

# Post Opening Project Evaluation

## A1(M) Bramham to Wetherby Five Years After Opening Study

November 2015



### Notice

This document and its contents have been prepared and are intended solely for Highways England's information and use in relation to the Post Opening Project Evaluation of Major Schemes.

Atkins assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

# Table of Contents

Chapter	Pages
<b>Executive Summary</b>	<b>4</b>
Scheme Description	4
Scheme Objectives	4
Summary of Scheme Impacts	5
<b>1. Introduction</b>	<b>8</b>
Background	8
Scheme Objectives	11
Highways England Appraisal Process	12
Post Opening Project Evaluation	12
Summary of the A1(M) Bramham to Wetherby Scheme One Year After Study	12
Report Structure	13
<b>2. Traffic Impact Analysis</b>	<b>14</b>
Introduction	14
Traffic Volume Analysis	16
Forecast vs. Outturn Traffic Flows	24
Vehicle Speed Analysis	28
Forecast Journey Times	30
Route Stress	30
<b>3. Safety</b>	<b>32</b>
Introduction	32
Sources	32
Background Changes in Collision Reduction	33
Collision Numbers	34
NMU Collisions	39
Collision Rates	41
Collision Locations	41
Road Safety Audit Findings	43
Fatalities and Weighted Injuries	43
Forecast vs. Observed Collision Savings	44
Personal Security	45
<b>4. Economy</b>	<b>47</b>
Introduction	47
Sources	47
Scheme Benefits	47
Transport Economic Efficiency	48
Collision Benefits	49
Present Value Benefits	50
Scheme Costs	51
Present Value Costs	52
Benefit Cost Ratio	52
Wider Economic Impact	53
<b>5. Environment</b>	<b>55</b>
Introduction	55
Methodology	58
Data Collection	58
Site Visit	59

Consultation	59
Traffic Forecast Evaluation	60
Noise 61	
Local Air Quality	62
Greenhouse Gases	63
Landscape/Townscape	64
Heritage	73
Biodiversity	75
Water Quality and Drainage	79
Physical Fitness	85
Journey Ambience	88
<b>6. Accessibility and Integration</b>	<b>95</b>
Accessibility	95
Option Values	95
Access to the Transport System	96
Severance	96
Integration	97
Transport Interchange	97
Land Use Policy	97
<b>7. Appraisal Summary Table &amp; Evaluation Summary Table</b>	<b>100</b>
Appraisal Summary Table	100
Evaluation Summary Table	100
<b>8. Conclusions</b>	<b>105</b>
Scheme Specific Objectives	105
<b>Appendices</b>	<b>106</b>
<b>Appendix A. Annual Average Weekday Traffic and Annual Average Daily Traffic Flows</b>	<b>107</b>
<b>Appendix B. Key Links Collision Analysis Area</b>	<b>110</b>
<b>Appendix C. COBA Model Area Collision Plots</b>	<b>111</b>
<b>Appendix D. Data Requested for the Environment Evaluation</b>	<b>113</b>
<b>Appendix E. Environmental Photographic Record of the Scheme</b>	<b>115</b>
<b>Appendix F. Long Term Environmental Management and Maintenance Requirements</b>	<b>126</b>
<b>Appendix G. Environmental Consultation Response (West Yorkshire Ecology)</b>	<b>127</b>
<b>Appendix H. Environmental Evaluation of Issues Raised in the Post Construction NMU Audit (November 2010)</b>	<b>128</b>
<b>Appendix I. Glossary</b>	<b>141</b>
<b>Appendix J. Tables and Figures in this Report</b>	<b>143</b>

# Executive Summary

## Scheme Description

The A1(M) Bramham to Wetherby improvement scheme was a major Highways England project north-east of Leeds which opened in 2009. The purpose of the scheme was to widen and upgrade the A1 to motorway standard to the east and south of the town of Wetherby. This involved:

- Upgrading of 6.2 miles (10km) of the A1 from all-purpose A road to motorway standard between A64 Bramham Crossroads junction and Kirk Deighton junction, tying into the Wetherby to Walshford upgrade north of York Road. Of the 6.2 miles, 2.5 miles (4km) of the A1 was widened from two to three lanes.
- The closure of the following junctions:
  - Tenter Hill (Bramham)
  - Wetherby Grange (Wetherby)
  - Walton Road (Wetherby)
- Following the scheme opening, the only access points onto the A1(M) between Bramham and Wetherby are at Junction 44 Bramham Crossroads, Junction 45 Grange Moor Junction and the newly constructed Junction 46 at Kirk Deighton.
- Construction of a single carriageway Local Access Road between the A64 Bramham Crossroads junction to the south, and Sandbeck Lane on the north-eastern perimeter of Wetherby to cater for local and non-motorway traffic. The local access road completes the 'inner bypass' of Wetherby by connecting with the local access road under the Wetherby to Walshford Scheme at Sandbeck Lane roundabout.
- The construction of a separate segregated route for non-motorised users (NMUs) provided between the A64 Bramham Crossroads junction in the south and Sandbeck Lane on the north-eastern perimeter of Wetherby.
- Replacement of road overbridges and the improvement of existing bridges over the Wharfe River.

## Scheme Objectives

Objectives Source: Statement of Case (2005), Environmental Statement (2005) and Appraisal Summary Table (2006)	Objective Achieved?
Reduce accidents and congestion caused by vehicles transitioning from a dual three lane all purpose (D3AP) standard road to a dual two lane all purpose (D2AP) standard road around Wetherby.	✓
Provide an upgraded section of motorway consistent with adjoining sections in Yorkshire which will become a high standard transport link between the north and south of England on the eastern side of the Pennines.	✓
Deliver an environmentally acceptable scheme that protects and enhances the built and natural environment, and that minimises and mitigates any significant environmental impacts to an acceptable level.	✓
Create savings in journey times.	✓
Reduce congestion and improve journey reliability.	✓
Provide improved facilities for pedestrians and cyclists to reduce severance and create potential to improve physical fitness.	✓

## Key Findings

- Traffic flows on the A1(M) have decreased since opening (due to re-assignment of traffic onto the Local Access Road). The observed traffic flows on the A1 are lower than forecast.
- A1(M) traffic is experiencing more reliable journey times and journey times have reduced slightly.
- The number of collisions has reduced since the scheme opened, but this saving is lower than forecast.
- Monetary benefits are lower than expected, primarily due to lower than expected journey time savings.
- The environmental impacts of the scheme have generally been mitigated as expected.

## Summary of Scheme Impacts

### Traffic

- Annual average daily traffic flows on the A1(M) between junctions 44 and 45 are 88,800 five years after opening, a slight fall of 1%.
- Between junction 45 and the former Wetherby Grange Junction, annual average daily traffic flows fell 16% to 75,200, reflecting the re-assignment of some local traffic onto the local access road.
- Between the former Wetherby Grange junction and junction 46, annual average daily traffic flows at the five year after stage were unchanged compared to the pre-scheme period.
- There has been a 21% increase in annual average daily traffic flows on Bridge Road (east of the A1(M) junction 45) at the five years after stage (600 vehicle increase), which is due to the re-assignment of local traffic travelling between Wetherby and Boston Spa following the closure of Wetherby Grange junction.
- The closure of Wetherby Grange junction also appears to have led to 20% less traffic on the A58 south-west of Wetherby, given that the route is no longer attractive for vehicles travelling onto the A1(M) from the west.
- Significantly less traffic uses the A1(M) and local access road than expected:
  - The forecasts of how much traffic there would be on this section when construction started were too high.
  - Similarly, the traffic flow forecast for after the scheme opened were higher than the observed flows. On the A1(M), annual average daily traffic flows were overestimated by 18-19% , representing 16,100 to 20,980 vehicles.
- Comparison of pre and post-scheme vehicle speeds reveal a modest increase in speeds of 3-5mph across the A1(M) junction 44 to 46.
- Since opening, the scheme section is considered less stressful to drive.

### Safety

- When factoring in the background reduction in collisions over time, there has been a 33% reduction in personal injury collisions across the scheme between the pre and post-scheme periods, an annual average saving of 5 personal injury collisions in the first five years after opening.
- This result is statistically significant, suggesting the collisions savings are a result of the scheme.
- Across the scheme area, fatal collisions have fallen by 60%. However, the severity index has increased as a result of the number of slight collisions falling by a greater rate than serious or fatal collisions.
- Across the wider model area, collisions have increased by 1% compared to a forecast reduction of 12%.

### Environment

- The impact of the A1(M) on noise is as expected, whilst the impact of the Local Access Road on noise is better than expected.
- Local air quality impacts are likely to be better than expected given that observed flows are lower than forecast.

- The scheme's outturn impact on greenhouse gas emissions is better than expected, with an increase in emissions of 1,206 carbon tonnes against a re-forecast increase of 12,000 carbon tonnes.
- The longer term screening and integration objectives of the planting plots are considered likely to be broadly on target to being achieved, although there are locations where the performance of the plant stock is considered to be less than satisfactory.
- The environmental fence adjacent to the southbound carriageway north of Farfield House has had a greater than expected visual impact on the surrounding landscape.
- It is considered that the effects of the scheme on protected and notable species are likely to be as expected, though the lack of animal mortality data has limited the evaluation.
- The habitat potential of a number of marginal/tree and shrub planting plots has likely not been realised to the extent expected at this stage. However, these areas are relatively localised.
- There is no evidence to suggest that the overall effect of the scheme on water quality and drainage is anything other than what would be expected at this time.
- Footpaths, bridleways, and cycleways generally appear to be maintained and capable of performing as expected, although the dedicated equestrian crossing point on the local access road just to the north of Wattle Syke Roundabout may not be benefiting the equestrian community to its full extent. The vast majority of issues raised by the non-motorised user audit and by stakeholders appear to have been resolved, including the outstanding snagging (construction) issues.

### Accessibility and Integration

- There is no evidence to suggest that the scheme has impacted on the provision of public transport links, though anecdotal comments from a local bus operator suggest that use of the local access road has improved service reliability.
- The scheme included a non-motorised user facility, provided alongside the local access road, with provision for pedestrians, cyclists and equestrians.
- Sustrans cycling group provided largely positive comments in regards to the facility, but noted the need for improved signage.
- The failure to connect the non-motorised user facility with the Freemans Way cycle route appears to be a missed opportunity to further enhance cycle connectivity across the area.
- The scheme is aligned with local, regional and national land use policy that was current at the time of scheme appraisal.

### Summary of Scheme Economic Performance

		Forecast	Outturn Reforecast
Journey Time Benefits		£264.9m	£54.0m
Safety Benefits		£40.7m	£18.2m
<i>Journey Time and Safety Benefits</i>		<i>£305.6m</i>	<i>£72.2m</i>
Investment Costs		£56.2m	£61.6m
Indirect Tax		-£20.8m	-£5.7m
<b>Benefit Cost Ratio</b>	<b>Indirect Tax as a Cost</b>	<b>7.9</b>	<b>1.2</b>
	<b>Indirect Tax as a Benefit</b>	<b>4.6</b>	<b>1.1</b>

Note: all monetary figures in 2002 prices discounted to 2002.

- The scheme is delivering journey time benefits, although they are considerably lower than forecast due to the saving in journey times being less than expected and traffic flows being less than expected.
- Safety benefits resulting from the scheme were forecast to be £40.7m, however, the outturn benefit is 55% below this at £18.2m.
- Outturn investment costs totalled £61.0m, 9% higher than the forecast of £56.2m.

- The forecast impact on indirect tax was for an increase in tax revenues to the Government. The outturn indirect tax evaluation shows that the Government is receiving lower than expected indirect tax revenue because traffic volumes are lower than forecast.
- Taking indirect tax as a benefit to the Treasury, the scheme achieves a BCR of 1.1. This is regarded as low value for money by the Department for Transport.

# 1. Introduction

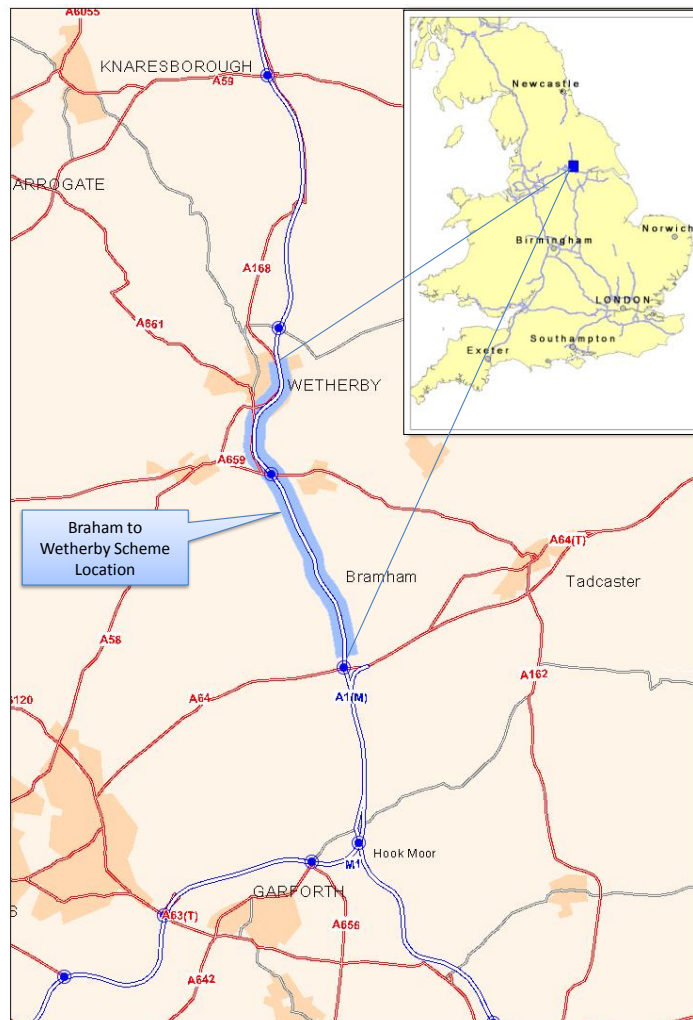
## Background

- 1.1. This report presents a Five Years After (FYA) opening evaluation of the A1(M) Bramham to Wetherby scheme, which opened to traffic in July 2009. The evaluation has been prepared as part of Highways England's Post Opening Project Evaluation (POPE) programme. The purpose of this report is to build upon the findings of the One Year After (OYA) published in September 2011.

## Scheme Context

- 1.2. The A1(M)<sup>1</sup> provides a strategic link connecting Scotland in the north through to the south of England, via Yorkshire. The route accommodates long distance traffic along the eastern corridor of the country as well as regional and local traffic between conurbations in Yorkshire. The Bramham to Wetherby section of route lies north-east of Leeds, falling within the city boundary. The geographical context of the scheme is presented in Figure 1.1.

Figure 1.1 Location of the scheme in a National and Regional Context



<sup>1</sup> For simplicity, the term A1(M) is used throughout this report in reference to the whole A1/A1(M) corridor, though it is noted that some sections are not built to motorway standard. A1 is only used when referring to the scheme section prior to the upgrade works.



A 33mile (53km) section of the A1(M) between Darrington and Dishforth is currently managed through a Design, Build, Finance and Operate (DBFO) contract. The Bramham to Wetherby scheme falls within this area, however the scheme was built under an Early Contractor Involvement (ECI) contract, not through the DBFO.

1.3. The scheme was one of a number of schemes arising from Government plans in 1990 to upgrade the A1 to motorway standard, including:

- A1(M) Walshford to Dishforth – completed 1995
- M1-A1 Link Road (Lofthouse to Bramham) – completed 1999
- A1(M) Wetherby to Walshford – completed 2005
- A1(M) Ferrybridge to Hook Moor – completed 2006
- *A1(M) Bramham to Wetherby – completed 2009*
- A1(M) Dishforth to Leeming Improvement – completed 2012

1.1. Further works commenced in 2014 to improve the A1(M) between Leeming and Barton, which is due for completion in 2017<sup>1</sup>.

1.2. Elements of the A1(M) Wetherby to Walshford scheme, completed in 2005, overlap with the Bramham to Wetherby upgrade considered in this study. The Wetherby to Walshford scheme involved an offline realignment of the A1 between Wetherby and Walshford, upgrading the route from dual two lane to dual three lane motorway standard, commencing north of York Road (east of Wetherby). The Bramham to Wetherby scheme considered in this study involved the upgrading of the A1(M) from A464 Bramham Crossroads to Kirk Deighton New Junction (Junction 46), tying in to the existing network north of York Road, as further detailed in the following section.

### Scheme Description

1.3. The scheme is an online improvement to the A1(M) east and south of the town of Wetherby and comprises:

- Upgrading of 6.2 miles (10km) of the A1 from all-purpose A road to motorway standard (D3M) between A64 Bramham Crossroads Junction and Kirk Deighton Junction, tying into the Wetherby to Walshford upgrade north of York Road. Of the 6.2 miles, additional widening of 2.5 miles (4km) of the A1 from two-lane A road to three-lane motorway standard (D3M) was undertaken.
- In order to improve safety on the A1(M) the scheme involved the closure of the following junctions:
  - Tenter Hill (Bramham)
  - Wetherby Grange (Wetherby)
  - Walton Road (Wetherby)
- Construction of a single carriageway Local Access Road (LAR) between the A64 Bramham Crossroads junction to the south, and Sandbeck Lane on the north-eastern perimeter of Wetherby to cater for local and non-motorway traffic. The LAR runs on the east side of the A1(M) between the A64 and Bramham, and on the west side between Bramham and Sandbeck Lane. The local access road completes the 'inner bypass' of Wetherby by connecting with the local access road under the Wetherby to Walshford Scheme at Sandbeck Lane Roundabout.
- Two new roundabouts were provided along the LAR, one connecting the road to the A659 at Wattle Syke and the other to York Road, adjacent to Wetherby. Improvements to existing roundabouts on the route of LAR were also undertaken.
- The construction of a separate segregated route for non-motorised users (NMUs) provided between the A64 Bramham Crossroads junction in the south and Sandbeck Lane on the north-eastern perimeter of Wetherby.

---

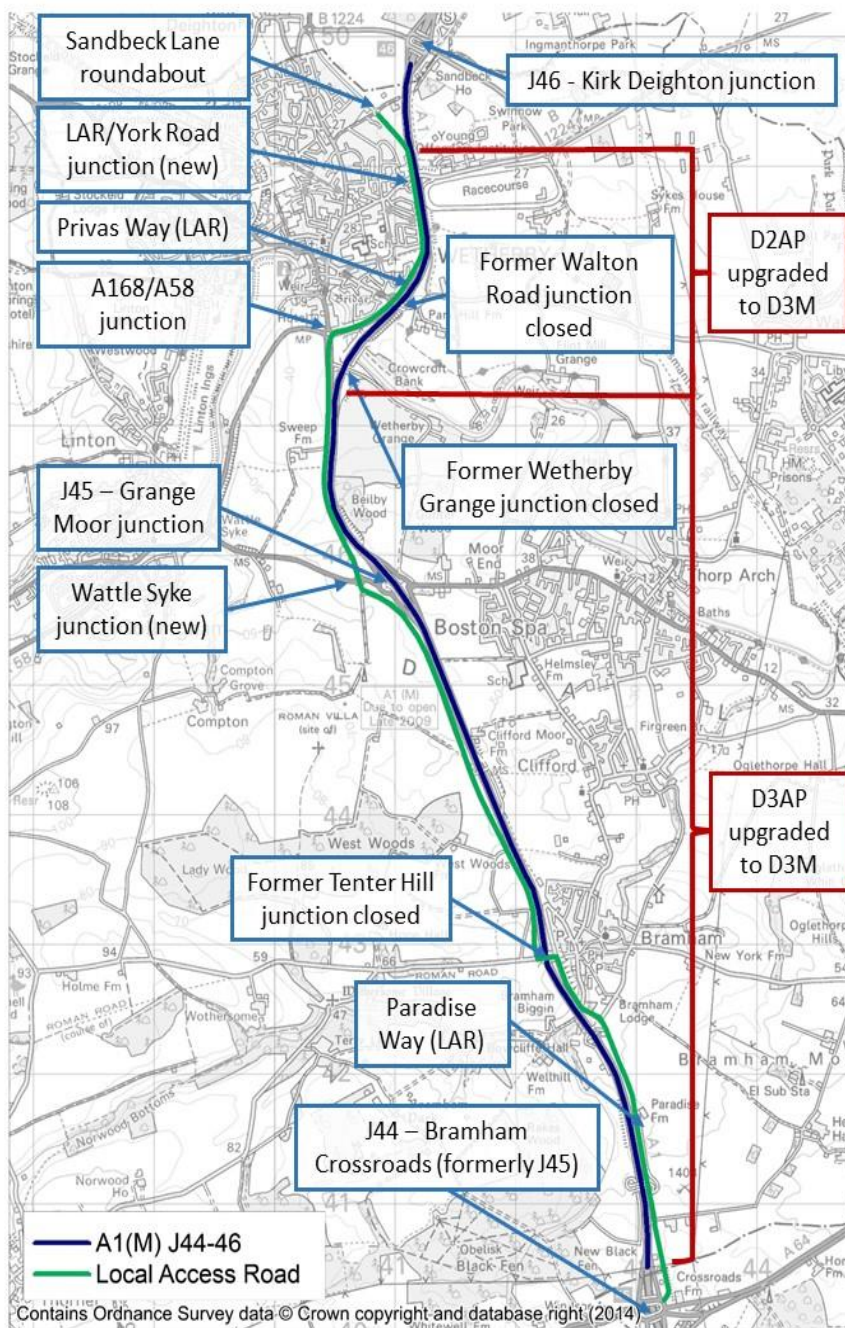
<sup>1</sup> A1 Leeming to Barton Improvement (Highways Agency, 2014) <http://www.highways.gov.uk/roads/road-projects/a1-leeming-to-barton-improvement/> Accessed: 27/11/14

- Replacement of road overbridges and the improvement of existing bridges over the River Wharfe.

1.4. Following the scheme opening, the only access points onto the A1(M) between Bramham and Wetherby are at Junction 44 Bramham Crossroads, Junction 45 Grange Moor Junction and the newly constructed Junction 46 at Kirk Deighton.

1.5. The key features of the scheme are summarised in Figure 1.2.

**Figure 1.2 Key Features of the Bramham to Wetherby Scheme**



1.6. It is understood that the following changes to the highway have been made since the scheme opened:

- The A1(M) Junction 45 northbound off-slip has been signalised at the approach to Grange Moor roundabout. It is understood that the signals were installed following

concerns about collisions potentially occurring as vehicles enter the junction from the A1(M).

- Signals were installed on the LAR at the junction of Paradise Way for Bramham Park (south of Bramham) to reduce the potential of a collision occurring.
- At Grange Moor roundabout, white line marking changes have been undertaken to reduce the number of lanes from three to two. It is understood that these changes arose from safety concerns regarding vehicular negotiation of the roundabout.

### Scheme History

- 1.4. A brief history of the principal events involved in the development of the scheme is provided in Table 1.1.

**Table 1.1 Summary of Scheme History**

Date	Event
2000	Scheme recommended by the A1 Bramham to Barton study of safety issues on the A1
June 2002	A1 Bramham – Wetherby scheme added to the Targeted Programme of Investment (TPI) programme
October 2003	Preferred route announcement
July - September 2005	Public consultations
February 2006	Public Inquiry followed by further consultation
April 2007	Secretary of State decision on amendments arising from public inquiry Start of Works
June 2009	Junction renumbering on the A1(M) <sup>1</sup>
July 2009	Effective completion: traffic management removed and official designation of motorway standard for upgraded A1
December 2009	Completion of works ceremony at Wetherby Grange Handover of LAR to Leeds City Council

### Scheme Objectives

- 1.7. The scheme's Statement of Case (2005) stated that the principal objectives of the scheme were to:

- Reduce accidents and to reduce congestion caused by the transition from dual three lane all purpose (D3AP) standard to dual two lane all purpose (D2AP) standard around Wetherby.
- Provide an upgraded section of motorway consistent with adjoining sections in Yorkshire which will become a high standard transport link between the north and south of England on the eastern side of the Pennines.

- 1.8. In addition, the following environmental objective has been identified from the scheme's Environmental Statement (2005):

<sup>1</sup> The completion of the Bramham – Wetherby scheme was the last stage of the upgrading of the A1 to motorway standard from Darrington to Dishforth (J40 to J49) :

- A1(M)/M1 Hook Moor junction number changed from J44 to J43.
- A1(M)/A64 Bramham Crossroads junction number changed from J45 to J44.
- Existing A1/A659 Grange Moor junction became A1(M) J45.
- Existing A1/B1224 Kirk Deighton junction remained A1(M) J46.

- Deliver an environmentally acceptable scheme that protects and enhances the built and natural environment, and that minimises and mitigates any significant environmental impacts to an acceptable level.
- 1.9. The scheme's Appraisal Summary Table (AST), published in 2006, further detailed the objectives. The full table is included in Table 7.1 and the key objectives additional to the above list are:
- Create savings in journey times
  - Reduce congestion and improve journey reliability
  - Provide improved facilities for pedestrians and cyclists to reduce severance and create potential to improve physical fitness.

## Highways England Appraisal Process

- 1.10. Highways England is responsible for improving the strategic highway network (motorways and trunk roads) through the Major Schemes programme (formerly the TPI programme). At each key decision stage through the planning process, schemes are subject to a rigorous appraisal process to provide a justification for the project's continued development.
- 1.11. At the time the scheme proposal was submitted, the Department for Transport (DfT) specified that an AST be produced, recording the degree to which the five DfT objectives for Transport (Environment, Safety, Economy, Accessibility and Integration) have been achieved (formerly referred to as the New Approach to Appraisal). The contents of the AST allow judgements to be made about the overall value for money of the scheme. This methodology has been updated but the evaluation process in this report follows the original appraisal approach. The AST for this scheme is presented in Chapter 7 of this report.

## Post Opening Project Evaluation

- 1.12. POPE studies are undertaken at two stages after all Major Schemes have opened: one year after scheme opening and five years after scheme opening. The purpose of POPE studies is to document outturn impacts, evaluate the strengths and weaknesses of the techniques used for appraising schemes so that informed improvements can be made to the appraisal process in the future. This is achieved by comparing information collected before and after the opening of the scheme to traffic, against predictions made during the planning process. The outturn impacts of a scheme are summarised in an Evaluation Summary Table (EST) which summarises the extent to which the objectives of a scheme have been achieved. The EST for this scheme can be found in Chapter 7.

## Summary of the A1(M) Bramham to Wetherby Scheme One Year After Study

- 1.13. The purpose of this FYA study is to verify and study in more detail the emerging trends and conclusions presented in the OYA study report. The main conclusions made in the A1(M) Bramham to Wetherby OYA report were as follows:
- Growth in traffic levels of 4% between the before and OYA periods was in line with wider trends seen along the A1(M) corridor.
  - Screenline analysis shows that some north-south traffic has rerouted away from the A58 and A61.
  - Traffic flows are below forecast on the A1(M), the new LAR and the adjacent A roads. This is due to the rate of traffic growth being lower than was predicted before the scheme opened and the impact of the economic downturn.
  - Journey times and reliability had improved following the scheme.
  - The number of personal injury vehicle collisions occurring following scheme opening fell on the A1(M) scheme section and in the wider study area.

- Environmental impacts and mitigation measures were generally as expected, though air quality was better than expected due to lower than forecast traffic flows.
- Facilities for NMUs were provided though some outstanding problems were noted.
- The scheme was found to have a strong BCR of 5.4, delivering a Present Value Benefit (PVB) of £456.7m.

1.14. It was concluded that all the scheme's objectives had been met.

## Report Structure

1.15. The remainder of this report is structured as follows:

- Chapter 2 – Traffic Analysis
- Chapter 3 – Safety
- Chapter 4 – Economy
- Chapter 5 – Environment
- Chapter 6 – Accessibility and Integration
- Chapter 7 – Appraisal Summary Table and Evaluation Summary Table
- Chapter 8 – Conclusions
- Appendix A – Annual Average Weekday Traffic and Annual Average Daily Traffic Flows
- Appendix B – Key Links Collision Analysis Area
- Appendix C – COBA Model Area Collision Plots
- Appendix D – Data Requested for the Environmental Evaluation
- Appendix E – Environmental Photographic Record of the Scheme
- Appendix F – Long Term Environmental Management and Maintenance Requirements
- Appendix G – Environmental Consultation Response (West Yorkshire Ecology)
- Appendix H – Environmental Evaluation of Issues Raised in the post Construction NMu Audit (November 2010)
- Appendix I – Glossary
- Appendix J – Tables and Figures in this Report

## 2. Traffic Impact Analysis

### Introduction

- 2.1. This chapter examines traffic data for the A1(M) in order to provide a before and after opening comparison of traffic flows and journey times. An analysis of traffic data for other routes within the wider area is also undertaken to understand the broader traffic impacts of the scheme. The purpose of this analysis is to understand whether changes in traffic flows and journey times may be attributable to the scheme.
- 2.2. This chapter comprises:
- An evaluation of national, regional and local background traffic trends.
  - A summary of the sources used to compile data for this analysis.
  - A detailed comparison of before, OYA and FYA traffic flows on the A1(M) and other routes in the study area likely to be affected by the scheme.
  - A comparison of vehicle speeds on the A1(M) between the before construction and FYA stages.
  - An evaluation of key differences between the forecast and outturn impacts of the scheme on traffic flows.
- 2.3. Following the completion of the scheme, a number of junctions were closed and the existing numbering of some junctions changed. The A1(M) is now motorway standard from J40 to J49. This report uses the new numbering for the current junctions on the A1(M), and the junction names for the pre-motorway junctions.

### Background Changes in Traffic

- 2.4. Historically in POPE scheme evaluations, the 'before' counts have often been factored to take account of background traffic growth so that they are directly comparable with the 'after' counts. This usually involves the use of National Road Traffic Forecasts (NRTF), with local adjustments made using Local Growth Factors if applicable.
- 2.5. However, in light of the recent economic climate, and coinciding widespread reductions in motor vehicle travel in the UK as a whole since 2008, it is no longer deemed appropriate to use this method of factoring 'before' counts to reflect background changes in traffic. Rather, recent POPE studies have taken a more considered approach in order to assess changes in the vicinity of the scheme, within the context of national, regional and locally observed background changes in traffic
- 2.6. As such, this section will examine and discuss the regional and local trends in traffic flows.

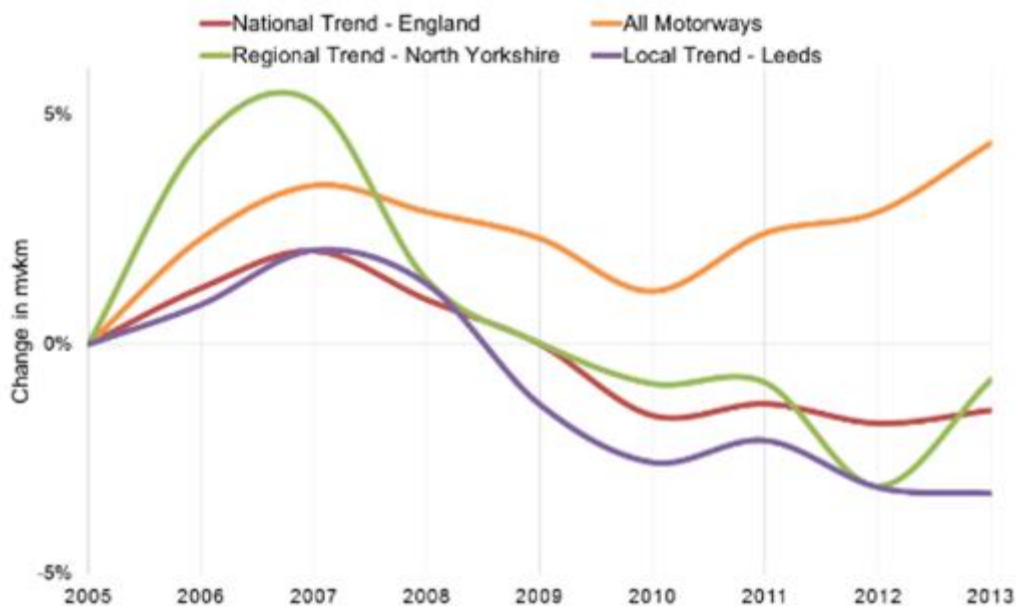
### Local, Regional and National Traffic Trends

- 2.7. The Department for Transport (DfT) produces observed annual statistics for all motor vehicles<sup>1</sup>. Data between 2005 (when the scheme's traffic impact appraisal was undertaken) and 2013 (the latest available) is shown in million vehicle kilometres (mvkm) for North Yorkshire, Leeds, England and all motorways in England in Figure 2.1.

---

<sup>1</sup> Tables TRA8904 and TRA4112 2005-2013 (Department for Transport).

**Figure 2.1 Local, Regional, National and Motorway Trends in Million Vehicle Kilometres**



- 2.8. In line with the national and regional trend, vehicle kilometres travelled locally increased between 2005 and 2007, before falling from 2007 until 2010. Since 2010 national vehicle kilometres travelled have remained relatively constant at 1% below 2005 levels, whilst regional trends in North Yorkshire saw a significant decline in 2012 before increasing again in 2013 to 1% below 2005 levels. Locally, vehicle kilometres travelled increased slightly in 2011 but have since declined to be 3% lower than in 2005.
- 2.9. The trend for all motorways in England shows a similar rise in vehicle kilometres travelled between 2005 and 2007 followed by a fall in 2010. However, since 2010 there has been a steady increase in motorway traffic, with 2013 flows being 4% greater than in 2005.

**Long Term Traffic Trends on the A1**

- 2.10. In order to ascertain a greater understanding of the historical fluctuations in yearly traffic flows along the A1(M), Table 2.1 presents flow annual average daily traffic flows (AADTs) for the route between Junctions 43 and 44, south of the scheme.
- 2.11. It is important to remember that during the time covered here, the A1(M) corridor through Yorkshire has been subject to a number of major schemes as discussed in Section 1.3.

**Table 2.1 Long term trend on A1(M) Junction 43-44**

Year	NB		SB	
	AADT	Factor of change on 2005	AADT	Factor of change on 2005
2005	55,100	-	54,800	-
2006	56,700	1.03	56,200	1.02
2007	58,100	1.05	57,700	1.05
2008	57,200	1.04	56,800	1.04
2009	57,800	1.05	57,500	1.05
2010	57,300	1.04	57,200	1.04
2011	58,000	1.05	57,500	1.05
2012	56,900	1.03	56,300	1.03
2013	58,300	1.06	57,900	1.06

- 2.12. The long term trends on this section of the A1(M) show an increase in vehicles between 2005 and 2006, and thereafter fluctuating but remaining relatively constant. In 2013, traffic flows along the route were 6% greater than in 2005, showing a similar trend for all motorways across England as presented in Figure 2.1.

