

Post Opening Project Evaluation

A453 Widening M1 Junction 24 to A52 - One Year After



August 2017

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Executive Summary

Scheme Description

The A453 widening scheme is a Highways England major project in Nottinghamshire between the M1 Junction 24 and the A52 in Nottingham. It opened to traffic in July 2015. The purpose of the scheme was to provide an 11.5km (seven mile) section of dual carriageway to replace the previous single carriageway road which was one of the most heavily congested routes in the region at peak times, had a poor safety record and posed maintenance difficulties.

Junctions were upgraded to split level (grade-separated), allowing A453 through traffic to have no junctions between the M1 Junction 24 and the new Mill Hill roundabout on the outskirts of Nottingham. The scheme also included retaining sections of the former route of the A453 route as a local distributor road between the West Leake junction and Mill Hill roundabout along with the provision of facilities for pedestrians and cyclists. In a separate scheme constructed at the same time, variable messaging signs (VMS) were installed on the westbound approach to the M1 to provide driver information.

Scheme Objectives

Objectives (Source: Client Scheme Requirements, 2013)	Has the objective been achieved?
To provide maximum value for money against its whole life costs in accordance with the Department's WebTAG Guidance (BCR adjusted for non-monetised impacts should be greater than 2).	✓
To deliver the scheme in a way which supports the delivery of the Government's transport policy objectives.	✓
To address the safety problems identified in the Challenges and Issues section of this document and should significantly reduce current accident levels for all road users including non-motorised users.	Too early to be conclusive. Further evaluation required at five years after.
To minimise the detrimental environmental effects of the scheme, in particular the adverse impacts on air quality and noise, and offset by mitigation measures where technically feasible and economic to do so, taking account of costs, availability of funding and statutory obligations.	✓
To protect the built and natural environment through mitigating the potentially adverse impact of adding additional capacity, meeting current environmental standards and taking opportunities to enhance poor environmental features where appropriate and taking into account value for money.	Too early to be conclusive. Further evaluation required at five years after.
To protect watercourses from pollution during and after construction.	✓
To support sustainable economic activity and local development plans.	Partial - Unable to be conclusive.
To provide an additional lane in each direction to reduce traffic congestion, reduce frequency of incidents and improve journey time reliability.	✓
To enhance walking and cycling facilities through Clifton, and provide a new Non-Motorised user route between Clifton and Kegworth.	✓
To improve access to public transport, considering safety and to ensure the shortest practical desire line is provided.	✓
To provide support to spatial and transport policies consistent with emerging local plans for the Nottingham and Rushcliffe areas.	Partial - Unable to be conclusive.

To facilitate future access to the Nottingham Express Transit (NET) Phase 2 Expansion	✓
To facilitate/improve access to the East Midlands Parkway Railway Station.	✓
To improve access between Nottingham and East Midlands Airport.	✓
To improve access to Nottingham Trent University while reducing conflict with through traffic on the A453.	✓

Key Findings

- Traffic flows have increased on the A453 scheme section post opening, in line with that forecast.
- Average speeds along the scheme section have increased and average journey times have reduced in all time periods along the scheme.
- Journey time variability across a typical day has reduced.
- Initial findings indicate that the collision record has improved, furthermore statistical testing indicated that the change is significant and therefore can be attributed to the scheme.
- Environmental impacts are generally in line with expectations.

Summary of Scheme Impacts

Traffic

Traffic Volumes

- Average weekday traffic flows along the scheme have increased by over 40% with increases of 10,600 vehicles per day on the rural section and 13,200 vehicles per day on the urban section. These increases are in line with the forecasts.
- The number of heavy goods vehicles using the A453 has increased post scheme and this has also resulted in an increase in the percentage HGVs.

Journey Times and Reliability

- Vehicles using the widened A453 have seen a reduction in journey times in all time periods. In the AM peak, savings of over 16 minutes in an eastbound direction, with an over 8-minute saving in a westbound direction in the PM peak.
- Time savings are seen in the inter-peak periods are lower than the peak period, in the range 3.5 – 4.5 minutes.
- Journey time variability has reduced post scheme opening, particularly in the peak periods.

Safety

- Collisions over the modelled area have reduced by an annual average of 63 collisions per year (18% reduction) since the scheme opened and statistical significance testing found this to be significant.
- In the immediate scheme area, the number of collisions has decreased by an average of 11.5 collisions per year (45% reduction) which again is significant. The reduction in collision rates post opening indicates that the increase in traffic has not had a detrimental effect on safety.
- The outturn collision savings are better than forecast for the scheme.

Environment

- The impact on noise and local air quality has been evaluated through examining changes to traffic flows. Based on the available traffic flow information it is likely that local noise impacts are as expected and air quality is better than expected on the rural section and worse than expected on the urban section (although any increase in emissions as a result of higher traffic flows may be offset by reduced congestion as a result of the scheme).

- Post opening, carbon emissions have increased however it has not been possible to compare this to forecast due to data issues.
- The measures identified to mitigate the impact of the scheme on the surrounding landscape have generally been provided in line with proposals, although, there were areas of slower growth/dead plants which will require replacement.
- Impacts on historic buildings and historic landscapes are in line with forecasts at this OYA stage. It is therefore considered that the effects of the scheme on the heritage resource are likely to be as expected overall.
- It has not been possible to fully evaluate the effects of biodiversity at this stage.
- Drainage systems have been installed as expected and appear to be working as required.
- Based on the OYA site visit, as built information and consultation responses it is considered that the impact of the scheme on physical fitness and journey quality is generally as expected.

Summary of the Scheme Economic Performance

All in monetary values in 2002 market prices, discounted to 2002		Forecast (£m)	Outturn (£m)	
Present Value Costs	A453 Widening	£102.2m	£104.8m	
	A453 VMS	£0.7m	£0.5m	
	One Year After (combined)	£102.9m	£105.2m	
Present Value Benefits (PVB)	Journey Time (TEE business and consumer users)	£204.4m	£221.7m	
	Vehicle Operating Costs (VOC)	£-6.3m	£-6.3m	
	Delay during construction/future maintenance periods: Journey time and VOC impacts	£3.3m	£3.3m	
	Safety Benefits	A453 Widening	£41.3m	£34.5m
		A453 VMS	£0.2m	
		Combined	£41.5m	
Carbon Benefits	£-4.0m	£-4.0m		
PVB subtotal	£238.9m	£249.2m		
Indirect Tax Revenue	£10.2m	£10.2m		
BCR (with indirect tax in PVB)		2.42	2.47	

- The scheme was forecast to have monetised journey time benefits for the scheme of £204.4 million over the 60 year appraisal period, while the reforecast scheme life benefits based on observed one year after findings is higher at £221.7 million benefits. This is primarily due to the higher than forecast observed journey time savings.
- The outturn monetised safety benefit of £34.5m was lower than forecast £41.5m but it should be noted that the method of calculating the outturn benefit was conservative, only focussing on the benefits of the outturn collision savings on the key scheme links.
- The outturn investment costs in 2002 prices was £125 million, 4% higher than forecast.
- Outturn Benefit Cost Ratio represents £2.47 of benefits for every £1 spent which represents high value for money, as expected.

1. Introduction

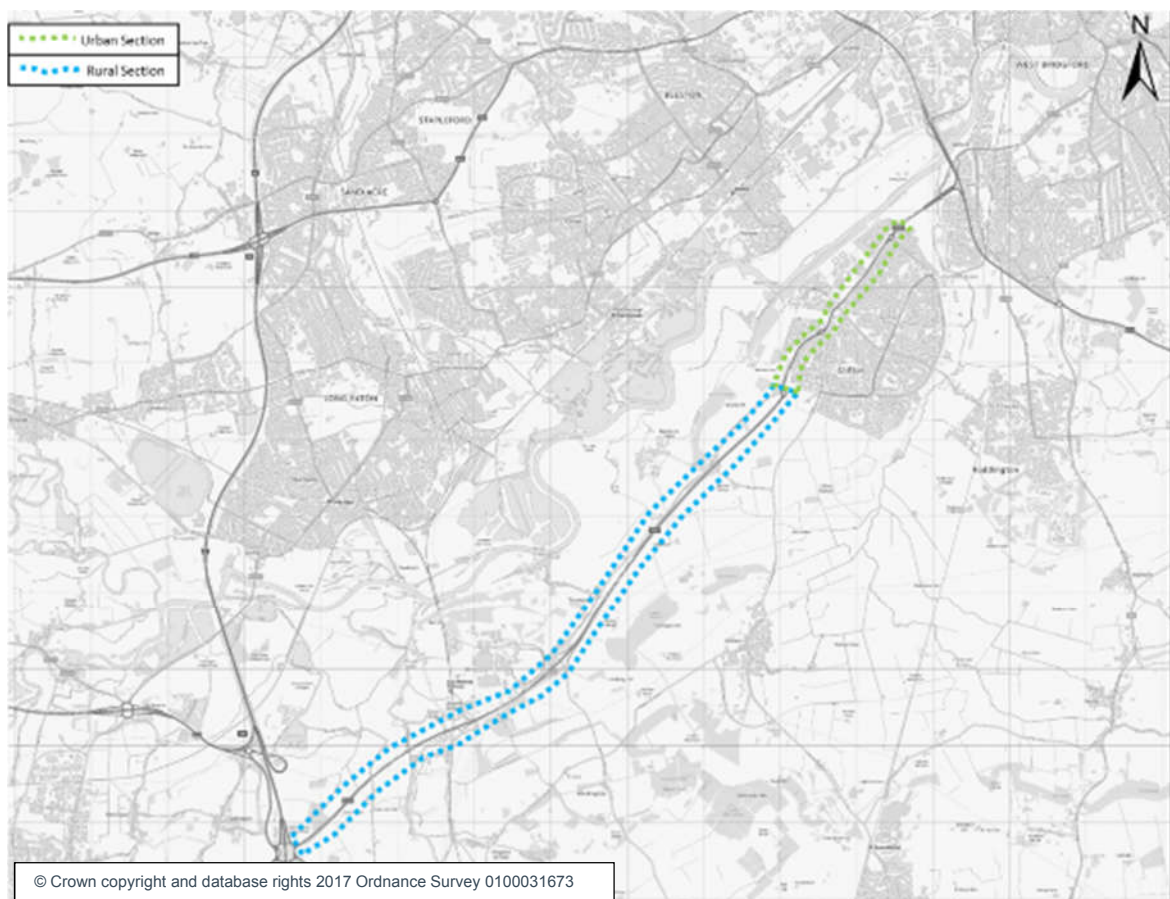
Background

- 1.1. This report presents a One Year After (OYA) opening evaluation of the A453 widening scheme between the M1 Junction 24 and the A52, Nottingham (hereafter known as 'the scheme') which opened to traffic in July 2015. The evaluation has been prepared as part of the Highways England's Post Opening Project Evaluation (POPE) programme. The purpose of this report is to present the initial impacts of the scheme.

Scheme Context

- 1.2. The A453 is part of a strategic route, linking the A42 at Junction 14 through to the A52 at Nottingham. The widening scheme improved a 7-mile (11.5km) section between the M1 at Junction 24 and the A52 at Nottingham. The scheme broadly comprises two sections; the rural section between the M1 and the new Mill Hill roundabout providing access to the Nottingham Express Transit (NET) Park and Ride at Clifton, and the urban section between the Mill Hill roundabout and the Farnborough Road junction. The location of the scheme is illustrated in **Figure 1-1**.

Figure 1-1 – Scheme Location



- 1.3. Prior to the scheme this section of the A453 between the M1 Junction 24 and Farnborough Road was single carriageway. The Statement of Case (2009) for this scheme indicates that this section of the A453 was one of the most heavily congested routes in the region at peak times. The 'rural' section carried 23,000 vehicles per day.

