part of existing views from these houses and it is considered that the additional gantry 180m away will not greatly reduce the overall amenity of these residential properties.

13.3.6 The assessment of the view from the road indicates that the visual experience of vehicle travellers will not be significantly affected by the proposed works.

13.4 Ecology and Nature Conservation

13.4.1 There are no statutory designated sites and three non-statutory designated sites with potential to be impacted on by the scheme. The habitat types present within the soft estate are plantation woodland, dense scrub, semi-improved neutral grassland, bare earth with ephemeral vegetation and running water. Species identified as potentially impacted are breeding birds, GCNs and reptiles.

13.4.2 Overall, the ecological values of the receptors which will be potentially impacted by the scheme are of up to unitary authority value. Impacts considered are those relating to loss and fragmentation of habitats and disturbance to protected species, both during construction and operation.

13.4.3 Construction-related impacts will be controlled through the implementation of a CEMP, which will include measures to prevent damage to designated sites, protected species and valuable habitats.

13.4.4 Habitat loss is relatively minor, with negative, direct and permanent impacts predicted to scrub and plantation woodland habitats and semi-improved neutral grassland habitat. Mitigation for birds and GCN will be implemented to satisfy legal requirements, with an overall minor loss of habitat, which is considered neutral. All other potential impacts are predicted as neutral.

13.5 Materials

13.5.1 The assessment of material resource use concluded that, following the implementation of mitigation measures, the environmental impacts would be neutral to slight adverse i.e. a change to environmental conditions may occur but is unlikely to have a

measurable impact in terms of the depletion of natural resources and the embodied energy associated with the manufacture and transport of materials.

13.5.2 The assessment of waste arising concluded that, following the implementation of mitigation measures the environmental impacts from the construction of the Proposed Scheme would be neutral to slight adverse, i.e. a change to environmental conditions may occur but is unlikely to have a measurable impact on the capacity of the available waste management infrastructure.

13.6 Noise and Vibration

13.6.1 The noise assessment concluded that the construction phase of the scheme is not predicted to result in significant impacts. It should be noted again however, that the assessment of construction impacts has been undertaken by making assumptions of likely plant, and cannot be considered as definitive until a the methods of construction are clearly defined.

13.6.2 In the short term there are 637 sensitive receptors where there are predicted to be minor increases (1 – 2.9 dB) in noise. At all other sensitive receptors there is predicted to be a negligible increase in noise, no change, or a negligible decrease in noise. In the long term all the impacts are predicted to be negligible (increases and decreases) or no change. Due to the low magnitude of impacts it is not considered necessary to propose mitigation measures.

13.6.3 Due to an increase in planned employment at Stourton, Leeds, there are forecast to be moderate adverse increases in noise in the long term at locations outside of the main calculation area. As these increases are forecast to occur regardless of the implementation of the managed motorway scheme it is not possible to consider mitigation as they are outside the control of the Highways Agency.

13.7 Effects on All Travellers

13.7.1 Overall during construction, traveller stress is anticipated to be moderate adverse due to the number of drivers likely to be affected during the construction period, although this would be temporary in nature.

13.7.2 Traffic data forecasts show that with the scheme in place, traffic flows per lane are expected to be lower in 2030 compared to existing conditions and the 2030 Do-Minimum. Average traffic speed is predicted to be slightly higher for the 2030 Do-Something compared with the 2030 Do-Minimum. This would result in slight reductions in driver stress. The percentage of HGVs is also predicted to reduce in 2030 with the Proposed Scheme in place resulting in slight beneficial significance of effects on fear of accidents.

13.7.3 In addition, the improved directional signs, new gantry and cantilever message signs, and the dedicated merge-diverge lane between Junctions 41 and 42 northbound, together with a reduction in the percentage of HGVs by 2030 would help to alleviate congestion, improve certainty of route and improve driver comfort.

13.7.4 As a result, the overall impact on driver stress (incorporating frustration, fear of accidents and route uncertainty) resulting from the Proposed Scheme is anticipated to be slight beneficial.

13.8 Assessment of Cumulative Effects

13.8.1 Nine receptors will experience a number of moderate and minor impacts as a result of the proposed scheme and other developments and projects. These are either the combined effects of the Proposed Scheme from different impacts such as noise and landscape, or the effects of the Proposed Scheme in combination with another nearby development. The majority of these impacts are short term and on transient receptors, e.g. users of footpaths and public rights of way. It is considered that the cumulative impacts of the proposed scheme are moderate adverse reducing to minor adverse.