### Conclusions on Background Growth

- 2.13. Based on the information presented in this section, it has been considered that no annual growth factors should be applied to the data presented in this report. Rather, when reading this report it is important to keep in mind that:
- There has been a decrease in vehicle flows across Leeds and the North Yorkshire region in recent years, coinciding with the economic recession and fiscal difficulties across the UK; whilst
  - On the A1(M) south of the scheme, there has been a long term increase in vehicle flows, following the trend for all motorways across England.

### Traffic Volume Analysis

**Scheme Objective: Reduce congestion caused by the transition from D3AP standard to D2AP standard around Wetherby**

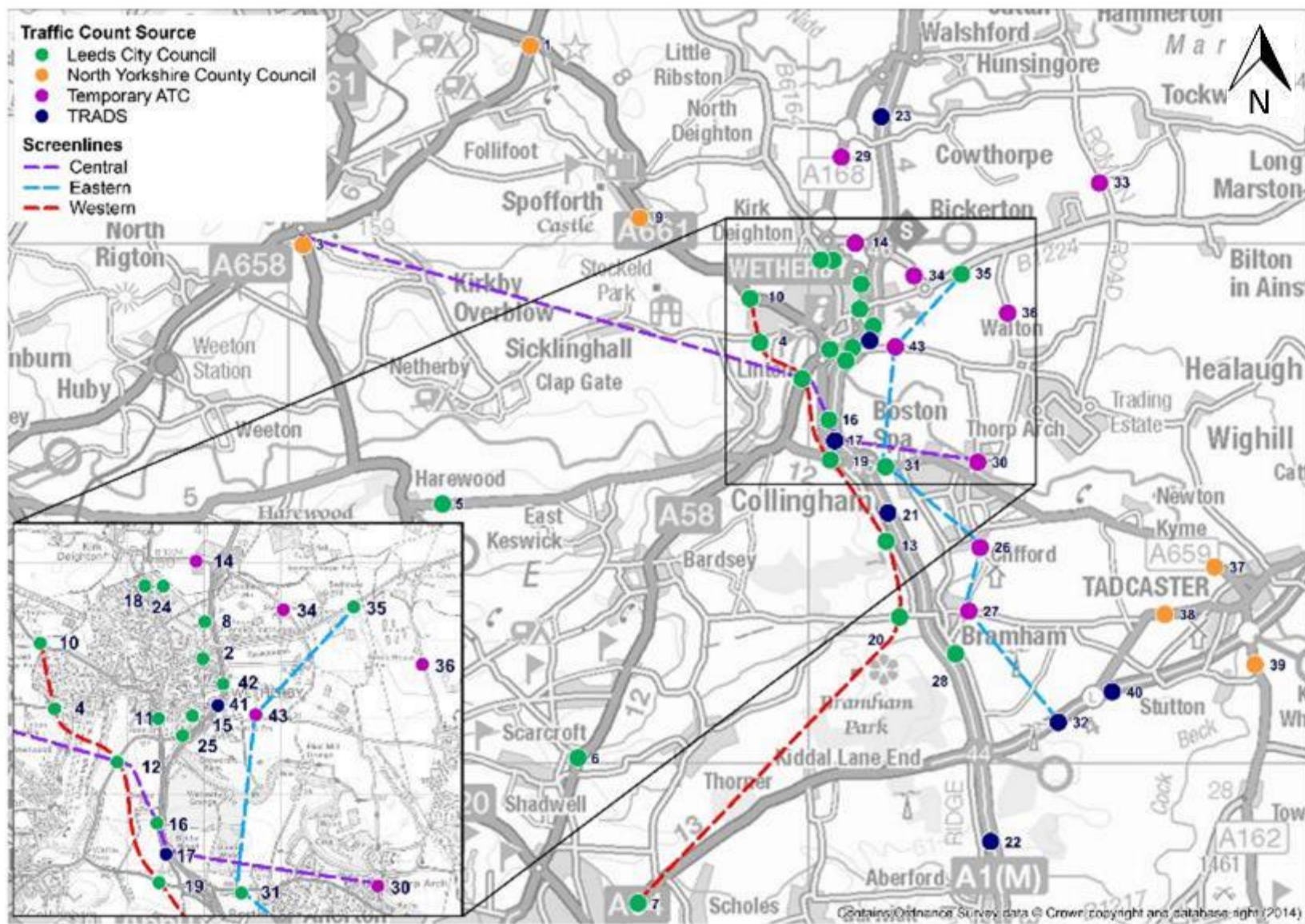
- 2.14. This section of the report uses data from a variety of sources to inform the before and after analysis of changes in traffic volumes and journey times for the scheme. To complete this evaluation, data from before construction (2007), OYA opening (2010) and FYA opening (2014) is compared.

### Traffic Count Data Sources

- 2.15. For the purposes of this study, the main sources of traffic data include:
- Permanent traffic count data obtained from the TRADS database for count locations on the trunk road network covering the pre-scheme, OYA and FYA stages.
  - Automatic traffic count (ATC) data supplied by Leeds City Council (LCC) and North Yorkshire County Council (NYCC) for local roads in the wider area around the scheme.
  - ATCs commissioned for use in this study at the pre-scheme, OYA and FYA stages.
- 2.16. The locations of the traffic count data sources used in this evaluation are shown in Figure 2.2 and details of each traffic count site are shown in Table 2.2.
- 2.17. All traffic flows presented have been annualised as AADTs or AAWTs using seasonality factors derived from historical local traffic flow data.



Figure 2.2 Location of Traffic Count Data Sources and Screenlines



**Table 2.2 Location of Traffic Count Data Sources**

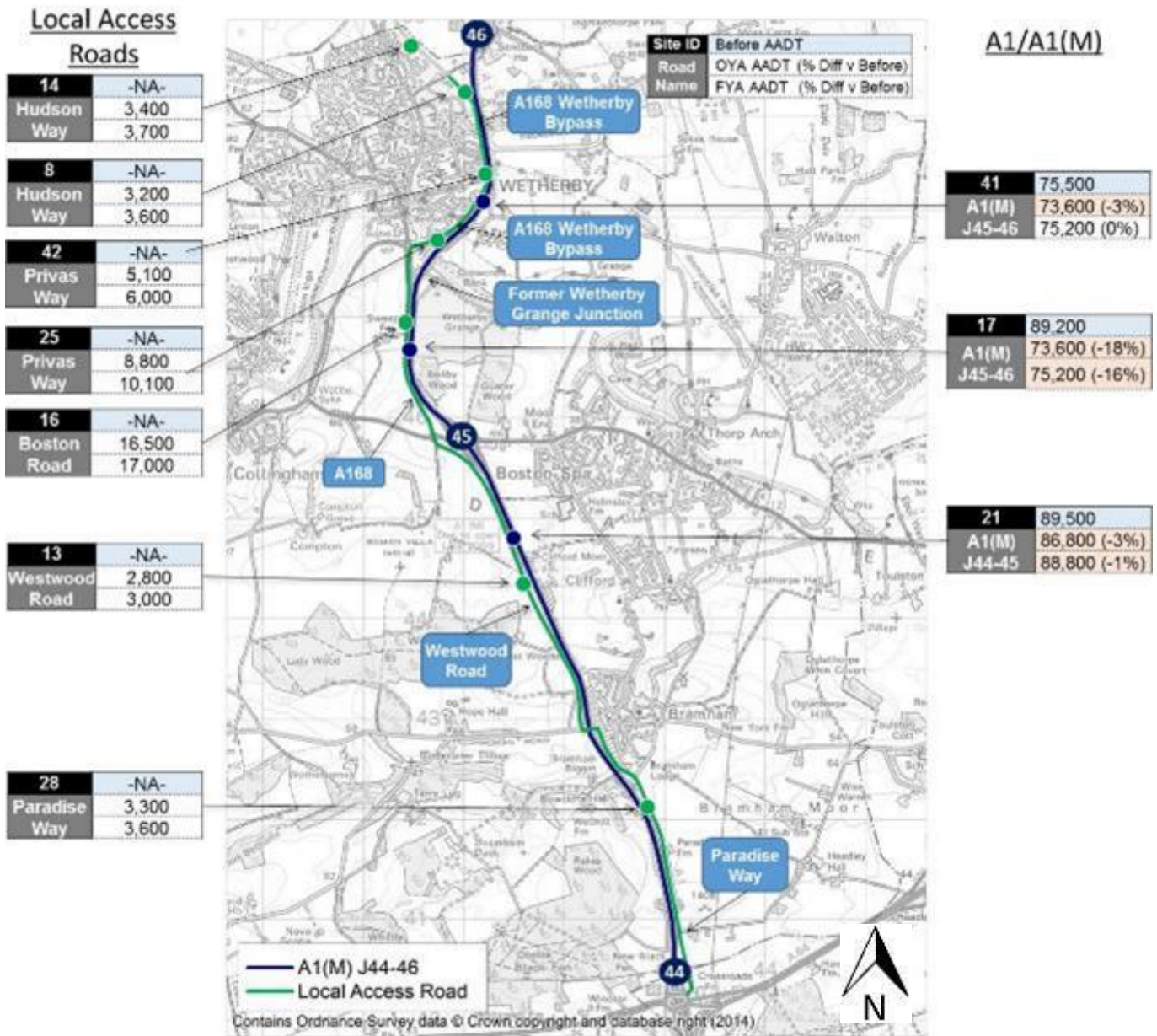
Site	Source	Location
1	NYCC	A658 Harrogate Southern Bypass
2	LCC	A661 York Road
3	NYCC	A61, south of A658
4	LCC	Linton Road, Wetherby
5	LCC	A659, east of Harewood
6	LCC	A58, south of Scarcroft
7	LCC	A64 York Road, east of Seacroft
8	LCC	LAR - A168 Hudson Way, north of York Road
9	NYCC	A661, south of Spofforth
10	LCC	A661, north-west of Wetherby
11	LCC	A661 Wetherby Bridge
12	LCC	A58, south-west of Wetherby
13	LCC	LAR - Westwood Road, north-west of Bramham
14	LCC	LAR - A168 Hudson Way, north of Sandbeck Lane
15	LCC	B1224 Walton Road
16	LCC	LAR - A168 Boston Road, north of A659
17	TRADS	A1(M) J45-46, Grange Moor (A659) to Wetherby Grange (A58) <sup>1</sup>
18	LCC	B6164 Deighton Road
19	LCC	A659, west of roundabout with A1(M)
20	LCC	Thorner Road, west of Bramham
21	TRADS	A1(M) J44-45
22	TRADS	A1(M) J43-44
23	TRADS	A1(M) J46-47
24	Temporary ATC	B1224 Link, west of A1(M)
25	LCC	LAR - A168 Privas Way, south of Walton Road
26	Temporary ATC	Windmill Road, north of Bramham
27	Temporary ATC	Toulston Lane, east of Bramham
28	LCC	LAR - Paradise Way, south of Bramham
29	Temporary ATC	A168 Great North Road
30	Temporary ATC	Bridge Road, Thorpe Arch
31	LCC	A659, east of Boston Spa Junction
32	TRADS	A64, east of A1(M) J44
33	Temporary ATC	Rudgate, west of Tockwith
34	Temporary ATC	B1224 Link, south-east of A1(M)
35	LCC	B1224 York Road, Wetherby
36	Temporary ATC	Springs Lane, Walton
37	NYCC	A659 Wetherby Road, Tadcaster
38	NYCC	A659 Leeds Road, Tadcaster
39	NYCC	A162, south of A64
40	TRADS	A64 between A659 and A162
41	TRADS	A1(M) J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)
42	LCC	LAR - A168 Privas Way, north of Walton Rd
43	Temporary ATC	Walton Road, East of the A1(M)

<sup>1</sup> A1 Wetherby Grange junction was closed as part of the scheme

### Observed Traffic Flows along the Scheme Route

2.18. Observed AADTs on the A1(M) scheme section and the new LAR parallel to the route are shown in Figure 2.2.

Figure 2.3 Observed Traffic Counts on the A1(M) and the Local Access Road<sup>1</sup>



2.19. The key points to note from Figure 2.3 are:

- AADT flows on the A1(M) between Junctions 44 and 45 have remained relatively unchanged, with a decrease of 1% (Site 21). This is counter to the wider trend on the A1(M), where flows increased 6% between 2005 and 2013 (as shown in Table 2.1).
- Between Junctions 45 and 46 of the A1(M), where at the before scheme stage this part of the route was split into two sections by the former Wetherby Grange Junction, the following can be noted:
  - Traffic flows between Junction 45 and the former Wetherby Grange Junction are 16% lower than at the before scheme stage, at 75,200 vehicles (Site 17).

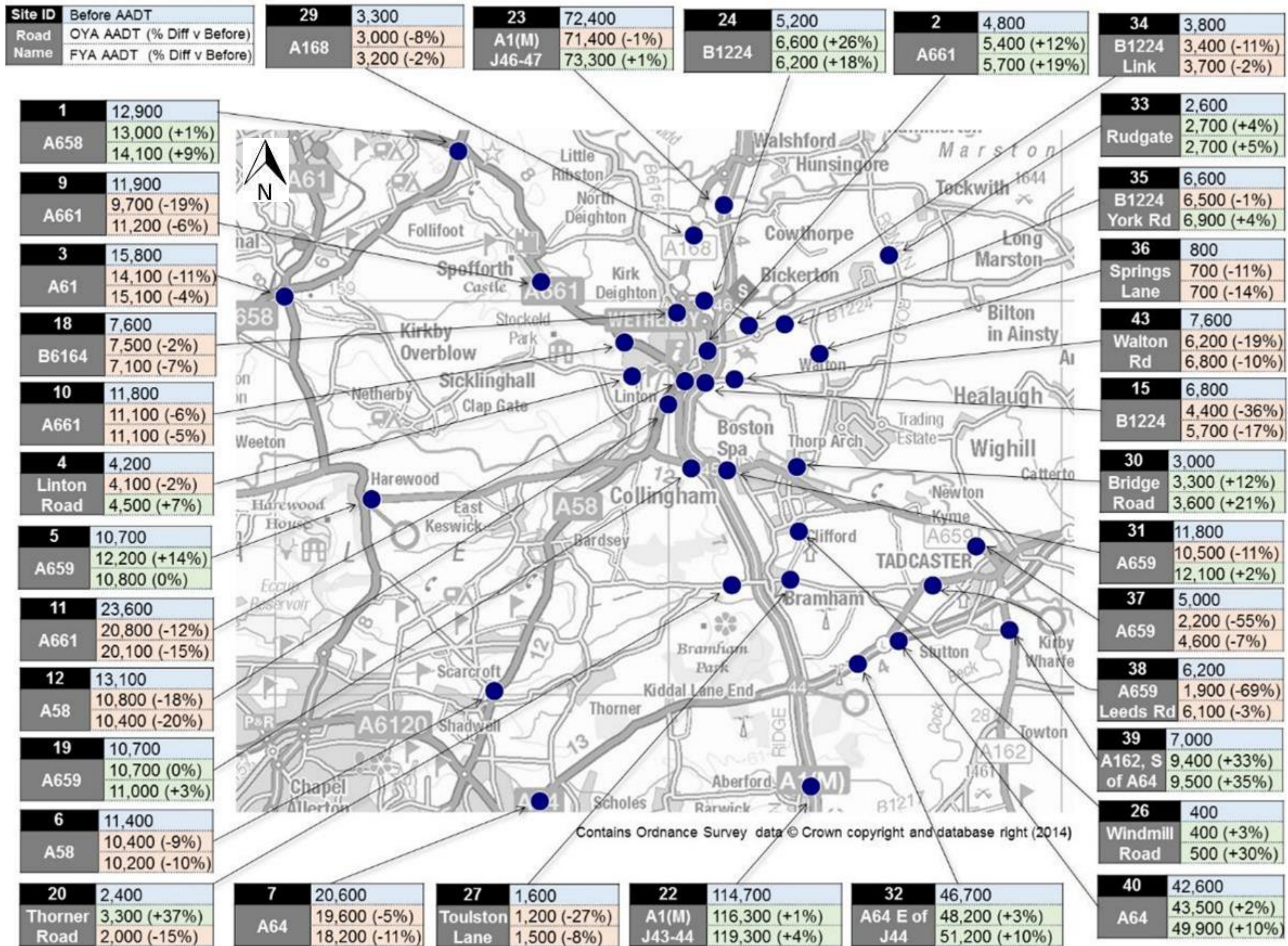
<sup>1</sup> Percentage change figures are based on the unrounded traffic flows

- Between the former Wetherby Grange Junction and Junction 46, traffic flows are have not changed between the pre- and post-scheme periods (Site 41).
- South of Junction 45, the local access road carries 3,000-3,600 vehicles (Sites 13 and 28), whilst north of the junction the road carries 17,000 vehicles (Site 16). This accounts for the reduction in traffic on the A1(M) between Junction 45 and the former Wetherby Grange Junction, with local traffic using the LAR rather than the A1(M). With the closure of the former Wetherby Grange Junction, traffic accessing the south of Wetherby will now use the LAR to access the A1(M) at J45.
- Along the section of LAR forming the Wetherby Bypass, AADT flows peak at 10,100 vehicles at the FYA stage, an increase on the OYA peak of 8,800 vehicles.

### **Observed Traffic Flows in the Wider Area**

- 2.20. Major improvements to the road network often result in traffic rerouting from other roads, and where the route is of strategic importance, the scope of this impact can be extensive. To assess whether the scheme has resulted in such an impact, an analysis of traffic flows on roads in the wider area has been undertaken.
- 2.21. Figure 2.4 shows the change in AADT flows on roads in the wider area. A comprehensive list of AADT and Annual Average Weekday Traffic (AAWT) flows is presented in Appendix A.
- 2.22. To allow for a better understanding of total vehicle movements across the wider area, an analysis of change in flows across three corridors has been undertaken by forming screenlines intersecting key routes. The three screenlines were shown earlier in Figure 2.2, with the results discussed in the following sections.

Figure 2.4 Observed Traffic Counts in the Wider Area<sup>7</sup>



<sup>7</sup> Percentage change figures are based on the unrounded traffic flows

### Central Screenline

2.23. The central screenline covers north-south traffic on the A1(M) and other routes to the east and west of it. Table 2.3 shows the change in traffic flows along this screenline.

**Table 2.3 Change in Traffic Flows across the Central Screenline**

Count locations (east to west)		AADT				
Site	Description	Before (2007)	OYA (2010)	FYA (2014)	Change Before to FYA	
3	A61, south of A658	15,800	14,100	15,100	-700	-4%
12	A58, south-west of Wetherby	13,100	10,800	10,400	-2,700	-21%
16	LAR - A168 Boston Road, North of A659	-	16,500	17,000	+17,000	-
17	A1(M) J45-46, Grange Moor (A659) to Wetherby Grange (A58)	89,200	73,600	75,200	-14,000	-16%
30	Bridge Road, Thorpe Arch	3,000	3,300	3,600	+600	+21%
<b>Total</b>		<b>121,100</b>	<b>118,300</b>	<b>121,300</b>	<b>+200</b>	<b>+2%</b>

2.24. Table 2.3 shows:

- The number of vehicles travelling north-south through the central screenline increased by 2% between the before and FYA periods, equivalent to 200 vehicles.
- As previously noted, the reduction in vehicles on the A1(M) between Junctions 45 and 46 (Site 17) is more than accounted for by the vehicles now using the LAR (Site 16). The closure of the former Wetherby Grange Junction has led to the re-assignment of local traffic to using the LAR rather than the A1(M).
- The number of vehicles using the A58 to travel north-south has fallen by 21% (Site 12). This reduction may be driven by a number of factors, including the re-assignment of trips from this route to either the A1(M) or the LAR, or drivers diverting via the Boston Spa junction to join the A58 to the north of Collingham in order to avoid driving through Wetherby town centre.
- The increase of 20% in the number of vehicles using Bridge Rd (Site 30) is due to the re-assignment of local traffic travelling between Wetherby and Boston Spa following the closure of the former Wetherby Grange Junction. Rather than using the A1(M) to travel between the two conurbations, traffic now must either the LAR or Bridge Road.

### Eastern Screenline

2.25. The eastern screenline covers the roads approaching the A1(M) from the east between J44 and J46. The change in traffic flows along this corridor are presented in Table 2.4.

**Table 2.4 Change in Traffic Flows across the Eastern Screenline**

Count locations (south to north)		AADT				
Site	Description	Before (2007)	OYA (2010)	FYA (2014)	Change Before to FYA	
32	A64, east of A1(M) J44	46,700	48,200	51,200	+4,500	+10%
27	Toulston Lane, east of Bramham	1,600	1,200	1,500	-100	-8%
26	Windmill Road, north of Bramham	400	400	500	+100	+30%
31	A659, east of Boston Spa Junction	11,800	10,500	12,100	+300	+2%
43	Walton Road, East of the A1	7,600	6,200	6,800	-800	-10%
35	B1224 York Road, Wetherby	6,600	6,500	6,900	+300	+4%
<b>Total</b>		<b>74,700</b>	<b>73,000</b>	<b>79,000</b>	<b>+4,300</b>	<b>6%</b>

2.26. Table 2.4 shows:

- The number of vehicles passing through the eastern screenline increased 6% between the before and FYA periods, an increase of 4,300 vehicles.
- The largest increase in vehicles is seen on the A64, east of A1(M) J44 (Site 32), with 4,500 additional vehicles. It is unclear why such an increase has occurred, given that the junction closures would be unlikely to have affected vehicles heading toward Tadcaster.
- Following a reduction in traffic flows on the A659 (Site 31) at OYA, traffic flows at FYA are 2% higher than at the pre-scheme period.
- There is no indication of significant traffic re-assignment.

### Western screenline

2.27. The western screenline covers the roads approaching the A1(M) from the west between J44 and J45. The change in traffic flows along this corridor are presented in Table 2.5.

**Table 2.5 Change in Traffic Flows across the Western Screenline**

Count locations (south to north)		AADT			
Site	Description	Before (2007)	OYA (2010)	FYA (2014)	Change Before to FYA
7	A64 York Rd, east of Seacroft	20,600	19,600	18,200	-2,300 -11%
20	Thorner Road, west of Bramham	2,400	3,300	2,000	-400 -15%
19	A659, west of roundabout with A1(M)	10,700	10,700	11,000	+300 +3%
12	A58 south-west of Wetherby	13,100	10,800	10,400	-2,700 -20%
4	Linton Road, Wetherby	4,200	4,100	4,500	+300 +7%
10	A661, north-west of Wetherby	11,800	11,100	11,100	-600 -5%
<b>Total</b>		<b>62,800</b>	<b>59,600</b>	<b>57,200</b>	<b>-5,400 -9%</b>

2.28. Table 2.5 shows:

- There has been an overall reduction of 9% in traffic along the western corridor, equivalent to 5,400 fewer vehicles. This reduction is unexpected given that this corridor covers key routes between Leeds and the wider region, including the A64 to York and A58 into Wetherby. As reported in Figure 2.1, local traffic flows have fallen since scheme opening, but not to the extent reported here.
- The greatest reduction in traffic is on the A58 south-west of Wetherby (Site 12). This can be explained by the closure of the Wetherby Grange Junction, meaning that this section of the A58 is no longer an attractive route for vehicles travelling onto the A1(M) from the west.
- Similarly, the reduction in traffic on Thorner Road (Site 20) may be attributed to the closure of the Tenter Hill junction of the A1(M).
- It is unclear why traffic on the A64 (Site 7) will have fallen by 11% (2,300 vehicles), given that this route leads to Junction 44 of the A1(M). Looking more widely, it can be seen the traffic flows on the A58 (Site 6) have fallen by 10% (1,200 vehicles), which combined with the fall on Site 7 could potentially explain some of the increase in traffic on the A1(M) (Site 22) of 4% (4,600 vehicles).

### Heavy Goods Vehicle Flows

2.29. Table 2.6 presents observed HGV<sup>1</sup> flows and the percentage of total flow that this represents along the A1(M), as both annual average weekday and daily flows. HGV data for the LAR was not available for analysis.

<sup>1</sup> The classification of HGVs is a vehicle over 5.2m in length, based on the data available.

**Table 2.6 Change in HGV Flows along the A1(M) Scheme Section**

Site	Location	Flow Type	Before (2007)		FYA (2014)	
			Number of HGVS	Percentage of Total Flow	Number of HGVS	Percentage of Total Flow
21	A1(M) J44-45	AADT	18,900	21%	17,900	20%
		AAWT	23,300	24%	22,400	23%
41	A1(M) J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)	AADT	18,200	24%	16,900	22%
		AAWT	22,300	28%	20,500	26%

- 2.30. Table 2.6 shows that HGV AADT flows between A1(M) J44 and J45 reduced by 5% between the pre- and post-scheme periods, a slightly higher reduction than the overall reduction in AADT of 1% as presented in Figure 2.3. Along the A1(M) J44-45 (between the former Wetherby Grange junction and Kirk Deighton junction), HGV AADT flows reduced by 7% across the same period, whilst total AADT flows on the same route were unchanged.
- 2.31. The reduction in HGVS using the A1(M) J44-45 (between the former Wetherby Grange junction and Kirk Deighton junction) may be the result of a small number of HGVS re-assigning onto the LAR in order to provide deliveries to the Wetherby area.
- 2.32. The reductions observed here should also be considered in light of macro-economic conditions since 2008, which may have caused changes to HGV flows.

### Forecast vs. Outturn Traffic Flows

- 2.33. The pre-scheme appraisal process for the scheme involved the forecasting of AADT traffic flows for 'Do Minimum' (DM) and 'Do Something' (DS) scenarios. The DS scenario includes the scheme whilst the DM scenario does not. As part of POPE methodology, these modelled forecast flows are compared with observed flows in order to ascertain the accuracy of the original predictions.
- 2.34. Details of the modelling approach and traffic forecasts presented here are taken from the 'A1 Bramham to Wetherby Upgrading Scheme Traffic Forecasting Report' 2005 (Revision F).

#### Traffic Modelling Approach

- 2.35. The scheme's strategic highway model was developed using the SATURN suite of computer programs. The base year used in the model was 2002, with DM and DS forecasts produced for an opening year of 2008 and a design year of 2023 (fifteen years after opening).

#### Model Network

- 2.36. The DM network model included the A1(M) Wetherby to Walshford scheme, which was completed in 2005 (as discussed in Section 1.2). The Base model did not include the Wetherby to Walshford scheme. Hence, the observed pre-scheme flows collected for this study in 2007 are comparable with the DM forecasts, not the Base forecasts.
- 2.37. The only difference between the DM and DS model networks is the Bramham to Wetherby scheme itself.

#### Growth Forecasts

- 2.38. DM and DS traffic forecasts were produced for three growth scenarios: pessimistic case, central reference case and optimistic case.
- 2.39. The forecasts for each were determined by:



- Applying a background growth rate in accordance with TEMPRO 4.2.3, adjusting for fuel and income effects.
  - For trips accessing and egressing the model network via the A1(M) (i.e. through trips), the Great Britain growth rate was applied, allowing for an upwards adjustment in line with recent historic growth at the time the forecasting was undertaken.
  - For all other trips, the Leeds Rural growth rate was applied.
- Trips generated by two new land use developments were applied, based on TRICS trip generation data. Details are of the developments are below:
  - A supermarket was constructed in Wetherby town centre in 2004, prior to the construction of the scheme.
  - A housing development was constructed 2004 at Micklethwaite Farm, just north of the A168/A58 junction (south of Wetherby Town Centre).

2.40. Additionally, consideration was given to trip re-assignment from the M6 corridor to the A1(M)/A66 corridor for traffic travelling north-south between England and Scotland. The Traffic Forecasting Report notes:

*...There are a number of Targeted Programme of Improvement schemes for both the A1 and the A66 that, whilst at varying stages in the planning process, if completed would lead to improved journey times on this route when compared to the M6. These comprise of five schemes to improve the A1 (including Bramham to Wetherby), and seven to improve the A66. In contrast there are no current TPI schemes for improvements on the M6, with the exception of the recently opened M6 Toll...The expectation is that the improvements resulting from the large number of schemes to improve the A1 and M66 would result in a transfer of traffic away from the M6 corridor and towards the A1/A66.*

2.41. Traffic modelling indicated that approximately 6,000 vehicles per day were making the north-south movement between England and Scotland, 4,000 using the M6 and 2,000 using the A1(M)/A66 corridor. Under the central reference case scenario, it was assumed that 50% of potential traffic transfer from the M6 to the A1(M)/A66 would occur, resulting in an additional 2,000 trips per day on the A1(M)/A66. Traffic growth in accordance with TEMPRO would then be applied to this figure to account for background growth.

#### **Do Minimum Forecasts vs. Observed Pre-Scheme Traffic Flows**

2.42. Table 2.7 compares the forecast DM reference case and observed pre-scheme AADT flows. The base model flows from 2002 are included for reference to reveal the forecast level of growth expected between the base and 2008 forecast years. Flows are not presented for the LAR as the road was constructed as part of the scheme.

**Table 2.7 Forecast 2008 AADT DM Flows vs. Observed 2007 AADT Flows**

Site	Location	Model Base (2002)	Forecast DM (Reference Case, 2008)	Observed Pre-Scheme (2007)	Difference Forecast DM v Observed Pre-Scheme	
21	A1(M) J44-45	81,100	102,300	89,500	-12,800	-13%
17	A1(M) J45-46, Grange Moor (A659) to Wetherby Grange (A58)	80,400	102,200	89,200	-13,000	-13%
41	A1(M) J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)	69,300	85,500	75,500	-10,000	-12%
19	A659, west of roundabout with A1(M)	10,000	12,200	10,700	-1,500	-12%
31	A659, east of Boston Spa Junction	11,000	12,900	11,800	-1,100	-9%
12	A58, south-west of Wetherby	15,900	17,400	13,100	-4,300	-25%
30	Bridge Road, Thorpe Arch	3,900	4,800	3,000	-1,800	-38%

2.43. From Table 2.7 it can be seen that:

- Between the model base year of 2002 and the DM forecast year of 2008, between 16,200 and 21,800 additional vehicles were expected on the A1(M), resulting in 102,300 AADT trips between Junctions 44 and 45. However, observed traffic flows reveal this level of growth did not occur, with observed traffic flows on the A1(M) being 13% lower than forecast, representing between 12,800 to 13,000 fewer vehicles.
- Similarly, on all other roads in the area, the expected level of growth between the model base year of 2002 and the forecast DM year of 2008 did not occur. In two cases (sites 12 and 30), the observed pre-scheme 2007 flows are lower than 2002 model base year flows.
- On the other roads, observed traffic flows were also lower than forecast. In particular, on the A58, flows were over forecast by 4,300 vehicles (25%).

2.44. These results indicate that the forecast growth expected between the model base year of 2002 and the DM forecast year of 2008 did not occur. This results in significant differences between the forecast model before any construction began.

#### **Do Something Forecasts vs. Observed Post-Scheme Traffic Flows**

2.45. Table 2.8 compares the post-scheme forecast DS and observed AADT flows. Forecast for the pessimistic, central reference and optimistic cases are presented in order to allow a comparison of observed flows against each forecast.

**Table 2.8 Forecast 2014 DS AADT Flows vs. Observed 2014 AADT Flows**

Site	Location	Forecast DS (2014)			Observed FYA (2014)	Difference - Forecast Reference vs. Observed		
		Pessimistic	Reference	Optimistic				
21	A1(M) J44-45	100,240	109,780	118,180	88,800	-20,980	-19%	
17	A1(M) J45-46, Grange Moor (A659) to Wetherby Grange (A58)	81,240	91,300	99,920	75,200	-16,100	-18%	
41								A1(M) J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)
28	Paradise Way, south of Bramham	6,940	9,780	11,680	3,600	-6,180	-63%	
13	Westwood Road, north-west of Bramham	4,260	7,120	11,260	3,000	-4,120	-58%	
16	LAR	A168 Boston road, north of A659	26,000	29,180	31,140	17,000	-12,180	-42%
25		A168 Privas Way, south of Walton Road	15,400	17,940	21,200	10,100	-7,840	-44%
42		A168 Privas Way, north of Walton Rd	6,520	8,780	9,880	6,000	-2,780	-32%
19	Other roads	A659, west of roundabout with A1(M)	24,180	13,860	29,480	11,000	-2,860	-21%
31		A659, east of Boston Spa Junction	14,300	13,360	16,740	12,100	-1,260	-9%
12		A58, south-west of Wetherby	12,260	15,580	15,360	10,400	-5,180	-33%
30		Bridge Road, Thorpe Arch	14,060	4,740	16,480	3,600	-1,140	-24%

2.46. From Table 2.8 it can be seen that:

- At all sites, flows were overestimated, with observed flows being lower than the pessimistic case.
- On the A1(M), flows were overestimated by 18-19% compared to the reference case, representing 16,100 to 20,980 vehicles.
- Flows on the LAR were significantly overestimated. Flows on the section of LAR south of Junction 45 are most overestimated, by as much as 63% on Paradise Way (Site 28). Whilst flows on the LAR north of Junction 45 are also overestimated, they are to a lesser degree.

#### Forecast Change vs. Observed Change

2.47. An analysis of the forecast change in traffic flows between the DM and DS pessimistic scenarios is presented alongside the observed change in traffic flows between the pre- and post-scheme periods in Table 2.9.

**Table 2.9 Forecast and Observed Changes in Traffic Flows**

Site	Description	Forecast Change between 2008 DM and 2014 DS			Observed Change between pre-scheme 2007 and FYA 2014
		Pessimistic	Reference	Optimistic	
21	A1(M) J44-45	-2%	7%	16%	-1%
17	A1(M) J45-46, Grange Moor (A659) to Wetherby Grange (A58)	-21%	-11%	-2%	-16%
41	A1(M) J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)	-5%	7%	17%	0%
19	A659, west of roundabout with A1(M)	17%	14%	37%	3%
31	A659, east of Boston Spa Junction	-5%	4%	19%	3%
12	A58, south-west of Wetherby	-19%	-10%	-5%	-21%
30	Bridge Road, Thorpe Arch	-19%	-1%	9%	20%

2.48. From Table 2.9 the following key points can be noted:

- The observed changes in traffic flow on the A1(M) are closer to the pessimistic case than the other two scenarios.
- On Bridge Road observed traffic flows increased by 20% between the pre- and post-scheme periods, a higher rate of growth than the optimistic forecast of 9%. The increase of 20% in the number of vehicles using Bridge Rd (Site 30) is potentially the result of local traffic travelling between Wetherby and Boston Spa re-routing following the closure of the former Wetherby Grange Junction, as discussed in Section 2.24. This re-assignment may not have been completely accounted for at the appraisal stage, hence the forecast reduction of 19%.

2.49. With traffic flows on the A1(M) generally being below the pessimistic scenario, there is no evidence to suggest that there has been re-assignment of trips from the M6 onto the A1(M)/A66 corridor as a result of the package of improvements on the corridor, as was forecast at appraisal stage.

2.50. It is arguable that recent economic conditions have had an impact on traffic growth which was not forecast at the appraisal stage, hence observed flows are closer to the pessimistic forecast than the other forecast scenarios. As macro-economic conditions improve, traffic flows can be expected to rise and so the results presented may not be representative of the long term trends in traffic flow on the scheme section.