- 1.4. There were numerous at-grade junctions in both the urban and rural sections and particularly high Non-Motorised User (NMU) activity in the urban section around the Nottingham Trent University Campus at Clifton. The signal controlled facilities in this area contributed to vehicle delays in this location. Bridleways and footpaths joined and crossed the rural section of the A453 but walkers, cyclists and horse-riders found it difficult to cross because of the high traffic flows.

Scheme Description

- 1.5. The A453 widening scheme is a major Highways England project which provided approximately 7 miles or 11.5km of dual carriageway. The scheme comprises two broad sections; namely the rural and urban sections.
- 1.6. The rural section, between the M1 and the newly constructed Mill Hill roundabout, is approximately 5.5 miles or 8.8km.
- 1.7. Between the M1 and the Thrumpton area, an additional carriageway was constructed to the south of the existing alignment; a technique known as parallel widening. Grade-separated junctions replaced the at-grade junctions at the Parkway junction and the West Leake Lane junction. Between Thrumpton and Mill Hill, a new carriageway was built away from the previous alignment; here the previous alignment has been 'de-trunked', now providing a local distributor road thus by-passing the villages of Barton in Fabis and Thrumpton.
- 1.8. Barton Lane, between the A453 and Nottingham Road, was closed to traffic to create a public bridleway and private access.
- 1.9. The urban section, between Mill Hill roundabout and Farnborough Road, is approximately 1.5 miles or 2.7km.
- 1.10. The Mill Hill junction is a newly constructed roundabout providing access to the NET Park & Ride at Clifton which opened in 2015.
- 1.11. Between the Mill Hill and the Crusader roundabouts, the carriageway was widened to the north and some modifications have been made to the Crusader roundabout. The road was widened to the south of the Green Lane junction to avoid the Village Green and the Green Lane junction was signal controlled. Between the Green Lane and Farnborough Road junctions, the road was widened to the north and improvements were made at the Farnborough Road junction through the provision of a signal controlled roundabout. Various improvements were also made to the access points to the Nottingham Trent University campus at Clifton. Further details are shown in **Figure 1-2** and **Figure 1-3**.
- 1.12. Within the rural section of the scheme, new indirect accesses have been provided to properties, farms and businesses where the original access was taken from the A453 directly. The only exception is for land known as Cedar Isle which is accessed via a left in/left out junction formed with the westbound carriageway as there was deemed to be no alternative.
- 1.13. Street lighting is in place along the urban section of the widening and on the A453 approach to Junction 24 of the M1.

M1 J24/A50 Approach Pinch Point Scheme Description

- 1.14. The M1 J24/A50 Approach scheme has changed the way traffic on the A50 eastbound enters the M1 southbound. A new by-pass section was constructed through the centre of the roundabout between the A50 eastbound approach and the A453 (W) exit. This redirects traffic travelling to the M1 southbound from the A50 eastbound from the circulatory carriageway along the A453 (W) to the entry slip road at Junction 23A to the south.
- 1.15. The impacts of the scheme were not included as part of the modelling of the A453 Widening scheme. This is however likely to impact traffic approaching M1 Junction 24 along the widened A453. It is not possible to isolate the impacts of this scheme from those of the A453 Widening scheme with the information available; however, an analysis of traffic count data and journey time data for this area of the network is included in relevant chapters of this report.
- 1.16. It should also be considered that the East Midlands Strategic Rail Freight Interchange (SRFI) has been granted planning consent which includes extensive infrastructure works to Junction 24 and Junction 24A of the M1 motorway. The associated highway improvements are (at the time of this report) underway and will effectively replace the recently constructed pinch point scheme.

A453 VMS Upgrade Pinch Point Scheme Description

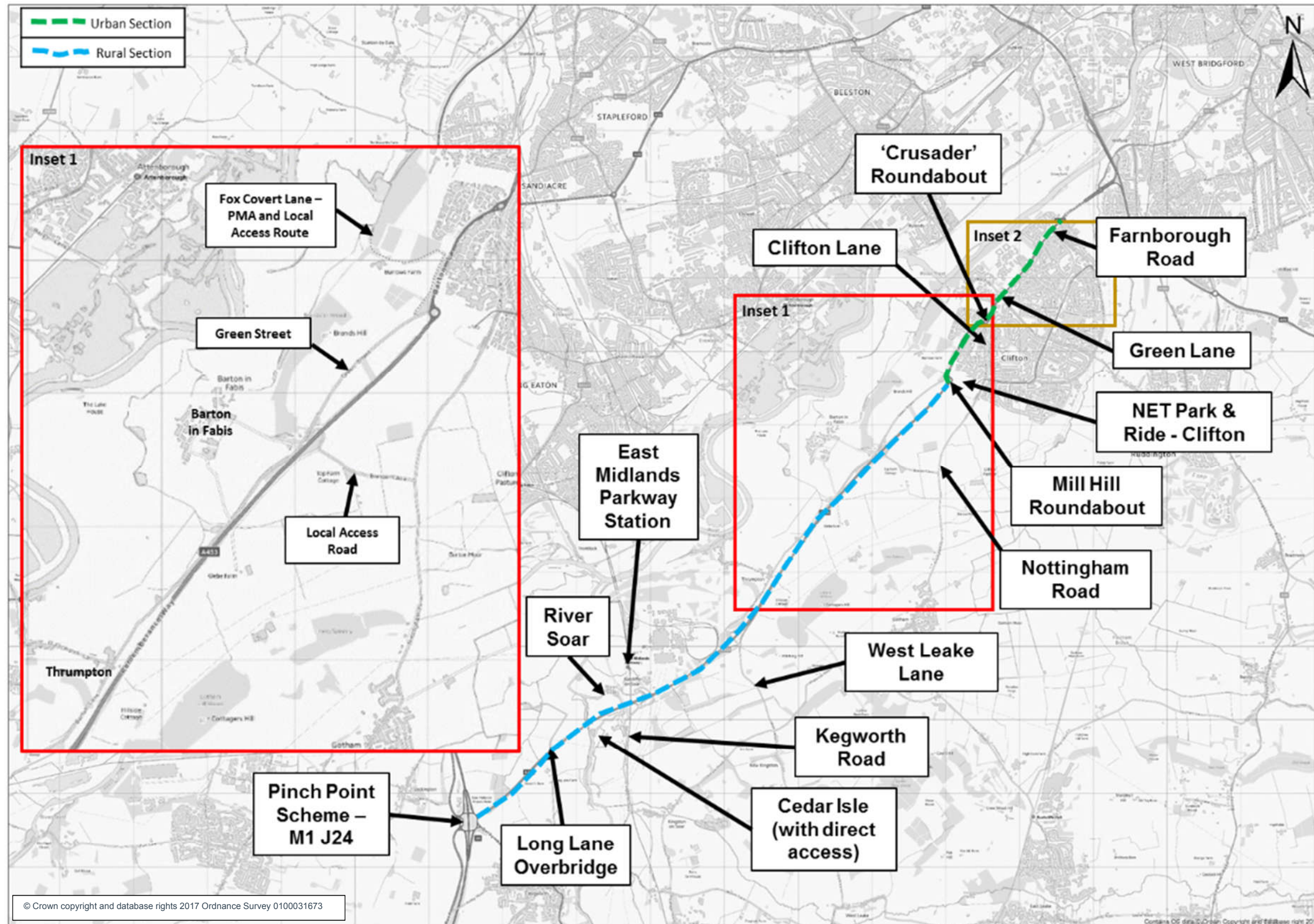
- 1.17. The A453 VMS upgrade pinch point scheme complements the A453 widening scheme. The scheme provides technology to facilitate the better management and enhanced monitoring of the area. Due to the complementary nature of the scheme, the evaluation will consider the widening scheme in conjunction with the VMS scheme.

Scheme Objectives

- 1.18. The objectives of the scheme, as set out in the Client's Scheme Requirements (2013) were as follows. Further details of the objectives assessed are included in **Appendix A**:
 - To provide maximum value for money against its whole life costs in accordance with the Department's WebTAG Guidance (BCR adjusted for non-monetised impacts should be greater than 2).
 - To deliver the scheme in a way which supports the delivery of the Government's transport policy objectives.
 - To address the safety problems identified and should significantly reduce current accident levels for all road users including non-motorised users.
 - To minimise the detrimental environmental effects of the scheme, in particular the adverse impacts on air quality and noise, and offset by mitigation measures where technically feasible and economic to do so, taking account of costs, availability of funding and statutory obligations.
 - To protect the built and natural environment through mitigating the potentially adverse impact of adding additional capacity, meeting current environmental standards and taking opportunities to enhance poor environmental features where appropriate and taking into account value for money.
 - To protect watercourses from pollution during and after construction.
 - To support sustainable economic activity and local development plans.

- To provide an additional lane in each direction to reduce traffic congestion, reduce frequency of incidents and improve journey time reliability.
- To enhance NMU facilities through Clifton, and provide a new NMU route between Clifton and Kegworth.
- To improve access to public transport, considering safety and to ensure the shortest practical desire line is provided.
- To provide support to spatial and transport policies consistent with emerging local plans for the Nottingham and Rushcliffe areas.
- To facilitate future access to the NET2.
- To facilitate/improve access to the East Midlands Parkway Railway Station.
- To improve access between Nottingham and East Midlands Airport.
- To improve access to Nottingham Trent University while reducing conflict with through traffic on the A453.

Figure 1-2 – Key Features of the Scheme



Scheme History

- 1.19. A brief history of the key events involved in the development of the scheme is provided in **Table 1–1**.

Table 1–1 Chronology of the A453 Widening Scheme development

Date	Event
1983	Scheme first considered a part of the National Trunk Road Programme
1996	Public Inquiry
1998	Scheme withdrawn from Roads Programme
1999	Further consideration of scheme through Multi-Modal Study (MMS)
February/March 2002	Public Consultation of Draft Conclusions of MMS
August 2002	Final Conclusions of MMS announced
January 2009	Draft Orders and ES published
November 2009	Public Inquiry
September 2012	Traffic Forecasting and Economics Update
January 2013	Start of Construction
July 2015	Scheme Opened to traffic

Overview of POPE

- 1.20. Highways England is responsible for improving the strategic highway network (motorways and trunk roads) through the Major Schemes programme. At each key decision stage through the planning process, schemes are subject to a rigorous appraisal process to provide a justification for the scheme’s continued development.
- 1.21. When submitting a proposal for a major transport scheme, the Department for Transport (DfT) specifies that an Appraisal Summary Table (AST) is produced. The contents of the AST allow judgements to be made about the overall value for money of the scheme. The AST for this scheme is presented in **Appendix B** of this report.
- 1.22. POPE studies are undertaken for all Major Schemes to evaluate the strengths and weaknesses in the techniques used for appraising schemes. This process helps to identify improvements which can be made in the future. For POPE, this is achieved by comparing information collected before and after the opening of the scheme, 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 **Appendix B** of this report.

Report Structure

- 1.23. Following this introduction, the report is divided into eight further chapters as follows:
- **Chapter 2** – Traffic Impact Evaluation;
 - **Chapter 3** – Safety Evaluation;
 - **Chapter 4** – Economic Evaluation;
 - **Chapter 5** – Environmental Evaluation;
 - **Chapter 6** – Accessibility and Integration Evaluation;
 - **Chapter 7** – Other Impacts Evaluation;
 - **Chapter 8** – Conclusions;

- **Appendix A** – Client Scheme Requirements Evaluated (CSR);
- **Appendix B** – Appraisal Summary Table (AST) and Evaluation Summary Table (EST);
- **Appendix C** – Environment Information Requested;
- **Appendix D** – Photomontages;
- **Appendix E** – Landscape Appendix;
- **Appendix F** – Biodiversity Appendix; and
- **Appendix G** – Glossary.