13.9 Summary

13.9.1 The environmental assessment undertaken for the Proposed Scheme has identified mainly negligible or slight impacts for most topics with only a very small number of moderate adverse and one large adverse impacts in the short term although these will all reduce to neutral or slight adverse by the design year. As such it is not considered that a statutory Environmental Impact Assessment will be required and it is not proposed that an Environmental Statement will be produced. This recommendation will be reported in the Record of Determination and Notice of Determination accordingly. A final round of statutory consultation was carried out in May 2013 when a draft of this EAR document was sent to the Statutory Environmental Bodies and Wakefield and Leeds City Councils. All five organisations replied confirming that they are in agreement with the EAR conclusion that a statutory Environmental Impact Assessment is not required.

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Abbreviations

AoD	Above ordnance datum
AMI	Advanced motorway indicators
ATM	Active Traffic Management
CALR	Controlled all lane running
CEMP	Construction Environmental Management Plan
D4M	Dual four lane motorway
DfT	Department for Transport
DHS	Dynamic hard shoulder
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EAR	Environmental Assessment Report
EC	European Community
EEC	European Economic Community
EH	English Heritage
EIA	Environmental impact assessment
ERA	Emergency refuge areas
HA	Highways Agency
HATO	Highways Agency Traffic Officer
HGV	Heavy goods vehicle
HHJV	Halcrow Hyder Joint Venture
HSR	Hard shoulder running
IAN	Interim advice note
IDM	Integrated demand management
MIDAS	Motorway incident detection and automated signalling

MM-ALR	Managed Motorways All Lane Running
MSA	Motorway service area
NE	Natural England
NoD	Notice of determination
PIE	Public Information Exhibition
RCC	Regional Control Centre
RoD	Record of determination
SEB	Statutory environmental bodies
SGAR	Stage Gate Assessment Review
SWMP	Site Waste Management Plan
SWYMMS	South and West Yorkshire Motorway Box Multi-Modal Study
TJR	Through junction running
TM	Traffic management
VMSL	Variable mandatory speed limits
vph	Vehicles per hour
WRAP	Waste and Resources Action Programme

Glossary

Air Quality Management Area (AQMA) – places where air quality objectives are not likely to be achieved. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.

Air Quality Strategy (AQS) **Objectives** – objectives for key air pollutants to protect health.

Amenity – the pleasant or normally satisfactory aspects of a location that contribute to its overall character and the enjoyment of residents or visitors.

Annual Average Daily Traffic flows (AADT) – the total volume of vehicle traffic in both directions of a road over the course of a year, divided by 365 days.

AOD - Above Ordnance Datum.

Appraisal Summary Table (AST) – a one page tabular summary of the main economic, environmental and social impacts of a transport solution. Providing the information in this way enables a clearer and more consistent view to be taken about the value of projects.

Aquifer - A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.

AQAP - Air Quality Action Plan.

Biodiversity - the biological diversity of the earth's living resources.

Body of surface water - A discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, a transitional water or a stretch of coastal water.

BPM - Best Practicable Means.

Built Form – the component features of buildings, streets and spaces that make up the urban environment.

Connectivity - a measure of the functional availability of the habitats needed for a particular species to move through a given area.

Conservation Area – an area given statutory protection under the Planning Acts, in order to preserve and enhance its character and townscape.

Controlled waters - In England, Scotland and Wales, a term used to describe groundwater and surface waters.

Construction Environmental Management Plan (CEMP) - Plan that sets out the requirements of site contractors during construction to ensure high standard and best practice protection of the environment is sustained.

County Wildlife Sites (CWS) – non-statutory designated areas of land that are important because of their wildlife.

Cumulative effects – the summation of impacts that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.

dB (decibel) – The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).

dB(A) - A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. „A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

DEFRA - Department for Environment, Food and Rural Affairs.

Design Manual for Roads and Bridges (DMRB) - is a series of 15 volumes that provide official standards, advice notes and other documents relating to the design, assessment and operation of trunk roads (including motorways).

Emergency Refuge Areas (ERA) – designed to be used in all cases of emergency or breakdown, not only when the hard shoulder is being used as a running lane.

Environmental Impact Assessment (EIA) – the evaluation of the impacts on the environment of particular development proposals.

Environmental Protection Agency - In England and Wales, this is the Environment Agency.

Fragmentation - the breaking up of a habitat, ecosystem or land-use type into smaller parcels.

Green Belt – specially designated area of countryside protected from most forms of development in order to prevent urban sprawl and the coalescence of settlements, preserve the character of existing settlements and encourage development to locate within existing built-up areas.

Habitat - a place in which a particular plant or animal lives. Often used in the wider sense referring to major assemblages of plants and animals found together.

Habitat Regulations Assessment Screening (HRA Screening) - the process which initially identifies the likely impacts upon a SAC, SPA or Ramsar site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant. It is important to note that the burden of evidence is to show that there will be no significant effect; if the effect is not known, that would trigger the need for an Appropriate Assessment.