## Vehicle Speed Analysis

**Scheme Objectives: Create savings in journey times**

2.51. POPE studies typically undertake journey time analysis in order to assess the impact of a scheme on user travel times and journey time reliability. However, due to the limited availability of quality journey time data covering the A1(M) J44-46, vehicle speed analysis has been undertaken instead.

### Vehicle Speed Data Source

- 2.52. Observed capped average vehicle speeds were provided by the DBFO Road Management Services Ltd. for locations along the A1(M) J44-46. Capped average speeds place an upper limit on recorded speeds of 72mph, meaning that any vehicle travelling past a recording point in excess of 72mph will have a recorded speed of 72mph. It should also be noted that the vehicle speeds provided are spot speeds for individual locations on the network; they are not averages between two points. As such the data does not take into account fluctuations in vehicle speeds as the result of, for example, stop-start traffic during congested periods or the impact of traffic merging onto/diverging from the mainline.
- 2.53. The data obtained covers the following periods:
- Pre-scheme: March 2007
  - Post-scheme: October 2014

### Observed Vehicle Speeds

- 2.54. The data provided was used to compare capped average vehicle speeds for the pre- and post-scheme periods across the following three sections of the scheme:
- A1(M) J44 to 45
  - A1(M) J45 to the former Wetherby Grange Junction
  - A1(M) the former Wetherby Grange Junction to J46
- 2.55. The results of this analysis is presented in Table 2.10.

**Table 2.10 Change in pre- and post-scheme 24 hour weekday average observed capped vehicle speeds (mph)**

Location	Northbound (speed, mph)			Southbound (speed, mph)		
	Pre-scheme	Post-scheme	Change	Pre-scheme	Post-scheme	Change
J44-45	67	70	+3	66	69	+4
J45-46, Grange Moor (A659) to Wetherby Grange (A58)	66	71	+5	67	70	+3
J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)	67	71	+4	65	70	+5

- 2.56. The results presented in Table 2.10 indicate that the scheme has led to an increase in speed between J44 and 46 of between three and five miles per hour. This increase is taken as conservative, given that recorded speeds are capped average.
- 2.57. Furthermore, during the pre-scheme period, the speed recording devices that provided the data used here were located immediately after the on-slips for the former Wetherby Grange and Walton Road junctions, meaning that any reductions in speed occurring as vehicles left the mainline will not have been recorded. As such the pre-scheme speeds between J45 and 46 are likely higher than the true speeds on the scheme section.
- 2.58. Given this, a conservative conclusion can be drawn that the scheme has led to a modest increase in vehicle speeds between J44 and 46, and it can therefore be assumed that user journey times on the A1(M) will have reduced between the junctions.

## Forecast Journey Times

- 2.59. The forecast impact of the scheme on journey times was presented in the AST, which state that the following journey time savings would be achieved:
- Peak: savings in the range of 0.95 to 1.06 minutes
  - Off peak: savings of 0.31 minutes
- 2.60. Due to the limited availability of quality journey time data covering the A1(M) J44-46, as discussed in the previous section, a comparison of forecast and observed journey times cannot be undertaken. The speed data used in the previous section cannot be used as a like for like comparison against the forecast journey times would not be possible.

## Route Stress

**Scheme Objectives: Create savings in journey times, reduce congestion and improve journey reliability**

- 2.61. WebTAG guidance uses the measurement of route stress as an appropriate proxy for measuring the reliability sub-objective, with the concept of stress development to provide an indication of the relationship between road volume and capacity. Route stress is the ratio of AADT flow to the Congestion Reference Flow (CRF), which is a definition of capacity<sup>1</sup>. Reliability of journey times reduce as flows approach capacity.
- 2.62. The AST stated that the scheme would reduce route stress from 113% to 71% on the A1(M) through Wetherby.
- 2.63. Route stress statistics have been calculated for before and after scheme opening as shown in Table 2.11. WebTAG states that where stress values are less than 75% or greater than 125%, values of 75% and 125%, respectively, should be used. However, to demonstrate the extent of the changes in route stress due to the scheme, Table 2.11 includes the unadjusted route stress.

**Table 2.11 Observed Route Stress on the A1(M) J44-46**

Route	Before scheme opening		FYA scheme opening	
	Unadjusted	Adjusted	Unadjusted	Adjusted
A1(M) J44-46	84%	84%	60%	75%

- 2.64. Table 2.11 shows that the unadjusted route stress has decreased from 84% to 60%. This improvement can be attributed to the upgrading of the route to motorway standard and the widening of 2.5 miles of the A1 from two-lane all-purpose A road to three-lane motorway standard (D3M).
- 2.65. Following WebTAG guidance, route stress must be assessed based on the adjusted route stress percentage, resulting in a reduction in route stress from 84% to 75%.

<sup>1</sup> The CRF of a link is an estimate of the AADT flow at which the carriageway is likely to be 'congested' in the peak periods on an average day.

## Key Points

### Traffic Flow Impacts

- ADT flows on the A1(M) between Junctions 44 and 45 are 88,800 five years after opening, a slight fall of 1%.
- Between J45 and the former Wetherby Grange Junction, AADT flows fell 16% to 75,200, reflecting the re-assignment of some local traffic onto the LAR, which carried 17,000 vehicles on the adjacent section of the LAR.
- Between the former Wetherby Grange Junction and J46, AADT flows at the five year after stage were unchanged compared to the pre-scheme period.
- There has been a 21% increase in annual AADT flows on Bridge Road (east of the A1(M) J45) at the FYA stage (600 vehicle increase), which is due to the re-assignment of local traffic travelling between Wetherby and Boston Spa following the closure of Wetherby Grange junction.
- The closure of Wetherby Grange junction also appears to have led to 20% less traffic on the A58 south-west of Wetherby, given that the route is no longer attractive for vehicles travelling onto the A1(M) from the west.

### Traffic Forecasting

- Significantly less traffic uses the A1(M) and LAR than expected.
- Pre-scheme forecast traffic flows are higher than the observed pre-scheme flows across all roads assessed. This is the result of the forecast growth in traffic between the 2002 model base and 2008 pre-scheme forecast having been overestimated.
- Similarly, forecast annual average daily traffic flows with the scheme are higher than observed flows on all roads assessed. On the A1(M), annual average daily traffic flows were overestimated by 18-19% when comparing observed and forecast flows, representing 16,100 to 20,980 vehicles.
- There is no evidence to suggest that there has been re-assignment of trips from the M6 onto the A1(M)/A66 corridor as a result of the package of improvements on the corridor, as was forecast at appraisal stage

### Vehicle speeds

- Comparison of pre- and post-scheme capped average vehicle speeds reveal a modest increase in speeds of 3-5mph across the A1(M) J44-46.
- Route stress on the A1(M) scheme section has reduced following scheme opening.

## 3. Safety

**Scheme Objective: Reduce accidents**

### Introduction

- 3.1. This chapter examines the impact of the scheme on safety. The DfT's objectives for transport set out the principal objectives to reduce collisions and improve security. This includes reducing the loss of life, injuries and damage resulting from transport collisions and crime.
- 3.2. In order to assess the scheme's impact on collisions, this section of the report analyses changes in personal injury collisions (PICs) occurring in the five year period before scheme opening and after. Evaluation of the scheme's impact on personal security has also been undertaken through the use of observations made during a site visit.
- 3.3. The analysis undertaken in this chapter covers two geographical areas. Initially, an assessment of collisions in the Cost Benefit Analysis (COBA) model area is undertaken (Figure 3.1) covering a wider geographical area. Alongside this, an examination of collisions on the scheme's *key links* (principally the A1(M) between Junctions 44 and 46 and the LAR) is undertaken in order to assess the direct impact of the scheme. A map of the key links area is presented in Appendix B.

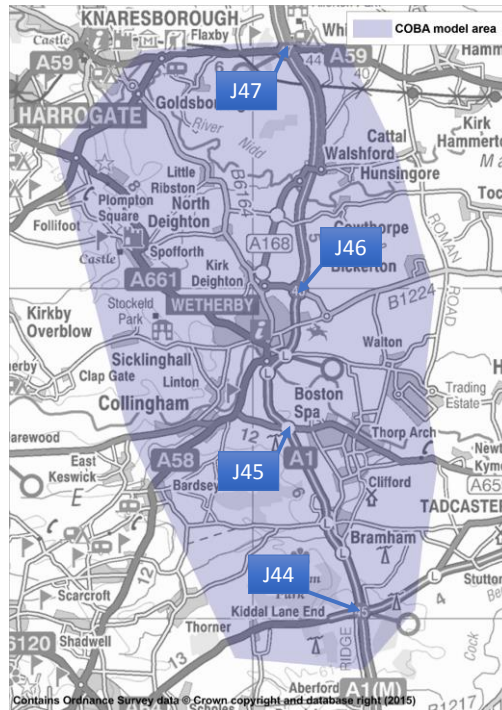
### Sources

#### Forecast data sources

- 3.4. For the purposes of assessing the collision impacts of the scheme, at the appraisal stage, forecasts were produced of the number of collisions the scheme was expected to save, together with the associated numbers of casualties and the monetary benefit of the savings. These forecasts were made using a COBA model, outputs from which have been obtained for this aspect of the evaluation.
- 3.5. Three COBA forecasts were produced: optimistic, pessimistic and central. The pessimistic forecast has been used here to assess the accuracy of the appraisal forecasts against the observed change in PICs following scheme opening given that observed traffic flows are more in line with the pessimistic forecasts (as presented in Table 2.9).
- 3.6. The extent of the COBA model area is shown in Figure 3.1 The COBA model area included the Wetherby to Walshford scheme which opened in 2005.



Figure 3.1 COBA Model Area



3.7. Unfortunately a detailed diagram identifying each of the COBA links could not be obtained for this study. As a result, the comparison of forecast and observed PICs is limited to the whole COBA model area, with no comparison for the scheme's key links possible.

### Observed Data Sources

3.8. For the purposes of this study, data on observed PICs has been obtained from Leeds City Council and North Yorkshire County Council. The data covers the roads in the COBA model area for the following time periods:

- Five year pre-scheme: 1st April 2002 – 31st March 2007
- Construction: 1st April 2007 – 30th June 2009
- Five years post-opening: 1st July 2009 – 30th June 2014

3.9. The collision data is based on the records of PICs (i.e. collisions that involve injuries to one or more persons) recorded in the STATS19 data collected by the police when attending collisions. Collisions that do not result in injury are not included in this dataset and are thus not considered in this evaluation.

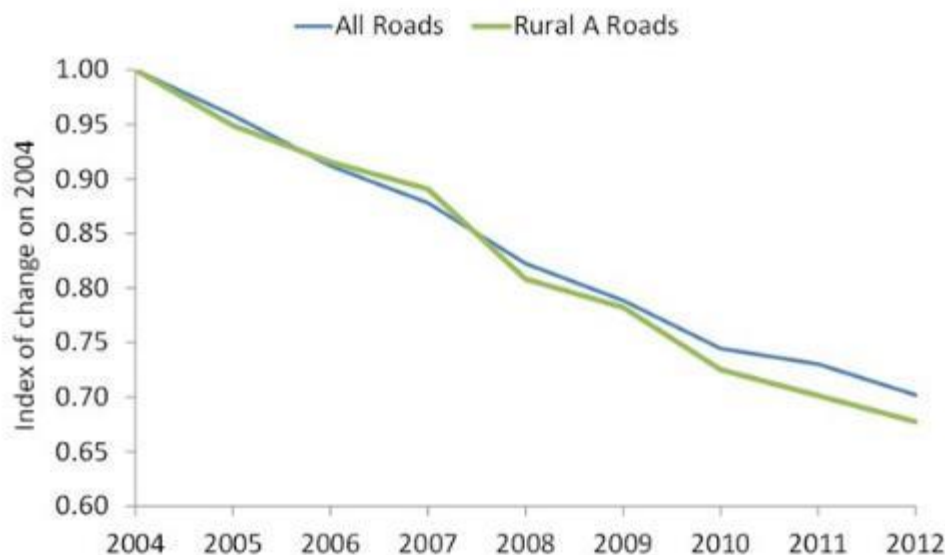
3.10. It should also be noted that at this stage, the collision data may not yet have been validated by the DfT. The requirement for up to date and site specific information necessitated the use of unvalidated data sourced from the local authority. Thus the data is judged to be sufficiently robust for use in this study, but it may be subject to change. However, it is not anticipated that this would be significant in terms of the analysis of collision numbers presented in this report.

### Background Changes in Collision Reduction

3.11. It is widely recognised that for over a decade there has been a year-on-year reduction in the numbers of personal injury collisions on the roads, even against a trend of increasing traffic volumes during much of that period. The reasons for the reduction are considered to be multi-factorial and include improved safety measures in vehicles and reduced numbers of younger drivers. We need to consider this background trend when considering the changes in collision numbers following scheme opening. If the scheme had not been built, collision numbers in the area may still be influenced by wider trends and reduced.

- 3.12. When we compare the numbers of collisions in this area before and after the scheme was built and associate the net change with the scheme, we need to take this background reduction into account. The best way to do this is to assume that, if the scheme had not been built, the number of collisions on the roads in the COBA model area here would have dropped at the same rate as they did nationally during the same period. This gives us what is known as the counterfactual ‘without scheme’ scenario on a like for like basis with the observed post opening data which is the ‘with scheme’ scenario.
- 3.13. The comparison needed is between the middle year in the after period (2012) and the middle of the pre-construction period (2004). The approach is to use national data for the changes in the numbers of collisions in this period occurring on all roads in the COBA model area, and for rural A roads for the scheme’s key links<sup>1</sup>. Figure 3.2 illustrates the changes in collision numbers by road type between 2004 and 2012.
- 3.14. The difference between the numbers of collisions in these two scenarios can then be attributed to the scheme rather than the wider national trends. This result will inform the calculation of monetised safety benefits achieved by the scheme as discussed in the economy chapter of this report.

**Figure 3.2 – Trends in Injury Collision Numbers<sup>2</sup>**



## Collision Numbers

- 3.15. This section analyses the observed trends in PICs following the implementation of the scheme. This includes investigating the changes in the number of collisions and associated casualties as well as whether there has been a reduction in the relative severity of incidents.

### Collisions - COBA Model Area

- 3.16. An evaluation of before and after opening collision numbers by year for the whole of the COBA model area (as shown in Figure 3.1) is presented in Table 3.1. As the COBA model area includes the extent of the Wetherby – Walshford major scheme, which was constructed and opened during the five years before period, an alternative time period between August 2005 to March 2007 is presented, covering the period following the completion of the Wetherby - Walshford scheme. For brevity, this alternative period will henceforth be known as the ‘pre-scheme excluding W-W’ period. This allows a comparison of the post-scheme period with a

<sup>1</sup> The index of change on rural A roads between 2004 and 2012 is 0.68; the index of change on all road types in the same period is 0.70.

<sup>2</sup> Department for Transport statistics: RAS10002

([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/239702/ras10002.xls](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239702/ras10002.xls))

'neutral' pre-scheme period, unaffected by construction works between Wetherby and Walshford.

3.17. Additionally presented is the without scheme counterfactual number of collisions, which is an alteration based on the counterfactual scenario in which it is assumed that without the scheme in place, the collision numbers here would have reduced in line with the national trend. This enables a like-for-like comparison with the post-opening period data. Counterfactuals are presented for the full pre-scheme period and the pre-scheme following completion of Wetherby-Walshford scheme period (August 2005 to March 2007).

3.18. The locations of collisions across the COBA model area during the pre-scheme and post-scheme periods are also displayed in Appendix C.

**Table 3.1 Number of Collisions by Severity in the COBA Model Area**

Time Period	Date		Number of Collisions				Average Annual				Severity Index
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	All	
Pre-scheme <sup>1</sup>	Apr 2002	Mar 2003	6	24	151	181	3.8	20.0	116.4	140.2	17%
	Apr 2003	Mar 2004	4	15	131	150					
	Apr 2004	Mar 2005	4	16	102	122					
	Apr 2005	Mar 2006	3	22	97	122					
	Apr 2006	Mar 2007	2	23	101	126					
Without scheme counterfactual										98.4	
Pre-scheme excluding W-W <sup>2</sup>	Aug 2005	Mar 2007	4	37	146	187	2.4	22.2	87.6	112.2	22%
Without scheme following completion of Wetherby-Walshford scheme counterfactual <sup>3</sup>										86.3	
Construction period	Apr 2007	Mar 2008	2	17	140	159	2.2	16.9	121.9	141.1	14%
	Apr 2008	Mar 2009	3	17	104	124					
	Apr 2009	Jun 2009	0	4	30	34					
Post-opening	Jul 2009	Jun 2010	5	15	97	117	2.2	18.0	80.2	100.5	20%
	Jul 2010	Jun 2011	2	18	84	104					
	Jul 2011	Jun 2012	2	14	89	105					
	Jul 2012	Jun 2013	1	17	65	83					
	Jul 2013	Jun 2014	1	26	66	93					

3.19. From Table 3.1 it can be seen that:

- The average number of collisions across the COBA model area has reduced from a pre-scheme observed annual average of 140 PICs, to a post-scheme annual average of 101 PICs, a reduction of 28%. This reflects an annual average collision saving of 40 PICs.
- The without scheme counterfactual average annual number of collisions (accounting for the background reduction in collisions over time) is calculated as 98 collisions per

<sup>1</sup> Includes the construction of the Wetherby – Walshford scheme, north of the Bramham – Wetherby scheme, between May 2003 and July 2005. Construction was mainly undertaken offline.

<sup>2</sup> Covers the period after the completion of the Wetherby – Walshford scheme and prior to the start of construction of the Bramham – Wetherby scheme.

<sup>3</sup> The pre-scheme excluding W-W period counterfactual is based on the change in collisions on all roads between 2006 and 2012, using the methodology discussed in Section 3.13.

annum. Compared with the post-opening average annual number of PICs, there has been an annual collision *increase* of 2 PICs. This change is not statistically significant<sup>1</sup>.

- The annual average number of PICs in the pre-scheme excluding W-W period of 112.2 suggests a reduction of in PICs occurred following completion of the Wetherby – Walshford scheme, prior to the start of construction of the Bramham – Wetherby scheme.
- Comparing the post-opening and pre-scheme excluding W-W periods reveals an annual average saving of 12 PICs. However, if we take into account the background collision reduction, there has been an annual collision *increase* of 14 PICs. This change is not statistically significant.
- The severity index in the post-scheme period has increased compared to the pre-scheme period, but is below the pre-scheme excluding W-W period.

### Casualties - COBA Model Area

3.20. In addition to analysing the number of observed collisions, it is also useful to investigate trends in the number of casualties associated with these incidents. As such, Table 3.2 presents casualty numbers and proportion of casualties who were Killed or Seriously Injured (KSI) for the COBA model area.

3.21. It should be noted that no pre-scheme counterfactual value (accounting for background reduction in associated collisions) has been calculated for casualty numbers as this does not inform calculations regarding the scheme’s value for money.

**Table 3.2 Number of Casualties by Severity in the COBA Model Area**

Time Period	Date		Number of Casualties				Average Annual Casualties	KSI
	From	To	Killed	Serious	Slight	All		
Pre-Scheme	Apr 2002	Mar 2003	6	32	257	295	233.0	13%
	Apr 2003	Mar 2004	5	16	263	284		
	Apr 2004	Mar 2005	4	20	161	185		
	Apr 2005	Mar 2006	4	28	158	190		
	Apr 2006	Mar 2007	4	32	175	211		
Pre-scheme excluding W-W <sup>2</sup>	Aug 2005	Mar 2007	7	51	248	306	183.6	19%
Construction Period	Apr 2007	Mar 2008	2	20	224	246	213.2	11%
	Apr 2008	Mar 2009	6	18	157	181		
	Apr 2009	Jun 2009	0	6	46	52		
Post-Opening	Jul 2009	Jun 2010	6	20	160	186	155.5	15%
	Jul 2010	Jun 2011	2	20	147	169		
	Jul 2011	Jun 2012	2	17	147	166		
	Jul 2012	Jun 2013	1	19	105	125		
	Jul 2013	Jun 2014	1	30	100	131		

3.22. The key points to note from Table 3.2 are:

- The average annual number of casualties reduced from 233 in the pre-scheme period to 156 post-scheme opening, a reduction of 33%. This is broadly in line with the fall in the number of collisions (as noted in the previous section).

<sup>1</sup> The statistical significant test is chi-squared based on a 95% confidence interval.

<sup>2</sup> Covers the period after the completion of the Wetherby – Walshford scheme and prior to the start of construction of the Bramham – Wetherby scheme.

- The number of fatal casualties fell by 48% between the pre-scheme and post-opening periods, greater than the reduction in serious (17%) and slight (33%) casualties.
- Comparing the post-opening and pre-scheme excluding W-W periods reveals an annual average saving of 28 casualties.
- As with the PIC results, the KSI in the post-scheme period has increased compared to the pre-scheme period, but is below the pre-scheme excluding W-W period.
- The reduction in casualties is statistically significant but it should be noted that this does not take into account the background trend.

### Collisions – Key Links

3.23. An evaluation of pre- and post-scheme opening collision numbers by year for the key links (comprising the A1(M) J44-45 and the LAR) is presented in Table 3.3, whilst Figure 3.3 presents this data graphically. A without scheme counterfactual is also presented to account for the reduction in collision which would have occurred if the scheme was not built. Locations of collisions in the pre- and post-scheme opening periods are presented later in Figure 3.5

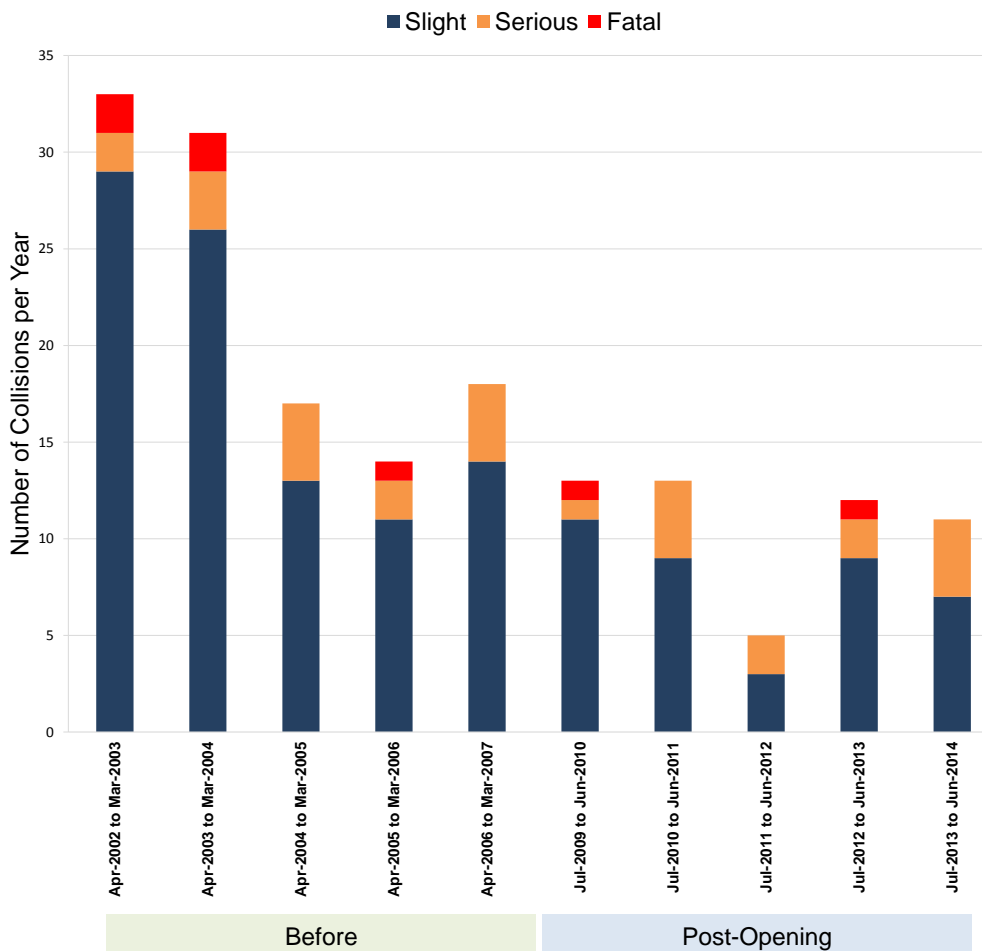
**Table 3.3 Number of Collisions by Severity on the Scheme's Key Links**

Time Period	Date		Number of Collisions				Average Annual				Severity Index
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	All	
Pre-Scheme	Apr 2002	Mar 2003	2	2	29	33	1.0	3.0	18.6	22.6	18%
	Apr 2003	Mar 2004	2	3	26	31					
	Apr 2004	Mar 2005	0	4	13	17					
	Apr 2005	Mar 2006	1	2	11	14					
	Apr 2006	Mar 2007	0	4	14	18					
Pre-Scheme Counterfactual										16.1	
Pre-scheme excluding W-W <sup>1</sup>	Aug 2005	Mar 2007	1	5	20	26	0.6	3.0	12.0	15.6	23%
Pre-Scheme following completion of Wetherby-Walshford scheme counterfactual <sup>2</sup>										11.1	
Construction Period	Apr 2007	Mar 2008	1	0	24	25	0.9	0.4	20.5	21.8	6%
	Apr 2008	Mar 2009	1	1	14	16					
	Apr 2009	Jun 2009	0	0	8	8					
Post-Opening	Jul 2009	Jun 2010	1	1	11	13	0.4	2.6	7.8	10.8	28%
	Jul 2010	Jun 2011	0	4	9	13					
	Jul 2011	Jun 2012	0	2	3	5					
	Jul 2012	Jun 2013	1	2	9	12					
	Jul 2013	Jun 2014	0	4	7	11					

<sup>1</sup> Covers the period after the completion of the Wetherby – Walshford scheme and prior to the start of construction of the Bramham – Wetherby scheme.

<sup>2</sup> The pre-scheme excluding W-W period counterfactual is based on the change in collisions on all roads between 2006 and 2012, using the methodology discussed in Section 3.13.

**Figure 3.3 Number of Collisions by Severity on the Key Links**



3.24. From Table 3.3 and Figure 3.3 it can be seen that:

- The average annual number of collisions has fallen by 52% between the pre- and post-scheme periods, a saving of 12 PICs per annum. This reduction is greater than the 28% reduction in the wider COBA model area, suggesting that the scheme has improved safety on the A1(M). This result is statistically significant.
- Fatal collisions have reduced by 60%, greater than serious (13%) and slight (58%) collisions.
- When taking into account the background collision reduction, there is a 33% reduction in collisions with the scheme, an annual average saving of 5 PICs. This result is statistically significant and therefore we can conclude that the change in collisions is not a result of chance alone and therefore the scheme has had a direct impact on PICs on the key links.
- Comparing the post-opening and pre-scheme excluding W-W periods, factoring in the background collision reduction, the collision reduction falls to 0.3 PICs.
- Whilst there has been a reduction in fatal collisions of 60%, the severity index in the post-scheme period has increased. This is as a result of the annual average number of slight collisions reducing by 58%, a greater extent than slight collisions (13%). The change in KSIs is not statistically significant.

### Casualties – Key Links

3.25. As with the study area, casualties resulting from collisions occurring along the key links have also been analysed. The results are presented in Table 3.4.

**Table 3.4 Number of Casualties by Severity on the Key Links**

Time Period	Date		Number of Casualties				Average Annual Casualties	Severity Index
	From	To	Fatal	Serious	Slight	All		
Pre-Scheme	Apr 2002	Mar 2003	2	4	49	55	39.4	12%
	Apr 2003	Mar 2004	3	3	57	63		
	Apr 2004	Mar 2005	0	4	25	29		
	Apr 2005	Mar 2006	1	2	18	21		
	Apr 2006	Mar 2007	0	4	25	29		
Pre-scheme excluding W-W <sup>1</sup>	Aug 2005	Mar 2007	1	5	36	42	25.2	14%
Construction Period	Apr 2007	Mar 2008	1	0	39	40	34.7	4%
	Apr 2008	Mar 2009	1	1	24	26		
	Apr 2009	Jun 2009	0	0	12	12		
Post-Opening	Jul 2009	Jun 2010	1	2	18	21	16.2	23%
	Jul 2010	Jun 2011	0	5	13	18		
	Jul 2011	Jun 2012	0	2	9	11		
	Jul 2012	Jun 2013	1	2	14	17		
	Jul 2013	Jun 2014	0	6	8	14		

3.26. Table 3.4 shows that the average annual number of casualties has fallen from 39 in the pre-scheme period to 16 post-scheme opening, a reduction of 59%, exceeding the 33% reduction in the COBA model area. This is further evidence to suggest that the scheme has improved safety on the A1(M).

## NMU Collisions

3.27. Table 3.5 shows the pre- and post-scheme opening pedestrian casualty numbers by year for the key links (which includes the LAR), whilst Table 3.6 presents the same data for cyclist casualties. Figure 3.4 maps the location of these casualties. From these results, it can be seen that:

- There have been no pedestrian casualties on the scheme's key links since opening, a saving of 0.6 casualties per annum.
- In the pre-scheme period, there were no casualties on the scheme's key links involving cyclists. In the post-opening period two casualties occurred, one classified as serious and the other as slight, resulting in an annual average increase in cyclist casualties of 0.4.

3.28. The serious post-scheme cyclist casualty occurred on the A168 LAR at the junction with Rowland Meyrick Way and involved the driver of a vehicle failing to look properly and colliding with a cyclist who was wearing dark clothing at night.

3.29. The slight post-scheme cyclist casualty occurred on the A168 LAR at the junction with the A58 and involved the driver of a vehicle failing to look properly and colliding with a cyclist.

3.30. Within the key links area, no collisions involving an equestrian occurred in the pre- or post-scheme periods.

<sup>1</sup> Covers the period after the completion of the Wetherby – Walshford scheme and prior to the start of construction of the Bramham – Wetherby scheme.

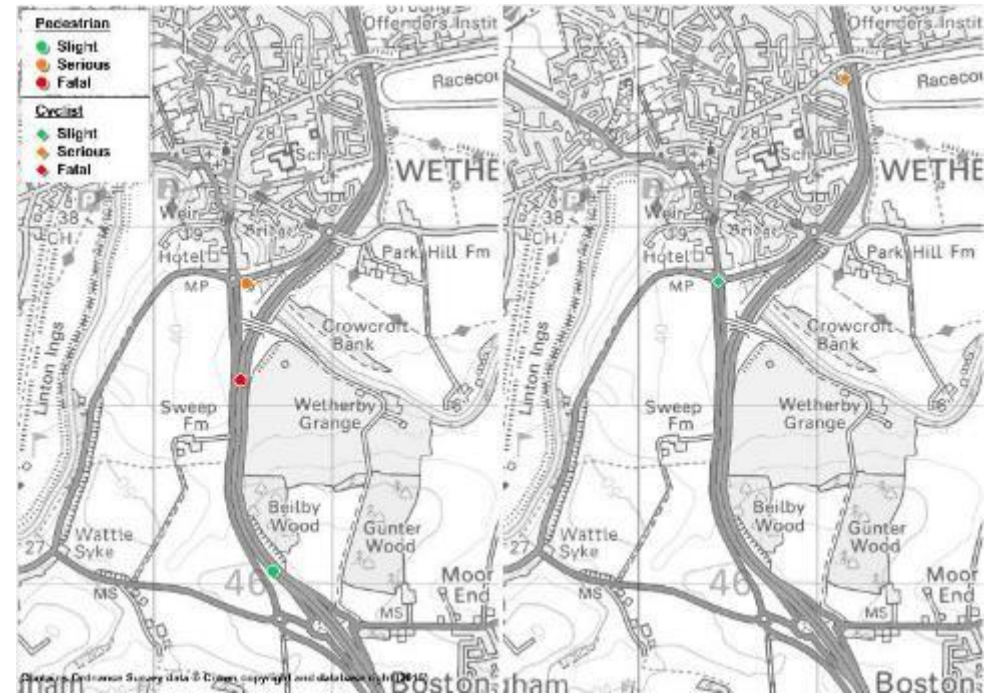
**Table 3.5 Pedestrian Casualties on the Key Links**

Time Period	Date		Pedestrian				Annual Average
			Number of Casualties				
	From	To	Fatal	Serious	Slight	All	
Pre-Scheme	Apr-02	Mar-03	0	0	1	1	0.6
	Apr-03	Mar-04	1	0	0	1	
	Apr-04	Mar-05	0	1	0	1	
	Apr-05	Mar-06	0	0	0	0	
	Apr-06	Mar-07	0	0	0	0	
Post-Opening	Jul-09	Jun-10	0	0	0	0	0.0
	Jul-10	Jun-11	0	0	0	0	
	Jul-11	Jun-12	0	0	0	0	
	Jul-12	Jun-13	0	0	0	0	
	Jul-13	Jun-14	0	0	0	0	

**Table 3.6 Cyclist Casualties on the Key Links**

Time Period	Date		Cyclist				Annual Average
			Number of Casualties				
	From	To	Fatal	Serious	Slight	All	
Pre-Scheme	Apr-02	Mar-03	0	0	0	0	0.0
	Apr-03	Mar-04	0	0	0	0	
	Apr-04	Mar-05	0	0	0	0	
	Apr-05	Mar-06	0	0	0	0	
	Apr-06	Mar-07	0	0	0	0	
Post-Opening	Jul-09	Jun-10	0	0	0	0	0.4
	Jul-10	Jun-11	0	1	0	1	
	Jul-11	Jun-12	0	0	0	0	
	Jul-12	Jun-13	0	0	0	0	
	Jul-13	Jun-14	0	0	1	1	

**Figure 3.4 NMU Casualties on the Key Links: Pre- (Left) and Post- (Right) Scheme Opening**





## Collision Rates

- 3.31. The number of collisions along a length of road together with its AADT can be used to calculate a collision rate (calculated as number of collisions per million vehicle kilometres). By looking at the rate it is possible to identify the impact of the roads of interest whilst ignoring the impact of the change in traffic volumes.
- 3.32. Table 3.7 presents observed collision rates on the scheme's key links. The lack of a COBA model prevents a comparison of these observed rates with those forecast at the appraisal stage.

**Table 3.7 Collision Rates on the Key Links**

Observed		
Collision rate on key links before (PIC/mvkm)	d	0.071
Collision rate on key links after	e	0.034
Unadjusted net change	d - e	0.037
Index of change of collision rate on All A Roads <sup>1</sup> 2004 - 2012	f	0.729
Collision rate on key links before - adjusted by national reduction on all A roads to give counterfactual	g=d*f	0.051
Adjusted net saving (PIC/mvkm)	h=g-e	0.017 (34%)

- 3.33. From Table 3.7 it can be seen that following scheme opening the collision rate has decreased by 0.017 PIC/mvkm (34%) when compared to the pre-scheme counterfactual rate.