2. Traffic Impact Evaluation

Introduction

- 2.1. To evaluate the traffic flow, journey time and reliability impacts of the scheme, the following chapter considers:
- Sources of data;
 - Summary of the traffic modelling approach and forecast assumptions;
 - Background traffic changes;
 - Observed traffic volume changes;
 - Traffic Flow forecasting accuracy;
 - Journey time changes on the A453;
 - Accuracy of journey time changes forecasting; and
 - Reliability impacts of the scheme.

Sources

- 2.2. The analysis of traffic in this section of the report draws upon from the following sources.
- Traffic volumes
 - Highways England permanent traffic counts for the A453 and other strategic routes of interest in the year before the start of construction (2012) and the year following completion (2016);
 - DfT data on national and regional traffic levels; and
 - Temporary traffic count surveys undertaken on local roads in 2012 and 2016 as part of this evaluation and undertaken by Nottinghamshire County Council.
 - Journey times
 - The pre-scheme (2012) observed journey times along the A453 have been extracted from TrafficMaster. The post-scheme (2016) observed journey times have been extracted from the Highways England's TRIS system. Different sources have been utilised as the mapping on which the TrafficMaster journey times are mapped to has not yet been updated for the new post scheme layout.
- 2.3. The following documents have been used to source the traffic modelling forecasts:
- A453 Widening Traffic Forecasting and Economics Update Report (Final – September 2012) (TFEUR).

Scheme Modelling and Forecast Assumptions

- 2.4. The pre-scheme appraisal process for the A453 M1 J24 to A52 widening scheme involved the forecasting of traffic flows for Do Minimum (DM) and Do Something (DS) scenarios. The DS scenario includes the widening scheme, whilst the DM scenario does not. As part of POPE methodology, these modelled forecast flows are compared with observed flows to ascertain the accuracy of the original forecasts.

Forecasting Assumptions

- 2.5. To understand the differences between the forecast and actual traffic impacts, it is first necessary to develop an understanding of how the scheme was appraised and the key assumptions used. This may then assist in explaining any differences observed.
- 2.6. All forecasting for the A453 widening scheme was undertaken using VISUM and DIADEM modelling software for variable demand modelling, with traffic growth forecast using NRTF and TEMPRO.
- 2.7. The study area was bordered by the A52 to the north and the M1 to the west and extends as far as Nottingham to the east and J23 of the M1 to the south. Minor roads through the villages along the route that would be affected by the route were also included.
- 2.8. The base year used in the model was 2006 with an updated opening year forecast of 2015 and a design year forecast of 2031.

Network Improvement Assumptions

- 2.9. The base model was the starting point for developing the future year network. The forecasting report for this scheme considered a number of improvements to the network including NET Phase 2 extension¹ at Clifton which was assumed to be complete from the 2015 DM scenario.
- 2.10. Throughout 2012 and 2013 there was disruption for traffic accessing Nottingham City urban area, particularly from the west and southwest due to roadworks for the NET extension. The completed scheme was included in the modelling; however, the construction may have had an impact on the pre-construction localised traffic flows and in particular, the surveys undertaken in 2012. This will be considered further in later sections.

Development Assumptions

- 2.11. The Traffic Forecasting Report for this scheme stated that various committed developments were included in the modelling. These were listed in the report and cover the following areas:
 - Broxtowe, Charnwood, Derby City, Erewash, Gedling, North West Leicestershire, Nottingham City, Rushcliffe and South Derbyshire.
- 2.12. The resultant matrix totals were constrained to the growth levels forecast by TEMPRO or NTM as appropriate².

Assessment Periods

- 2.13. The strategic traffic model was developed for the following time periods:
 - AM Peak Hour (07:30 to 08:30);
 - Average Inter Peak Hour (10:00 to 16:00); and
 - PM Peak Hour (16:30 to 17:30).

¹ The NET Phase 2 extension at Clifton also comprised the construction of a Park and Ride site. The Park and Ride site offers over 1,000 spaces accessed from the Mill Hill roundabout on the A453 and a further access from Nottingham Road.

² The TEMPRO and NTM factors were based on the latest available forecast at the time of the modelling; Version 6.2 and Road Traffic Forecast 2011, respectively.

Background Changes in National and Regional Traffic Trends

- 2.14. Traffic flow changes occur over time, and therefore POPE studies assess changes in the vicinity of the scheme, within the context of national, regional and locally observed background changes in traffic.
- 2.15. As such, this section will examine and discuss the national, regional and local trends in traffic flows.

National Trends

- 2.16. The Department for Transport (DfT) produces observed annual statistics for all motor vehicles in billion vehicle kilometres (bvkm) by road type³. Data between 2012 (just prior to construction commencing) and 2016 has been used to calculate the factor of change compared to a base year of 2012 on a yearly basis, and is shown in **Table 2–1** for all 'A' roads.

Table 2–1 Observed Trends (All 'A' Roads)

Period	Change in Traffic Flow	
	National	East Midlands
2012 – 2013	0.0%	0.0%
2013 – 2014	+2.0%	+2.4%
2014 – 2015	+1.8%	+2.8%
2015 – 2016	+2.1%	+1.8%
2012 – 2016	+5.9%	+7.0%

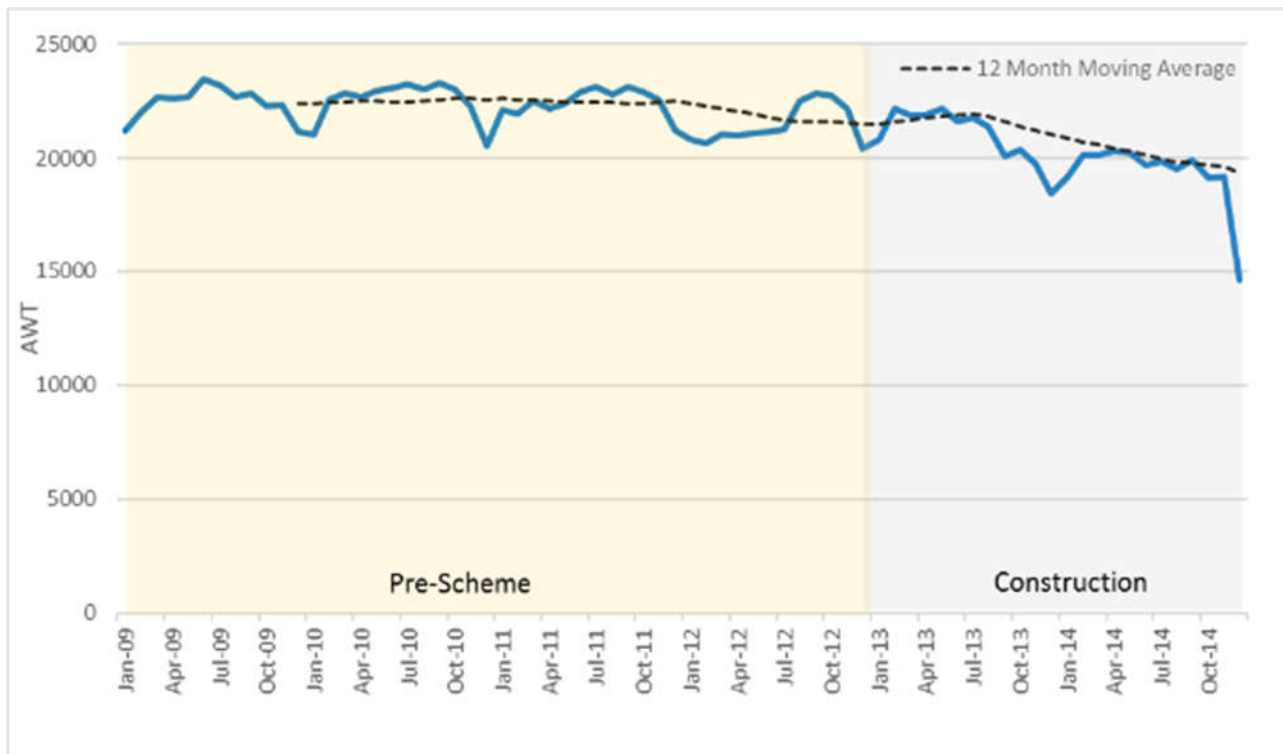
- 2.17. It can be seen from **Table 2–1** that traffic levels on all 'A' roads increased with a variation of 5.9% nationally and 7.0% regionally in traffic flows between 2012 (just prior to construction commencing) and 2016.

A453 Trends

- 2.18. The long-term average weekday traffic (AWT) trends on a site on the A453 at Barton (which is along the rural part of the scheme and remained operational during scheme construction) has been looked at. It can be seen from **Figure 2-1** that average daily traffic volumes by month were fairly static, however the construction period demonstrates a more significant reduction in traffic, which is likely to be due to the speed and lane restrictions that were in force.

³ Road Traffic and Speeds (<http://www.dft.gov.uk/pgr/statistics/datatablespublications/roads/traffic>). Table TRA0202. Motor vehicle traffic (vehicle kilometres) by road class in Great Britain, annual from 1993 to 2016 and Table TRA0203. Motor vehicle traffic (vehicle kilometres) by road class and region in Great Britain, annual from 1993 to 2016.