Dynamic Hard Shoulder Running (DHSR) - the controlled use of the Hard Shoulder during periods of high vehicle flow or incidents.

HER - Historic Environment Record – the archaeological sites and monuments database developed and maintained by local authorities for planning control and research purposes.

Heritage – historic or cultural associations.

HLC – Historic Landscape Character.

Indirect impacts – impacts on the environment that are not a direct result of the development but are often produced away from it or as a result of a complex association, such as off-site traffic movements.

LAeq - the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.

LAmax - the maximum A - weighted sound pressure level recorded over the period stated. LAmax is often used as a measure of the most obtrusive facet of the noise, even though it may only occur for a very short time and is the level of the maximum Root Mean Square reading.

The time weighting response of the sound level meter (fast (F), slow (S) or impulse (I)) should also be specified to make the reading meaningful, which is reported as LAF,max in dB, for example.

Landscape baseline – a description of the environment as it is currently and as it could be expected to develop if the project were not to proceed.

Landscape condition – based on judgements about the physical state of a particular landscape/area, and about its visual and functional intactness. It also reflects the state of repair of individual features and elements that make up the character in any one place.

Landscape elements – groups of features of the soft landscape, for example roadside planting, street trees, amenity open space.

Landscape evaluation – the process of attaching value (non-monetary) to a particular landscape area, usually by the application of previously agreed criteria, including consultation and third party documents, in the context of the assessment.

Landscape feature – prominent eye-catching elements (other than designated ones), for example a church spire, monument or distinctive landmark building, significant mature specimen tree, that contributes to landscape character through appearance or specific civic use.

Landscape quality – largely subjective judgement based on particular characteristics that influence the way in which the environment is experienced, including special interests such as cultural associations or heritage interests, the presence and/or type of elements and condition.

Landscape resource – the combination of elements that contribute to landscape context, character and value.

Landscape sensitivity – the extent to which a landscape can accept a change of a particular type and scale without unacceptable adverse impacts on its character.

Landscape value – areas of formally designated landscape that, through national or local consensus, reflect the value placed by society on particular urban environments or their features.

Listed Building – building or other structure of special architectural or historic interest included on a statutory list and assigned a grade (I, II* or II).

Main River - A river maintained directly by the EA.

Magnitude – a combination of the scale, extent and duration of an impact.

Methodology – the specific approach and techniques used for a given study.

Mitigation – measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse townscape and visual impacts of a development project.

MSA - Motorway Service Area.

National Monuments Record – the records and archives section of English Heritage.

Noise - is defined as unwanted sound, and the unit of measurement is the decibel (dB). Noise levels range from the threshold of hearing at 0 dB to levels of over 130dB at which point the noise becomes painful.

Non- Motorised User (NMU) – Includes cyclists, pedestrians and equestrians.

NO2 - Nitrogen Dioxide.

NOx - Oxides of Nitrogen.

O3 – Ozone.

PM10 - Particulate Matter Smaller than 10 Micrometer (µm) in Diameter.

Public Open Space – land provided in urban or rural areas for public recreation, though not necessarily publicly owned.

Public Realm – outdoor areas accessible to the public, providing pedestrian uses and linkages, and with landscape and townscape elements such as street furniture (seating, lighting, signage, etc).

Public Right of Way (PRoW) - paths on which the public have a legally protected right to pass.

Ramsar Site – wetlands of international importance designated under the Ramsar Convention.

Receptor – physical landscape resource, special interest or person and/or viewer group that will experience an impact.

Residual impact – an impact that occurs/persists after mitigation measures have been put in place.

Resource - any ecological or other environmental component affected by an impact.

Scheduled Monument– a nationally important archaeological site or historic building, which has been given protection against unauthorised change.

Site of Special Scientific Interest (SSSI) – the country's very best wildlife and geological sites, protected by legislation.

Special Area of Conservation (SAC) - are strictly protected sites designated under the EC Habitats Directive.

Special Protection Area (SPA) - are strictly protected sites classified for rare and vulnerable birds, listed in Annex I to the Birds Directive, and for regularly occurring migratory species.

Sustainability – meeting the needs of the present without compromising the ability of future generations to meet their own needs (environment, social and economic).

Surface water - Waters including rivers, lakes, lochs, loughs, reservoirs, canals, streams, ditches, coastal waters and estuaries.

Visual amenity – the value of a particular area or view in terms of what is seen.

Visual impact – Changes in the appearance of the landscape or in the composition of available views as a result of development, to people"s responses to these changes, and to the overall impacts in regard to visual amenity. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).

Visual envelope – extent of potential visibility to or from a specific area or feature.

Zone of Visual Influence (ZVI) – area within which a proposed development may have an influence or impact.