## Collision Locations

- 3.34. The locations of PICs on the scheme's key links in the pre- and post-scheme periods is shown in Figure 3.5. Appendix C presents location maps for collisions in the pre- and post-scheme periods across the whole COBA model area.
- 3.35. This shows that prior to scheme completion collisions were spread across the key links, with a greater concentration occurring around the now A1(M) Junction 45 and to the section of route immediately south and east of Wetherby.
- 3.36. Following scheme completion, collisions are consistently spread across the links. Collisions continue to occur in the proximity of Junction 45, though this is not unexpected for a junction. Examination of the records for collisions occurring at this location on the A1(M) and the LAR (including Grange Moor and Wattle Syke Roundabouts) does not suggest recurring collision causation linked to road design.
- 3.37. Although not shown to be a cause of collisions, faded road markings were noted on the site visit, and are considered further in the Traveller Stress section of this report.

<sup>1</sup> If the scheme had not been built, the key links would have remained an A road, therefore the counterfactual assessment uses the change in collision rates for this road type.

Figure 3.5 Collision Locations on the Key Links: Pre- (Left) and Post- (Right) Scheme Opening



## Road Safety Audit Findings

- 3.38. A Road Safety Audit (RSA) Stage 4a was undertaken in 2011 for the A1(M). No concerns about the locations or causation of PICs on the A1(M) were raised.
- 3.39. A RSA Stage 4 (a – 12 months after opening and b – 36 months after opening) was undertaken in 2012 for the LAR. The audit noted that there had been previous concerns about collisions occurring on the north off-slip at Junction 45. These concerns led to the off-slip being signalised at the circulatory, as shown in Figure 3.6. The audit raised no concerns about collisions locations or causation on the LAR.

**Figure 3.6 A1(M) Junction 45 Northbound Exit Off-Slip**



- 3.40. Signals were also installed following scheme completion on the LAR at the junction of Paradise Way for Bramham Park (south of Bramham), but it is unknown if they were installed as the result of a RSA. The signals, shown in Figure 3.7, were installed to slow vehicles down on the approach to the junction.

**Figure 3.7 Junction of Paradise Way for Bramham Park on the LAR**



## Fatalities and Weighted Injuries

- 3.41. The collision rate discussed above does not take into account the severity of collisions. To analyse this we now present the Fatalities and Weighted Injuries (FWI) metric which is a combined measure of casualties based on the numbers of fatal, serious and slight casualties. The FWI for the five years before and five years after period is shown in Table 3.8. To take into account changes in traffic and for comparison with other schemes, we also present the

FWI rate per billion vehicle kilometres (bvkm). It should be noted that these figures do not include any adjustment for the changes in the background reduction in collisions/casualties.

**Table 3.8 FWI on the Key Links**

Period	FWI/collision	FWI/year	FWI/bvkm
Before	0.084	1.89	6.3
After	0.080	0.86	2.7

3.42. From Table 3.8 it can be seen that each of the FWI metrics have reduced following scheme opening, indicating that the seriousness of collisions has reduced.

### Forecast vs. Observed Collision Savings

3.43. This section compares the number of observed collisions with those forecast in the pessimistic case COBA model. A comparison of the forecast and observed change in PICs on the scheme's key links has not been possible due to the lack of a COBA diagram for this scheme.

#### COBA Model Area

3.44. A comparison of the COBA forecast and observed collisions for is presented in Table 3.9, using five years of pre-scheme and five years of post-scheme data.

**Table 3.9 Comparison of Opening Year Forecast and Annual Average Observed Collisions**

<b>COBA Area Pessimistic Case Forecast (Opening Year Forecast)</b>	Do- Minimum (without scheme)	143
	Do-Something (with scheme)	127
	Saving	16
	% Change	12%
<b>COBA Area Annual Average Observed Collisions</b>	Do-Minimum (before opening)	140
	Counterfactual Do-Minimum (before opening)	98
	Do-Something (after opening)	101
	Saving	-2
	% Change	-1%

3.45. Table 3.9 shows that the COBA model forecast a reduction of 16 PICs in the opening year, a decrease of 12% from the DM scenario. From the observed collisions, it can be seen that when taking into account the counterfactual change, collisions have increased in the post-opening period by an average of 2 PICs, counter to the forecast.

3.46. In examining the actual number of forecast and observed collisions, it can be seen that the COBA forecast model was accurate for the DM pre-scheme period, however the forecast savings have not occurred.

A similar comparison of the COBA forecast and observed collisions when excluding the W-W period from the pre-scheme observed collision numbers results in similar findings, as shown in Table 3.10.

**Table 3.10 Comparison of Opening Year Forecast and Observed Collisions excluding W-W period**

<b>COBA Area Pessimistic Case Forecast (Opening Year Forecast)</b>	Do- Minimum (without scheme)	143
	Do-Something (with scheme)	127
	Saving	16
	% Change	12%
<b>COBA Area Observed</b>	Do-Minimum (before opening)	112
	Counterfactual Do-Minimum (before opening)	86
	Do-Something (after opening)	101
	Saving	-14
	% Change	-13%

## Personal Security

3.47. The aim of this sub-objective is to reflect both changes in security and the likely number of users affected. In terms of roads, security includes the perception of risk from personal injury, damage to or theft of vehicles, and theft of property for individuals or from vehicles.

- On the road itself (e.g. being attacked whilst broken down)
- In service areas, car parks, and so on (e.g. vehicle damage while parked at a service station, being attacked while walking to a parked car)
- At junctions (e.g. smash and grab incidents while queuing at lights)

3.48. The primary indicators for roads include surveillance, landscaping, lighting and visibility, emergency call facilities and pedestrian and cyclist facilities.

### Forecast

3.49. The appraisal for the security objective for this scheme stated that emergency telephones would be installed along the scheme extent but there would be no other new surveillance as part of the scheme. The AST assessment was that the emergency telephones would provide a slight benefit.

### Observed

3.50. A site visit confirmed the presence of emergency phones along the A1(M). Such phones are considered to provide a slight security benefit for road users in emergency situations on the hard shoulder.

## Key Points

### Collisions

- Taking into account the background reduction in collisions over time on the key links, there has been a 33% reduction in PICs across the scheme between the pre- and post-scheme periods, a saving of 5 PICs.
- This result is statistically significant, suggesting the collisions savings are a result of the scheme.
- Across the scheme area, fatal collisions have fallen by 60%. However, the severity index has increased as a result of the number of slight collisions falling by a greater rather than KSIs.
- Following scheme opening, the collision rate across the scheme area has decreased by 0.02 PICs/mvkm, a 34% reduction.
- The change in collision numbers across the wider COBA model area show a slight increase but they are not statistically significant.

### Forecast vs. Observed Collision Savings

- Across the COBA model area, collisions have increased 1% compared to a forecast reduction of 12%.
- Analysis of the forecast and observed change in collisions in the scheme area only could not be undertaken due to the lack of a COBA diagram.

### Location of Collisions

- Analysis of collision locations shows no unusual trend. Collisions are consistently spread across the scheme area, with a higher number occurring at junctions, as expected.

### Personal Security

- Emergency telephones have been provided along the A1(M) scheme section, providing a slight personal security benefit for road users in an emergency.

## 4. Economy

### Introduction

- 4.1. The purpose of this chapter is to evaluate how the scheme is performing against the economy objective, which consists of the following sub-objectives:
- Achieve good value for money in relation to impacts on public accounts.
  - Improve Transport Economic Efficiency (TEE) for business users, transport providers and consumer users.
  - Improve journey reliability.
  - Provide beneficial wider economic impacts.
- 4.2. The scheme's economic impacts were forecast for a 60 year period and stated in 2002 prices discounted to 2002. The following models were used in the scheme appraisal:
- Transport Users Benefit Appraisal (TUBA) – to model the TEE impacts of the scheme.
  - COBA – to model the impacts of the scheme on collisions.
  - Queues and Delays at Roadworks (QUADRO) – to model the construction impacts of the scheme.
- 4.3. This section provides a comparison between the outturn costs and benefits and the forecast economic impacts, as well as considering the scheme's wider economic impacts, using results presented in Chapters 2 and 3.

### Sources

- 4.4. Forecasts of the economic impacts were obtained from:
- A1 Bramham to Wetherby Upgrading Scheme Economic Assessment Report (2005). Cost Increase Report (2005)
  - Stage 5 works commencement estimate of costs (2007)
  - TUBA (2005) and COBA (2005) models used as the basis of the EAR
  - AST (2006)
- 4.5. Modelling of the benefits covered three scenarios covering the 'Optimistic Case' (high growth) 'Pessimistic Case' (low growth) and central 'Reference Case'. Results presented in Table 2.8 revealed that observed traffic flows at the FYA stage are closer to the pessimistic case forecasts. Therefore, analysis in this chapter uses the pessimistic case economic forecasts as the best guide for the long term benefits of the scheme.
- 4.6. The updated economic assessment of November 2005 took into account the revised modelling following revisions to some aspects of the local road network at Wetherby which had been prompted by Order exhibitions in July and September 2005.

### Scheme Benefits

- 4.7. A summary of the forecast monetary benefit of the scheme are presented in Table 4.1

**Table 4.1 Summary of Forecast Scheme Benefits**

Benefit Stream	Forecast Benefit	Evaluation	
		Evaluate?	Evaluation methodology
Journey Times	£264.9m	✓	Observed vehicle hours saved per annum based on saving per vehicle approach using pre- and post-scheme vehicle speed data.
Vehicle Operating Costs (VOC)	-£26.2m	✓	Ratio between EAR forecast and POPE re-forecast changes in indirect tax applied to the monetary forecast VOC in order to calculate a proxy outturn reforecast value of VOC
Safety	£40.7m	✓	Monetised using PAR method based on pre- and post-scheme collision data.
TEE impacts during construction and maintenance	-£1.03m	✗	Not known and this stage and not within the remit of POPE.
<b>Total</b>	<b>£278.37m</b>		

## Transport Economic Efficiency

### Journey Time Benefits

- 4.8. Forecast journey time monetary benefits were set out in the scheme's TEE Table, as presented in the scheme's Economic Assessment Report (2005, Revision E), with a pessimistic forecast of £264.9m.
- 4.9. The POPE method of evaluating the economic value of benefits deriving from journey time savings is typically based upon comparing forecast and observed vehicle hour savings using journey time data on the key links. However, as journey time data is not available for this scheme (as discussed in section 2.51), for the purposes of this analysis, proxy journey times for A1(M) J44-46 have been determined using the speed data presented in Table 2.10.
- 4.10. In order to establish the proportion of vehicle hours saved in the post-opening period compared to that forecast, it was necessary to calculate the observed vehicle hours saved per annum based on the FYA speeds and traffic flows. This was done using a 'saving per vehicle' approach, with the rule of half not needing to be applied for this scheme as traffic flows fell between the pre- and post-scheme periods.
- 4.11. The resulting re-forecast vehicle hour saving was monetised using the Project Appraisal Report (PAR) approach, following the methodology set out below:
- Monetising the change in vehicle hour savings using values of time set out in PAR Guidance Note 5.
  - Applying a capitalisation factor for a 60 year period based on expected traffic growth.
  - Apply a discount factor to 2002.
- 4.12. The scheme's forecast and re-forecast journey time monetary benefits are presented in Table 4.2. Two re-forecast results are presented, one using a 0% growth capitalisation factor over the 60 year appraisal period and the other using a NRTF growth capitalisation over the same period.



**Table 4.2 Annual Journey Time Saving and Re-Forecast Sixty Year Monetary Benefit**

		<b>60 Year Monetary Benefit based on Value of Time saved</b>
<b>Re-Forecast based on FYA Outturn Impacts on the A1(M) only</b>	<b>TUBA Forecast (pessimistic case)</b>	£264.9m
	<b>0% growth capitalisation factor</b>	£42.8m
	<b>NRTF growth capitalisation factor</b>	£54.0m

Note: 2002 market prices discounted to 2002.

- 4.13. The results presented in Table 4.2 show that the re-forecast 60 year monetary journey time benefit for the scheme range from £42.8-54.0m, dependent on the assumed growth capitalisation factor. This level of benefit is no more than 20% of that originally forecast.
- 4.14. The difference between the appraisal forecast and the outturn re-forecast can be by the lower than forecast traffic flows on the A1(M) and the difference between the forecast and outturn changes in journey times.
- 4.15. As macro-economic conditions improve it is expected that traffic flows along the A1(M) will increase in line with DfT forecast traffic growth. As such, the re-forecast NRTF growth capitalisation factor figure of £54.0m is taken forward as the scheme's monetary journey time benefit.

### Vehicle Operating Costs

- 4.16. WebTAG guidance states that the use of the road system by private cars and lorries gives rise to operating costs for the user. These are fuel and non-fuel costs, where fuel is the majority net cost impact of conventional highways schemes. In the case of this scheme, the forecast changes in Vehicle Operating Costs (VOC) are large and have a considerable impact on the overall TEE benefits. For this reason, it has been necessary to evaluate the impact.
- 4.17. As with journey time benefits, changes in the VOC impacts were forecast by the TUBA model, but this cannot be re-run to evaluate the impact. Given that VOC is largely comprised of fuel costs, the alternative approach adopted here is based on calculating the ratio between the AST forecast and POPE re-forecast changes in indirect tax (as presented in Table 4.7). This ratio is applied to the monetary forecast VOC in order to calculate a proxy outturn reforecast value of VOC. The results of this calculation are shown in Table 4.3.

**Table 4.3 Summary of Vehicle Operating Costs Benefit (60 years)**

	<b>Forecast</b>	<b>Rerecast</b>
<b>Change in Vehicle Operating Cost (VOC)</b>	-£26.2m	-£7.2m

Note: 2002 market prices discounted to 2002

- 4.18. The results in Table 4.3 demonstrate that the forecast VOC dis-benefit is less than forecast. This can be explained by observed flows at FYA being lower than forecast and less change in speeds.

### Collision Benefits

- 4.19. The AST states that the scheme's monetary impact on collisions across the COBA area was forecast to be in the range of £36.4m to £46.3m. This broadly aligns with forecasts provided in the EAR for pessimistic (£40.7m), optimistic (£45.3m) and a central reference cases (£43.0m). This pessimistic case forecast has been used in this evaluation as forecast traffic flows are more in line with the pessimistic case (as presented in Table 2.9).
- 4.20. The evaluation of the outturn safety benefits is based on the forecast 60 year safety benefits and the comparison between the forecast and observed saving of collisions in the opening year. Typical POPE studies undertake this analysis for the COBA modelled area.

- 4.21. However, the findings presented in Chapter 3 revealed that the change in collisions across the COBA area were not statistically significant. Therefore, the change in collisions within the key links area has been monetised instead (taking into account the background reduction), as this change was found to be statistically significant.
- 4.22. Without a COBA model diagram it not possible to extract from the COBA model the forecast change in collisions on the key links for use in the evaluation. Therefore, the PAR method of monetising the change in collisions numbers on the key links are has been used, using the methodology detailed below:
- Monetising the change in collisions in the key links area using the PAR method with values of collisions saved based on the road type
  - Applying a capitalisation factor for a 60 year period based on expected traffic growth.
  - Apply a discount factor for the 60 year period.
- 4.23. This calculation is set out in Table 4.4.

**Table 4.4 Economic Evaluation of Safety Benefits**

Average Annual Collision Saving in Post- Opening Period (based on adjusted counterfactual)	(a)	5.3
Value of collision saving	(b)	£80,065
Capitalisation for 60 years	(c)	54.926
Discount factor	(d)	0.786
<b>Outturn 60-year benefit</b>	<b>(a)*(b)*(c)*(d)</b>	<b>£18.2m</b>

Note: 2002 market prices discounted to 2002

- 4.24. Table 4.4 shows that outturn reforecast safety benefits total £18.2m. This is lower than the £40.7m pessimistic case forecast benefit, though it is based on the key links only, rather than the wider COBA model area.

### Construction Delay and Maintenance

- 4.25. The DfT's QUADRO program was used to estimate the impact of the proposed scheme on road users in terms of journey times and operating costs during the construction phase and future periods of future maintenance. The pessimistic case forecast was for a £1.03m disbenefit to users over 60 years.
- 4.26. It is not possible to undertake an evaluation of the monetary impact of construction and future maintenance as this would have required traffic surveys to have been undertaken during periods of roadworks and is outside the scope of POPE.
- 4.27. It is therefore considered that the construction and future maintenance disbenefits forecast are valid and that the monetary impact of construction and maintenance will not be taken into account when calculating the scheme's Present Value Benefits (PVB).

### Present Value Benefits

- 4.28. A comparison of all forecast and outturn benefits is presented in Table 4.5.

**Table 4.5 Summary of Scheme Present Value Benefits**

Benefit	Pessimistic Forecast	Re-Forecast based on FYA Outturn Impacts
Journey Time Benefits	£264.9m	£54.0m
Vehicle Operating Costs	-£26.2m	-£7.2m
Collision Benefits	£40.7m	£18.2m
<b>Total PVB</b>	<b>£279.4m</b>	<b>£65.0m</b>

Note: 2002 market prices discounted to 2002.

- 4.29. The results presented in Table 4.5 show that the re-forecast PVB for the scheme is £65m, 77% lower than forecasted at the appraisal stage. This is driven by both journey time and collision benefits being lower than forecast.

## Scheme Costs

### Investment Costs

- 4.30. This section compares the forecast cost of the scheme with the outturn cost. Scheme costs include the cost to Highways England of constructing the scheme and purchasing the land. Forecast costs are taken from the most recent pre-scheme information available (April 2007).
- 4.31. Outturn investment costs have been obtained from the Highways England Regional Finance Manager and are presented along with the forecast cost in Table 4.6.
- 4.32. For consistency with the POPE assessment of other schemes and to compare between forecast and outturn, these figures have been converted to a 2002 price base.

**Table 4.6 Summary of Investment Costs**

Forecast Cost	Outturn Cost	Difference
£56.2m	£61.0m	£4.8m

- 4.33. Table 4.6 shows the outturn cost for the scheme is £61m, 9% higher than forecast.

### Indirect Taxation

- 4.34. Indirect tax revenue impact is the expected change in indirect tax revenue to the Government due to changes in the transport sector as a result of the scheme over the appraisal period. At the appraisal stage, the impact of the scheme on indirect taxation was calculated as a negative cost using TUBA.
- 4.35. For this study, the indirect tax impact is derived primarily from the monetisation of the forecast change in fuel consumption over the sixty years period. A scheme may result in changed fuel consumption due to:
- Changes in speeds resulting in greater or lesser fuel efficiency for the same trips, or
  - Changes in distance travelled, or
  - Increased road use through induced traffic or the reduction of trip suppression
- 4.36. The methodology adopted to evaluate the indirect tax impact of the scheme has been based on estimating the change in fuel consumption as a result of the scheme opening. This involves comparing the forecast and observed net change in vehicle flows, speeds and classes for the DM and DS scenarios in order to calculate fuel consumption in the opening year. The ratio method is then used to reforecast the outturn monetary impact.
- 4.37. Table 4.7 presents a summary of the indirect taxation impact as forecast at the appraisal stage in the EAR as an impact on the cost and re-forecast using observed data.

**Table 4.7 Summary of Indirect Taxation Impact (60 years)**

	Forecast	Re-Forecast based on FYA Outturn Impacts
Change in Indirect Taxation	-£20.8m	-£5.7m

Note: 2002 market prices discounted to 2002

- 4.38. The results presented in Table 4.7 show that the scheme has a re-forecast outturn impact on indirect taxation of £5.7m, 73% lower than forecast. The decrease on the original forecast is the result of significantly lower than forecast vehicle flows on the A1(M) J44-46 and the LAR.
- 4.39. A difference in forecast and outturn journey times may also be contributing to the difference, though without accurate observed journey times this cannot be stated definitively.
- 4.40. It is acknowledged that the methodology applied is only an approximate estimate of indirect tax; however it is a useful indicator of the scheme's impact on this economic element.

## Present Value Costs

- 4.41. The Present Value Cost (PVC) is calculated to allow for a valid comparison with benefits. Values in differing years are converted to a standard base year through the process of discounting, as defined by the Treasury Green Book. A comparison of all forecast and outturn costs is presented in Table 4.8<sup>1</sup>.

**Table 4.8 Summary of Scheme Present Value Costs**

Cost	Forecast	Re-Forecast based on FYA Outturn Impacts
Scheme Costs	£56.2m	£61.6m
Indirect Taxation to public accounts	-£20.8m	-£5.7m
Total PVC	£35.4m	£55.9m

Note: 2002 market prices discounted to 2002.

## Benefit Cost Ratio

- 4.42. The Benefit Cost Ratio (BCR) is used as an indicator of the overall value for money of the scheme. It is the comparison of the benefits (PVB) and costs (PVC) expressed in terms of present value.
- 4.43. Projects with a BCR greater than 1 have greater benefits than costs; hence they have positive net benefits. The higher the ratio, the greater the benefits relative to the costs. It is to be noted that the BCR is insensitive to the magnitude of net benefits and therefore may favour projects with small costs and benefits over those with higher net benefits.
- 4.44. At the time of scheme appraisal, Treasury guidance was to include indirect tax as a cost. However, the most recent guidance on indirect tax impacts is to include these as a benefit, rather than a reduction in cost. This means that when a scheme leads to increase fuel consumption and hence increase tax revenue, the PVB is increased rather than the PVC being decreased.

<sup>1</sup> At the time of appraisal, Treasury guidance was to include indirect tax as a cost, hence its inclusion here.

**Table 4.9 Forecast vs. Outturn Re-forecast Benefit Cost Ratio**

		COBA Forecast	Re-Forecast based on FYA Outturn Impacts
Indirect Tax as a Cost	PVB	£279.4m	£65m
	PVC	£35.4m	£55.9m
	BCR	7.9	1.2
Indirect Tax as a Benefit	PVB	£258.6m	£70.7m
	PVC	£56.2m	£61.6m
	BCR	4.6	1.1

Note: 2002 market prices discounted to 2002.

- 4.45. It can be seen from Table 4.9 that the outturn BCR is lower than forecast. This is largely the result of journey time and safety benefits being lower than forecast.
- 4.46. At the OYA stage, the scheme was found to have an outturn BCR of 5.4. The reason for the change in BCR by the FYA stage is a significant reduction in journey time savings between the OYA and FYA periods, as well as lower safety benefits.
- 4.47. It should be noted that the BCR ignores non-monetised impacts. Under the DfT's objectives for Transport, the impacts on wider objectives must be assessed but are not monetised. The evaluations of the wider economic impacts, environmental, accessibility and integration objectives are covered in the following sections of the report.

## Wider Economic Impact

- 4.48. It is inherently difficult to isolate wider economic impacts which can be attributed to highway schemes, particularly those that do not involved entirely new infrastructure. However, it is important to understand the socio-economic context in which the scheme opened and how the upgrading of the route may have assisted local and regional socio-economic aspirations.

### Forecast

- 4.49. The AST for this sub-objective stated that the 'scheme is not in a designated regeneration area, nor are there any significant developments dependent on the upgrading of the A1'. As such no impact was forecast.

### Evaluation

- 4.50. Discussion with LCC during the OYA evaluation confirmed that no specific developments were dependent on the scheme. This could not be re-confirmed at the FYA stage though this conclusion is not expected to have changed.
- 4.51. Desktop analysis, supported by a site visit, found no indication that the scheme has direct impacts on the local economy. However, the improved connectivity provided by the upgraded route is likely to have had indirect benefits for the local economy.
- 4.52. Due to no quantitative data to support any other conclusion, the AST assessment of 'neutral' is upheld.

## Key Points

### Present Value Benefits

- The outturn journey time benefit resulting from the scheme for users of the A1(M) J44-46 total £54.0m, 80% lower than forecast.
- Safety benefits resulting from the scheme were forecast to be £40.7m, however the outturn benefit is 55% below this at £18.2m.
- Vehicle Operating Cost dis-benefits were forecast as -£26.2 million. Applying the Indirect Tax forecast and observed ratio method, the observed VOC dis-benefits are -£7.2 million.
- Overall, the outturn PVB for the scheme totals £65.0m, 77% lower than that forecasted at the appraisal stage (£279.4m).

### Present Value Costs

- Outturn investment costs totalled £61.0m, 9% higher than the forecast of £56.2m.
- The scheme was forecast to have an indirect tax impact of -£20.8m, however the outturn re-forecast impact is 73% lower than this, at £5.7m.
- Overall, the outturn PVC for the scheme totals £55.9m, against a forecast of £35.4m.

### Benefit Cost Ratio

- Taking indirect tax as a benefit to the Treasury, the scheme achieves a BCR of 1.1. This is regarded as low value for money by the DfT. This is primarily due to traffic flows and journey time savings being lower than forecast.

### Wider Economic Impacts

- There is no indication that the scheme has had a direct impact on the local economy. However, the improved connectivity provided by the upgraded route is likely to have had indirect benefits for the local economy.

## 5. Environment

### Introduction

- 5.1. This section documents the evaluation of the environmental sub-objectives, focussing on those aspects not fully evaluated at the One Year After (OYA) stage or where suggestions were made for further study. A summary of the OYA recommendations is presented below.

#### Summary of OYA Evaluation Recommendations

The OYA evaluation identified a number of areas where further analysis was required at the FYA stage to confirm the longer term impacts of the scheme on the surrounding environment, as summarised below:

**Noise** – Traffic growth may begin to increase in the period up to 2024, and it is suggested that noise be reconsidered at the FYA stage.

**Air Quality** – As trends in air quality need to be established over relatively long periods of time, it is recommended that air quality could be reconsidered at the FYA stage.

**Landscape** – Species composition of replacement planting may be reviewed at the FYA stage and details regarding off site planting may also be available and considered at this time. The effectiveness of the planting measures with regard to the longer term objectives of screening and integration may also be reviewed as part of the FYA evaluation, along with the establishment of the new planting.

**Biodiversity** – The effectiveness of management regimes in relation to biodiversity should be considered as part of the FYA evaluation.

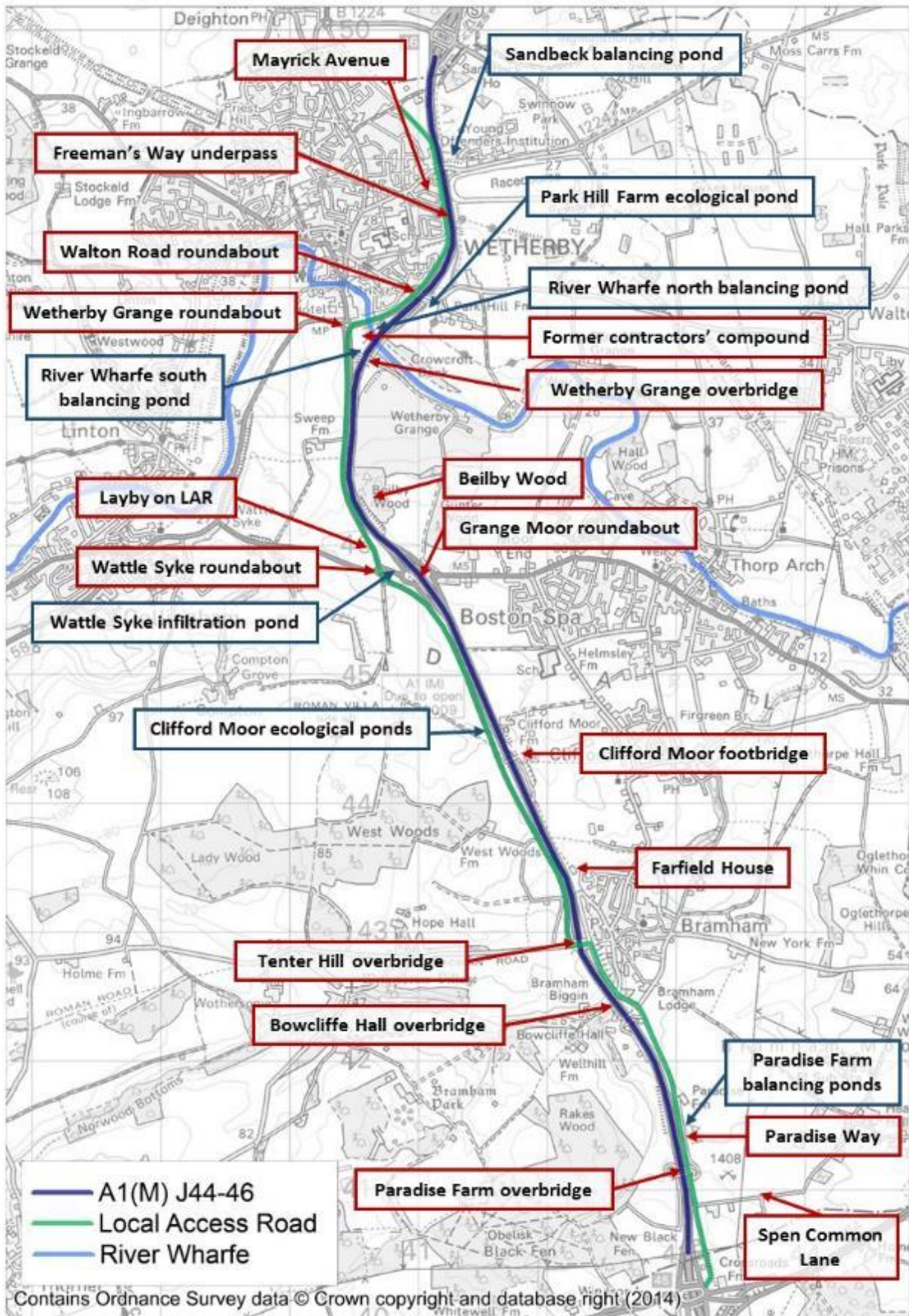
**Cultural Heritage** – The post-excavation report should be available and reviewed as part of the FYA evaluation.

**Physical Fitness** – There are many remedial details and issues outstanding with regard to NMU facilities; it is suggested that NMU facilities are evaluated more fully at FYA.

**Journey Ambience** – It is suggested that traveller views are considered again at FYA, when the effective establishment of planting will be clearer. Traveller stress should also be reviewed at this time.

- 5.2. A key location plan which identifies the locations of key sites mentioned in this chapter is shown in Figure 5.1.

Figure 5.1 Key Location Plan – Scheme locations referenced in Environment Chapter





- 5.3. The Environmental Statement (ES) stated that whilst the scheme area was not particularly environmentally sensitive, in that there were no international or national designated sites of interest, there are features and characteristics that needed to be considered and retained where possible. Principally, these were:
- The broad character of the area, which lies within the Southern Magnesian Limestone character area, reflected in the traditional use of local limestone as a building material in the local settlements.
  - Two Special Landscape Areas (SLA), centred on the parklands and woodlands of Bowcliffe Hall and Bramham Park in the south and Grange Park and the River Wharfe in the north.
  - Characteristic long range views across the open agricultural landscape.
  - Features of the built environment, including Bramham Park (a Grade 1 listed building) and the Conservation Area of Bramham.
  - The amenity of adjacent and nearby settlements and communities, including Bramham, Boston Spa, Clifford and Wetherby.
  - Potentially significant archaeological features, including the regionally important buried settlement of Wattle Syke at the Grange Moor junction.
  - The ecological features of the area, including the Magnesian limestone belt and River Wharfe (a locally designated Site of Interest for Nature Conservation), which support a varied flora and fauna including legally protected species and species of national nature conservation concern.
  - The River Wharfe, along with its tributaries, is classed as a main river by the Environment Agency.
- 5.4. These characteristics had constrained the development of design options for the scheme in order to provide a scheme that met transport and safety objectives while complying with HA (at the time of appraisal) environmental policy. The subsequent environmental objectives for the scheme, as stated in the ES, were to:
- Reduce congestion on the A1 by avoiding queues and delays and reduce driver stress by improving reliability of journey times.
  - Deliver an environmentally acceptable scheme that protects and enhances the built and natural environment, that minimises and mitigates any significant environmental impacts to an acceptable level.
  - Seek opportunities to reduce severance caused by the existing road and to improve access to local facilities and the wider transport network by producing a comprehensive strategy for local equestrian, pedestrian, disabled and cycle traffic including, where appropriate, adequate means of crossing the proposed route corridor for east-west movements based on the existing pattern of footpaths and bridleways.
  - Develop a scheme that will better or equal the AST sub-categories for the preferred route.
- 5.5. A Public Inquiry was held in 2006, as a result of which two minor design amendments were recommended:
- The Wetherby Grange Bridge was constructed off-line to the north of the existing Wetherby Grange Bridge, with associated slight amendments to the layout and location of the NMU route and a balancing pond.
  - The design of the Walton Road Bridge approach roads were changed in order to improve forward visibility whilst minimising loss of land from Park Hill Farm, to improve the access arrangements for Park Hill Farm, to reduce loss of land from Rose Dene Farm and maintain their existing access and to improve the NMU route so that users would not have to cross the Park Hill Farm access road.

- 5.6. In accordance with IAN 79/06, it was determined that a full EIA was not required as a result of these changes; it is therefore considered that there are no significant environmental effects associated with these design changes.
- 5.7. The following environmental sub-objectives were appraised in the ES and in the Appraisal Summary Table (AST) according to NATA guidance at that time (2006):
- Noise
  - Local air quality
  - Greenhouse gases
  - Heritage
  - Landscape/townscape
  - Biodiversity
  - Water environment
  - Physical fitness
  - Journey ambience
- 5.8. For each of these environmental sub-objectives, the evaluation in this section assesses the environmental impacts predicted in the scheme's AST and ES against those observed five years after opening.
- 5.9. In the context of the findings from the OYA evaluation and using new evidence collected five years after opening, this section presents:
- An evaluation of the ongoing effectiveness of the mitigation measures implemented as part of the scheme.
  - An updated summary of key impacts against all of the nine environment WebTAG sub-objectives, with particular focus on the assessment of sub-objectives where it was too early for conclusions to be drawn at the OYA evaluation stage.
  - Additional analysis relevant to close out issues/areas for further study identified at the OYA stage for consideration at the FYA stage.

## Methodology

- 5.10. This section focuses on those aspects not fully evaluated at OYA (or where at OYA, suggestions were made for further study), and also on any issues that have arisen since the OYA evaluation. Although the detail of the OYA evaluation is not repeated here, reference is made to the OYA evaluation where required and key points are incorporated into this FYA report to provide contextual understanding where appropriate; no new modelling or survey work has been undertaken for this FYA environmental evaluation.

## Data Collection

- 5.11. The following documents/data have been used for the FYA evaluation of the A1(M) Bramham to Wetherby scheme:
- Environmental Statement, Volumes I and II, July 2005
  - Non-Technical Summary, July 2005
  - Appraisal Summary Table, Revision 5c, December 2006
  - Environmental Report on Changes to Design at Wetherby Grange and Walton Road, December 2006
  - Highways Agency press releases, various dates between 2006 and 2008
  - Landscape and Ecological Design 'As Built' drawings (Revision O), April 2009

- Draft Handover Environmental Management Plan (dHEMP), March 2010<sup>1</sup>
- Bat Box Monitoring Report (Final Visit), October 2010
- Post Construction Non-Motorised User (NMU) Audit, November 2010
- OYA Post Opening Project Evaluation (POPE), September 2011

5.12. A full list of the background information requested and received to help with the compilation of this report is included in Appendix D.