Figure 2-1 A453 - Trend over Time

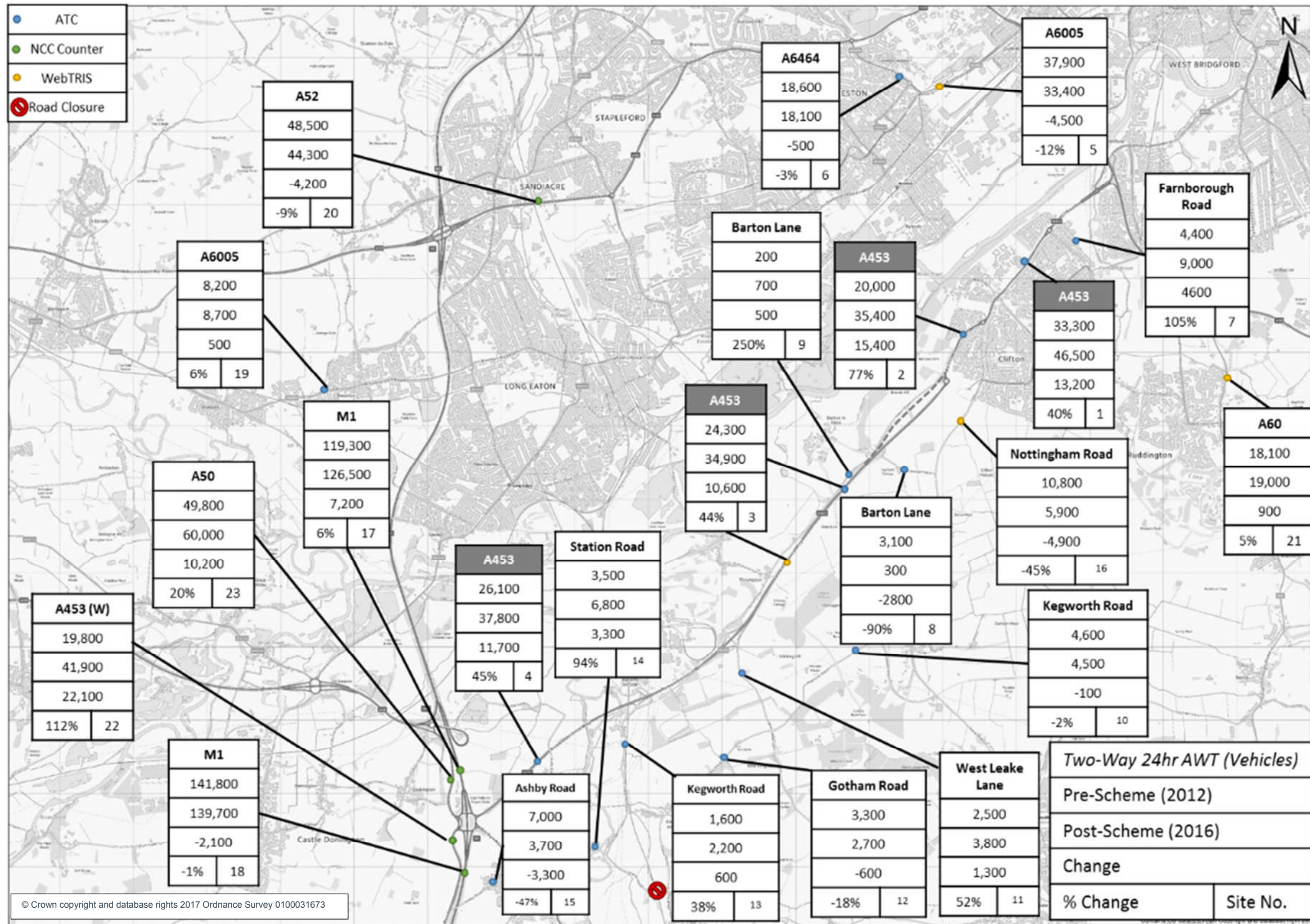


- 2.19. Although there has typically been an increase in traffic levels nationally on 'A' roads, this same trend did not occur on the A453 in the period prior to the start of construction.
- 2.20. Since it is not known whether this trend occurred because of no growth in traffic volumes or whether it occurred because of congestion and resulting capacity constraints (i.e. no additional traffic could utilise the pre-scheme A453), no factors have been applied to observed traffic flows to account for an annual change. This trend should however be borne in mind when assessing the changes in traffic volumes later in this section, as it is important to acknowledge that an element of traffic growth observed may merely be indicative of national trends.

Traffic Volume Changes

- 2.21. A comparison of pre and post scheme opening observed 24-hour average weekday traffic (AWT) flows is shown in **Figure 2-2**. Traffic flows are based on data extracted for September/October 2012 (pre-scheme) and September/October 2016 (post-scheme).

Figure 2-2 Average Weekday Traffic (AWT)



2.22. Key observations on the changes to weekday flows (AWT) to note from **Figure 2-2** are:

A453:

- Traffic using the dualled A453 has increased by over 75% on the section between Mill Hill and Crusader roundabout (Site 2) compared to the pre-scheme situation; more than 15,000 additional vehicles per weekday.
- Traffic has also increased significantly along the rest of the A453 with an additional 13,200 vehicles per day using the urban section (Site 1), an increase of around 40%.

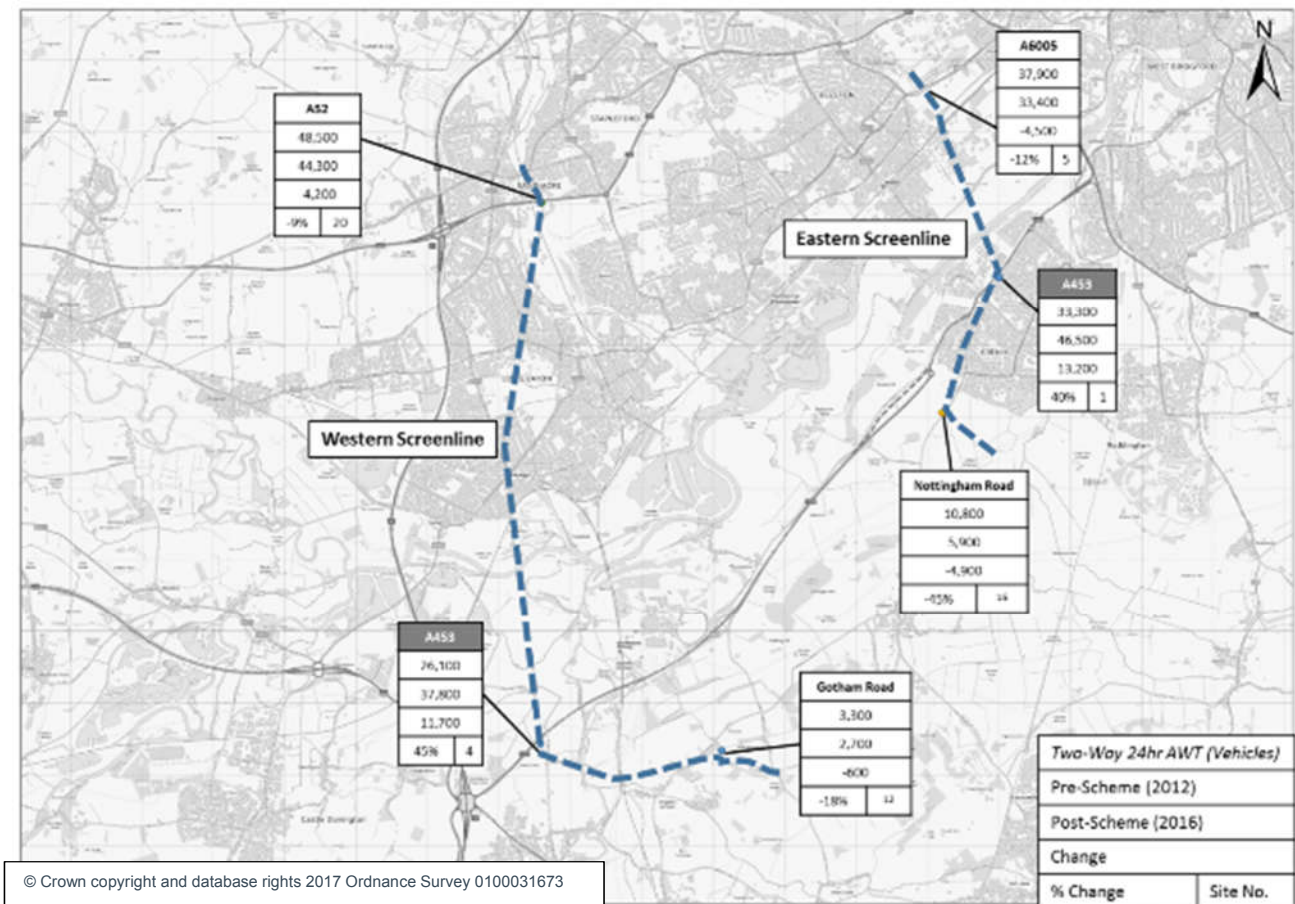
Other Roads:

- Traffic flows on the A52 (Site 20), an alternative route Nottingham from M1 J25, have decreased which could be due to traffic accessing Nottingham from the M1 now using the J24 and the A453 instead of the A52.
- Traffic flows on Kegworth Road (Site 13) and West Leake Lane (Site 11) have increased which are likely to be due to an increase in vehicles routing to/from the improved A453 because it has become a more attractive route. This is also likely to be due to the consolidation of points to access and leave the A453.
- Traffic flows on Nottingham Road (Site 16), Gotham Road (Site 12) and Ashby Road (Site 15), which may have provided an alternative parallel route to the A453 to/from the south west of Nottingham, have reduced.
- Traffic flows in the Beeston area (Sites 5 and 6) have also reduced but this could be in relation to the introduction of the NET extension in this area causing a mode shift away from private car use.

Screenlines

- 2.23. To further investigate any wider potential reassignment as a result of the scheme, a screenline analysis has been undertaken for the screenlines identified in **Figure 2-3**. Screenline analysis allows a better understanding of total vehicle movements across a wider corridor. The intention is to count vehicles at only one location on a screenline for each journey they make.
- 2.24. Two screenlines have been identified for this scheme, one running across the eastern section of the scheme, and the other across the western section of the scheme. This analysis enables a comparison of how east-west movements on the major roads have been affected by the scheme. Locations are noted in **Table 2-2** and **Table 2-3**.

Figure 2-3 Screenline Locations



2.25. The results of the screenline analysis are shown in **Table 2–2** for the eastern screenline and **Table 2–3** for the western screenline of the scheme.

Table 2–2 Eastern Screenline Analysis

	Site	Description (North to South)	Average Weekday Traffic		Pre-Scheme to OYA Change	Pre-Scheme to OYA %Change
			Pre-Scheme (2012)	OYA (2016)		
Eastern Screenline Two way flows	5	A6005 (@ Beeston)	37,900	33,400	-4,500	-12%
	1	A453 (Southwest of Farnborough Road Junction)	33,300	46,500	13,200	40%
	16	Nottingham Road (South of Clifton)	10,800	5,900	-4,900	-45%
	Screenline Total			82,000	85,800	3,800

2.26. Using the data presented in **Table 2–2**, it can be seen that:

- Across the eastern part of the scheme, total AWT flows increased by 3,800 vehicles equating to a 5% increase in traffic flow over the wider area, this is broadly in line with traffic growth experienced in the period 2012-2016.
- The increase is largely attributed to the increase in traffic on the widened A453, which has seen an increase of 13,200 vehicles (40% increase) which is predominantly traffic reassigning from other roads. Based on the reduction in other routes accessing from

the west, it is likely that this increase in traffic is partly drawn from sites 5 and 16. This indicates that perhaps more traffic is now accessing Nottingham via the A453 than was previously.

- Other roads have seen a decrease in traffic to the north and south suggesting that there has been some rerouting away from parallel (in some cases rat-running) routes onto the improved A453.

Table 2–3 Western Screenline Analysis

	Site	Description (North to South)	Average Weekday Traffic		Pre-Scheme to OYA Change	Pre-Scheme to OYA %Change
			Pre-Scheme (2012)	OYA (2016)		
Western Screenline Two Way Flows	20	A52 (@ Stapleford)	48,500	44,300	-4,200	-9%
	4	A453 (M1 J24 to Kegworth Road)	26,100	37,800	11,700	45%
	12	Gotham Road (NE of Kingston)	3,300	2,700	-600	-18%
	Screenline Total			77,900	84,800	6,900

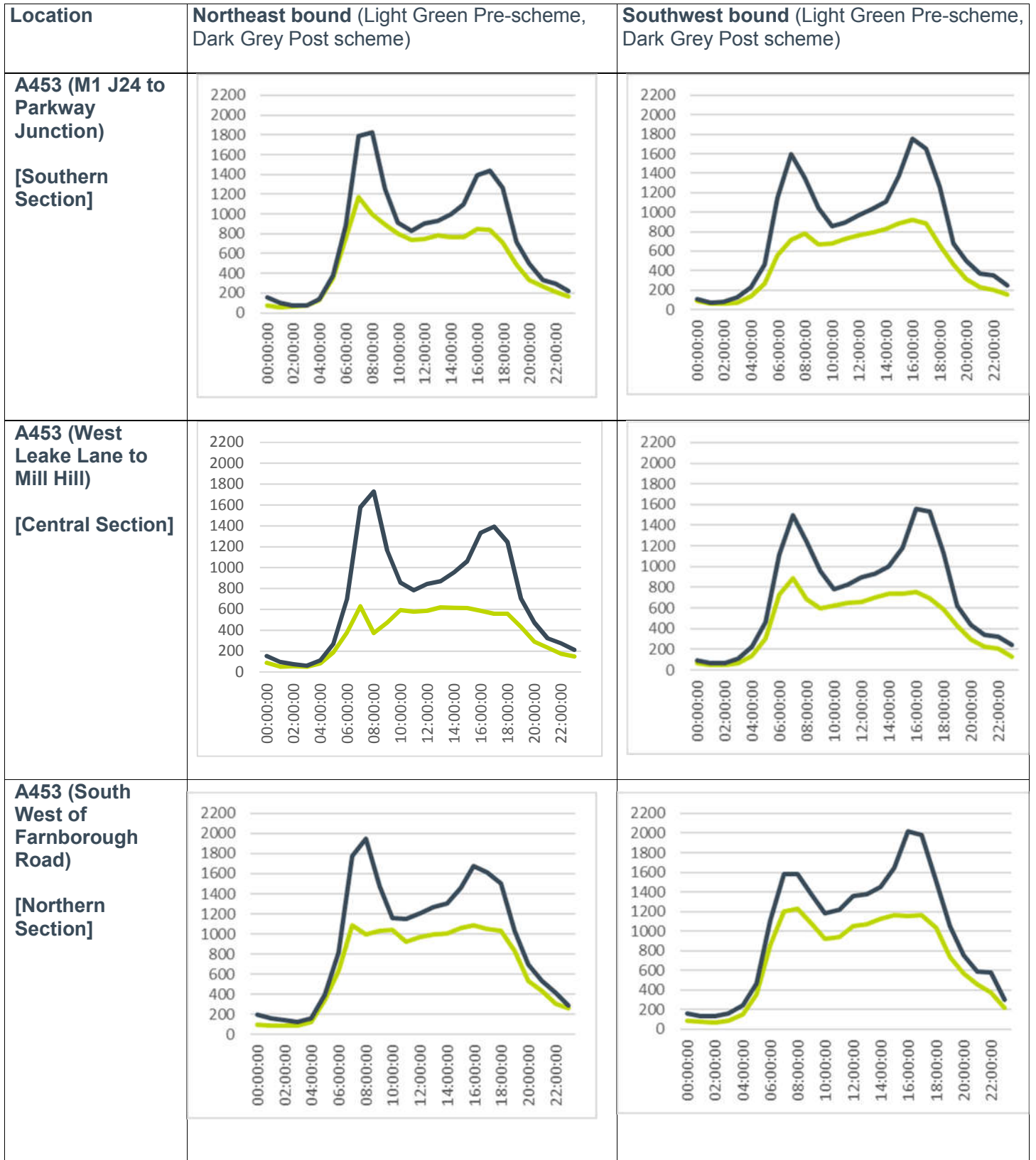
2.27. Key points that can be drawn from **Table 2–3** are:

- Overall there has been an increase of 9% over the screenline with the major change being seen on the A453 scheme section where an increase of 45% is seen. This is beyond the wider traffic growth experienced between 2012-2016. This could suggest that there has been an increased attraction of traffic to the improved A453, although there are some key routes which would form part of this screenline where there is no data available.
- A decrease can be seen on the A52 which may be as a result of re-routing of traffic travelling to/from Nottingham onto the A453.
- An 18% decrease in traffic is seen on the Gotham Road although this only equates to 600 vehicles. This traffic change may be a reduction in rat running vehicles through this rural area.
- There is evidence of reassignment onto the A453, with an increase of 45% (11,700 vehicles) post opening.

Average Daily Traffic Flow Profile

2.28. The previous sections note that there has been a large increase in traffic on the A453 post opening. To try to analyse the daily change in more detail, traffic flows have been assessed by hour of day for each of the main scheme sections.

Figure 2-4 A453 weekday average hourly flows (by hour commencing)



2.29. The traffic flow is broadly tidal with a higher flow of traffic in a northeast bound direction in the AM peak hour and a higher flow in a southwest bound direction in the PM peak hour.

- 2.30. The changes in the flow profile across the day show that in the pre-scheme period there was trip suppression in the peak periods as the increases between the pre and post-scheme traffic flows were more apparent during these periods (i.e. the pre-scheme traffic flows denoted in green followed a 'smoother' curve with the post-scheme traffic flows showing more pronounced peaks). Post opening, the increased capacity and the improvements have enabled the suppressed traffic to use the route and have also encouraged reassignment from less suitable roads. The impact of the scheme on the wider area is considered in the proceeding sections.

A453 HGV Traffic Flows

- 2.31. **Table 2-4** shows a comparison of HGV (vehicles longer than 5.2m) usage for the pre and post scheme periods for sections on the A453 where traffic composition data is available.

Table 2-4 HGV flows on A453

Site No.	Name	Before			OYA			Change (OYA – Before)			
		ADT	HGV		ADT	HGV		ADT		HGV	
			Abs	%		Abs	%	Abs	%		
2	A453 (South West of Crusader)	18,900	1,600	8%	32,000	3,200	10%	13,100	69%	1,600	100%
4	A453 (M1 J24 to Parkway Junction)	23,800	1,500	6%	34,400	3,600	10%	10,600	45%	2,100	140%

- 2.32. There has been an increase in the number of HGVs observed pre and post scheme. Whilst there has been a large increase in total traffic flows, the increase in the percentage HGVs is greater than the increase in total vehicles.

Traffic Forecasting

- 2.33. The future demand for travel within the strategic model study area was determined to be affected by several key factors. These included:
- Changes in the number of households;
 - Changes in population and employment levels;
 - Changes in the level of car ownership; and
 - Changes to the local highway network.

Residential Development

- 2.34. Development-specific information used to inform the model forecasting reports was provided by the following planning authorities:
- Broxtowe; Charnwood; Derby City; Erewash; Gedling; North West Leicestershire; Nottingham City; Rushcliffe and South Derbyshire.
- 2.35. This was supplemented with information from the county authorities of Leicestershire, Nottinghamshire and Derbyshire.
- 2.36. The information provided includes details of planned developments that might affect the scheme along with a classification of how certain the development was to go ahead. The Core scenario (used in this evaluation), included those developments which were 'Near certain' or 'More than likely'.
- 2.37. A total of 22 sites which included residential provision were included in the Core Scenario modelling. These varied in size and were located across the different authority areas considered. A summary of the residential sites, with more than 100 dwellings, is provided in **Table 2-5**.

Table 2-5 Summary of Core Scenario Residential Development Proposals

Development Description	District/Borough	Number of Dwellings	Assumed Complete by 2015 (opening year)
Eastside	Nottingham	3,000	429
Drakelow Power Station, Drakelow	South Derbyshire	2,239	140
Highfields Farm (Urban extension to Derby)	South Derbyshire	1,200	109
Boulton Moor (Urban extension to Derby)	South Derbyshire	1,058	317
Land North of Bingham	Rushcliffe	1,000	0
Rykneld Road	Derby	980	123
Castleward - City Centre Regeneration	Derby	800	100
Kingsway Hospital	Derby	700	117
Former RAF Newton Phase 2	Rushcliffe	550	0
Stenson Fields (Urban extension to Derby)	South Derbyshire	500	167
Harrowgate Drive, Wanlip/Birstall	Charnwood	344	49
Leicester Road, Ashby-de-la-Zouch	North West Leicestershire	261	174
Depot, Darklands Road, Swadlincote	South Derbyshire	201	67
Friar Gate Station	Derby	150	19
Dark Lane, Calverton	Gedling	110	28
RBS Computer Centre, Derby Road, Kegworth	North West Leicestershire	104	69

2.38. Based on the size and location of the above residential developments, it is likely that the only site which could have a noticeable impact on the A453 scheme is the Eastside development. At the time of the 2016 surveys, construction of this site had not commenced.

2.39. The other developments are either remote of the scheme (i.e. development generated traffic would have largely dissipated before reaching the A453) or are small (with fewer than 100 dwellings assumed to be complete in the Opening Year) and therefore would not have a material impact on traffic flows of the scheme links.

Change in Population/ Car Ownership

2.40. The impact of changes in employment/ population levels, changes in car ownership and changes in the number of households are modelled at a national level through the National Transport Model (NTM) developed by the DfT, which itself incorporates the National Trip End Model (NTEM). The NTEM provides future year demand growth inputs, forming the starting point for national travel demand forecasting work.

2.41. Use of the TEMPRO database allows for the information contained within the NTM to be output in the form of forecast year trip end growth projections for car travel, thus allowing

for local area traffic models to be developed on a consistent basis with regards to future year growth.

Changes to the Local Highway Network

- 2.42. The model forecasting reports included highways schemes that were either committed, or considered highly likely to occur within the study area within the period 2012 to 2031.
- 2.43. **Table 2-6** demonstrates that the majority of schemes included in the DM model scenario were constructed by the assumed 2015 modelled year.

Table 2-6 Planned Transport Infrastructure Improvements (Core Scenario)

Scheme	Year Modelled	Modelled Likelihood	Status as of 2016
A52 Bardills Roundabout Improvements	2015	Complete	Complete
A612 Gedling transport improvement scheme	2015	Complete	Planned start Spring 2018
Connecting Derby integrated transport project	2015	Complete	Complete
Earl Shilton Bypass	2015	Complete	Complete
East Midlands Parkway Station	2015	Complete	Complete
Eastside Transport Proposals Phase 1	2015	Near certain	Complete
Hucknall Town Centre improvements	2015	Near certain	Complete Spring 2017
Ilkeston - Awworth link road	2015	Complete	Complete
Loughborough Town Centre	2015	Near certain	Unknown
M1 Widening Contract 1 J25 to J28	2015	Complete	Complete
Mansfield town centre regeneration transport improvements package	2015	Under construction	Complete
Markham Vale / M1 J29A	2015	Complete	Complete
Nottingham Ring Road Major Scheme	2015	Near certain	Complete
Southside transport measures	2015	Near certain	Unknown
Workplace Parking Levy	2015	Near certain	Complete
A46 dualling between Newark and Widmerpool	2015	Under construction	Complete
M1 J28-31 Managed Motorways	2015	More than likely	Complete Winter 2016
NET Phase 2 Chilwell Extension (Line 3) and M1 J25 Park and Ride	2015	Near Certain	Complete
NET Phase 2 Clifton Extension (Line 2) and Clifton park and ride	2015	Near Certain	Complete
A6 and A5111 Raynesway Park Junction Improvement	2015	Complete	Complete

A52 - Bramcote to QMC junctions (Nottinghamshire & Nottingham City) - Capacity scheme	2015	Under construction	Complete
A52 - Sharphill Wood (Nottinghamshire) - Housing development	2015	Near certain	Not commenced until 2017
M1 J32-35a Managed Motorways	2015	More than likely	Complete Spring 2017
T12	2015	Near Certain	Complete 2016

Forecast vs. Observed Traffic Flows

- 2.44. Forecast traffic flows are provided in the TFEUR, 2012 which provides flow forecasts for a 2015 opening year, and a 2031 future year for the Do Minimum (DM without scheme) and Do Something (DS with scheme) scenarios.
- 2.45. Although the assessment years of the pre-scheme observed traffic data (2012) and the post-opening observed traffic data (2016) are not consistent with the modelled opening year, the forecast traffic flows have not been factored due to minimal changes in background traffic levels observed from long term trends based on a long term count on the A453 in the period prior to construction (2008 to 2012). Furthermore, there are implemented schemes including the M1 Junction 24/A50 approach pinch point scheme and the NET Phase 2 extension at Clifton which are likely to complicate traffic patterns further.
- 2.46. A full summary of forecast and observed traffic flows at all comparable sites is shown in **Table 2-7**, **Table 2-8** and **Table 2-9**. Annual average daily traffic (AADT) opening year (2015) Do Minimum and Do Something flows have only been presented for the A453 in the latest version of the Traffic Forecasting Report. Both AM (07:30 to 08:30) and PM (16:30 to 17:30) peak hour opening year Do Minimum and Do Something traffic flows have however been presented for the wider study area.