## Site Visit

5.13. As part of the FYA evaluation, a site visit was undertaken in September 2014. This included a review of the physical aspects of the scheme and inspection from publicly accessible locations (e.g. footpaths, over bridges, subways).

5.14. Where possible, viewpoint locations noted in the landscape and visual assessment chapter of the ES were visited and photographs taken from the same locations to provide comparison with material produced for the ES and at OYA. These photographs can be found in Appendix E.

## Consultation

5.15. Statutory environmental organisations (Natural England, English Heritage and the Environment Agency), Leeds City Council, West Yorkshire Archaeology Advisory Service, West Yorkshire Ecology, Town/ Parish Councils (Wetherby/Harewood) and the British Horse Society were contacted as part of the FYA evaluation regarding their views on the impacts they perceive the scheme has had on the environment. The results of this consultations are presented in Table 5.1.

**Table 5.1 Summary of Environmental Consultation Responses**

Organisation	Field of Interest	Comments at OYA	Comments at FYA
<b>Natural England</b>	Biodiversity & Landscape	<p>Commented on:</p> <ul style="list-style-type: none"> <li>• Effects on the landscape features</li> <li>• Bat roosts</li> <li>• Impact on Sites of Special Scientific Interest (SSSI)</li> </ul> <p>Natural England has no information on any effects on badgers, otters, bats and reptile or amphibian species.</p>	Natural England is satisfied that the scheme has not had any significant impacts on Kirk Deighton SSSI/Special Area of Conservation (SAC), and that the impacts on protected species have been adequately mitigated.
<b>English Heritage</b>	Cultural Heritage	No response was received from English Heritage.	<p>Commented that the scheme had met expectations regarding its impact on the historic environment.</p> <p>Also commented that the non-designated below-ground resource was appropriately evaluated and that adequate mitigation was put in place.</p>

<sup>1</sup> It should be stressed that the HEMP made available for this report was draft only; whilst the information reported therein may be based on initial fact, its use is reasonably limited given its draft status.

Organisation	Field of Interest	Comments at OYA	Comments at FYA
<b>Environment Agency</b>	Water	The Environment Agency stated that after consultation with various departments within the organisation, they had no comments to make.	Commented that there was no evidence to suggest the scheme had any beneficial or detrimental effects on incident frequency or water quality and there was no discernible change in water quality which could be attributed to the scheme.  The Groundwater and Contaminated Land Team are unaware of any impacts on the groundwater water environment.
<b>Leeds City Council</b>	General	Commented on: <ul style="list-style-type: none"> <li>Planting, dry stone walls, visual impact of acoustic fences on the landscape</li> <li>Aspects of the bridleway/cycle tracks alongside the local access roads and NMU access across the motorway at various locations</li> </ul>	Commented on a range of issues.
<b>West Yorkshire Archaeology Advisory Service</b>	Cultural Heritage	Commented on mitigation measures for below ground archaeology and on the post-excavation process.	Commented that views remain generally as those expressed at OYA.
<b>West Yorkshire Ecology</b>	Biodiversity	Commented on: <ul style="list-style-type: none"> <li>Benefits of the newly-exposed limestone and management of grassland areas</li> <li>Badgers</li> </ul>	Commented on a range of issues.
<b>Town/Parish Councils</b>	General	Not contacted at OYA	Wetherby Town Council commented on a range of issues.  Harewood Parish Council did not respond to the invitation to provide feedback.
<b>British Horse Society</b>	Equestrian issues	Not contacted at OYA	Did not respond to the invitation to provide feedback.

- 5.16. The DBFO (Area) 33 have also been consulted with regard to animal mortality figures, but no information was forthcoming.

### Traffic Forecast Evaluation

- 5.17. Three of the environmental sub-objectives (noise, local air quality and greenhouse gases) are directly related to traffic flows. No new noise or air quality surveys are undertaken for POPE and an assumption is made that the level of traffic and the level of traffic noise and local air quality are related.

- 5.18. The ES outlined the need for the scheme and included data on the AADT for traffic flows stating that in 2002, the Bramham to Wetherby section of the A1 carried approximately 40,000 vehicles daily (AADT) in each direction. The ES also noted that this volume of traffic was above the normal flow range for a two lane dual carriageway, stating that further traffic growth was expected in subsequent years with or without the scheme. South of Wetherby (without the scheme), it was predicted that the AADT would be 70,000 in each direction by the design year (2023).
- 5.19. The OYA report noted that details of the traffic forecasts by road section were not presented in the ES, and so presented figures from the traffic forecasting report (which would have used the same underlying modelling as used in the ES). A similar approach has been taken for the FYA evaluation, and this data is presented in Table 5.2, with forecasts for 2014 being based on interpolated forecasts. The location of traffic data collection points is detailed in Chapter 2, where an explanation of the differences between OYA and FYA flows is also provided.

**Table 5.2 Forecast 2014 DS AADT Flows (Central Case) vs. Observed 2014 AADT Flows**

Location	Predicted AADT 2014 Central Case	Observed AADT 2014	% Diff. Forecast vs. Actual
<b>Upgraded A1(M)</b>			
J44-45 Bramham Crossroads (A64) to Grange Moor (A659)	109,780	88,800	-19%
J45-46 Grange Moor (A659) to Kirk Deighton (B1224)	91,300	75,200	-18%
<b>Local Access Roads parallel to A1(M)</b>			
Paradise Way, south of Bramham	9,780	3,600	-63%
Westwood Road, north-west of Bramham	7,120	3,000	-58%
A168 Boston road, north of A659	29,180	17,000	-42%
A168 Privas Way, south of Walton Road	17,940	10,100	-44%

## Noise

### Forecast

#### AST

- 5.20. The AST stated that the increase in population annoyed was mainly in Wetherby and along local roads, due to the reopening of the former A1 (closed under the Wetherby-Walshford scheme) as the LAR. The AST stated that 337 people were exposed to noise levels of 70 decibels (dB) or more and that such increases could not be mitigated due to the nature of the road, trade-offs with visual amenity (of same properties) and distance from the road. 230 properties in Bramham and 101 in Wetherby were expected to experience noise reductions due to the mitigation proposals.

#### Environmental Statement

- 5.21. The ES stated that although the scheme would have residual slight adverse effects for 757 properties in Wetherby and 62 properties in Bramham (due an increase in noise of between 1 and 5dB), the scheme would also provide beneficial effects for 92 properties in Wetherby and 216 properties in Bramham (due to reductions in noise of between 1 and 10dB).
- 5.22. The ES also noted that no properties in Bramham or Wetherby would experience an increase in airborne vibration, but that 11 properties in Bramham and 6 properties in Wetherby would experience a reduction.

## OYA

- 5.23. The OYA noise evaluation stated that mitigation measures appeared to have been implemented as expected, and that there had been no increase in traffic as a result of the scheme. Overall, the evaluation concluded that the noise climate was likely to be as expected at the OYA stage.

## FYA

### Consultation

- 5.24. Wetherby Town Council (WTC) commented that for those living in the north of Wetherby near the former A1 route (now the A168/LAR), the reduction in background traffic noise was beneficial and immediately noticeable on the day the upgraded A1(M) was opened.

### Evaluation

- 5.25. The OYA evaluation confirmed that low noise surfacing had been used throughout the scheme as expected, although it did not confirm the Road Surface Index (RSI) value of the installed surface. No high speed RSI values were made available for the FYA study and as such, any noise reduction properties of the installed surfacing remain unconfirmed.
- 5.26. The OYA evaluation also confirmed that bunds and noise barriers had been installed as expected, although it did not confirm the performance specification of the new noise barriers. No performance specification was made available for the FYA study and as such, any noise reduction properties of the new noise barriers remains unconfirmed.
- 5.27. An assumption is made by POPE methodology that noise levels will be as expected if observed traffic flows are within 25% more or 20% less than predicted.
- 5.28. As shown in Table 5.2, the observed AADT flows on the upgraded A1(M) for 2014 are 19% and 18% less than predicted between junctions 44-45 and junctions 45-46 respectively and being within the tolerances assumed by POPE, these figures are broadly in line with expectations. It is therefore considered that the noise climate along the upgraded A1(M) is likely to be as expected.
- 5.29. Table 5.3 also shows that the AADT traffic flows for the LAR in 2014 to be between 42% and 63% less than predicted. These figures significantly exceed the lower tolerance assumed by POPE and as such, are below expectations. It is therefore considered that the noise climate along the LAR is likely to be better than expected.

**Table 5.3 Evaluation Summary: Noise**

Sub-Objective	AST	FYA
Noise	Estimated population annoyed by noise will increase by 10 with the scheme.	A1(M) - As expected LAR – Better than expected

## Local Air Quality

### Forecast

#### AST

- 5.30. The AST stated that there would be a slight increase in long term concentrations of particulate matter up to 10 micrometres in size (PM<sub>10</sub>) and nitrogen dioxide (NO<sub>2</sub>) but these would not be significant at any property. There were no predicted breaches of Air Quality System (AQS) objective concentrations for NO<sub>2</sub> or PM<sub>10</sub> (40µg/m<sup>3</sup> as an annual mean) at any properties.

### Environmental Statement

- 5.31. The ES stated that the results of a local air quality assessment undertaken for the proposed scheme indicated that concentrations of all pollutants were expected to meet air quality objectives by their year of achievement in all locations both with and without the scheme. The differences in NO<sub>2</sub> and PM<sub>10</sub> concentrations, the two pollutants generally of most concern in local air quality management, were not predicted to change significantly with the introduction of the proposed scheme.

### OYA

- 5.32. The OYA evaluation stated that based on POPE methodology, the air quality climate due to traffic was likely to be better than expected between J44-45 (Bramham), and as expected between J45-46 (Wetherby). Overall, the report concluded that air quality was likely to be as, or better than, expected.

### FYA

#### Consultation

- 5.33. No responses to consultation requests were received.

#### Evaluation

- 5.34. An assumption is made by POPE methodology that local air quality will be as expected if observed traffic flows are within +/-1000 of those predicted.
- 5.35. As can be seen by the comparison of the predicted and observed AADT flows in Table 5.2, the data indicates that the observed flows are lower than those forecast at all locations by a minimum of 16,100 AADT along the upgraded A1(M) and by a minimum of 4,120 AADT along the LAR parallel to the A1(M). This indicates that pollutant concentrations are also likely to be lower than expected at properties near the scheme.
- 5.36. Based on the information presented in this evaluation, it is therefore concluded that the overall effects of the scheme in terms of local air quality are likely to be better than expected, due to observed traffic flows being lower than those forecast at all locations.

**Table 5.4 Evaluation Summary: Local Air Quality**

Sub-Objective	AST	FYA
Local Air Quality	No. of properties worse off = 548 (NO <sub>2</sub> ) 569 (PM <sub>10</sub> ); No. properties better off = 46 (NO <sub>2</sub> ) 25 (PM <sub>10</sub> ).	Better than expected

### Greenhouse Gases

- 5.37. The assessment of the impacts of transport schemes on emissions of greenhouse gases is one of the environment sub-objectives. WebTAG notes that carbon dioxide (CO<sub>2</sub>) is considered the most important greenhouse gas which is therefore used as the key indicator for the purposes of assessing the impacts of transport options on climate change. Changes in CO<sub>2</sub> levels are considered in terms of equivalent tonnes of carbon released as a result of the scheme. Carbon emissions are therefore estimated for the DS and DM scenarios using forecast and observed FYA traffic data.

#### Forecast

##### AST

- 5.38. The AST predicted a 1% increase CO<sub>2</sub> on emissions of 12,000 tonnes as a results of the scheme, which can be explained by the forecast increase in vehicle flows and less efficient speeds. 12,000 tonnes of CO<sub>2</sub> equates to 3,273 carbon tonnes.

## Evaluation of Greenhouse Gases

- 5.39. Given that the AST forecast covers a wider area, a re-forecast of carbon emissions for the DM and DS scenarios has been calculated using current DMRB guidance. Observed carbon emissions were calculated using the same methodology for the DM and DS scenarios, using flow and speed data collected for this study for both the A1(M) J44-46 and the LAR. Table 5.5 presents the results of this exercise.

**Table 5.5 Re-Forecast and Outturn Change in Carbon Emissions (2014)**

	Carbon Emissions (carbon tonnes/year)	
	Re-Forecast	Observed
<b>Do Minimum</b>	30,612	26,884
<b>Do Something</b>	35,201	28,090
<b>Net Change</b>	13%	4%
	4,589	1,206

- 5.40. Table 5.5 shows that observed carbon emissions increased by 4% between the DM and DS scenarios, equivalent to 1,206 tonnes of carbon. This is lower than the re-forecast growth in emissions of 13% between the DM and DS scenarios. This difference can be explained by lower than forecast traffic flows on the A1(M) and LAR.

- 5.41. From these results it can be concluded that whilst the scheme has led to an increase in carbon emissions from vehicles travelling on the A1(M) and LAR, the increase of 1,206 tonnes in carbon is lower than the 3,273 forecast.

**Table 5.6 Evaluation Summary: Greenhouse Gases**

Sub-Objective	AST	FYA
Greenhouse Gases	Increase in emissions of 12,000 tonnes of CO <sub>2</sub> (3,273 tonnes of carbon)	Better than expected - Increase in emissions of 1,206 tonnes of carbon

## Landscape/Townscape

### Forecast

#### AST

- 5.42. The AST assessed the landscape impact to be slight adverse, stating that:
- Although there would be a minor loss of land from the edge of one SLA there would be no long term effects on the overall character of the area.
  - There would be some residual adverse visual effects on two areas used for public amenity, but the landscape proposals would provide some benefits for Public Rights of Way (PRoW) users.
  - In the winter of year 15, the scheme would result in a moderate adverse impact on the visual amenity of one property, a slight adverse impact on the visual amenity of 123 properties (mainly due to lighting along the LAR), negligible/no change impact on the visual amenity of 250 properties and a slight beneficial impact on the visual amenity of 154 properties.
- 5.43. In terms of townscape, the AST assessed the impact to be slight beneficial at Wetherby due to the introduction of gateway features at three locations/planting improvements/the closure of the York Road junction, which would outweigh the slight adverse impact on the eastern fringe of the settlement from the wider road corridor and additional lighting to part of the LAR.



### **Environmental Statement**

- 5.44. Although the ES noted that the majority of the scheme lies within a landscape that is designated at both a regional and local level for its scenic qualities, it was stated that the impacts on the existing landscape character would be effectively reduced and mitigated by a combination of vegetation and local topography. The proposed mitigation measures were considered to help strengthen the character of the area, and reduce the wider landscape impacts of the overall A1 corridor.
- 5.45. Consequently, the ES considered that while landscape impacts would be mostly slight adverse in the first year after completion of the scheme, the impacts in the longer term would be reduced as the proposed woodland and linear planting along the embankments matured, thereby helping to screen the scheme and integrate the earthworks within the local landscape. Thus by year 15, the impacts on the landscape were expected to be neutral or better.
- 5.46. The ES also stated that the effects of the scheme upon the townscape area to the eastern fringe of Wetherby from the lighting added along part of the LAR would be balanced by the beneficial effects of moving the motorway traffic slightly away from the urban edge, and by the creation of gateway features at both Walton Road and York Road. Townscape impacts were considered to be minor as the closure of the slip into Wetherby would reduce traffic numbers and increase safety.
- 5.47. In terms of visual impact, the ES predicted that the impacts of the scheme would be limited and local, with only one substantial and no severe adverse impacts. The ES also considered that many of the predicted adverse effects would be reduced or changed to beneficial impacts by the design year, with the principal adverse residual effects arising from the additional lighting on the LAR links and roundabouts.

### **OYA**

- 5.48. The OYA evaluation stated that the majority of the planting mitigation proposals had been implemented as per the proposals and with the exception of the cowslip plug planting within the verge at some locations, plant stock appeared to be establishing satisfactorily. As it was deemed too soon at OYA to evaluate the effectiveness of the planting with regard to the longer term objectives of screening and integration, it was suggested that the effectiveness of the planting measures should be re-evaluated at FYA.
- 5.49. The OYA report also noted that details of off-site planting had not made available for the evaluation, and suggested that this could also be considered at FYA along with the species composition of the replacement planting.
- 5.50. Overall, the OYA evaluation considered that the landscape/townscape effects of the scheme were largely as expected, with some impacts being better than expected for some visual amenity receptors.

### **FYA**

#### **Consultation**

- 5.51. Natural England commented that they were satisfied that the scheme had not had any significant impacts on Kirk Deighton SSSI/SAC.
- 5.52. In summary, LCC provided the following general observations:
- Large areas of plant growth seem to be well below expectation and with plant stock often being stunted and lacking in vigour, visual impacts have not been mitigated as envisaged. Poor ground preparation could be an explanation for poor planting performance in some locations.
  - The acoustic/close boarded fencing conflicts with the surrounding predominantly rural character of the area, and alternatives such as stone walling, earth banking, or hedging, may have been more appropriate. The lack of screen planting on both sides

of such fencing and the lack of plant stock vigour does nothing to soften the visual impact of the fencing.

- Variation in the cutting height of grassland areas would provide greater visual interest throughout the scheme, as well as providing a cost effective method of enriching biodiversity.

5.53. WTC commented that in terms of landscape, the new tree planting along the A1(M) and the LAR had already improved the visual environment, and this improvement was expected to increase over time. In terms of townscape, WTC commented that there appeared to be fewer HGVs passing through the town.

### Evaluation

5.54. Where landscape and visual impacts of the proposals were identified in the ES, mitigation measures were incorporated into the scheme to avoid, minimise, or reduce potentially adverse impacts. These mitigation measures were stated to include a range of grassland, hedge, and tree/woodland planting to replace lost landscape elements/habitats and help integrate the LAR and junction improvements into the wider landscape.

5.55. Comparison views with ES photomontages and OYA photographs are shown in Appendix E.

5.56. As at OYA, the dHEMP set out the framework for the long-term maintenance and management of the on-site planting for the 20 year period following the one year aftercare period was available to POPE for the FYA evaluation. The dHEMP described the management requirements and target coverage of each landscape element implemented as part of the scheme, and these requirements are detailed in Appendix F.

5.57. In summary, the described management requirements and target coverage of each landscape element implemented as part of the scheme related to selective control of broadleaved weeds, grass cutting/hedgerow pruning, replacement of dead/dying/diseased plant stock, and target percentage coverages. No records of maintenance operations or specific issues arising during the one year aftercare period were documented in the dHEMP.

5.58. The dHEMP noted that no off-site planting arrangements had been made at the time it was written (2010), and no details regarding off-site planting arrangements been made available to POPE for this evaluation.

### Grasslands

5.59. The FYA site visit observed that the areas identified by the as-built drawings as species rich grassland had established to their target percentages. Scrub cover was observed to be insignificant and there was no evidence to suggest that the management regime specified by the dHEMP was not being adhered to.

5.60. Although the timing of the site visit was towards the end of the flowering period and as such the species composition/diversity of the species rich grasslands were unable to be fully evaluated, stands of nettle and thistles were observed to be present within these areas, particularly along the southbound verge of Paradise Way to the south of Spen Common Lane, as shown in Figure 5.2.

**Figure 5.2** Area indicated by the as-built drawings as species rich grassland along the southbound verge of Paradise Way, south of Spen Common Lane



- 5.61. Although the presence of species preferring nutrient rich soils could be taken as an indication that the fertility of the topsoil is greater than that conducive to supporting a species rich sward, this remains unconfirmed by POPE.
- 5.62. Areas of open and amenity grassland (the latter not mentioned in the dHEMP but indicated on the as-built drawings) were also observed during the FYA site visit to have established well throughout the scheme, with no evidence to suggest that management operations regarding open grassland were not being undertaken as specified in the dHEMP. Areas of amenity grassland seemed to be maintained, and appeared neat and tidy, as shown in Figure 5.3 and Figure 5.4.

**Figure 5.3** Open grassland along the northbound verge of the LAR near Wattle Syke roundabout



**Figure 5.4** Amenity grassland adjacent to the former contractor's compound at Wetherby Grange roundabout



*Native Trees and Shrubs*

- 5.63. Although undefined by the dHEMP, the term 'percentage cover' has (for the purposes of this evaluation) been assumed to broadly equate with the percentage of healthy/established plants within any individual plot. As such, percentage cover has been ascertained by assessing a representative sample of adjacent plants within individual plots.
- 5.64. Tree and shrub planting was generally considered by the OYA study to be establishing satisfactorily and at FYA, the site visit observed that plants within the tree and shrub plots were generally establishing well throughout the scheme. Evidence of maintenance operations, including replacement planting corresponding to the planting schedules on the as built drawings, was observed, the latter being illustrated by the smaller plant stock within areas of larger plant stock in Figure 5.7. Examples of successfully establishing tree and shrub plots are also illustrated by Figure 5.5 and Figure 5.6.

**Figure 5.5** Tree and shrub planting establishing along the southbound carriageway of the A1(M) south of Wetherby Grange Bridge



**Figure 5.6** Tree and shrub planting between the A1(M) and LAR just north of Clifford Moor Ecological Ponds



**Figure 5.7** Tree and shrub planting between the A1(M) and LAR just north of Clifford Moor Ecological Ponds - note the smaller plant stock within areas of larger plant stock, indicative of replacement planting



5.65. In terms of LCC's comments regarding plant vigour and establishment, the FYA site visit did observe that plant stock at certain locations, most notably along the NMU route adjacent to the A1(M) southbound south east of the Paradise Farm overbridge and adjacent to the southbound carriageway of the A1(M) north of Walton Road overbridge, were not performing as well as perhaps would be expected; gaps were evident within the planting matrix, and surviving plants were stunted and considered to be less developed than would be reasonably expected at the FYA stage. These are illustrated in Figure 5.8.

**Figure 5.8** Notable areas where planting is not as vigorous as perhaps would be expected are along the NMU route adjacent to the southbound carriageway of the A1(M) south east of the Paradise Farm overbridge (top) and adjacent to the southbound carriageway of the A1(M) north of Walton Road overbridge (bottom)



- 5.66. However, given that the site visit was undertaken during the growing (i.e. not the planting) season and evidence of maintenance/replacement planting was observed throughout the rest of scheme, there is no reason to suggest that maintenance/replacement operations as specified by the dHEMP are not being adhered to in these areas.
- 5.67. Despite the reasons for the reduced vigour/poor establishment of these planting plots being unclear, potential contributing factors could include poor/unsuitable soil, bad handling of plant stock, exposure and the effects of resource competition from the under-planted sward (i.e. lack of weed free circles) in these areas.
- 5.68. Regarding LCC comments concerning the conflict between the environmental fencing and the surrounding landscape character, the landscape and ecological design proposals indicate a noise bund planted with native shrubs adjacent to the fence along the southbound carriageway, directly to the north of Farfield House. As can be seen in Figure 5.9 , no planting is evident at this location. The reason for this deviation from the landscape and ecological design proposals is unknown, and as such, it is considered that the visual impact of the scheme, specifically the environmental fence, is greater, i.e. worse, than expected at this location.

**Figure 5.9** The environmental barrier replacing the noise bund adjacent to the southbound carriageway, directly north of Farfield House remains unplanted (top and bottom)



5.69. Hedgerows generally appear to be establishing well and where appropriate, are developing the screening functions as intended. The maintenance recommendations outlined by the dHEMP appear to have been adhered to where the plant stock has matured sufficiently, as shown in Figure 5.10.

**Figure 5.10 Dense native species hedgerows between the southbound verge of the LAR and the northbound carriageway of the A1(M) just north of Wattle Syke roundabout (top) and adjacent to the northbound carriageway of the LAR to the north of Tenter Hill overbridge (bottom)**



- 5.70. In terms of other maintenance operations, removal of plant shelters was not specified by the dHEMP and plant shelters remain in place throughout the scheme with no evidence of restricted plant growth resulting from plant shelters remaining in situ observed. Planting plots were observed to be generally litter free at the time of the FYA site visit.

*Wetland Elements*

- 5.71. As discussed in the water and drainage sub-objective evaluation, observations made during the FYA site visit suggest that the planting plots surrounding the ponds are generally establishing well and that the surrounds of the ponds are likely being maintained such that access to the ponds/Pollution Control Devices (PCDs) is facilitated; vegetative treatment systems (rushes) appear to have generally established well where planted (Sandbeck Balancing pond excepted).

*Pests and Diseases/Noxious Weed Control*

- 5.72. The FYA site visit found plant stock throughout the scheme to be generally healthy and free from pests and diseases.
- 5.73. The A1(M) and LAR road corridors were also observed to be predominantly free of noxious weeds, although the occasional infestation of ragwort and thistle was noted; the localised



nature of these infestations however, was such that they are not considered to be significant at this time.

### *Townscape*

- 5.74. The response received from WTC at consultation would suggest that the closure of the slip road into Wetherby has reduced traffic numbers in the town as predicted by the ES.
- 5.75. No further evaluation regarding townscape was undertaken, as no issues were identified during the FYA site visit and there were no unresolved issues from the OYA evaluation

### *Summary*

- 5.76. The current coverage, establishment, and condition of the majority of the plant stock indicates that the environmental functions of the mitigation measures are generally developing well and there is no evidence to suggest that the landscape proposals are not being maintained as specified by the dHEMP. With a few exceptions, the longer term screening and integration objectives of the planting plots are therefore considered likely to be broadly on target to being achieved subject to ongoing management and maintenance.
- 5.77. However, there are areas where it is considered that the current levels of growth and establishment of the marginal/tree and shrub planting is less, i.e. worse, than expected; it is therefore considered that the longer term landscape objectives of these plots are unlikely to be developing to the extent possible.
- 5.78. Overall, it is concluded that the landscape and visual impacts of the scheme are likely to be broadly as expected, although there are locations where the performance of the plant stock is considered to be less than satisfactory, and the planting along the environmental fence north of Farfield House has not been implemented.
- 5.79. There is no reason to suggest that townscape impacts are anything other than as expected.

**Table 5.7 Evaluation Summary: Landscape/Townscape**

<b>Sub-Objective</b>	<b>AST</b>	<b>FYA</b>
Landscape	Slight Adverse	Broadly as expected
Townscape	Slight Beneficial	As expected

## **Heritage**

### **Forecast**

#### **AST**

- 5.80. The AST stated that the scheme would damage locally (a battle site and historic parkland) and regionally (Wattle Syke) significant heritage features (specifically buried archaeological remains) for which adequate mitigation could be specified, but stated that no remains of national significance were present. The AST concluded that the impact of the scheme would be slight adverse.

#### **Environmental Statement**

- 5.81. The ES stated the scheme would have no significant adverse effects on the built heritage, including the historic landscape. Although the ES stated that the scheme proposals would have an impact on buried archaeological remains, it was considered that mitigation excavation works would adequately alleviate the effects of the construction works through preservation by record. Following the implementation of the identified mitigation works, the ES concluded that the scheme would have a slight adverse effect on the cultural heritage resource.

## OYA

- 5.82. The OYA evaluation considered that the archaeological excavation works in advance of the construction phase had been carried out sufficiently, noting that as the post-excavation report was still in preparation (September 2011) it should be reviewed as part of the FYA evaluation.
- 5.83. Other aspects of mitigation (such as the relocation of the Clifford Moor Farm milepost and the installation of the Battle of Bramham Moor interpretation board) were reported by the OYA report as having been undertaken, and mitigation aims were stated as having been achieved.
- 5.84. Overall, the OYA evaluation considered that the impact of the scheme on known cultural heritage features was as expected.

## FYA

### Consultation

- 5.85. English Heritage (EH) commented that the scheme met expectations regarding its impact on the historic environment, and had no specific comments regarding any designated assets adjacent, or in close proximity, to the scheme. With regard to the non-designated below-ground archaeology, EH commented that the resource was appropriately evaluated and that adequate mitigation was put in place; the Wattle Syke excavation produced a worthwhile and useful monograph<sup>1</sup>.
- 5.86. West Yorkshire Archaeology Advisory Service (WYAAS) commented that the impact of the scheme on the heritage resource was as expected, noting that comments regarding the impact of the scheme remained generally as those expressed at OYA. Additional comments were made as follows:
- A monograph of the archaeological work has been published to a high standard.
  - No stable isotope analysis was carried out on the human skeletal remains from the site, and thus a rare opportunity to obtain potentially very useful information was lost.
  - Mitigation planting was undertaken too close to the relocated Clifford Moor Farm milepost, and removal of the nearest saplings would benefit the milepost.
  - The nature of some of the remains at Wattle Syke would have been more apparent if a greater number/density of evaluation trenches had been excavated in this area.
- 5.87. LCC commented that the general experience of heritage has remained unchanged, and that there had been limited visual impact on the setting of built heritage. Comments were also received to the effect that:
- While the road has an impact on the site of the Battle of Bramham Moor, Bowcliffe Hall, and other listed buildings along the length of the road, LCC were unable to comment whether the impact was better or worse than the pre-scheme situation.
  - The road has very little impact on Bramham (Grade I registered) Park/Garden of Special Historic Interest and Bramham Conservation Area.

### Evaluation

- 5.88. According to POPE methodology, all archaeological reports should have been published and deposited in the agreed archive for future reference by the FYA evaluation.
- 5.89. As noted in EH's and WYAAS' response at consultation, the monograph/post excavation report<sup>2</sup> has been published by Archaeological Services WYAS. At the time of writing, this is available for online purchase from the Archaeological Services WYAS website, the product detail stating:

---

<sup>1</sup> Post excavation report.

<sup>2</sup> (Martin L, Richardson J, and Roberts I (2013) *Yorkshire Archaeology 11. Iron Age and Roman Settlements at Wattle Syke*, ISBN 978-1-870453-49-3)

*The report of the archaeological excavations carried out along the route of the A1 Bramham to Wetherby Upgrading Scheme between 2007 and 2008, dealing principally with the investigation of an enclosure complex near the Wattle Syke roundabout between Collingham and Boston Spa. A Late Iron Age settlement, in which the structured burials of very young children and animals was commonplace, expanded in the early Roman period, when it became more geared to arable farming and crop processing. An unenclosed late Roman settlement, represented by sunken-floored buildings, is of a type previously unrecognised in the archaeological record of the region and may have been associated with a nearby Roman villa.*

- 5.90. The OYA report stated that the Leeds Museum Service had agreed to take the project archive, but noted that this had not been actioned at the time of the OYA report. The Leeds Museum Service was contacted as part of this FYA, confirming that the scheme archive has been deposited with them. The archive details are as follows:
- Archive accession number: Leedm.d.2010.12
  - Site Code: BTW07
- 5.91. The OYA evaluation stated that analysis of the human skeletal remains recovered as a result of the scheme had been undertaken by WYAAS as agreed, although there was an element of uncertainty on the part of EH whether stable isotope analysis<sup>1</sup> was carried out on the remains. As part of the FYA consultation process, EH clarified that the uncertainty was centred on the lack of radiocarbon date modelling (which would have greatly refined the chronological phasing of the Wattle Syke site) rather than stable isotope analysis.
- 5.92. While EH also commented that partial stable isotope analysis had been undertaken (Table 76 of the published post excavation report), this comment was not reflected by WYAAS' response to consultation. Differing consultation responses to the same issue aside, it remains possible that more information could have been obtained from the human skeletal remains.
- 5.93. Concerning WYAAS's comments regarding the proximity of the landscape proposals to the Clifford Moor milepost, the milepost was unable to be located during the FYA site visit and it is possible that it has now been obscured by the establishing planting. If this is the case, it is considered that clearance of plant stock closest to the milepost would quickly remediate the situation, and therefore any adverse effects of the planting proposals in this regard are not considered to be particularly significant.
- 5.94. No further evaluation has been undertaken, as no changes regarding Cultural Heritage were identified during the FYA evaluation.
- 5.95. Based on the evidence presented, it is considered that the effects of the scheme are as expected.

**Table 5.8 Evaluation Summary: Heritage**

Sub-Objective	AST	FYA
Heritage	Slight adverse	As expected

## Biodiversity

### Forecast

#### AST

- 5.96. The AST stated that the loss of hedges, trees, ponds, watercourse habitat and grassland of importance in a local context would be mitigated, but like for like replacement could not be

<sup>1</sup> Stable isotope analysis of human bone relates to potential 'offsets' caused by atypical diets that could skew scientific dating.

guaranteed. No significant effects on any legally protected species were identified, and it was stated that approximately 15% of grassland would be managed as conservation grassland. It was also stated that recently disturbed land was to be checked for the legally protected species thistle broomrape and, if found, soil would be relocated to new verges. Overall, the AST assessed the impact of the scheme on biodiversity as slight adverse.

### **Environmental Statement**

- 5.97. The ES stated that although impacts on ecology were generally considered to be of minor magnitude during both construction and operation of the scheme, the potential existed for the disturbance of legally protected species, including otters, bats and breeding birds. Loss of high quality habitat due to the scheme was stated as minimal, although small losses of bank-side habitat, mature trees, short sections of hedge, two ponds and some generally species-poor verge grassland were noted.
- 5.98. The ES considered that habitat loss would be offset by the creation of new ponds, new structure planting, and species-rich grass verges, noting that new habitats would be designed with ecological principles in mind and would be related to HA Biodiversity Action Plan (BAP) and local BAP objectives.
- 5.99. With proposed mitigation fully implemented, the significance of the overall residual impact on biodiversity was considered by the ES to be minor adverse in the short-term, reducing to negligible in the long term with the establishment of new planting and habitat enhancement measures.

### **OYA**

#### **Conclusions**

- 5.100. The OYA evaluation confirmed that the mitigation measures outlined in the ES had been largely implemented as expected, noting that the marginal planting within the ponds had not established well and that the establishment of habitat enhancement should be considered at FYA. The OYA evaluation concluded that based on the information available, the impacts of the scheme on biodiversity were as expected.

### **FYA**

#### **Consultation**

- 5.101. Natural England commented that they were satisfied that the impacts of the scheme on protected species had been adequately mitigated.
- 5.102. West Yorkshire Ecology (WYE) commented on a range of issues (see Appendix G), noting that their observations were not based on data supplied by POPE nor on their own monitoring work
- 5.103. LCC noted that if required, comments could be provided on the results of any monitoring reports comparing the pre and post scheme situation. Further comments were made that (in summary) water channels were often over-engineered and sterile in terms of biodiversity, and could have been designed to encourage habitat connectivity.

### **Evaluation**

#### *Species*

- 5.104. The dHEMP confirmed that the infrastructure to provide appropriate mitigation for the impact of the scheme on environmentally protected species had been put in place during the scheme (sic), and listed the monitoring requirements for each.
- 5.105. In terms of bats, the dHEMP confirmed that bat boxes had been installed on trees at four locations along the scheme between June 2007 and September 2008 as compensation for initial loss of mature trees with potential to be used by bats. The bat boxes east of Grange Moor roundabout as identified on the site visit are shown in Figure 5.11.