Table 2-7 Two-Way Traffic Flow forecast vs observed: Daily (ADT)

Site No.	Name	24hr ADT							
		Opening Year (2015) Do Minimum	2012 Observed	% Difference	Opening Year (2015) Do Something	2016 Observed	% Difference	DM/DS % Change	Observed Pre/Post % Change
1	A453 (Southwest of Farnborough Road Junction)	32,200	31,400	-3%	43,400	43,500	0%	35%	39%
2	A453 (Southwest of Crusader Rbt)	19,000	18,900	-1%	33,900	32,500	-4%	78%	72%
4	A453 (M1 J24 to Kegworth Road)	23,000	23,800	3%	33,900	34,400	1%	48%	45%

Site numbers as per Figure 2-2

Table 2-8 Two-Way Traffic Flow forecast vs observed: AM Peak Hour

Site No.	Name	AM Peak Hour (07:30 to 08:30)							
		Opening Year (2015) Do Minimum	2012 Observed	% Difference	Opening Year (2015) Do Something	2016 Observed	% Difference	DM/DS % Change	Observed Pre/Post % Change
1	A453 (Southwest of Farnborough Road Junction)	2,700	2,200	-23%	3,900	3,700	-5%	44%	68%
2	A453 (Southwest of Crusader Rbt)	1,600	1,200	-33%	3,100	3,000	-3%	94%	150%
3	A453 (Southwest of Mill Hill/Barton Lane) TRADS	1,600	1,700	6%	3,000	3,000	0%	88%	76%
4	A453 (M1 J24 to Kegworth Road)	2,000	1,800	-11%	2,900	3,200	9%	45%	78%
5	A6005 (@ Beeston)	3,600	2,800	-29%	3,500	2,700	-30%	-3%	-4%
7	Farnborough Road	1,100	400	-175%	1,200	800	-50%	9%	100%
8	Barton Lane East of A453	500	300	-67%	20	30	33%	-96%	-90%
10	Kegworth Road	500	500	0%	400	500	20%	-20%	0%
11	West Leake Lane	60	200	70%	400	400	0%	567%	100%
12	Gotham Road (NE of Kingston)	400	500	20%	400	300	-33%	0%	-40%
13	Kegworth Road (South of Ratcliffe)	60	170	65%	60	300	80%	0%	76%
16	Nottingham Road (South of Clifton)	1,600	1,000	-60%	1,100	500	-120%	-31%	-50%
17	M1 (N of J24)	9,200	9,100	-1%	8,500	8,900	4%	-8%	-2%
18	M1 (S of J24)	10,700	11,000	3%	10,900	10,000	-9%	2%	-9%
19	A6005 Draycott Road	500	700	29%	500	800	38%	0%	14%
20	A52 (@ Stapleford)	4,100	4,400	7%	3,900	4,100	5%	-5%	-7%
21	A60 (@ Ruddington)	1,800	1,500	-20%	1,800	1,500	-20%	0%	0%
22	A453 (W)	2,000	1,400	-43%	2,200	3,000	27%	10%	114%
23	A50	4,600	4,200	-10%	4,700	4,800	2%	2%	14%

Site numbers as per Figure 2-2

Table 2-9 Two-Way Traffic Flow forecast vs observed: PM Peak Hour

Site No.	Name	PM Peak Hour (16:30 to 17:30)							
		Opening Year (2015) Do Minimum	2012 Observed	% Difference	Opening Year (2015) Do Something	2016 Observed	% Difference	DM/DS % Change	Observed Pre/Post % Change
1	A453 (Southwest of Farnborough Road Junction)	2,500	2,200	-14%	3,500	3,500	0%	40%	59%
2	A453 (Southwest of Crusader Rbt)	1,400	1,100	-27%	3,200	3,200	0%	129%	191%
3	A453 (Southwest of Mill Hill/Barton Lane) TRADS	1,300	2,000	35%	3,200	3,200	0%	146%	60%
4	A453 (M1 J24 to Kegworth Road)	2,100	2,000	-5%	3,500	3,400	-3%	67%	70%
5	A6005 (@ Beeston)	3,800	3,000	-27%	3,700	2,700	-37%	-3%	-10%
7	Farnborough Road	1,100	500	-120%	1,100	700	-57%	0%	40%
8	Barton Lane East of A453	800	500	-60%	20	30	33%	-98%	-94%
10	Kegworth Road	900	600	-50%	800	500	-60%	-11%	-17%
11	West Leake Lane	140	200	30%	800	400	-100%	471%	100%
12	Gotham Road (NE of Kingston)	700	400	-75%	500	300	-67%	-29%	-25%
13	Kegworth Road (South of Ratcliffe)	160	160	0%	100	200	50%	-38%	25%
16	Nottingham Road (South of Clifton)	1,900	1,400	-36%	1,000	600	-67%	-47%	-57%
17	M1 (N of J24)	9,300	8,900	-4%	9,100	8,900	-2%	-2%	0%
18	M1 (S of J24)	11,200	10,800	-4%	11,200	10,500	-7%	0%	-3%
19	A6005 Draycott Road	600	700	14%	600	700	14%	0%	0%
20	A52 (@ Stapleford)	4,800	4,600	-4%	4,500	4,300	-5%	-6%	-7%
21	A60 (@ Ruddington)	2,400	1,700	-41%	2,400	2,000	-20%	0%	18%
22	A453 (W)	1,700	1,300	-31%	2,000	2,900	31%	18%	123%
23	A50	5,100	4,300	-19%	5,000	5,000	0%	-2%	16%

Site numbers as per Figure 2-2

2.47. The key points to note from **Table 2-7**, **Table 2-8** and **Table 2-9** are:

Over a typical day:

- Both the forecast DM and DS flows were comparable with the observed pre and post scheme traffic flows with differences of less than 5%.

In the AM peak:

- The DM scenario typically overestimated traffic flows on the A453. This could be as a result of traffic growth (since the DM flows relate to an Opening Year of 2015 which is compared to an observed year of 2012) or that traffic flows were affected at the time of the 2012 surveys by the commencement of works for the NET Phase 2 extension at Clifton.
- The DM scenario also overestimated traffic volumes across most of the links considered. This could be due to traffic growth between the 2012 observed surveys and the 2015 DM scenario.
- With the exception of the A453 scheme links, the DS scenario also typically overestimated traffic volumes across most of the links considered this could be due to issues with the DM forecasting.
- The A453 links were consistent with the 2016 observed traffic flows.
- The direction of change forecast (i.e. an increase or a reduction) was typically in line with the observed data. West Leake Lane was forecast to have a much greater increase in traffic than was observed. This is however likely to be due to relatively low traffic flows.
- The A453 (W) was observed to have a much greater increase in traffic than was forecast. This is likely to be due to the M1 J24 pinch point scheme, as set out previously.
- On Kegworth Road (South of Gotham), a change of -38% was forecast however, this was observed to be an increase of 25%. This increase is expected due to the use of this road to access the A453 at the new grade separated junction.

In the PM peak:

- The DM scenario typically overestimated traffic flows on the A453. This could be as a result of traffic growth or that traffic flows were affected at the time of the 2012 surveys by the commencement of works for the NET Phase 2 extension at Clifton.
- Across the other links, there is much variability between the 2015 DM scenario and the pre-scheme observed traffic flows.
- The DS forecasts are comparable to the post-scheme observed traffic flows on the A453. Although the differences between the DM and the pre-scheme observed flows result in the scheme impact being greater than forecast.
- As with the DM scenario, across the other links, there is much variability between the 2015 DS scenario and the post-scheme observed traffic flows.
- The direction of change forecast (i.e. an increase or a reduction) was typically in line with the observed data. West Leake Lane was forecast to have a much greater increase in traffic than was observed. This is however likely to be due to relatively low traffic flows.
- The A50 was observed to have a much greater increase in traffic than was forecast. This is likely to be due to the M1 J24 pinch point scheme, as set out in proceeding sections.
- On Kegworth Road (South of Gotham), no change was forecast however, there was observed to be an increase of 76%. This increase may be due to the use of this road to access the A453 at the new grade separated junction.

Impact of M1 Junction/A50 Approach Pinch Point Scheme

- 2.48. The pinch point scheme at Junction 24 of the M1 was not included in the strategic modelling. The scheme was intended to re-route traffic approaching the M1 southbound from the A50 eastbound along the A453 to the west of the Junction 24 and instead access the motorway at Junction 23A. This was achieved through the provision of a 'by-pass' section through the M1 Junction 24 roundabout. This scheme would have the effect of removing traffic from the circulatory carriageway and in particular from the circulatory carriageway at the A453 approach. This could reduce delays for traffic approaching the M1 Junction 24 from the A453.
- 2.49. In order to establish the potential effects of the pinch point scheme, traffic flows have been obtained for the pre and post scheme periods for key links surrounding the M1 Junction 24, in particular:
- A50
 - A453 (E) and A453 (W)
 - M1 Mainline between J23A and J24; and
 - M1 Mainline between Junction 23 and J23A.
- 2.50. This will help to establish whether any traffic re-routing may have occurred as a result of the pinch point scheme. The pre and post scheme AADT flows are provided in **Table 2-10**, below.

Table 2-10 Pre and Post Scheme M1 J24/A50 Approach Pinch Point Scheme Observed Traffic Flows

Arm	Direction	2012 Observed AADT	2016 Observed AADT	Difference (2016-2012)	
				Net	Percentage
A50	Eastbound	21,400	25,900	4,500	21%
	Westbound	23,600	28,200	4,600	19%
A453 (E)	Eastbound	11,900	16,800	4,900	41%
	Westbound	11,900	17,600	5,700	48%
A453 (W)	Eastbound	14,400	19,800	5,400	38%
	Westbound	8,100	18,600	10,500	130%
M1 Mainline South of J24	Northbound	65,300	67,600	2,300	4%
	Southbound	70,800	68,500	-2,300	-3%
M1 Mainline South of J23A	Northbound	50,800	53,600	2,800	6%
	Southbound	52,700	57,800	5,100	10%

- 2.51. Observed traffic flows in the area surrounding the M1 J24/A50 approach pinch point scheme have typically increased. The increase in traffic flows on the A50 approach to the junction

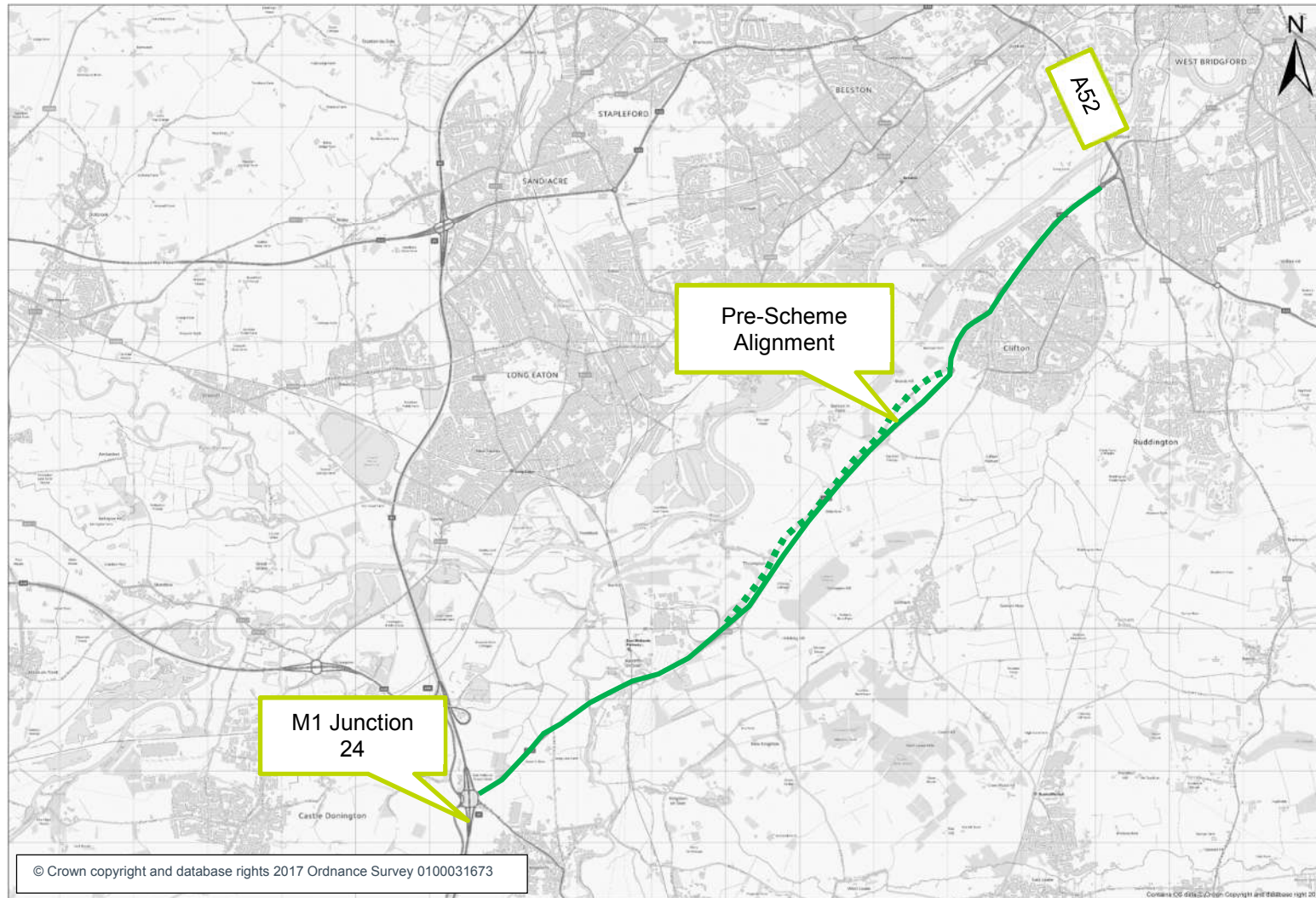
and the A453 (W) exit from the junction coupled with the decrease in southbound traffic flows on the M1 mainline between Junction 24 and Junction 23A indicates the pinch point scheme has had the effect of re-routing traffic travelling between the A50 and the M1 southbound. The traffic flows on the A453 (E) have also increased which is also likely to contribute towards the overall increases in traffic using the M1 Junction 24 roundabout.

- 2.52. It is likely that the pinch point scheme would have an impact on the evaluation of the A453 Widening scheme but it is not possible to isolate the scheme specific impacts. Furthermore, the pinch point scheme is due to be replaced shortly by major improvement works to facilitate the East Midlands SRFI.

Journey Times Evaluation

- 2.53. This section considers the impact of the A453 Widening on journey times following the implementation of the scheme. Journey times are considered pre and post-scheme opening along the routes shown in **Figure 2-5**.
- 2.54. The journey time route between M1 Junction 24 and the A52 diverge has been considered in line with the journey time forecasts. Only the forecast journey time savings for the scheme have been provided and these were extracted from the Stage 6 Client Scheme Requirements. Journey time forecasts have not been presented elsewhere.
- 2.55. The pre-scheme observed journey times along the A453 have been extracted from TrafficMaster, which records the average vehicle journey time for sections of the UK road network. The post-scheme observed journey times have been extracted from the Highways England's TRIS system, through which journey times and speeds are estimated using a combination of sources, including Automatic Number Plate Recognition (ANPR) cameras, in-vehicle Global Positioning Systems (GPS) and inductive loops built into the road surface.
- 2.56. Journey time periods were collected for the following time periods (by direction) to enable comparison with forecast impacts later in this chapter:
- AM Peak: Monday – Friday, 07:00-09:00
 - Interpeak: Monday – Friday, 10:00-16:00
 - PM Peak: Monday – Friday, 16:00-18:00

Figure 2-5 Journey Time Routes



Observed Journey Times

- 2.57. The pre-scheme observed journey times along the A453 have been extracted from TrafficMaster. The post-scheme observed journey times have been extracted from the Highways England's TRIS system.
- 2.58. The journey time data was extracted for the below periods, which avoided school holiday periods:
- Pre-scheme: 17 September 2012 – 14 October 2012
 - Post-scheme: 1 March 2016 – 21 March 2016
- 2.59. This section analyses the change in journey times along the routes outlined in **Figure 2-5**.
- 2.60. It is noted that the section between Farnborough Road and Clifton Lane at the northern end of the scheme extends marginally beyond the scheme section, however the pre and post scheme routes are the same length so still represent the impact of the scheme. This short section between the Farnborough Road roundabout and the diverge to the A52 was not changed as part of this scheme.
- 2.61. Pre and post scheme journey times are presented in **Table 2–11** for east and westbound directions for the three main time periods.

Table 2–11 Observed Journey Times on A453 (mm:ss)

Direction	Time Period	Observed Pre-Scheme (2012)	Observed OYA (2016)	Change	% Change
Eastbound	AM Peak	26:11	09:50	-16:21	-62%
	Interpeak	13:48	09:23	-04:25	-32%
	PM Peak	19:10	09:18	-09:53	-52%
Westbound	AM Peak	15:05	12:25	-02:39	-18%
	Interpeak	13:37	09:56	-03:41	-27%
	PM Peak	20:45	12:17	-08:28	-41%

- 2.62. The key points to note from this journey time data are:
- Journey times have fallen in all time periods by a minimum of 18%.
 - The largest decrease in journey times are seen in the eastbound direction with the largest improvement observed during the AM peak. This period had the longest journey time pre-scheme, indicating congestion and so had the potential for the most improvement.
 - Correspondingly, the greatest saving seen in westbound journey times are during the PM peak hour with a saving of over 8 minutes or 41%, reflecting the tidal nature of traffic flows on the widened A453.
 - Pre-scheme average journey times in the periods examined above (AM peak, Interpeak and PM Peak) varied by over 12 minutes and 7 minutes depending on time period in an eastbound and westbound direction respectively. Whereas post scheme there is variability of around 30 seconds in an eastbound direction and less than 3 minutes in a westbound direction between time periods suggesting that journeys are more predictable across the day.

Journey Time Reliability

- 2.63. No measure of forecast journey time reliability has been presented in the TFEUR as the nature of the scheme improvements (an upgrade from single carriageway road) meant that it was not possible to undertake an Incident Cost Benefit Analysis⁴ (INCA) which calculates the monetary benefits of changes in reliability.
- 2.64. It has not been possible to quantitatively evaluate the changes in reliability using journey time data because the variability recorded in the two different data sources used to for the pre- and post-scheme are not directly comparable.
- 2.65. It can however be inferred from **Table 2–11** that journey times are less variable in the post opening period because journey times during the peak periods are more similar to those in the inter-peak period. This provides an indication that journey times are more reliable than before the scheme was implemented.

Journey Time Forecasting Accuracy

- 2.66. Do Minimum and Do Something forecast journey times have not been presented in the documentation provided to the POPE team. However, forecast journey time *savings* have been provided in the Project Control Framework (PCF) Stage 6 Client Scheme Requirements. This presented journey time savings only for an opening year of 2015 and a future year of 2031 for the AM, Inter Peak and PM peak periods. Although the time periods were not explicitly defined, it is assumed that the time periods coincide with those considered throughout this report.
- 2.67. No breakdown of forecast journey time savings by section was available beyond that presented in **Table 2–12**.
- 2.68. Although not stated explicitly, the forecast journey time savings are assumed to be for the scheme extent between the M1 Junction 24 to the west and the eastern scheme extent (to the east of the Farnborough Road roundabout). The observed journey times (both pre and post scheme) extend marginally beyond the scheme itself at the eastern, to the diverge to the A52.

Table 2–12 Forecast vs Observed Journey Time Improvements on A453 (mm:ss)

Direction	Time Period	Forecast Change (2015)	Observed Change (2016)	Difference (Observed – Forecast)	
				Absolute	Percentage
Eastbound	AM Peak	05:18	16:21	11:03	208%
	Interpeak	04:00	04:25	00:25	10%
	PM Peak	04:24	09:53	05:29	125%
Westbound	AM Peak	03:30	02:39	-00:51	-24%
	Interpeak	02:06	03:41	01:35	75%
	PM Peak	04:06	08:28	04:22	107%

- 2.69. The forecast change is typically lower than observed in all periods and both directions. The forecast traffic flows during the above time periods were generally overestimated in the

⁴ An INCA provides an indication of the reliability impacts of a scheme allowing for such impacts to be quantified and monetised. The methodology only allows for the assessment of the impacts of dualled and motorway schemes and not single carriageway schemes.

opening year DM scenario and therefore this could explain why the forecast improvement in journey time is not as high as the observed journey time saving.

- 2.70. The only exception is the westbound journey time saving in the AM peak hour. Since the DM and DS forecast journey times have not been provided, it is not possible to conclusively establish the reason for the difference. One possible reason could however be that congestion levels were overestimated in the DM scenario, particularly on the approach to the M1 Junction 24 (as the pinch point scheme was not included as part of the modelling).
- 2.71. In a westbound direction during the AM peak hour, the observed journey time improvements are less than those forecast. This could be due to the higher than forecast level of traffic approaching the M1 Junction 24 roundabout which has resulted in higher delays.

Key Points – Traffic Impact Evaluation

Traffic Flow Impacts

- The scheme has led to extra traffic on the A453, with an increase of 44% (10,600 vpd) on an average weekday between the West Leake Lane junction and the Mill Hill junction. Increases of 40% are seen in the urban section of the A453 at Clifton where an additional 13,200 vehicles are seen on an average weekday. The highest percentage increase on the A453 scheme section is the mid-section between the Mill Hill junction and Crusader roundabout, where an increase of 77% is seen, which equates to 15,400 vehicles.
- The increase in traffic is highest in the AM peak travelling eastbound, and in the PM peak travelling westbound.
- There has been a reduction in traffic on the strategic A52 which offers a parallel route to the A453.
- There has been a reduction in traffic on routes to the south of the scheme which offered a parallel route to the A453. These routes were formerly used as rat runs to avoid the delays on the A453 through the villages of Gotham, Kingston-on-Soar and Kegworth.
- The number of HGVs using the A453 has increased post scheme and this has also resulted in an increase in the percentage HGVs.
- Screenlines show that:
 - There has been an increase in traffic of 5% over the wider area at the eastern end of the scheme. This primarily comprises a 40% increase on the A453 with corresponding decreases on the A6464, A6005 and Nottingham Road. This suggests that traffic has rerouted from alternative roads to the A453.
 - There has been an increase in traffic of 9% over the wider area at the western end of the scheme. This primarily comprises a 45% increase on the A453 with corresponding decreases on the A52 and Gotham Road. This suggests that traffic has rerouted from alternative roads to the A453.

Traffic Forecasting

- The traffic modelling used variable demand, with traffic growth calculated using NTM and TEMPRO to limit growth forecast from specific developments.
- 24hr ADT forecast flows were only provided for the A453. Both the DM and DS forecast flows were comparable with the observed pre and post scheme traffic flows.
- In the AM peak:
 - The DM scenario typically overestimated traffic flows on the A453. This could be as a result of traffic growth or that traffic flows were affected at the time of the 2012 surveys by the commencement of works for the NET Phase 2 extension at Clifton.
 - The DM scenario also overestimated traffic volumes across most of the links considered. This could be due to traffic growth between the 2012 observed surveys and the 2015 DM scenario.
 - The DS scenario also typically overestimated traffic volumes across most of the links considered with the exception of the A453 links which were consistent with the 2016 observed traffic flows. This could be due to issues with the DM forecasting.
 - The direction of change forecast (i.e. an increase or a reduction) was typically in line with the observed data. West Leake Lane was forecast to have a much greater increase in traffic than was observed. This is however likely to be due to relatively low traffic flows.
 - The A453 West of the M1 J24 was observed to have a much greater increase in traffic than was forecast. This is likely to be due to the M1 J24 pinch point scheme, as set out previously.