**Figure 5.11 Bat boxes installed to the east of Grange Moor roundabout (top and bottom)**



- 5.106. The dHEMP noted that all bat boxes had been checked in October 2008, at which time evidence of use of the boxes by bats (including pipistrelle bats) was recorded in the boxes at Wetherby Grange and to east of Grange Moor Roundabout. Repeat bat box checks were undertaken in October & November 2009. The dHEMP also stated that the final bat box check of the aftercare period was planned for October 2010.
- 5.107. The Bat Box Monitoring Report (Final Visit) (October 2010), concluded that as evidence of use by bats had been recorded at all four locations where the bat boxes had been located, this indicated that the boxes had been placed in good locations near good habitats. The report stated that this underlined the value of providing boxes as mitigation for loss of trees with potential for use as roosts, and that the identification of a number of different species found using the boxes within three years of installation underlined the value of providing a range of different types of boxes to appeal to a number of different species.
- 5.108. In terms of badger fencing, the ES stated that none was to be implemented due to low levels of badger activity within the scheme's vicinity. It was suggested by WYE at OYA that badger fencing be installed between the A64 junction (towards Leeds) and Bowcliffe Hall following a badger fatality, and the WYE consultation response at FYA suggests that the issue remains unresolved.
- 5.109. No badger fencing was observed between the A64 junction and Bowcliffe Hall during the FYA site visit, but in the absence of animal mortality data no firm conclusions can be drawn whether

implementation of badger fencing at this location would mitigate any potential adverse effects of the scheme on protected species.

- 5.110. Regarding both badgers and otters, the dHEMP confirmed that appropriate mitigation had been implemented as part of the construction phase, noting that no monitoring of either species was required during the post construction period.
- 5.111. To compensate for the loss of roosting perches in a barn that was removed as part of the road construction, an artificial owl perch was installed on the eastern verge of the LAR near Bowcliffe Hall in 2007. This is shown in Figure 5.12.

**Figure 5.12 Owl perch near Bowcliffe Hall.**



- 5.112. Although the dHEMP confirmed that no further surveys or monitoring of the owl perch were required, it did note that the planting provided at that time (2010) had only partially achieved the objective to provide shelter to the perch and that the hedgerow and standard trees close to this box should be retained and severe pruning should not be undertaken.
- 5.113. The FYA site visit observed that the owl perch remains partially exposed, although given the response to consultation from NE this is not considered to be an issue as subject to ongoing management and maintenance as specified by the dHEMP, there should be no reason why the adjacent planting proposals would not provide the shelter intended by design year.
- 5.114. In terms of Great Crested Newts (GCNs), the dHEMP confirmed that no specific mitigation was required (or implemented) during the construction phase, and that no further works or monitoring was required in respect of this species post construction.
- 5.115. The dHEMP noted that during the construction of the footpath through Beilby Wood, a small number of Common Spotted Orchids were identified. The dHEMP confirmed that the footpath was sensitively located to reduce the impact on the orchids and where necessary, a small number of orchids were translocated from the working area to an adjacent area in accordance with a method statement prepared by an ecologist. It was noted that orchids were positively identified in the area the following year, and that no specific ongoing management was required for this species. No orchids were observed during the FYA site visit at this location.
- 5.116. The dHEMP also noted that a small (unspecified) number of grass verges were identified as having the potential to contain Thistle Broomrape seeds, and confirmed that where soil stripping had taken place in these areas, the top soil was kept separate from other soils and had been translocated to a receptor site near the turning head beneath the River Wharfe New East bridge (after bridge construction was completed). The disturbance of the receptor site was considered by the dHEMP to likely provide a germination opportunity for the translocated

Thistle Broomrape seed and to encourage the growth of thistle that is parasitized by Thistle Broomrape. The FYA site visit observed a thistle population at the receptor site.

- 5.117. As previously noted, requests for animal mortality data were not forthcoming for the purposes of this study. As such, no conclusions can be drawn regarding the effects of the scheme on this aspect of the biodiversity sub-objective.

*Habitat*

- 5.118. As confirmed by the FYA site visit, each balancing/infiltration/ecological pond throughout the scheme provides a varied wetland habitat for a range of wildlife, the land surrounding each pond having been engineered to provide a range of habitats where possible to maximise wildlife potential.

- 5.119. As discussed in the landscape sub-objective above, observations made during the FYA site visit suggest that the aquatic and marginal habitats are generally establishing well and as such, this is considered to be an improvement on the situation reported at OYA. The exceptions are Sandbeck Balancing pond, where no evidence of the marginal planting indicated by the as-built drawings was observed, and River Wharfe North Bank Balancing pond where marginal planting coverage is less than as specified by the dHEMP.

- 5.120. In terms of terrestrial habitats, other ecological mitigation measures confirmed during the FYA site visit include new tree, shrub, hedge and species rich grassland planting, the establishment and performance of which are described and evaluated in the landscape sub-objective evaluation.

*Summary*

- 5.121. Despite the limited ecological monitoring undertaken as part of mitigation, it is considered that the effects of the scheme on protected and notable species are likely to be as expected, based on the evidence presented.

- 5.122. In terms of habitat enhancement, it is considered that the planting proposals are broadly developing in line with the ecological mitigation proposals. However (and as noted in the landscape sub-objective evaluation), the establishment and performance of a number of marginal/tree and shrub planting plots has likely not been realised to the extent expected at this stage. However, these areas of poor performance broadly lie within the individual plots and being relatively localised, are not considered to significantly contribute to the predicted slight adverse ecological impact of the scheme overall.

- 5.123. It is therefore concluded that the effects of the scheme on biodiversity are likely to remain slight adverse, and as such are broadly as expected.

**Table 5.9 Evaluation Summary: Biodiversity**

Sub-Objective	AST	FYA
Biodiversity	Slight adverse	Broadly as expected

## Water Quality and Drainage

### Forecast

#### AST

- 5.124. The AST stated that short sections of new culvert would be unavoidable, leading to residual adverse impacts as a result of the loss of natural aspects of two watercourses. A perceived risk on conveyance of flood flows in the River Wharfe would be addressed by provision of additional balancing ponds. Spillage risk would decrease due to closure of three junctions. Overall, the AST predicted that the impact of the scheme would be neutral.

### **Environmental Statement**

- 5.125. The ES stated that features of the water environment identified in the study area were surface watercourses (River Wharfe, Openrakes Beck, Carr/Bramham Beck, and Sand Beck), floodplains and groundwater. The ES also stated that the only notable impacts were those to conveyance of flow and material both in the River Wharfe and its floodplain and biodiversity, and concluded that these impacts were of low significance and would be addressed with mitigation. All other impacts on the water and drainage environment were found to be insignificant and overall, the ES concluded that the impact of the scheme would likely be neutral.

### **OYA**

#### **Conclusions**

- 5.126. The OYA evaluation noted that no information had been made available to indicate that the drainage design was operating other than as intended and, based on the information available at that time, concluded that mitigation had been implemented largely as expected.
- 5.127. Overall, the OYA evaluation concluded that the impact of the scheme in terms of water quality and drainage was likely to be as expected.

### **FYA**

#### **Consultation**

- 5.128. The Environment Agency (EA) commented that there was no evidence to suggest the scheme had any beneficial or detrimental effects on incident frequency or water quality, adding that from the available pre and post scheme summary data for chemical sampling at the nearest upstream and downstream Wharfe monitoring points, it was not possible to pick up on any discernible change in water quality which could be attributed to the scheme. The EA's Groundwater and Contaminated Land Team are unaware of any impacts on the groundwater water environment, and the only comment made was that there was no evidence to suggest the scheme has had any beneficial or detrimental effects on incident frequency or water quality.
- 5.129. WTC commented that the scheme had affected three properties in Meyrick Avenue, resulting in sewage ingress under floorboards and in to gardens on a regular basis. Further comment was made that the cause was due mainly to blocked run offs from the A1(M) and construction taking place over a drain, noting that the drain was indicated on the plans but is not in situ. This is understood to be an ongoing issue.

#### **Evaluation**

- 5.130. No water quality monitoring data/information has been made available to POPE for this evaluation, and no information has been received at FYA to indicate whether any incidents had occurred that may have affected the drainage system.
- 5.131. Anecdotally however, it is understood that an unknown surface water sewer was found to run through the location of the balancing pond at Sandbeck during the construction phase, and that this sewer was subsequently diverted around the pond. It is understood that this is a known issue that is in the process of being resolved at the time of writing.
- 5.132. Regarding the sewage ingress at the properties on Meyrick Avenue, it is understood that the issue is currently under investigation by Highways England with a view to resolution in 2015.
- 5.133. The FYA site visit observed an area of standing water at the western end of the Freemans Way underpass, adjacent to the LAR and approximately 120m southeast of Meyrick Avenue, as illustrated in Figure 5.13.



**Figure 5.13** Ponding at the western end of the Freemans Way underpass, adjacent to the LAR



- 5.134. Although this instance of highly localised flooding cannot be confirmed as a consequence of the scheme, it is considered unlikely to have any long term adverse effects at this location provided that it is rectified promptly.

*Wetlands*

- 5.135. Wetland at Clifford Moor and Park Hill Farm Ecological Ponds (Figure 5.14) and the Paradise Farm and River Wharfe South Bank Balancing Ponds (Figure 5.15) shows marginal plantings are establishing well and coverages are as specified by the dHEMP. No algae were observed and there is no reason to suggest that these landscape elements will not achieve their design functions by design year subject to ongoing management and maintenance.

**Figure 5.14** Ecological Ponds at Clifford Moor (top) and Park Hill Farm (bottom)



**Figure 5.15 Balancing Ponds at Paradise Farm (top) and River Wharfe South Bank (bottom)**



- 5.136. The River Wharfe North Bank Balancing Pond is illustrated in Figure 5.16 and Figure 5.17. At this site, establishing, and marginal planting coverage is less than as specified by the dHEMP. It is considered that unless replacement planting is undertaken during the next planting season, this landscape element may struggle to achieve its design function by design year.
- 5.137. Regarding health and safety, it should also be noted that the lifebuoy was missing at this location (Figure 5.17).

**Figure 5.16 River Wharfe North Bank Balancing Pond**



**Figure 5.17 River Wharfe North Bank Balancing Pond**



- 5.138. The Sandbeck Balancing Pond is illustrated in Figure 5.18. None of the marginal planting indicated by the as-built drawings was observed during the FYA site visit and it is considered that unless replacement planting is undertaken during the next planting season, this landscape element is highly unlikely to achieve its design function by design year.

**Figure 5.18 Sandbeck Balancing Pond**



- 5.139. The grassland areas (including open, species rich, marsh and wet grasslands) within all of the balancing and ecological ponds were observed to have established successfully and coverages were all as specified by the dHEMP. Despite the encroaching nettles at the southern corners of the Park Hill Farm Ecological Pond and the Wharfe North Bank Balancing Pond enclosures, there is no reason to suggest that management of any pond enclosure is anything other than as specified by the dHEMP.
- 5.140. The pond at Wattle Syke (see Figure 5.19) is an infiltration pond and no marginal planting was specified at this location. As with the other ponds, the open grassland area within the pond enclosure has established well and at approximately 80% coverage, coverage is as specified by the dHEMP. There is also no reason to suggest that management is anything other than as specified by the dHEMP at this stage.

**Figure 5.19 Wattle Syke Infiltration Pond**



- 5.141. Pond inlets and outlets noted during the FYA site visit were observed to be generally clear and appeared able to operate as expected.
- 5.142. Although not considered significant at this stage, up to approximately 5% of the water surface areas of Sandbeck and River Wharfe North Bank Balancing Ponds were observed to be covered with algal growth. It should be noted that regular management and maintenance is required to control algal growth to ensure that it does not present a problem in the future -

MCHW1 (Volume 1 Specification for Highway Works, Series 3000 Landscape and Ecology, Section 11) provides an example of good practice guidance.

- 5.143. All other drainage facilities within the scheme noted during the FYA site visit were observed to be relatively clear of vegetation and/or maintained.

#### Summary

- 5.144. Based on the FYA site visit, there is no conclusive evidence to suggest that the drainage system is not functioning as intended, and wetland areas are likely being maintained such that access to the ponds/Pollution Control Devices (PCDs) is facilitated. Vegetative treatment systems (rushes) appear to have generally established well where planted (Sandbeck Balancing pond excepted).
- 5.145. It is therefore considered that as the effects of the scheme on the water environment are likely to be generally as expected.

**Table 5.10 Evaluation Summary: Water Quality and Drainage**

Sub-Objective	AST	FYA
Water Quality and Drainage	Neutral	Generally as expected

## Physical Fitness

### Forecast

#### AST

- 5.146. The AST stated that the network was not well used by NMUs at the time of appraisal, largely because it was unsafe, poorly maintained and disjointed. Noting that the proposals included new bridleways and cycle paths along with improved amenity and better links for all NMUs to the wider PRoW network, the AST stated that opportunities for leisure would be increased. The AST also noted potential benefits for the communities of Bramham, Wetherby, Clifford and Boston Spa and overall, stated that the impact of the scheme would be neutral.

#### Environmental Statement

- 5.147. The ES stated that there would be a general reduction in severance for NMUs from the baseline, and that a safer environment would be created that would link into the wider pedestrian, cyclist and equestrian networks.
- 5.148. The ES identified that it would be appropriate to implement a coherent signage strategy to enable users to make best use of the new NMU network, and concluded that following completion of the scheme there would be long term benefits for NMUs, especially where they would be separated from fast moving motorised vehicles.

#### OYA

- 5.149. The OYA evaluation considered that NMU facilities had been provided broadly in line with ES proposals. However, it was noted that there were many remedial details and issues outstanding that were subject to discussion between stakeholders and the HA at that time, and suggested that NMU facilities should be evaluated more fully at FYA.

### FYA

#### Consultation

- 5.150. LCC provided a range of comments, summarised as follows:

<sup>1</sup> Manual of Contract Documents for Highway Works

- Overall, the development of the NMU routes has been welcomed by NMUs. Better connectivity has been provided to/between the rights of way and cycle route network, and informal observations suggest that the routes are reasonably well used for utility/recreational uses.
- The occupation by travellers of some of the wide verges alongside the LAR is a recurring problem that has resulted in alleged NMU intimidation, inconvenience to adjacent farmers/landowners and enforcement/clearing up costs for the Local Authority.
- The crushed stone NMU route to the east of Clifford Moor Farm interrupts the tarmac cycle route, and damage caused by regular use by farm vehicles and large horse-boxes has resulted in complaints from both cyclists and adjacent landowners/tenants.
- The tarmac cycle paths next to the parallel grass surfaced bridleways were not legally defined in the Side Roads Orders for the scheme. This is a legal anomaly and means that although the bridleways have been added to the Definitive (PRoW) Map and are therefore maintainable and protected by law, the cycle paths are not.
- A request to install triangular signs warning of cyclists crossing the A659 to Boston Spa has been received by LCC.
- There is no link between the shared use cycle track alongside the LAR and Freemans Way.
- Although the sealed surfaces of the NMU route are good, some areas of (water) ponding are evident which present particular problems during icy weather.

5.151. WTC commented that the number of footpaths/cycle tracks had increased alongside the A1(M) and the LAR, and that the new paths linked up with the existing paths to increase the number of routes available. Further comment was made that the new NMU routes were of great benefit to walkers and cyclists.

### **Evaluation**

5.152. Although no NMU audits or Vulnerable User (VU) studies have been undertaken specifically for this study, the Post Construction NMU Audit (November 2010) commented on issues raised by stakeholders, including LCC and the British Horse Society (BHS) and as well as identifying issues requiring rectification, listed outstanding snagging issues that were the responsibility of the contractor to rectify.

5.153. Appendix E presents a full commentary on these issues, based on the evidence observed by the FYA site visit. In summary, the vast majority of these issues appear to have been resolved, including the outstanding snagging issues noted by the NMU audit as being the responsibility of the contractor.

5.154. All footpaths and cycleways viewed during the FYA site visit appeared to be maintained and capable of performing as expected, although scant evidence of NMU use was observed on a weekday.

5.155. The FYA site visit observed tree trunks/forestry waste within the verge at a number of locations along the NMU route adjacent to the NMU route to the south of the scheme, as shown in Figure 5.20.

**Figure 5.20 Tree trunks within the verge of the NMU route adjacent to Paradise Way at the southern extents of the scheme (top and bottom)**



- 5.156. Although the tree trunks do not actually preclude pedestrian/cycle use and the NMU route is able to function as intended, the location and size of the tree trunks are such that they are presumably intended to discourage unauthorised vehicular access to the verge, and to prevent the occupation of the verges referred to by LCC at consultation.
- 5.157. Regarding bridleways, the presence of vegetation within the corrals at the equestrian crossing on the LAR just to the north of Wattle Syke Roundabout indicates that it may be used less than frequently, the taller, brittle nature of the (dead) vegetation suggesting that the crossing has been unlikely to have been subject to equestrian use for a period of time.
- 5.158. Construction debris in the form of a sign was also noted on the corral adjacent to the southbound carriageway at this location, and it is considered that this may constitute a trip hazard for horses and as such, render the corral less than attractive for equestrian use. This is shown in Figure 5.21.

**Figure 5.21 Vegetation and construction debris within the equestrian corral on the LAR just north of Wattle Syke Roundabout**



5.159. All other bridleways viewed during the FYA site visit appeared to be maintained and capable of performing as expected, with evidence of equestrian use was noted at several locations throughout the scheme.

*Summary*

5.160. The vast majority of issues raised by the NMU audit and by stakeholders appear to have been resolved, including the outstanding snagging issues noted by the NMU audit as being the responsibility of the Contractor. This is considered to be an improvement on the situation at OYA.

5.161. NMU facilities are generally well maintained and capable of performing as expected and no issue was observed during the FYA site visit that would preclude the use of any NMU facility. However, the dedicated equestrian crossing point on the LAR just to the north of Wattle Syke Roundabout may not be benefiting the equestrian community to its full extent.

5.162. Consequently, it is considered that the effects of the scheme on physical fitness are likely to remain neutral, being generally as expected.

**Table 5.11 Evaluation Summary: Physical Fitness**

Sub-Objective	AST	FYA
Physical Fitness	Neutral	Generally as expected

## Journey Ambience

### Forecast

#### AST

5.163. The journey ambience sub-objective considers traveller care (facilities and information), traveller views and traveller stress (frustration, fear of potential accidents and route uncertainty).

5.164. The AST stated that the scheme would reduce congestion and together with improved highway junctions, would reduce driver stress. Landscape proposals were expected to improve views from the road and to help create a sense of place. The impact overall was assessed by the AST as moderate beneficial.



### Environmental Statement

- 5.165. The ES stated that in terms of traveller care, no new service areas were proposed as part of the scheme, but two lay-bys were proposed on the LAR (one in either direction) between Wattle Syke and Wetherby. The removal of junctions affording easy access into Bramham and Wetherby were expected to reduce the accessibility of the local services.
- 5.166. In terms of traveller views, the ES stated that the scheme would not result in a significant change in the extent of views from the A1(M) in the long term and that the LAR would have a combination of open and restricted views (as dictated by the undulating topography).
- 5.167. The ES reported no reduction in levels of driver stress due to continuing high traffic volumes, but stated that the predicted reduction in accidents, the removal of local, slow-moving traffic and the reduction in the number of junctions were likely to be associated with reduced levels of driver stress. In addition, the ES noted that a reduction in accidents would lead to a reduction in queuing and general route uncertainty, which was also expected to reduce driver stress.

### OYA

#### Conclusions

- 5.168. The OYA considered that as expected, there had been no changes to traveller facilities as a result of the scheme.
- 5.169. Although the OYA evaluation considered that planting proposals had been carried out broadly as expected, as impacts on traveller views were to be largely mitigated by planting it was noted that traveller views could be considered again at FYA when the effective establishment of the planting would be clearer. However, impacts on traveller views were considered to be as expected at OYA.
- 5.170. The OYA stated that traffic volumes had not grown as much as expected and so considered the impact of the scheme on driver stress to be beneficial and as expected. However, the evaluation noted that one year after opening was too short a time period to form reliable conclusions in this regard, stating that driver stress should be reviewed at the FYA stage.

### FYA

#### Consultation

- 5.171. WTC provided the following, summarised comments regarding journey ambience:
- Traveller Care: The number of HGVs parked overnight around Sandbeck and along the new LAR has increased, as has the volume of litter (particularly on the LAR). Wetherby Services<sup>1</sup> is expensive and parking facilities do not meet the needs of truck drivers. The removal of the brown tourist information sign indicating Wetherby to be a market town caused trade in the town to suffer and was replaced at cost to the town.
  - Traveller Views: the new tree planting along the A1(M) and the LAR has already improved the visual environment and this improvement is expected to increase over time.
  - Traveller Stress: less local traffic joining and leaving the A1(M) makes the new road safer, as some of the local junctions on the former A1 were somewhat hazardous.

### Evaluation

#### Traveller Care

- 5.172. The FYA site visit observed the lay-by on the LAR between Wattle Syke and Wetherby to be clearly signed and well used. Some litter was noted along the verge of the lay-by on the northbound carriageway of the LAR despite the provision of litter bins and a quantity of spilled

---

<sup>1</sup> Wetherby Services is a motorway service area north of A1(M) J46 that opened in 2008. It was not constructed as part of the scheme.

granular material was evident along the kerbed edge of the parking area. A typical view is shown in Figure 5.22.

**Figure 5.22 The lay-by on the northbound carriageway of the LAR between Wattle Syke and Wetherby**



- 5.173. Regarding the apparent increase in the number of HGVs parked overnight around Sandbeck and along the new LAR, given the consultation response from WTC it is considered possible that the facilities at Wetherby Motorway Service Area are proving to be unattractive to HGV drivers, who may consequently be seeking alternative parking arrangements.
- 5.174. Regarding the removal of the brown tourist information sign indicating Wetherby to be a market town, access to facilities in the town are available from junctions 45 and 46 of the A1(M), both of which are clearly signed.
- 5.175. No further evaluation regarding traveller care was undertaken, as no other issues were identified during the FYA site visit and there were no unresolved issues from the OYA evaluation.

#### *Traveller Views*

- 5.176. At the time of the FYA site visit, both the upgraded A1(M) and the LAR corridors were found to be generally tidy and litter free.
- 5.177. As discussed in the landscape sub-objective evaluation, the current coverage, establishment, and condition of the majority of the plant stock indicates that the environmental functions of the planting proposals are generally developing as expected. Although there are a number of areas where the performance of tree and shrub planting is less, i.e. worse, than expected, these areas are considered to form a small part of the generally long distance journeys undertaken along the A1(M) and are not thought to be significant in terms of the journeys undertaken along the LAR.
- 5.178. Traveller views through the new section of the A1(M) are consequently considered to be as expected, as are views from the LAR.
- 5.179. No further evaluation regarding traveller views was undertaken, as no other issues were identified during the FYA site visit and there were no unresolved issues from the OYA evaluation.

#### *Traveller Stress*

- 5.180. It is understood that since the OYA report, there has been a change to the white line road markings at the Grange Moor roundabout resulting in a reduction of three lanes to two on the approach to the roundabout; it is further understood that this change arose from safety concerns regarding vehicular negotiation of the roundabout, and these changes are discussed in the Safety chapter of this report.

- 5.181. The FYA site visit observed that some of the directional/lane markings on the approach to the Wattle Syke roundabout have faded, as have some of the markings at the roundabout itself, as illustrated in Figure 5.23.

**Figure 5.23 Typical examples of the faded road markings at the Wattle Syke roundabout; approaching the roundabout (top) and on the roundabout (bottom)**



- 5.182. It is considered likely that these faded road markings may have resulted in an increased degree of driver frustration borne out of route uncertainty, both of which could potentially lead to poor lane discipline and late/erratic lane changes that in turn, may result in an increase in fear regarding accidents. This is because:
- As a result of the faded lane markings, lane discipline is likely to suffer and it is possible that drivers may form artificial lanes.
  - In the absence of clear directional markings, drivers may be unsure as to which lane they should be in to reach a particular exit, or of which exit they need to take from the roundabout.
- 5.183. It is therefore considered that the faded road markings at this location are unlikely to be beneficial in terms of reducing traveller stress.
- 5.184. The FYA visit observed that a number of demarcation posts at the lay-by on the LAR between Wattle Syke and Wetherby were either missing (on the splitter island) or had been damaged (in the verge), as illustrated in Figure 5.24.

**Figure 5.24 Demarcation posts at the lay-by on the LAR between Wattle Syke and Wetherby: missing posts on the splitter island (top) and damaged posts in the verge (bottom)**



- 5.185. In the absence of clear lay-by demarcation on the splitter island and given the damaged demarcation posts in the verge, it is considered likely that travellers may be uncertain of the extents of the lay-by. This is considered unlikely to be beneficial in terms of reducing traveller stress.
- 5.186. Any changes in journey times and reliability for either scheme may also have had an impact of traveller stress; these issues are examined in detail within the Chapter 2 of this report.
- 5.187. No further evaluation regarding traveller stress was undertaken, as no other issues were identified during the FYA site visit and there were no unresolved issues from the OYA evaluation.

#### *Summary*

- 5.188. It is considered that the overall effects of the scheme on traveller care and traveller views are broadly as expected.
- 5.189. However, the faded road markings at the Wattle Syke roundabout and the missing/damaged demarcation posts on the splitter island/verge at the lay-by on the LAR between Wattle Syke and Wetherby are considered unlikely to have a beneficial impact on traveller stress and as such, the effect of the scheme on this aspect of journey ambience is considered likely to be worse than expected.

**Table 5.12 Evaluation Summary: Journey Ambience**

Sub-Objective	AST	FYA
Journey Ambience	Moderate beneficial	Traveller Care/Traveller Views: Generally as expected Traveller Stress: Worse than expected

**Key Points (part 1)**

**Noise**

- It is considered that the noise climate along the upgraded A1(M) is likely to be as expected.
- Traffic flows are significantly lower than expected in all sections of the LAR, and it is considered that the noise climate along the LAR is likely to be better than expected.

**Local Air Quality**

- Comparison of both the predicted and observed ADT flows indicates that traffic flows are lower than forecast at all locations by a minimum of 4,120 ADT, indicating that pollutant concentrations are also likely to be lower than expected at properties near the scheme.

**Greenhouse Gases**

- The scheme’s outturn impact on greenhouse gas emissions is better than expected, with an increase in emissions of 1,206 carbon tonnes against a re-forecast increase of 3,273 carbon tonnes.

**Landscape and Townscape**

- Landscape: The longer term screening and integration objectives of the planting plots are considered likely to be broadly on target to being achieved, although there are locations where the performance of the plant stock is considered to be less than satisfactory.
- Landscape: The environmental fence adjacent to the southbound carriageway north of Farfield House has had a greater than expected visual impact on the surrounding landscape.
- Townscape: There is no reason to suggest that impacts are anything other than as expected.

## Key Points (part 2)

### Biodiversity

- It is considered that the effects of the scheme on protected and notable species are likely to be as expected although in the absence of animal mortality data, no firm conclusions can be drawn whether implementation of badger fencing at the A64 junction (towards Leeds) and Bowcliffe Hall (as suggested by WYE at OYA) would have any effect on protected species.
- The habitat potential of a number of marginal/tree and shrub planting plots has likely not been realised to the extent expected at this stage. However, these areas are relatively localised and are not considered to significantly contribute to the predicted slight adverse ecological impact of the scheme overall.

### Heritage

- The post excavation report has been published, and the project archive has been deposited with the Leeds Museum Service.
- It is possible that more information could have been obtained from the human skeletal remains, and that the Clifford Moor milepost is obscured by the establishing landscape proposals.

### Water

- There is no evidence to suggest that the overall effect of the scheme on water quality and drainage is anything other than what would be expected at this time.
- The surrounds of the ponds are likely being maintained such that access to the ponds/Pollution Control Devices (PCDs) is facilitated, and vegetative treatment systems (rushes) appear to have generally established well where planted (Sandbeck Balancing pond excepted).

### Physical Fitness

- The vast majority of issues raised by the NMU audit and by stakeholders appear to have been resolved, including the outstanding snagging (construction) issues.
- Footpaths, bridleways, and cycleways generally appear to be maintained and capable of performing as expected, although the dedicated equestrian crossing point on the LAR just to the north of Wattle Syke Roundabout may not be benefiting the equestrian community to its full extent, possibly on account of in situ construction debris.

### Journey Ambience

- Traveller Care: The lay-by on the LAR between Wattle Syke and Wetherby is clearly signed and well used; access to facilities in Wetherby are available from junctions 45 and 46 of the A1(M), both of which are clearly signed.
- Traveller Views: Although there are a number of areas where the performance of tree and shrub planting is less, i.e. worse, than expected, these areas are considered to form a small part of the generally long distance journeys undertaken along the A1(M), and not to be significant in terms of the journeys undertaken along the LAR.
- Traveller Stress: The faded road markings at the Wattle Syke roundabout and the missing/damaged demarcation posts on the splitter island/verge at the lay-by on the LAR between Wattle Syke and Wetherby are considered unlikely to have a beneficial effect in terms of Traveller Stress.

## 6. Accessibility and Integration

- 6.1. This chapter evaluates the impact of the scheme in terms of the accessibility and integration objectives; comparing qualitative forecast assessments from the scheme AST (as shown in Chapter 7) with post-opening findings and analysis of policy objectives.

### Accessibility

- 6.2. The accessibility objective is concerned with how the scheme has affected the ability of people in different locations to reach different types of facility, using any mode of transport. The accessibility objective consists of three sub-objectives. These are:

- Option Values
- Access to the transport system
- Severance

### Option Values

#### Forecast

- 6.3. Option values, as defined in webTAG, relate to the availability of different transport modes within the study area, even if they are not used. For example, a car user may value a bus service along their route even if they never used it because they have the option of another mode should their car become unavailable.
- 6.4. The AST stated that the scheme would allow existing public transport links to be maintained and in some areas potentially improved.

#### Evaluation

- 6.5. Three bus routes operate along the LAR:
- Service 173 and 174 are operated by Arriva Yorkshire along the LAR between A1(M) Junction 44 and Bramham, and then between Boston Spa junction and Wetherby.
  - Service 923 is operated by Connexionsbuses along the LAR between Boston Spa junction and Wetherby.
- 6.6. Connexionsbuses were contacted for consultation but did not operate along the scheme route prior to the scheme and so cannot provide information on how the scheme has impacted on their service provision. Attempts to contact Arriva Yorkshire failed.
- 6.7. Utopia Coaches formerly operated a service along the LAR between Wetherby Boston Spa. They were consulted with at OYA stage, the findings of which suggested that there had been a notable benefit for the bus service following scheme opening. Previously, the service used to operate for a short distance on the A1(M), but were often subject to delay during peak periods or at the time of an accident. The service now operates via the LAR, avoiding the need to use the A1(M) for the short stretch between Boston Spa and Wetherby. The operator did not change the timetable as a direct result of the scheme, but noted that it was possible to operate the existing timetable more reliably. Utopia Coaches no longer operate the service.
- 6.8. Any long distance coach services (such as those operated by National Express) are likely to have received some benefit as a result of the slightly reduced journey times on the A1(M).
- 6.9. There is no evidence to suggest that the scheme has impacted on the provision of public transport links, though comments from Utopia Coaches suggest that the LAR had improved service reliability. The AST assessment that the scheme would allow existing public transport links to be maintained appears valid.

## Access to the Transport System

### Forecast

- 6.10. The AST states that the scheme does not include proposals for public transport nor does it directly affect access to existing public transport within the A1(M) corridor.

### Evaluation

- 6.11. The AST forecast is considered valid as the scheme did not specifically include any proposals relating to public transport. However, as discussed in the previous section, the LAR does provide an alternative and potentially more reliable route for local bus services to use.

## Severance

### Forecast

- 6.12. The AST states that there would be slightly longer journey times for pedestrians but the segregated NMU facilities on the LARs would improve the amenity of public rights of way and result in a reduction in severance from the baseline by linking more safely into the wider public rights of way (PRoW) network. No new severance was predicted. Consultation results suggested that there was some suppressed demand, but this was not quantified.

### Evaluation

- 6.13. The upgrade of the A1(M) to motorway standard prohibits its use by NMUs. However, the LAR which runs alongside the A1(M) provides full access to cyclists and equestrians. In addition, there is a segregated NMU facility running in parallel to the LAR, as shown in Figure 6.1. Hence north-south connectivity for NMUs has been maintained, with the LAR experiencing much lower levels of vehicle flow than the former A1 and therefore improving the quality of the route for NMUs.

**Figure 6.1 NMU Facility between the LAR (left) and A1(M) (obscured to the right)**



- 6.14. Sustrans' National Cycle Route 6 (Manchester to Spurn Head via Leeds) passes along the NMU facility between A1(M) Junction 44 and Bramham. Sustrans were contacted to ascertain their view of the facility, with largely positive responses received. It was noted that the route is poorly signed, with locals often not being aware of its existence. As such, improvement to the route signage was suggested.
- 6.15. One issue noted concerning the cycle facilities is the lack of a direct link between the NMU facility running alongside the LAR and Freemans Way, east of Wetherby. The failure to connect the NMU facility with Freemans Way appears to be a missed opportunity to further enhance cycle connectivity across the area.



- 6.16. Facilities for equestrians crossing Wattle Syke Roundabout along the LAR are also provided, in the form of corrals for equestrians waiting to cross, as shown in Figure 6.2. Further discussion of equestrian facilities is provided in Section 5.157.

**Figure 6.2 Corral for Equestrians Crossing the LAR at Wattle Syke Roundabout**



## Integration

- 6.17. The integration objective consists of two main elements:
- Interchange with other transport modes: how the scheme assists different modes of transport in working together and the ease of people moving between them to choose sustainable transport choices.
  - Land Use Policy and Other Government Policies: how the scheme integrates with local land use and wider government objectives.

## Transport Interchange

- 6.18. The AST stated that the scheme did not include any interchange between different modes of transport. As such, the assessment was scored as 'neutral'.

## Evaluation

- 6.19. The scheme did not involve any alterations to transport interchange options. Therefore, the AST assessment score of 'neutral' can be upheld.

## Land Use Policy

### Forecast

- 6.20. The AST stated:

*The scheme is of national importance (supports Planning Policy Statements 1, 11 and 13), is recognised as being regionally important within the Regional Spatial Planning framework...and is strategically important in a local context (supports policies in the Leeds Unitary Development Plan and Selby District Local Plan)...*

- 6.21. Overall, the land use policy sub-objective was scored as 'neutral'.

### Evaluation

- 6.22. An evaluation of the scheme in relation to policy has been undertaken and is summarised in Table 6.1 on the following page. This evaluation shows that the scheme is in alignment with local, regional and national land use policy. Given this, it is considered that the impact of the scheme on land use policy integration is beneficial.

## Key Points

### Accessibility Impacts

- There is no evidence to suggest that the scheme has impacted on the provision of public transport links, though anecdotal comments from a local bus operator suggest that the LAR has improved service reliability.








### Access to the Transport System

- The scheme included a NMU facility, provided alongside the LAR, with provision for pedestrians, cyclists and equestrians.
- Sustrans cycling group provided largely positive comments in regards to the facility, but noted the need for improved signage.
- The failure to connect the NMU facility with Freemans Way appears to be a missed opportunity to further enhance cycle connectivity across the area.

### Integration Impacts

- The scheme is aligned with local, regional and national land use policy that was current at the time of scheme appraisal.

**Table 6.1 Scheme Alignment with National Regional and Local Policy**

	<b>Policy/Document</b>	<b>Relevant Policy Objective/Reference</b>	<b>Relevant Scheme Impacts</b>	<b>Alignment</b>
<b>Local and Sub-Regional Policies</b>	<b>Leeds Unitary Development Plan (UDP) (2001)</b>	The Leeds UDP set out the local planning policies in place at the time of scheme appraisal in Leeds, within which the majority of the scheme lies. The UDP identified the need for strategic highway network improvements, including the scheme itself.	<ul style="list-style-type: none"> <li>• The delivery of the scheme is in line with the UDP and thereby supports the city's development plan.</li> </ul>	
	<b>Selby District Local Plan</b>	The Selby District Local Plan set out the local planning policies in place at the time of scheme appraisal in Selby district, within which a small part of the scheme lies. The plan acknowledges the strategic importance of the A1(M) and the need to upgrade the road where traffic is in excess of capacity.	<ul style="list-style-type: none"> <li>• The scheme has been delivered in accordance with the Local Plan.</li> </ul>	
<b>Regional Policy</b>	<b>Regional Planning Guidance for Yorkshire and the Humber (RPG12) (2003)</b>	RPG12 sets out the strategic development objectives for Yorkshire and the Humber up to 2016, with a key objective of promoting sustainability. The scheme is acknowledged within RPG12 as being of strategic importance to the region in terms of economic growth and further expansion of the Trans European Network. The guidance includes general aims of improving safety and capacity, and in delivering multi-modal approaches to transport.	<ul style="list-style-type: none"> <li>• Delivery of the scheme is in line with the RPG12 guidance, supporting the local and regional economy.</li> <li>• Safety on the scheme's key links has improved, with a 31% reduction in collisions when considering the background reduction in collisions.</li> <li>• The scheme has improved the capacity of the road network.</li> <li>• The scheme has provided a LAR and NMU facility, thereby promoting active modes of transport.</li> </ul>	
<b>National Policy</b>	<b>A New Deal for Trunk Roads in England (1998)</b>	The Government's overarching objectives for transport at the time the scheme was developed include policies to: <ul style="list-style-type: none"> <li>• Protect and enhance the built and natural environment.</li> <li>• Improve safety for all travellers.</li> <li>• Contribute to an efficient economy, and to support sustainable economic growth in appropriate locations.</li> <li>• Promote accessibility to everyday facilities for all, especially those without a car.</li> <li>• Promote the integration of all forms of transport and land use planning, leading to a better, more efficient transport system.</li> </ul>	<ul style="list-style-type: none"> <li>• The scheme has improved road safety along the key links.</li> <li>• The scheme promotes access for NMUs through the provision of the LAR and a NMU facility along the route of the A1(M).</li> </ul>	
	<b>Planning Policy Statement 1 – Delivering Sustainable Development (2005)</b>	Establishes the principle of promoting sustainable development and the role of the development plan to provide a framework within which to deliver sustainability through the planning process. Dictates that Local Planning Authorities are required to produce development plans, establishing the principle of the "plan led system" in England and Wales.	<ul style="list-style-type: none"> <li>• The scheme is in accordance with the principles outlined in PPS1, and is included in the relevant Development Plan as set out in PPS1.</li> <li>• The LAR and NMU facility promotes sustainable modes of transport.</li> </ul>	
	<b>Planning Policy Statement 11 - Regional Spatial Strategies (2004)</b>	Sets out the establishment of Regional Spatial Strategies.	<ul style="list-style-type: none"> <li>• The scheme is in line with regional policy.</li> </ul>	
	<b>Planning Policy Guidance 13 – Transport (2001)</b>	Identifies the need to provide transport infrastructure which allows for continuing economic growth and sets the framework for local transport plans. The adoption of safe and easy access to local and rural services is promoted, particularly for walking and cycling (paragraph 20).	<ul style="list-style-type: none"> <li>• The scheme was developed in line with PPG13.</li> <li>• The scheme provides safe and easy access for NMUs.</li> </ul>	

## 7. Appraisal Summary Table & Evaluation Summary Table

### Appraisal Summary Table

- 7.1. The AST is a brief summary of the main economic, safety, environmental and social impacts of a highway scheme. Table 7.1 presents the AST for the A1(M) Bramham to Wetherby scheme.
- 7.2. The AST presents a brief description of the scheme, a statement detailing the problems that the scheme planned to address, and makes an assessment of the scheme's predicted qualitative and quantitative impacts against the following core DfT objectives for transport:
- **Environment** – an estimate of the impact of the scheme on factors such as noise, local air quality, landscape, biodiversity, and water.
  - **Safety** – measured reduction in the number and severity of collisions and qualitative assessment of impacts on security.
  - **Economy** – Estimated impact of the scheme upon journey times, vehicle operating costs, scheme costs, journey time reliability and wider economic impact.
  - **Accessibility** – A review of scheme impact upon access to the public transport network, community severance, and non-motorised user impact.
  - **Integration** – A description of how a scheme is integrated with wider local planning, regional and national policy objectives.

### Evaluation Summary Table

- 7.3. The EST was devised for the POPE process to record a summary of the outturn impacts against the DfT's objectives for transport, compared to the predictions in the AST.
- 7.4. Drawing on the results presented in this report, Table 7.2 presents the EST for the scheme. An assessment of each of the objectives at the FYA stage is given. Where possible, the format of the EST mirrors the appearance and process of the AST to enable direct comparison between the two.

Table 7.1 Appraisal Summary Table (2006)

Objective	Sub-Objective	Qualitative Impacts	Quantitative Impacts	Assessment
Environment	Noise	Increase in population annoyed is mainly in Wetherby and along local roads, due to the reopening of the former A1 (closed under the Wetherby-Walshford scheme) as the local access road (LAR). 337 people exposed to 70dB or more; such increases cannot be mitigated due to nature of roads, trade-offs with visual amenity (of same properties) and distance from road. 230 properties in Bramham and 101 in Wetherby would experience noise reductions due to mitigation proposals.	Overall, 587 annoyed with Do-Minimum 597 annoyed with Do Something	Estimated population annoyed by noise will increase by 10 with the scheme
	Local Air Quality	A slight increase in long term concentrations of PM10 and NO2 but these are not significant at any property. There are no predicted breaches of AQS objective concentrations for NO2 or PM10 (40µg/m3 as an annual mean) at any properties.	No. properties worse off = 548 (NO2) 569 (PM10); No. properties better off = 46 (NO2) 25 (PM10)	Aggregate PM10 = -480 Aggregate NO2 = -878
	Greenhouse Gases	Scheme would result in an increase of 1% (12000 tonnes) in CO2 in Opening Year 2008.	883600 tonnes of CO2 with DM 895600 tonnes of CO2 with DS	+ 12000 tonnes CO2
	Landscape	Minor loss of land from the edge of 1 Special Landscape Area (SLA) but no long-term effects on the overall character. Residual adverse visual effects on 2 areas used for public amenity. Landscape design would provide some benefits for PRoW users. In winter Y15 there would be moderate adverse impact in visual amenity on 1 property, slight adverse impact on 123 properties (many due to lighting on the LAR), negligible/no change to 250 and slight benefits for 154.	Not applicable	Slight adverse
	Townscape	Beneficial effects at Wetherby due to the introduction of gateway features at three locations, planting improvements and the closure of the York Road junction outweigh the slight impact on the eastern fringe of Wetherby from the wider road corridor and the addition of lighting to part of the LAR.	Not applicable	Slight beneficial
	Heritage of Historic Resources	The scheme would damage locally (battle site, historic parkland) and regionally (Wattle Syke) significant heritage features (specifically buried archaeological remains) for which adequate mitigation can be specified. No remains of national significance are present.	Not applicable	Slight adverse
	Biodiversity	Loss of hedges, trees, ponds, watercourse habitat and grassland of importance in a local context would be replaced but like for like replacement cannot be guaranteed. No significant effects on any legally protected species have been identified. Approximately 15% of grassland would be managed as conservation grassland. Recently disturbed land will be checked for the legally protected species thistle broomrape and, if found, soil would be relocated to new verges.	Not applicable	Slight adverse
	Water	Short sections of new culvert would be unavoidable, resulting in residual adverse impacts as a result of loss of natural aspects of 2 watercourse corridors. Perceived risk on conveyance of flood flows in the R. Wharfe would be addressed by provision of additional balancing ponds. Spillage risk would decrease due to closure of 3 junctions	Not applicable	Neutral
	Physical Fitness	The network is currently not well used, largely because it is unsafe, poorly maintained and disjointed. The proposals include new bridleways and cycle paths, improved amenity and better links for all NMUs to the wider PRoW network, thus increasing the opportunities for leisure. There is potential for benefits, for the communities of Bramham, Wetherby, Clifford and Boston Spa.	Not applicable	Neutral
	Journey Ambience	Reduced congestion, improved highway and fewer junctions would reduce driver stress. Landscape proposals will improve views from road and help create a sense of place. The AADT for the A1 is around 55,000.	Not applicable	Moderate beneficial

Objective	Sub-Objective	Qualitative Impacts	Quantitative Impacts	Assessment
Safety	Collisions	Upgrading to motorway standard and rationalisation of junctions will produce safety benefits (note the economic assessment forecasts an increase in slight casualties based on the COBA default of 1.467 slight casualties for a motorway accident compared to 1.312 slight casualties on D2AP)	Reduction of 666 to 872 accidents; Fatal: 15 to 19; Serious: 128 to 164; Slight: 790 to 1033	PVB £36.4M to £46.3M
	Personal Security	Emergency telephones are to be installed but no new surveillance, other than what is provided as part of the D-D DBFO project.	Not applicable	Slight beneficial
Economy	Public Accounts		BCR (indirect tax revenue as positive benefit) = 4.8 to 17.0	
	Transport Economic Efficiency	Savings in journey times. Vehicle operating costs increase because of increased fuel consumption through high speeds but this will create additional indirect taxation revenue for the Government which will reduce the net scheme cost. Unlike the greenhouse gas calculation, this calculation of fuel consumption does not take account of the shorter journey distances.	297,000 to 303,000 vehicle-h; 0.95 to 1.06 min reduction, peak journey time; 0.31 min reduction, off-peak journey time in opening year	Consumer Benefits: £98.0M to £394.5M Business Benefits £135.8M to £509.8M
	Reliability	Upgrading to motorway standard will reduce congestion and improve journey reliability	Stress on Wetherby section reduced 113% to 71% in open year	Large Beneficial
	Wider Economic Impacts	Scheme is not in a designated regeneration area, nor are there any significant developments dependent on the upgrading of the A1.	Not applicable	No
Accessibility	Option Values	Scheme will allow existing public transport links to be maintained and in some areas potentially improved	Not applicable	PVB £0m
	Severance	Slightly longer journey times for pedestrians but the segregated NMU facility would improve the amenity of public rights of way and result in a reduction in severance from the baseline by linking more safely into the wider PRoW network. No new severance is predicted. Consultation results suggest some suppressed demand, but this has not been quantified.	Not applicable	Slight benefit
	Access to the Transport System	Scheme does not include proposals for public transport nor does it directly affect access to existing public transport with the A1 corridor	Not applicable	Not applicable
Integration	Transport Interchange	Scheme does not include for any interchange between different modes to transport.	Not applicable	Not applicable
	Land-use Policy and Other Government Policies	The scheme is of national importance (supports PPS1, 11 and 13), is recognised as being regionally important within the Regional Spatial Planning framework (supports RPG12) and is strategically important in a local context (supports policies in the Leeds UDP and Selby District Local Plan). NMU and LAR foster the use of sustainable modes of transport. Neutral effect on all other policies. Potential for more convenient car journeys hinders healthy lifestyle policies, but balanced by provision of NMU and LAR, which promote healthy lifestyles (by encouraging non-motorised modes of transport) and social inclusion (by reducing community severance).	Not applicable	Not applicable

Table 7.2 Evaluation Summary Table

Objective	Sub-Objective	Qualitative Impacts	Quantitative Impacts	Assessment
Environment	Noise	Observed AADT flows on the upgraded A1(M) for 2014 are broadly in line with expectations. It is therefore considered that the noise climate along the upgraded A1(M) is likely to be as expected. AADT traffic flows on the LAR in 2014 are significantly lower than forecast. It is therefore considered that the noise climate along the LAR is likely to be better than expected.		A1(M) - As expected LAR – Better than expected
	Local Air Quality	With traffic flows on the A1(M) and LAR being lower than expected, pollutant concentrations are also likely to be lower than expected at properties near the scheme. As such the impact of the scheme on local air quality is likely to be better than expected.		Better than expected
	Greenhouse Gases	Observed carbon emissions have increased by 4% between the DM and DS scenarios, equivalent to 1,206 tonnes of carbon. This is lower than the re-forecast growth in emissions of 13% between the DM and DS scenarios. This difference can be explained by lower than forecast traffic flows on the A1(M) and LAR. As such, the impact of the scheme of greenhouse gas emissions is better than expected.	Net increase in emissions of 1,206 tonnes	Better than expected
	Landscape	Overall, that the landscape and visual impacts of the scheme are likely to be broadly as expected, although there are locations where the performance of the plant stock is considered to be less than satisfactory, and the planting along the environmental fence north of Farfield House has not been implemented.		Broadly as expected (slight adverse)
	Townscape	There is no reason to suggest that townscape impacts are anything other than as expected.		As expected (slight beneficial)
	Heritage of Historic Resources	Comments from English Heritage and West Yorkshire Archaeology Advisory Service indicate that the impact of the scheme on the heritage of historic recourses was as expected. Leeds City Council stated that that scheme has had limited visual impact on the setting of built heritage.		As expected (slight adverse)
	Biodiversity	It is considered that the effects of the scheme on protected and notable species are likely to be as expected. In terms of habitat enhancement, it is considered that the planting proposals are broadly developing in line with the ecological mitigation proposals. However, the establishment and performance of a number of marginal/tree and shrub planting plots has likely not been realised to the extent expected at this stage. However, these areas of poor performance broadly lie within the individual plots and being relatively localised, are not considered to significantly contribute to the predicted slight adverse ecological impact of the scheme overall.		Broadly as expected (slight adverse)
	Water	There is no conclusive evidence to suggest that the drainage system is not functioning as intended, and wetland areas are likely being maintained such that access to the ponds/Pollution Control Devices is facilitated. Vegetative treatment systems (rushes) appear to have generally established well where planted (Sandbeck Balancing pond excepted).		Generally as expected (neutral)
	Physical Fitness	NMU facilities are generally well maintained and capable of performing as expected. However, the dedicated equestrian crossing point on the LAR just to the north of Wattle Syke Roundabout may not be benefiting the equestrian community to its full extent. The majority of issues raised at the OYA stage appear to have been addressed.		Generally as expected (neutral)
	Journey Ambience	The overall effects of the scheme on traveller care and traveller views are broadly as expected on the A1(M) and LAR. Faded road markings at the Wattle Syke roundabout and missing/damaged demarcation posts on the slitter island/verge at the lay-by on the LAR between Wattle Syke and Wetherby are considered unlikely to have a beneficial impact on traveller stress and as such, the effect of the scheme on this aspect of journey ambience is considered likely to be worse than expected.		Traveller Care/Traveller Views: Generally as expected (moderate beneficial) Traveller Stress: Worse than expected (moderate beneficial)
Safety	Collisions	There has been a statistically significant reduction in collisions along the scheme section (A1(M) and the local access road), equivalent to a saving of 5 personal injury collisions (PICs). Fatal collisions within the scheme area have fallen by 60%.	33% reduction in PICs across the scheme area when factoring in the background reduction in collisions	£18.2m 60 year benefit
	Personal Security	Emergency telephones have been provided along the A1(M). Such phones are considered to provide a slight security benefit for road users in emergency situations on the hard shoulder.		As expected (slight beneficial)
Economy	Public Accounts		BCR (indirect tax revenue as a cost) = 1.2 BCR (indirect tax revenue as a benefit) = 1.1	Lower than expected as TEE and safety benefits are lower than forecast.

Objective	Sub-Objective	Qualitative Impacts	Quantitative Impacts	Assessment
	Transport Economic Efficiency	Journey time benefits lower than forecast due to lower than expected traffic flows and journey time savings.	Outturn journey time benefit: £54.0m.	Worse than expected (beneficial)
	Reliability	Upgrading the A1(M) J44-46 to motorway standard and widening to three lanes has improved journey reliability	Route stress on A1(M) J44-46 has reduced from 84% to 75% (adjusted, unadjusted rate has fallen 84% to 60%).	As expected (large beneficial)
	Wider Economic Impacts	No specific developments have come forward as a result of the scheme. There is no evidence to support any other conclusions that as forecast (neutral).		As expected (neutral)
Accessibility	Option Values	There is no evidence to suggest that the scheme has impacted on the provision of public transport links, though comments from a local bus operator suggest that the local access road had improved service reliability.		As expected (no impact)
	Severance	Though upgrading the A1 to motorway standard prohibits its use by non-motorised users (NMUs), the local access road and a segregated track running alongside it provide full access for cyclists, pedestrians and equestrians. An opportunity has been missed to link the NMU facility with a cycle route along Freemans Way.		As expected (slight benefit)
	Access to the Transport System	The scheme did not specifically include any proposals relating to public transport.		As expected (no impact)
Integration	Transport Interchange	The scheme did not involve any alterations to transport interchange options.		As expected (no impact)
	Land-use and Other Gov't Policies	The scheme is in alignment with local, regional and national land use policy, supporting objectives to improve road safety and improve connectivity		As expected (no impact)



## 8. Conclusions

### Scheme Specific Objectives

- 8.1. Table 8.1 presents an evaluation of the scheme's objectives using the evidence presented in this study.

**Table 8.1 Success against Scheme Objectives**

Objectives Source: Statement of Case (2005), Environmental Statement (2005) and AST (2006)	Objective achieved?	
Reduce accidents and reduce congestion caused by the transition from dual three lane all purpose (D3AP) standard to dual two lane all purpose (D2AP) standard around Wetherby.	There has been a reduction in collisions within the scheme area since opening.	✓
Provide an upgraded section of motorway consistent with adjoining sections in Yorkshire which will become a high standard transport link between the north and south of England on the eastern side of the Pennines.	The scheme has successfully upgraded the former A1 between Bramham and Wetherby to motorway standard, being consistent with adjoining section of route and improving north-south connectivity.	✓
Deliver an environmentally acceptable scheme that protects and enhances the built and natural environment, and that minimises and mitigates any significant environmental impacts to an acceptable level.	The environmental impacts of the scheme are generally as expected.	✓
Create savings in journey times.	The scheme has reduced journey times, although the saving is lower than expected.	✓
Reduce congestion and improve journey reliability.	Journey reliability, as measured by the CRF, has improved as a result of the scheme.	✓
Provide improved facilities for pedestrians and cyclists to reduce severance and create potential to improve physical fitness.	Facilities for NMU's are generally well maintained and capable of performing as expected.	✓

# Appendices

# **Appendix A. Annual Average Weekday Traffic and Annual Average Daily Traffic Flows**

Table A.1 Traffic Flows<sup>1</sup>

Site	Location	Annual Average Weekday Traffic					Annual Average Daily Traffic				
		Pre-scheme (2007)	OYA (20010)	FYA (2014)	Pre Scheme to FYA Change	Pre Scheme to FYA % Change	Pre-scheme (2007)	OYA (20010)	FYA (2014)	Pre Scheme to FYA Change	Pre Scheme to FYA % Change
1	A658 Harrogate Southern Bypass	13,500	13,900	14,600	1,100	8%	12,900	13,000	14,100	1,200	9%
2	A661 York Road	4,900	5,600	6,000	1,100	22%	4,800	5,400	5,700	900	19%
3	A61, south of A658	16,800	15,200	15,800	-1,000	-6%	15,800	14,100	15,100	-700	-4%
4	Linton Road, Wetherby	4,400	4,300	4,700	400	9%	4,200	4,100	4,500	300	7%
5	A659, east of Harewood	11,500	13,000	11,000	-500	-4%	10,700	12,200	10,800	0	-
6	A58, south of Scarcroft	12,100	11,000	10,700	-1,500	-12%	11,400	10,400	10,200	-1,200	-10%
7	A64 York Road, east of Seacroft	21,500	20,400	19,300	-2,200	-10%	20,600	19,600	18,200	-2,300	-11%
8	LAR - A168 Hudson Way, north of York Road	0	3,500	4,000	4,000	-	0	3,200	3,600	3,600	-
9	A661, south of Spofforth	12,600	10,500	11,700	-800	-7%	11,900	9,700	11,200	-700	-6%
10	A661, north-west of Wetherby	12,500	11,600	11,800	-700	-5%	11,800	11,100	11,100	-600	-5%
11	A661 Wetherby Bridge	24,700	21,600	20,700	-3,900	-16%	23,600	20,800	20,100	-3,600	-15%
12	A58, south-west of Wetherby	13,800	11,200	10,600	-3,200	-23%	13,100	10,800	10,400	-2,700	-20%
13	LAR - Westwood Road, north-west of Bramham	0	3,000	3,200	3,200	-	0	2,800	3,000	3,000	-
14	LAR - A168 Hudson Way, north of Sandbeck Lane	0	3,800	4,200	4,200	-	0	3,400	3,700	3,700	-
15	B1224 Walton Road	7,400	4,600	6,100	-1,400	-18%	6,800	4,400	5,700	-1,100	-17%
16	LAR - A168 Boston road, north of A659 (LAR)	0	17,600	18,300	18,300	-	0	16,500	17,000	17,000	-
17	A1(M) J45-46, Grange Moor (A659) to Wetherby Grange (A58) <sup>2</sup>	95,800	78,900	80,600	-15,300	-16%	89,200	73,600	75,200	-14,000	-16%
18	B6164 Deighton Road	7,900	7,600	7,300	-600	-7%	7,600	7,500	7,100	-600	-7%
19	A659, west of roundabout with A1(M)	11,500	11,300	11,500	0	-	10,700	10,700	11,000	300	3%
20	Thorner Road, west of Bramham	2,700	3,800	2,200	-500	-19%	2,400	3,300	2,000	-400	-15%
21	A1(M) J44-45	96,200	93,700	96,100	-100	0%	89,500	86,800	88,800	-600	-1%
22	A1(M) J43-44	121,900	124,600	128,300	6,400	5%	114,700	116,300	119,300	4,600	4%
23	A1(M) J46-47	77,400	76,400	78,500	1,100	1%	72,400	71,400	73,300	900	1%
24	B1224 Link, west of A1(M)	6,000	7,200	6,900	900	15%	5,200	6,600	6,200	1,000	18%

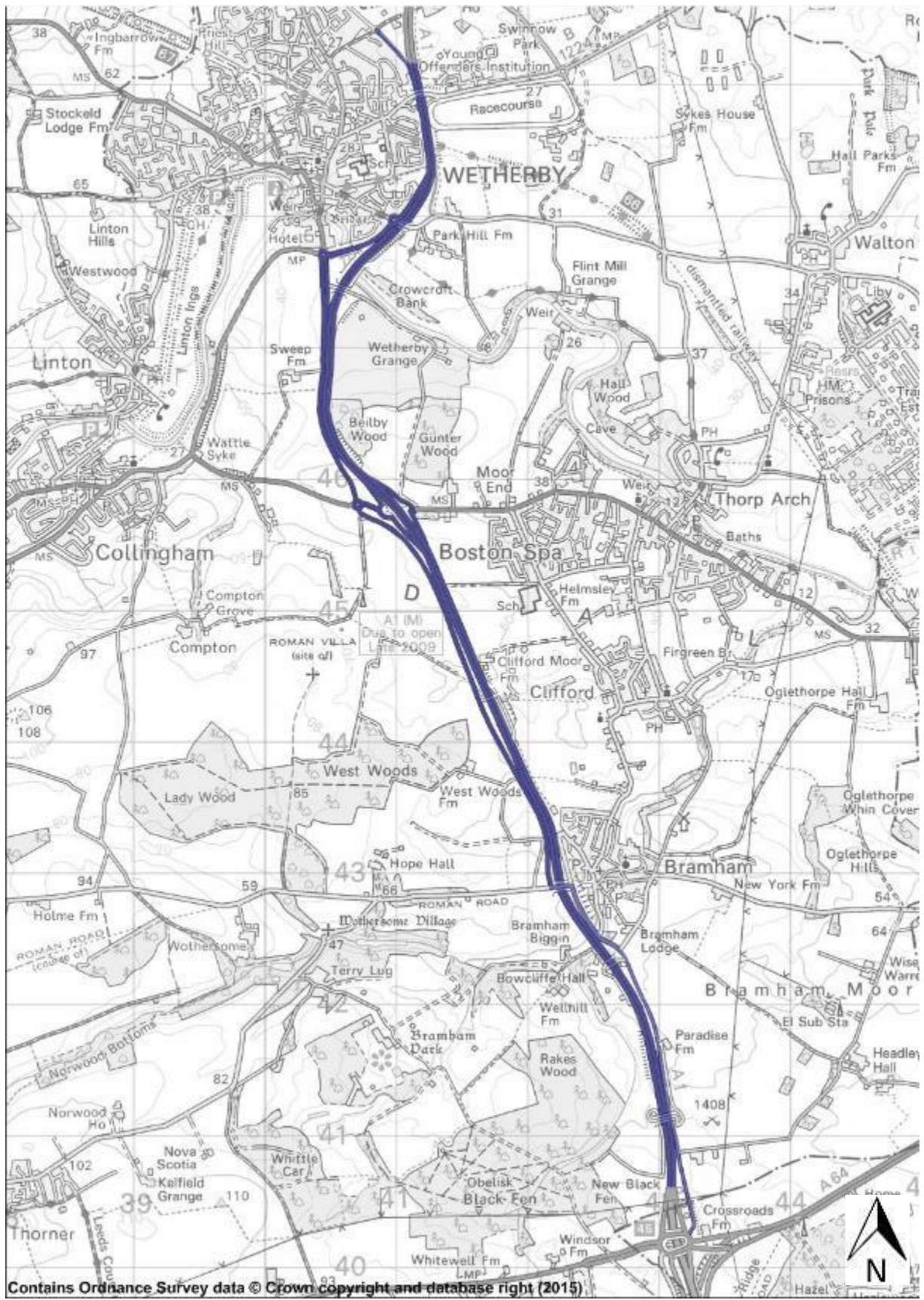
<sup>1</sup> Figures are rounded to the nearest hundred.

<sup>2</sup> A1 Wetherby Grange junction was closed as part of the scheme

Post Opening Project Evaluation  
A1(M) Bramham to Wetherby Five Years After Opening Study

Site	Location	Annual Average Weekday Traffic					Annual Average Daily Traffic				
		Pre-scheme (2007)	OYA (20010)	FYA (2014)	Pre Scheme to FYA Change	Pre Scheme to FYA % Change	Pre-scheme (2007)	OYA (20010)	FYA (2014)	Pre Scheme to FYA Change	Pre Scheme to FYA % Change
25	LAR - A168 Privas Way, south of Walton Road	0	9,600	11,400	11,400	-	0	8,800	10,100	10,100	-
26	Windmill Road, north of Bramham	400	400	500	100	30%	400	400	500	100	30%
27	Toulston Lane, east of Bramham	1,800	1,300	1,600	-100	-8%	1,600	1,200	1,500	-100	-8%
28	LAR - Paradise Way, south of Bramham	0	3,600	4,000	4,000	-	0	3,300	3,600	3,600	-
29	A168 Great North Road	3,800	3,300	3,500	-300	-7%	3,300	3,000	3,200	-100	-2%
30	Bridge Road, Thorpe Arch	3,200	3,700	4,000	800	24%	3,000	3,300	3,600	600	21%
31	A659, east of Boston Spa Junction	12,600	11,200	12,600	0	-	11,800	10,500	12,100	300	2%
32	A64, east of A1(M) J44	48,600	50,600	53,500	5,000	10%	46,700	48,200	51,200	4,500	10%
33	Rudgate, west of Tockwith	3,000	3,200	3,200	300	9%	2,600	2,700	2,700	100	5%
34	B1224 Link, south-east of A1(M)	4,000	3,500	4,000	0	-	3,800	3,400	3,700	-100	-2%
35	B1224 York Road, Wetherby	7,000	6,800	7,300	300	4%	6,600	6,500	6,900	300	4%
36	Springs Lane, Walton	900	800	800	-100	-11%	800	700	700	-100	-14%
37	A659 Wetherby Road, Tadcaster	5,300	2,400	4,800	-500	-9%	5,000	2,200	4,600	-400	-7%
38	A659 Leeds Road, Tadcaster	7,100	2,200	6,800	-300	-4%	6,200	1,900	6,100	-200	-3%
39	A162, south of A64	7,500	10,000	9,900	2,400	32%	7,000	9,400	9,500	2,400	35%
40	A64 between A659 and A162	43,700	45,300	47,600	4,000	9%	42,600	43,500	46,900	4,300	10%
41	A1(M) J45-46, Wetherby Grange (A58) to Kirk Deighton (B1224)	81,100	78,900	80,600	-500	-1%	75,500	73,600	75,200	-300	0%
42	LAR - A168 Privas Way, north of Walton Rd	0	5,600	6,700	6,700	-	0	5,100	6,000	6,000	-
43	Walton Road, East of the A1	8,500	7,000	7,300	-1,200	-14%	7,600	6,200	6,800	-800	-10%

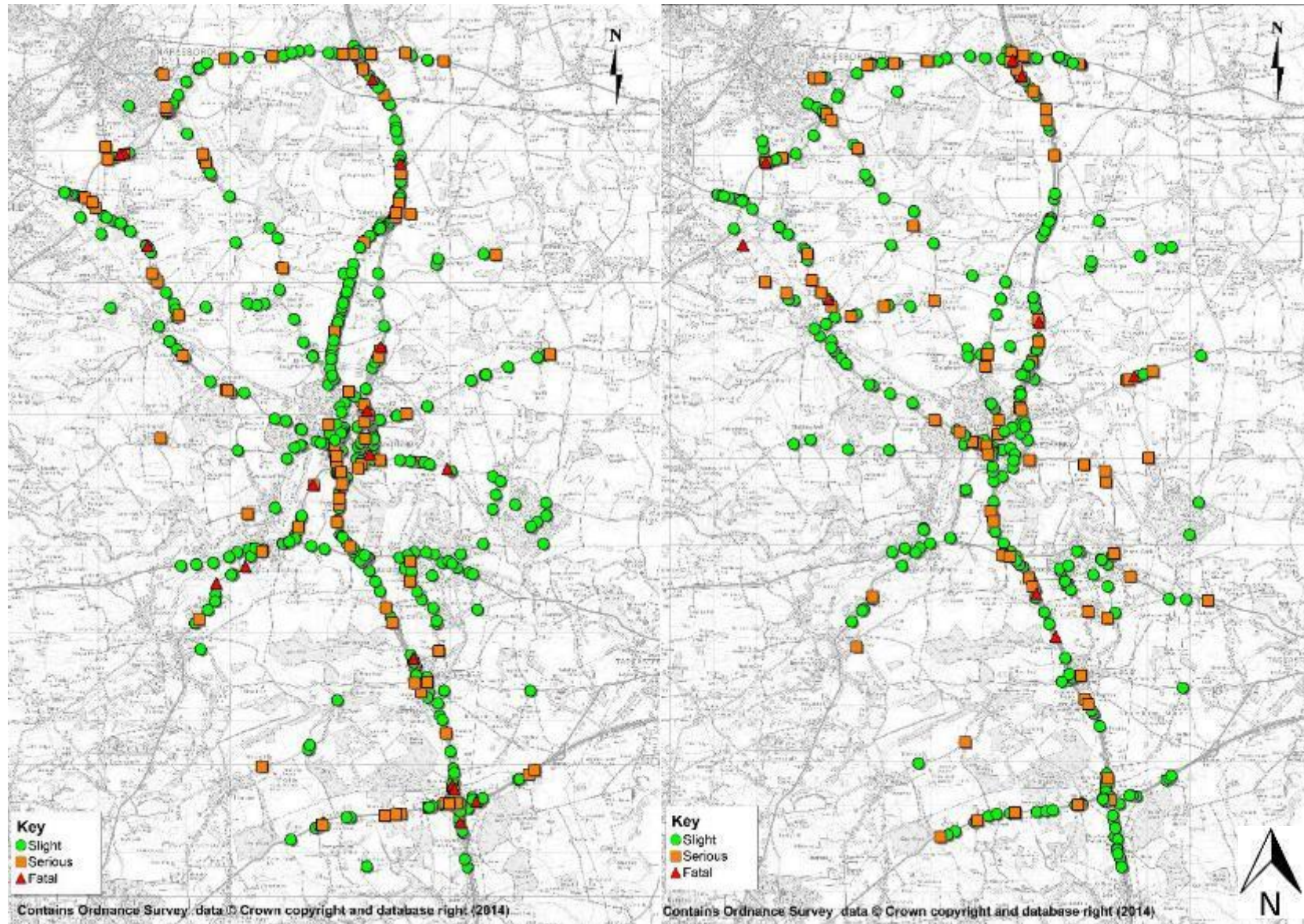
# Appendix B. Key Links Collision Analysis Area



Contains Ordnance Survey data © Crown copyright and database right (2015)

# Appendix C. COBA Model Area Collision Plots

Figure C.1 Location of Collisions in the Pre-Scheme (left) and Post-Scheme (right) periods





## Appendix D. Data Requested for the Environment Evaluation

Table D.1 Information requested to evaluate the environmental sub-objective

Environment Specific Requirements	OYA Response	FYA Response
Environment Statement (ES) or Stage 3 Scheme Assessment Report (SAR) or Environmental Assessment Report (EAR) including Environmental Masterplan (EMP) drawings.	A1 Bramham to Wetherby Upgrading Scheme Environmental Statement January 2005 Volumes 1 (text) & 2 (appendices and figures).	Received at OYA.
AST	AST (2006)	Received at OYA.
Any amendments / updates, additional surveys or reports since the ES / SAR / EAR. Have there been any changes to the scheme since the ES / SAR / EAR e.g. to lighting and signs, retention of material on site in earthworks in the form of landscape bunds or other, or to proposed mitigation measures.	Environmental Report on Changes to Design at Wetherby Grange Bridge and Walton Road, including: Wetherby Grange Bridge constructed off-line with amendments to NMU route and balancing pond location. Design change to Walton Road Bridge approach roads in order to improve visibility, improve access to Park Hill Farm, reduce land take at Rose Dene Farm and improve NMU route.	No additional information received at FYA.
As built drawings for landscape/ biodiversity/ environmental mitigation measures/ drainage/ fencing/ earthworks etc.	Landscape and Ecological Design Drawings Ecological Design Drawings Areas of Environmental Significance	Received at OYA as noted.
Construction Environment Management Plan (CEMP), Landscape and Ecology Aftercare Plan (LEAP), Landscape Management Plan (LMP) or Handover Environmental Management Plan (dHEMP).	Handover Environmental Management Plan	dHEMP (Nov 2010) received at OYA.
Health and Safety File – Environment sections (to include all environment As-Built reports).	-	-
Relevant Contact Names for consultation.	Provided.	Received at OYA.
Archaeological Reports (popular and academic).	Not provided. The post excavation report was still in preparation.	Available for online purchase from the Archaeological Services WYAS website.
The Road Surface Influence (RSI) value of any low noise surface installed.	Not received.	Not received.

Environment Specific Requirements	OYA Response	FYA Response
The insulation performance properties of any noise barriers installed (The BS EN 1794-2 result provided by the noise barrier manufacturer).	Not received.	Not received.
List of properties eligible for noise insulation.	Not received.	Not received.
Employers Requirements Works Information - Environment sections.	Not provided.	Not provided.
Reports for any pre/ post opening survey and monitoring work e.g. for noise, biodiversity, water quality).	Bat Box Monitoring 2010.	No additional information received at FYA.
Animal mortality data.	Provided.	No additional information received at FYA.
Pre or Post opening Non-motorised User (NMU) Audits or Vulnerable User Surveys.	Copy of post opening Non-motorised User Survey provided.	No additional information received at FYA.
Information may be available regarding environmental enhancements to streetscape/ townscape for bypassed settlements	-	-
Scheme Newsletters / publicity material/ Award information for the scheme.	-	HA press releases received.

# **Appendix E. Environmental Photographic Record of the Scheme**

**OYA Figure 5.1: View from Paradise Farm entrance**

**Figure E.1 View from Paradise Farm entrance at OYA (March 2011)**



**Figure E.2 View from Paradise Farm entrance at FYA (September 2014)**



The OYA noted that the combination of the upgraded road and the adjoining side roads had increased the visual perception of the road and to a limited degree, exacerbated the impact of the existing road on the character, landform and scale of the landscape. However, the opportunity for landscape enhancement provided by the LAR and the NMU route has provided an opportunity for landscape enhancement in the form of mitigation planting, which is now helping to screen the scheme, in particular the gantry at this location, and integrate the earthworks within the local landscape and reducing the impact of the scheme overall.

**Figure E.3** Bat boxes installed in retained trees near to Clifford Moor Ecological Pond at OYA (March 2011)



**Figure E.4** Bat boxes installed in retained trees near to Clifford Moor Ecological Pond at FYA(September 2014)



The Bat Box Monitoring Report (Final Visit), October 2010, concluded that as evidence of use by bats had been recorded at all four locations where the bat boxes had been located, this indicated that the boxes had been placed in good locations near good habitats. The report stated that this underlined the value of providing boxes as mitigation for loss of trees with potential for use as roosts, and that the identification of a number of different species found using the boxes within three years of installation underlined the value of providing a range of different types of boxes to appeal to a number of different species. The FYA site visit found that bat boxes had been installed as expected.

**Figure E.5 Park Hill Farm Ecological Pond at OYA (March 2011)**



**Figure E.6 Park Hill Farm Ecological Pond at FYA (September 2014)**



Unlike the OYA site visit, the FYA site visit observed that with the exception of Sandbeck Balancing Pond, marginal plantings are now generally establishing well and coverage is as specified by the HEMP; minimal algae were observed and despite the encroaching thistles at the southern corner of the pond, there is no reason at FYA to suggest that these landscape elements are not being managed in accordance with the dHEMP and will not achieve their design functions by design year subject to ongoing management and maintenance.

**Figure E.7 Looking northeast towards the A1 from Laneside Farm entrance gate before scheme construction (circa 2005)**



**Figure E.8** Looking northeast towards the A1(M) from Laneside Farm entrance gate at OYA (March 2010)



**Figure E.9** Looking northeast towards the A1(M) from Laneside Farm entrance gate at FYA (September 2014)



Views to the A1(M) are available, although replacement planting, combined with existing planting, has resulted in very little visual change and is absorbing and integrating the scheme into the landscape; however, the signing remains visible.



**Figure E.10** View from junction of Walton Road and the LAR to the eastern edge of Wetherby, looking south before scheme construction (circa 2005)



**Figure E.11** View from junction of Walton Road and the LAR to the eastern edge of Wetherby, looking south at OYA (March 2010)



**Figure E.12** View from junction of Walton Road and the LAR to the eastern edge of Wetherby, looking south at FYA (September 2014)



Deciduous woodland and individual tree planting adjacent along the southbound carriageway of the LAR, just southeast of Walton Road Roundabout, is establishing well and starting to perform the landscape integration functions for which they were intended and as required by the ES; as such, the planting is currently considered to be on track to meet the requirements of the ES.

**Figure E.13** View from Freemans Way looking east towards the A1 before scheme construction (circa 2005)



**Figure E.14 View from Freemans Way looking east towards the A1(M) at OYA (March 2010)**



**Figure E.15 View from Freemans Way looking east towards the A1(M) at FYA (September 2014)**



There is very little visual change since the construction of the shared use cycle track alongside the LAR. Comments from consultation noted that although the new NMU routes linked up with the existing to increase the number of routes available and provide benefit to walkers and cyclists, there is no link between the shared use cycle track alongside the LAR and Freemans Way.

**Figure E.16** Looking south from Walton Road towards Park Hill Farm before scheme construction (circa 2005)



**Figure E.17** Looking south from Walton Road towards Park Hill Farm at OYA (March 2010)



**Figure E.18** Looking south from Walton Road towards Park Hill Farm at FYA (September 2014)



Tree and shrub planting was generally considered by the OYA study to be establishing satisfactorily and at FYA, the site visit observed that plants within the tree and shrub plots were generally establishing well throughout the scheme and are beginning to perform the visual screening and landscape integration functions for which they were intended.

# Appendix F. Long Term Environmental Management and Maintenance Requirements

The draft Handover Environmental Management Plan (dHEMP) set out the framework for the long-term maintenance and management of the on-site planting for the 20 year period following the 1 year aftercare period, and described the management requirements and target coverage of each Landscape Element implemented as part of the scheme as follows:

- Species Rich Grassland<sup>1</sup>/ Open Grassland:
  - Management: Selective control of broadleaved weeds twice per year during the growing season; plots cut in mid-September to late-October with all cuttings (arisings) raked off and removed from site.
  - Coverage: Colonisation by native scrub species to collectively form less than 5% of each plot (Species Rich Grassland); maintained free of significant scrub cover (Open Grassland).
- Woodland (incl. Edge)/ Linear Belts of Trees & Shrubs/ Shrubs with Intermittent Trees:
  - Management: 1.0m diameter circle free of grass and weed growth established around each plant and maintained clear as long as necessary to achieve the required percentage cover; dead/ dying stock causing gaps in the canopy replaced annually; damaged/ unhealthy stock pruned.
  - Coverage: Although the term “percentage cover” was not specifically defined by the dHEMP, percentages of cover were given:
    - i. 80% (Woodland/ Linear Belts of Trees and Shrubs);
    - ii. 85% (Woodland Edge); and
    - iii. 90% (Shrubs with Intermittent Trees).
- Scattered Trees/ Individual Trees:
  - Management: 1.0m diameter circle free of grass and weed growth established around each tree and maintained clear as long as necessary to achieve the required coverage; dead/ dying stock replaced; damaged/ unhealthy stock pruned.
  - Coverage: 20-150 per hectare (Scattered Trees); as indicated by the Landscape Proposals (Individual Trees).
- Native Species Hedgerow/ Native Species Hedgerow with Trees:
  - Management: Selective control of broadleaved weeds and vegetation around plant stock cut back; dead/ dying stock causing gaps replaced; damaged/ unhealthy stock pruned; tops of hedgerows trimmed to an (undefined) appropriate height, with sides managed to encourage branching and the formation of a dense visual screen with base broader than top, and vegetation to ground level.
  - Coverage: 85% of the Basal Area (defined as the hedgerow length plus a width of 0.2m either side of the planting row or rows).
- Marginal Plants:
  - Management: No more than 30% of emergent or marginal vegetation cleared in any one year.
  - Coverage: 70% of design area with woody species comprising less than 30% (Marginal wetland species); 90% of design area (reed bed species); 100% of the water surface clear of weeds, emergent vegetation (outside of design area), or blanket algae.
- Marsh and Wet Grassland:
  - Management: Selective control of broadleaved weeds twice per year during the growing season; plots cut in mid-September to late-October with all cuttings (arisings) raked off and removed from site.
  - Coverage: 70% of design area with woody species comprising less than 30% of the area.

---

<sup>1</sup> The Landscape Element referred to by the dHEMP as “*Species Rich Grassland*” is termed “*Conservation Grassland*” on the As Built drawings; in the interests of clarity and consistency, dHEMP terminology has been used throughout the Environmental Chapter of this report.

# Appendix G. Environmental Consultation Response (West Yorkshire Ecology)

West Yorkshire Ecology commented on a range of issues (underlined, below), noting that their quoted observations (italicised) were not based on any sound data supplied by POPE nor on their own monitoring work:

1. The ecological impact of the scheme on Statutory/ Non-Statutory Designated Sites and watercourses: *Kirk Deighton Great Crested Newt population is reported to have crashed in recent years to <10, but this is not likely to be linked to the road. The cause is not known to us. We have no recent records for the River Wharfe or other non-statutory nature conservation sites near to the works. We have positive records for otter on the Bramham Beck in the centre of Bramham and upstream to the west of the motorway both collected on 02/03/2012. This suggests that this species was managing the underpass under the motorway and local road at this date.*
2. The effectiveness of the ecological mitigation measures: *We still consider that too much top soil was used along the local road between Bramham and the Wetherby roundabout. This has resulted in coarse neutral grassland with poor floristic diversity. The most promising area is one which has been left without any soil. We would like to see this type of area increased in extent. It would be useful to see botanical and invertebrate monitoring results submitted to West Yorkshire Ecology every 3-5 years. Other areas need a more intensive cutting regime and arising raked off. Cuts should be July, September and October to reduce the dominance of the coarse grasses.*
3. The impact of the scheme on biodiversity: *The badger fencing is still an issue at the A64 junction (towards Leeds) and Bowcliffe Hall. The opportunities for calcareous grassland could have been better used in some areas of the local road. The damage to exposed limestone on the local road between Bowcliffe Hall and Bramham was heavy handed. The fresh limestone cliffs on the motorway in some areas are too heavily engineered and would have benefitted from roughing up rather than perfectly engineered slopes. This would have provided interesting niches sooner in the regeneration process.*
4. The success or otherwise of scheme specific ecological mitigation measures: *It would be useful to see some monitoring data for these measures. It is clear that most of us are not able to access the motorway verges as part of our routine work.*
5. The effectiveness of the landscape proposals in reducing/ avoiding impacts on biodiversity: *As for 4.*
6. Habitat establishment, management, and maintenance: *See comments in 2 above on cutting regimes. It will also be useful to cut back 20 to 30% of the scrub every 5 to 10 years, in order to maximise edge effects for breeding passerine birds. There is a fine stand of bee orchids in the central reservation of the A64 (towards Leeds) and last year a single pyramidal orchid on the southern verge both of which were cut down. The cutting regime needs to be modified.*
7. Other environmental aspects of the scheme: *The A1(M) and M1 corridors have both been put forward for inclusion in the Leeds Wildlife Habitat Network in the Leeds Local Development Framework. This is to reflect the existing and potential future value of the low intensity managed mixture for habitats.*
8. Unforeseen ecological impacts of the scheme: *Red kites seem to be doing well on the road kill.*

# Appendix H. Environmental Evaluation of Issues Raised in the Post Construction NMU Audit (November 2010)

Regarding the issues raised by the NMU Audit (*italicised*) and the actions stated therein to be taken to remediate the issues, the following commentary, based on the evidence observed by the FYA site visit, is presented. Where possible, the FYA photographs have been taken from the same locations as those in the NMU audit.

1. Spenn Common Lane, NMU/ Farm access crossing at Paradise Farm Bridge: *Advanced warning signs for NMUs should be provided on the approaches to the crossing point.*

The FYA site visit observed that these have now been provided, as illustrated in Figure H.1 and Figure H.2.

**Figure H.1** Spenn Common Lane, view from NMU northeast (top) and southwest (bottom)





**Figure H.2 Spen Common Lane, view from Farm Access east (top) and west (bottom)**



2. Fairfield House Junction: *Debris should be removed from the gully grating and surrounding area.*

The NMU audit noted that the surfacing had been replaced to ensure that surface runoff is directed into the gully. The FYA site visit observed that the replacement surfacing appeared to be performing as intended and that runoff was now being directed into the gully; this is illustrated in Figure H.3.

**Figure H.3** Fairfield House Junction: the ponding issue appears to have been resolved with surface runoff directed into the drain.



3. Wattle Syke north of farm access: *Drainage trench to be provided, running parallel to the footpath, connecting to existing soak away.*

The FYA site visit confirmed that a drainage trench has now been provided parallel to the footpath and is connected to the existing soakaway; no evidence of ponding was observed during the site visit as illustrated in Figure H.4.

**Figure H.4 Wattle Syke north: the ponding issues adjacent to the farm access appear to have been resolved**



4. Wattle Syke to Wetherby Grange, NMU route: *Cut off drainage to be provided along the length of footpath where evidence of ponding has occurred.*

As illustrated in Figure H.5, cut off drainage has been provided. No evidence of ponding was observed during the FYA site visit.

**Figure H.5** Wattle Syke to Wetherby Grange NMU route: cut off drainage has been provided and the ponding issue appears to have been resolved



5. Wetherby Grange roundabout, north splitter island: Sign to be incorporated into the scheme design and installed on railings on north splitter island.

As illustrated in Figure H.6, the shared use sign has now been installed.

**Figure H.6** Splitter island with shared use sign installed on railings



6. York Road roundabout: The signing at York Roundabout needs to be modified as follows:
  - The destination to “Thorp Arch Retail Park” shown on the sign located to the south of York Road roundabout should be blanked out. (Sign reference 43);
  - Additional signs for “York Road (Town Centre)” should be added to the sign post on the south side of the roundabout;
  - Additional signs for “York Road (Racecourse)” should be added to the sign post on the north side of the roundabout; and
  - The sign post on the North verge of York Road (sign reference 147) “York Road (Race Course)” should be amended to point east towards the racecourse.

The FYA site visit confirmed that additional signs for “York Road (Town Centre)” and “York Road (Racecourse)” have been added to the signposts to the south and north of the roundabout respectively.

However, the destination to “Thorp Arch Retail Park” on the sign located to the south of York Road roundabout remains, and the sign to “York Road (Race Course)” on the sign located to the north of the roundabout points to the south.

Both signposts are illustrated in Figure H.7.

**Figure H.7** York Road Roundabout NMU signage, south (top) and north (bottom) side



7. York Road: *Drop crossing to be provided.*

The NMU audit noted that a drop crossing had been installed since the audit took place; this is illustrated in Figure H.8.

**Figure H.8** A drop crossing has been provided for NMUs at York Road



8. York Road North, east side: *Where evidence of ponding has occurred, ensure that the bridleway stays free of surface water by either providing additional drainage or raising/shaping the bridleway to shed water to the verges.*

As illustrated in Figure H.9, it would appear that the bridleway has been re-profiled to shed water to the verges; no evidence of ponding was observed during the FYA site visit.

**Figure H.9** York Road North, east side re-profiled NMU route: no evidence of ponding was observed



9. York Road North, east side (northern end): *Planting to be provided at exposed corner at northern end of NMU route on York Road east side, in accordance with the construction drawings.*

The FYA site visit confirmed that the planting has been undertaken to fill the gap as specified; this is illustrated in Figure H.10.

**Figure H.10 York Road North, East Side (northern end): the previously exposed corner has now been planted**



10. Sandbeck Roundabout: *For consistency and clarity it is recommended that sign 104 should be replaced with a sign for York Road.*

As illustrated in Figure H.11, the FYA site visit confirmed that the sign has been replaced.

**Figure H.11 Sandbeck Roundabout; replaced NMU signage**



11. Privas Way: *Additional signing to be provided on Privas Way where the equestrian route diverges from the pedestrian cycle route. Bridleway sign to be mounted at junction.*

The NMU audit noted that since the audit was undertaken, additional signing had been provided at this location; this is illustrated in Figure H.12.



**Figure H.12 Privas Way: additional NMU signage has been provided**



Regarding the outstanding snagging issues raised by stakeholders and noted by the NMU audit as being the responsibility of the contractor to rectify, the actions stated within the NMU audit (again, italicised) to rectify the issues have, based on the evidence observed by the FYA site visit, also been evaluated:

- A. Grange Moor Roundabout, NMU signage to Beilby Wood: *The sign needs to be relocated from the existing sign pole, where the sign is pointing in the opposite direction to Beilby Woods, and needs to be re-mounted on the post as indicated the as-built drawings.*

As illustrated in Figure H.13, the FYA site visit confirmed that the sign has been relocated.

**Figure H.13** The issue with NMU signage to Beilby Wood has been rectified



- B. Tenter Hill to Wattle Syke, NMU signing: *The sign to Collingham needs to be mounted on existing post as per the as-built drawing.*

As illustrated in Figure H.14, the FYA site visit confirmed that the sign has now been installed.

**Figure H.14** The missing figure board sign has now been provided



- C. Freemans Way: *The signpost needs to be straightened.*

The FYA site visit confirmed that the signpost has been straightened, as illustrated in Figure H.15.

**Figure H.15** The Freemans Way signpost has been straightened



- D. York Road North, east side (northern end, culvert crossing): *Contractor to inspect the ditch for any blockages along its route.*

As illustrated in Figure H.16, it would appear that the bridleway has been re-profiled to shed water to the verges; no evidence of ponding was observed during the FYA site visit, and the ditch was not observed to be blocked.

**Figure H.16 York Road North, east side (northern end, culvert crossing)**



The NMU Audit considered that all other issues raised by stakeholders had either been resolved or did not warrant further action.

# Appendix I. Glossary

Terms	Definition
AADT	<b>Annual Average Daily Traffic.</b> Average of 24 hour flows, seven days a week, for all days within a year.
Accessibility	Accessibility can be defined as 'ease of reaching'. The accessibility objective is concerned with increasing the ability with which people in different locations, and with differing availability of transport, can reach different types of facility.
ADT	<b>Average Daily Traffic.</b> Average daily flows across a given period.
AEL	<b>Ancient Enclosed Land</b>
AST	<b>Appraisal Summary Table.</b> This records the impacts of the scheme according to the Government's five key objects for transport, as defined in DfT guidance contained on its Transport Analysis Guidance web pages, WebTAG.
ATC	<b>Automatic Traffic Count</b>
AAWT	<b>Annual Average Weekday Traffic.</b> As AADT but for five days (Monday to Friday) only.
AWT	<b>Average Weekday Traffic.</b> As ADT but for five days (Monday to Friday) only.
BCR	<b>Benefit Cost Ratio.</b> This is the ratio of benefits to costs when both are expressed in terms of present value i.e. PVB divided by PVC.
BHS	<b>British Horse Society</b>
CEEQUAL	The sustainability assessment and awards scheme for civil engineering.
COBA	<b>Cost Benefit Analysis.</b> A computer program which compares the costs of providing road schemes with the benefits derived by road users (in terms of time, vehicle operating costs and collisions), and expresses the results in terms of a monetary valuation. The COBA model uses the fixed trip matrix unless it is being used in Collision-only mode.
CSR	<b>Confirmatory Studies Report</b>
D2AP	<b>Dual Two lane All Purpose road</b>
D3AP	<b>Dual Three lane All Purpose road</b>
DfT	<b>Department for Transport</b>
Discount Rate	The percentage rate applied to cash flows to enable comparisons to be made between payments made at different times. The rate quantifies the extent to which a sum of money is worth more to the Government today than the same amount in a year's time.
Discounting	Discounting is a technique used to compare costs and benefits that occur in different time periods and is the process of adjusting future cash flows to their present values to reflect the time value of money, e.g. £1 worth of benefits now is worth more than £1 in the future. A standard base year needs to be used which is 2002 for the appraisal used in this report.
DM	<b>Do Minimum.</b> In scheme modelling, this is the scenario which comprises the existing road network plus improvement schemes that have already been committed.
DMRB	<b>Design Manual for Roads and Bridges</b>
DS	<b>Do Something.</b> In scheme modelling, this is the scenario detailing the planned scheme plus improvement schemes that have already been committed.
EA	<b>Environment Agency</b>
EAR	<b>Economic Assessment Report</b>
ES	<b>Environmental Statement</b>
EST	<b>Evaluation Summary Table.</b> In POPE studies, this is a summary of the evaluations of the TAG objectives using a similar format to the forecasts in the AST.
FYA	<b>Five Year After</b>
HA	<b>Highways Agency.</b> An Executive Agency of the DfT, responsible for operating, maintaining and improving the strategic road network in England until end of March 2015.
HGV	<b>Heavy Goods Vehicle</b>
JTDB	<b>Journey Time Database.</b> HA database holding information on journey times and traffic flows for links of the network.

Terms	Definition
KSI	<b>Killed or Seriously Injured.</b> KSI is the proportion of casualties who are killed or seriously injured and is used as a measure of collision severity.
LAR	<b>Local Access Road</b>
LCA	<b>Landscape Character Areas</b>
LNS	<b>Low Noise Surfacing</b>
LTP3	<b>Local Transport Plan 3</b>
MAC	<b>Managing Area Contractor</b> Organisation normally contracted in 5-year terms for undertaking the management of the road network within a Highways England area.
MVKM	<b>Million Vehicle Kilometres</b>
NATA	<b>New Approach to Appraisal.</b> The basis of the standard DfT appraisal approach when this scheme was appraised. This is now referred to as the DfT's objectives for transport.
NMU	<b>Non-Motorised User.</b> A generic term covering pedestrians, cyclists and equestrians.
NRTF	<b>National Road Traffic Forecasts.</b> This document defines the latest forecasts produced by the Department of the Environment, Transport and the Regions of the growth in the volume of motor traffic. At the time this scheme was appraised, the most recent one was NRTF97, i.e. dating from 1997.
NTM	<b>National Transport Model</b>
NVC	<b>National Vegetation Communities</b>
ONS	<b>Office for National Statistics</b>
OYA	<b>One Year After</b>
PIC	<b>Personal Injury Collisions</b>
POPE	<b>Post Opening Project Evaluation.</b> The before and after monitoring of all major highway schemes in England.
Present Value	<b>Present Value.</b> The value today of an amount of money in the future. In cost benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.
PRoW	<b>Public Right of Way</b>
PVB	<b>Present Value Benefits.</b> Value of a stream of benefits accruing over the appraisal period of a scheme expressed in the value of a present value.
PVC	<b>Present Value Costs.</b> As for PVB but for a stream of costs associated with a project
Rule of half	The calculation used to determine economic benefits resulting from improved journey, whereby vehicles already travelling along the corridor get the full benefit, whilst extra traffic is assumed to get half the benefit.
QUADRO	<b>Queues and Delays at Roadworks.</b> A software program for calculating the monetary impacts of delays at roadworks.
SAC	<b>Special Area of Conservation</b>
SATURN	<b>Simulation and Assignment of Traffic to Urban Road Networks.</b> A strategic transport modelling software programme.
SLA	<b>Special Landscape Area</b>
STATS19	A database of injury collision statistics recorded by police officers attending collisions.
SSSI	<b>Site of Special Scientific Interest</b>
TEE	<b>Transport Economic Efficiency</b>
TEMPRO	<b>Trip End Model Program.</b> This program provides access to the DfT's national Trip End Model projections of growth in travel demand, and the underlying car ownership and planning data projections.
TRADS	<b>Traffic Flow Data System.</b> Database holding information on traffic flows at sites on the strategic network.
webTAG	DfT's website for guidance on the conduct of transport studies at <a href="http://www.webtag.org.uk/">http://www.webtag.org.uk/</a>
WTC	<b>Wetherby Town Council</b>

# Appendix J. Tables and Figures in this Report

## Tables

Table 1.1	Summary of Scheme History	11
Table 2.1	Long term trend on A1(M) Junction 43-44	15
Table 2.2	Location of Traffic Count Data Sources	18
Table 2.3	Change in Traffic Flows across the Central Screenline	22
Table 2.4	Change in Traffic Flows across the Eastern Screenline	22
Table 2.5	Change in Traffic Flows across the Western Screenline	23
Table 2.6	Change in HGV Flows along the A1(M) Scheme Section	24
Table 2.7	Forecast 2008 AADT DM Flows vs. Observed 2007 AADT Flows	26
Table 2.8	Forecast 2014 DS AADT Flows vs. Observed 2014 AADT Flows	27
Table 2.9	Forecast and Observed Changes in Traffic Flows	28
Table 2.10	Change in pre- and post-scheme 24 hour weekday average observed capped vehicle speeds (mph)	29
Table 2.11	Observed Route Stress on the A1(M) J44-46	30
Table 3.1	Number of Collisions by Severity in the COBA Model Area	35
Table 3.2	Number of Casualties by Severity in the COBA Model Area	36
Table 3.3	Number of Collisions by Severity on the Scheme's Key Links	37
Table 3.4	Number of Casualties by Severity on the Key Links	39
Table 3.5	Pedestrian Casualties on the Key Links	40
Table 3.6	Cyclist Casualties on the Key Links	40
Table 3.7	Collision Rates on the Key Links	41
Table 3.8	FWI on the Key Links	44
Table 3.9	Comparison of Opening Year Forecast and Annual Average Observed Collisions	44
Table 3.10	Comparison of Opening Year Forecast and Observed Collisions excluding W-W period	45
Table 4.1	Summary of Forecast Scheme Benefits	48
Table 4.2	Annual Journey Time Saving and Re-Forecast Sixty Year Monetary Benefit	49
Table 4.3	Summary of Vehicle Operating Costs Benefit (60 years)	49
Table 4.4	Economic Evaluation of Safety Benefits	50
Table 4.5	Summary of Scheme Present Value Benefits	50
Table 4.6	Summary of Investment Costs	51
Table 4.7	Summary of Indirect Taxation Impact (60 years)	51
Table 4.8	Summary of Scheme Present Value Costs	52
Table 4.9	Forecast vs. Outturn Re-forecast Benefit Cost Ratio	53
Table 5.1	Summary of Environmental Consultation Responses	59
Table 5.2	Forecast 2014 DS AADT Flows (Central Case) vs. Observed 2014 AADT Flows	61
Table 5.3	Evaluation Summary: Noise	62
Table 5.4	Evaluation Summary: Local Air Quality	63
Table 5.5	Re-Forecast and Outturn Change in Carbon Emissions (2014)	64
Table 5.6	Evaluation Summary: Greenhouse Gases	64
Table 5.7	Evaluation Summary: Landscape/Townscape	73
Table 5.8	Evaluation Summary: Heritage	75
Table 5.9	Evaluation Summary: Biodiversity	79
Table 5.10	Evaluation Summary: Water Quality and Drainage	85
Table 5.11	Evaluation Summary: Physical Fitness	88
Table 5.12	Evaluation Summary: Journey Ambience	93

Table 6.1	Scheme Alignment with National Regional and Local Policy	99
Table 7.1	Appraisal Summary Table (2006)	101
Table 7.2	Evaluation Summary Table	103
Table 8.1	Success against Scheme Objectives	105
Table A.1	Traffic Flows	108
Table D.1	Information requested to evaluate the environmental sub-objective	113

## Figures

Figure 1.1	Location of the scheme in a National and Regional Context	8
Figure 1.2	Key Features of the Bramham to Wetherby Scheme	10
Figure 2.1	Local, Regional, National and Motorway Trends in Million Vehicle Kilometres	15
Figure 2.2	Location of Traffic Count Data Sources and Screenlines	17
Figure 2.3	Observed Traffic Counts on the A1(M) and the Local Access Road	19
Figure 2.4	Observed Traffic Counts in the Wider Area	21
Figure 3.1	COBA Model Area	33
Figure 3.2	Trends in Injury Collision Numbers	34
Figure 3.3	Number of Collisions by Severity on the Key Links	38
Figure 3.4	NMU Casualties on the Key Links: Pre- (Left) and Post- (Right) Scheme Opening	40
Figure 3.5	Collision Locations on the Key Links: Pre- (Left) and Post- (Right) Scheme Opening	42
Figure 3.6	A1(M) Junction 45 Northbound Exit Off-Slip	43
Figure 3.7	Junction of Paradise Way for Bramham Park on the LAR	43
Figure 5.1	Key Location Plan – Scheme locations referenced in Environment Chapter	56
Figure 5.2	Area indicated by the as-built drawings as species rich grassland along the southbound verge of Paradise Way, south of Spen Common Lane	67
Figure 5.3	Open grassland along the northbound verge of the LAR near Wattle Syke roundabout	67
Figure 5.4	Amenity grassland adjacent to the former contractor's compound at Wetherby Grange roundabout	68
Figure 5.5	Tree and shrub planting establishing along the southbound carriageway of the A1(M) south of Wetherby Grange Bridge	68
Figure 5.6	Tree and shrub planting between the A1(M) and LAR just north of Clifford Moor Ecological Ponds	69
Figure 5.7	Tree and shrub planting between the A1(M) and LAR just north of Clifford Moor Ecological Ponds - note the smaller plant stock within areas of larger plant stock, indicative of replacement planting	69
Figure 5.8	Notable areas where planting is not as vigorous as perhaps would be expected are along the NMU route adjacent to the southbound carriageway of the A1(M) south east of the Paradise Farm overbridge (top) and adjacent to the southbound carriageway of the A1(M) north of Walton Road overbridge (bottom)	70
Figure 5.9	The environmental barrier replacing the noise bund adjacent to the southbound carriageway, directly north of Farfield House remains unplanted (top and bottom)	71
Figure 5.10	Dense native species hedgerows between the southbound verge of the LAR and the northbound carriageway of the A1(M) just north of Wattle Syke roundabout (top) and adjacent to the northbound carriageway of the LAR to the north of Tenter Hill overbridge (bottom)	72
Figure 5.11	Bat boxes installed to the east of Grange Moor roundabout (top and bottom)	77
Figure 5.12	Owl perch near Bowcliffe Hall.	78
Figure 5.13	Ponding at the western end of the Freemans Way underpass, adjacent to the LAR	81
Figure 5.14	Ecological Ponds at Clifford Moor (top) and Park Hill Farm (bottom)	81
Figure 5.15	Balancing Ponds at Paradise Farm (top) and River Wharfe South Bank (bottom)	82
Figure 5.16	River Wharfe North Bank Balancing Pond	83
Figure 5.17	River Wharfe North Bank Balancing Pond	83



Figure 5.18	Sandbeck Balancing Pond	84
Figure 5.19	Wattle Syke Infiltration Pond	84
Figure 5.20	Tree trunks within the verge of the NMU route adjacent to Paradise Way at the southern extents of the scheme (top and bottom)	87
Figure 5.21	Vegetation and construction debris within the equestrian corral on the LAR just north of Wattle Syke Roundabout	88
Figure 5.22	The lay-by on the northbound carriageway of the LAR between Wattle Syke and Wetherby	90
Figure 5.23	Typical examples of the faded road markings at the Wattle Syke roundabout; approaching the roundabout (top) and on the roundabout (bottom)	91
Figure 5.24	Demarcation posts at the lay-by on the LAR between Wattle Syke and Wetherby: missing posts on the splitter island (top) and damaged posts in the verge (bottom)	92
Figure 6.1	NMU Facility between the LAR (left) and A1(M) (obscured to the right)	96
Figure 6.2	Corral for Equestrians Crossing the LAR at Wattle Syke Roundabout	97
Figure C.1	Location of Collisions in the Pre-Scheme (left) and Post-Scheme (right) periods	112
Figure E.1	View from Paradise Farm entrance at OYA (March 2011)	116
Figure E.2	View from Paradise Farm entrance at FYA (September 2014)	116
Figure E.3	Bat boxes installed in retained trees near to Clifford Moor Ecological Pond at OYA (March 2011)	117
Figure E.4	Bat boxes installed in retained trees near to Clifford Moor Ecological Pond at FYA(September 2014)	117
Figure E.5	Park Hill Farm Ecological Pond at OYA (March 2011)	118
Figure E.6	Park Hill Farm Ecological Pond at FYA (September 2014)	119
Figure E.7	Looking northeast towards the A1 from Laneside Farm entrance gate before scheme construction (circa 2005)	119
Figure E.8	Looking northeast towards the A1(M) from Laneside Farm entrance gate at OYA (March 2010)	120
Figure E.9	Looking northeast towards the A1(M) from Laneside Farm entrance gate at FYA (September 2014)	120
Figure E.10	View from junction of Walton Road and the LAR to the eastern edge of Wetherby, looking south before scheme construction (circa 2005)	121
Figure E.11	View from junction of Walton Road and the LAR to the eastern edge of Wetherby, looking south at OYA (March 2010)	121
Figure E.12	View from junction of Walton Road and the LAR to the eastern edge of Wetherby, looking south at FYA (September 2014)	122
Figure E.13	View from Freemans Way looking east towards the A1 before scheme construction (circa 2005)	122
Figure E.14	View from Freemans Way looking east towards the A1(M) at OYA (March 2010)	123
Figure E.15	View from Freemans Way looking east towards the A1(M) at FYA (September 2014)	123
Figure E.16	Looking south from Walton Road towards Park Hill Farm before scheme construction (circa 2005)	124
Figure E.17	Looking south from Walton Road towards Park Hill Farm at OYA (March 2010)	124
Figure E.18	Looking south from Walton Road towards Park Hill Farm at FYA (September 2014)	125
Figure H.1	Spen Common Lane, view from NMU northeast (top) and southwest (bottom)	128
Figure H.2	Spen Common Lane, view from Farm Access east (top) and west (bottom)	129
Figure H.3	Fairfield House Junction: the ponding issue appears to have been resolved with surface runoff directed into the drain.	130
Figure H.4	Wattle Syke north: the ponding issues adjacent to the farm access appear to have been resolved	131
Figure H.5	Wattle Syke to Wetherby Grange NMU route: cut off drainage has been provided and the ponding issue appears to have been resolved	132
Figure H.6	Splitter island with shared use sign installed on railings	132

Figure H.7 York Road Roundabout NMU signage, south (top) and north (bottom) side	133
Figure H.8 A drop crossing has been provided for NMUs at York Road	134
Figure H.9 York Road North, east side re-profiled NMU route: no evidence of ponding was observed	135
Figure H.10 York Road North, East Side (northern end): the previously exposed corner has now been planted	136
Figure H.11 Sandbeck Roundabout; replaced NMU signage	136
<b>Figure H.12</b> Privas Way: additional NMU signage has been provided	137
Figure H.13 The issue with NMU signage to Beilby Wood has been rectified	138
Figure H.14 The missing figure board sign has now been provided	139
Figure H.15 The Freemans Way signpost has been straightened	139
Figure H.16 York Road North, east side (northern end, culvert crossing)	140