Key Points – Traffic Impact Evaluation (cont'd)

- On Kegworth Road (South of Gotham), a change of -38% was forecast however, this was observed to be an increase of 25%. This increase is expected due to the use of this road to access the A453 at the new grade separated junction.
- In the PM peak:
 - The DM scenario typically overestimated traffic flows on the A453. This could be as a result of traffic growth or that traffic flows were affected at the time of the 2012 surveys by the commencement of works for the NET Phase 2 extension at Clifton.
 - Across the other links, there is much variability between the 2015 DM scenario and the pre-scheme observed traffic flows.
 - The DS forecasts are comparable to the post-scheme observed traffic flows on the A453. Although the differences between the DM and the pre-scheme observed flows result in the scheme impact being greater than forecast.
 - As with the DM scenario, across the other links, there is much variability between the 2015 DS scenario and the post-scheme observed traffic flows.
 - The direction of change forecast (i.e. an increase or a reduction) was typically in line with the observed data. West Leake Lane was forecast to have a much greater increase in traffic than was observed. This is however likely to be due to relatively low traffic flows.
 - The A50 was observed to have a much greater increase in traffic than was forecast. This is likely to be due to the M1 J24 pinch point scheme, as set out previously.
 - On Kegworth Road (South of Gotham), no change was forecast however, this was observed to be an increase of 76%. This increase is expected due to the use of this road to access the A453 at the new grade separated junction.

Journey Times

- Vehicles using the widened A453 have seen a reduction in journey times in all time periods. In the AM peak, savings of over 16 minutes in an eastbound direction, with over an 8 minute saving in a westbound direction in the PM peak.
- Smaller savings are seen in the inter-peak periods of 3.5 – 4.5 minutes.

Journey Time Reliability

- Journey time variability has improved as a result of the scheme opening, with post opening journey times more similar across time periods.

Journey Time Forecasting

- The observed journey time improvements are generally higher than the forecast. Although it is noted that traffic flows in the DM scenario were overestimated and therefore this could explain why the forecast improvement in journey time is not as high as the observed journey time saving.

3. Safety

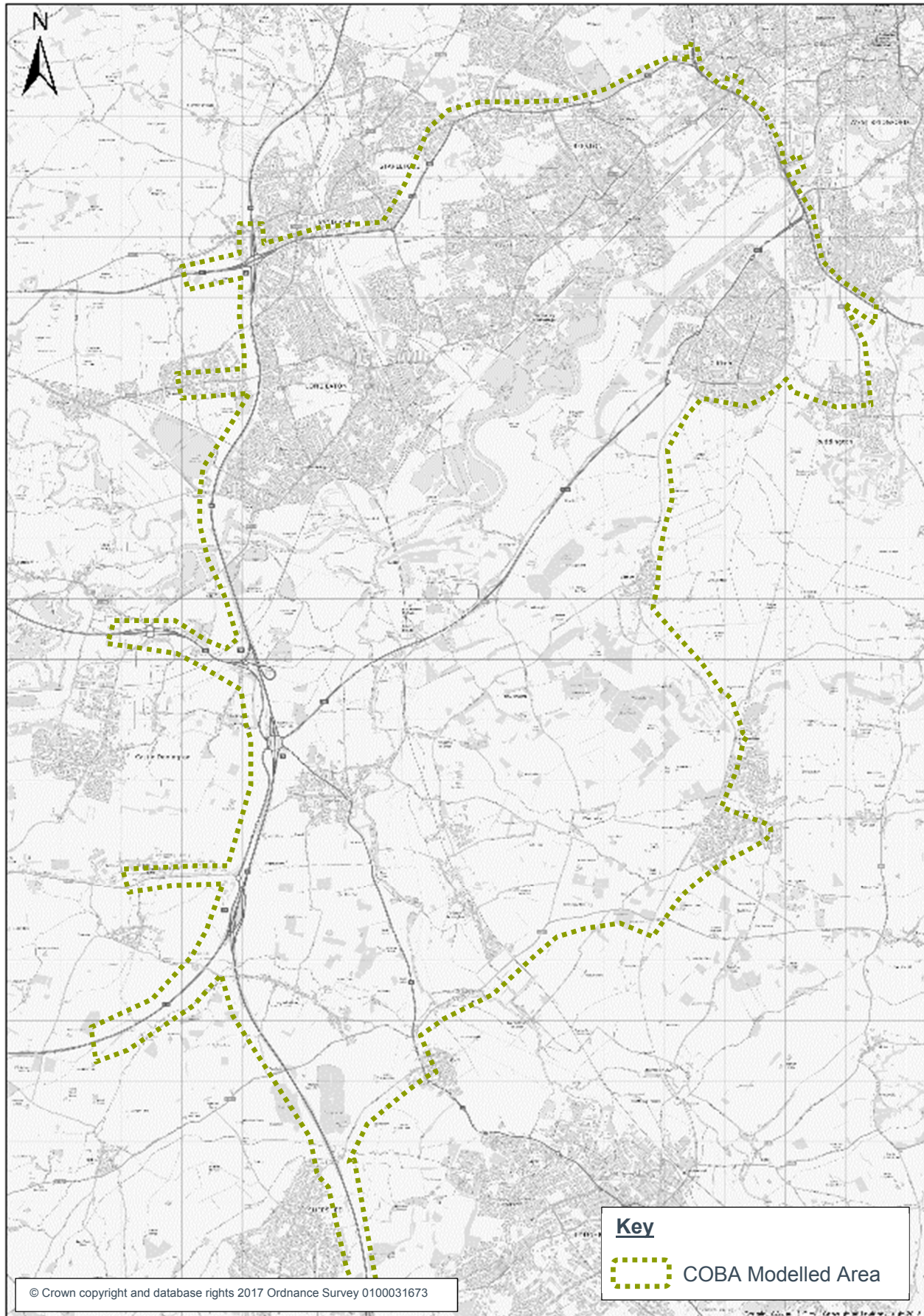
Introduction

- 3.1. This section considers the impact of the scheme in terms of the level of success in addressing the objective of reducing collisions.
- 3.2. The Statement of Case for this scheme stated that “*the A453 has a poor safety record, with a recorded accident level 33% higher than the observed national average for similar rural roads and 23% higher than the observed national average for similar urban roads*”. This highlights the need for the scheme to address the identified safety issues.
- 3.3. To assess the impact of the scheme on collision numbers, this section of the report analyses change in personal injury collisions (PICs) occurring in the five-year pre-construction period, and the 12-month post-opening period. Evaluation of the scheme’s impact on personal security has been undertaken using observations made during a site visit.

Forecast Data

- 3.4. For the purposes of assessing the collision impacts of the scheme, forecasts were produced for the number of collisions the scheme is expected to save, together with the associated numbers of casualties and the monetary benefit of the savings. The safety evaluation of the A453 widening scheme has been combined with the complementary VMS scheme
- 3.5. Forecasts of the impact of the A453 Widening scheme on safety have been obtained from the scheme’s Cost Benefit Analysis model (COBA). The forecast saving is calculated for the opening year, and over the scheme appraisal period of 60 years.
- 3.6. The forecast safety impacts of the A453 VMS upgrade scheme have been obtained from the corresponding Project Appraisal Report (PAR), August 2012. The forecast saving is calculated for the opening year, and over the scheme appraisal period of 30 years (since this is a technology based scheme). A forecast saving of 0.2 collisions in the scheme opening year and 1.6 collisions over the 30-year period has been reported.
- 3.7. The extent of the COBA model area is shown in **Figure 3-1**. This covers the network, and all the main routes in the immediate and wider vicinity of the scheme where changes in traffic were anticipated, and hence changes in collisions may occur. To ensure a like-for-like comparison between the predicted and observed collision changes, the overall geographical area of analysis used for this study is the same area covered by the COBA model.

Figure 3-1 Model Study Area used in Collision Analysis



Observed Data

- 3.8. Collision data has been obtained for the modelled roads in the COBA area which covers four different local authority areas; Nottinghamshire County, Leicestershire County, Derbyshire County and Nottingham City Councils. The availability of data varies by each of the aforementioned areas and therefore collision records have been obtained from data provided by the DfT (based on data from STATS 19) covering the following time periods to ensure consistency of data used:
- Pre-scheme – 01 January 2008 to 31 December 2012 (5 years)
 - Construction – 01 January 2013 to 24 July 2015 (1 year, 7 months)
 - Post scheme – 25 July 2015 to 31 July 2016 (1 year)
- 3.9. A five-year period of data is a standard assessment period to draw robust conclusions from, therefore conclusions drawn from the 12 months of post opening data should be treated with a degree of caution.
- 3.10. The collision data is based on the records of PICs (i.e. collisions that may involve injuries to one or more persons) recorded in the STATS19 data collected by the police when attending collisions. The data up to the end of June 2016 has then been validated by the DfT. Collisions that do not result in injury are not included in this dataset and are therefore not considered in this evaluation.

Background Changes in Collision Reduction

- 3.11. It is widely recognised that, for over a decade, there has been a general reduction in the number 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 wide ranging and include improved safety measures in vehicles and reduced numbers of younger drivers. Consideration of this background trend is needed when considering the changes in collision numbers in the scheme area in the before and after periods. If the scheme had not been built, collision numbers in the area are still likely to have been influenced by wider trends and reduced.
- 3.12. The numbers of collisions nationally in the years before and after the scheme was built are compared. Although the net change is primarily associated with the scheme, this background reduction is taken 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 study area here would have dropped at the same rate as they did nationally during the same time period⁵. This gives what is known as a counterfactual scenario. A comparison can then be made between this data for the counterfactual 'without scheme' scenario on a like-for-like basis and the observed post opening data which is the 'with scheme' scenario.
- 3.13. 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.
- 3.14. The counterfactual scenario compares the national collision data⁶ in the period after the scheme opened to the pre-construction period. The most recent statistics available only extend to 2015. Thus, the average number of collisions occurring pre-construction (2008-2012) has been compared with the national average in 2015 (post-scheme construction used in the absence of 2016 data being available). **Table 3-1** illustrates that there has been a 10% reduction in collision numbers on 'A' Roads between 2008 and 2015. This reduction has

⁵ National trend data is sourced from DfT table RAS10002

been applied to the pre-scheme opening collision numbers across the key links analysis area to create the counterfactual scenario.

- 3.15. **Table 3-1** also illustrates that there has been an 11% reduction in collision numbers on 'All' Roads between 2008 and 2015, which has been applied to the pre-scheme opening collision numbers across the COBA model study area to create the counterfactual scenario.

Table 3-1 Index of Change for Collision Numbers on 'A' Roads and All Roads GB

Year	'A' Roads		All Roads	
	Reported Number of Collisions (DfT Table RAS10002)	Average Number of Collisions	Reported Number of Collisions (DfT Table RAS10002)	Average Number of Collisions
2008	76,839	71,633	170,591	157,121
2009	74,149		163,554	
2010	70,274		154,414	
2011	69,889		151,474	
2012	67,166		145,571	
2015	64,280	64,280	140,056	140,056
	Reduction	-10%	Reduction	-11%

Observed Collision Numbers

- 3.16. This section analyses observed changes in the number of PICs following the implementation of the scheme and includes investigation of changes in the relative severity index.
- 3.17. In addition, to determine whether the changes in collision numbers observed before and after the scheme opened are statistically significant, a Chi-square test has been undertaken for the 'COBA' and the 'Key Links'⁷ analysis area. This test uses the without scheme counterfactual collision numbers (pre-scheme) and post-scheme collision numbers to establish whether the changes are significant and related to the scheme, or are likely to have occurred by chance.

COBA Modelled Area

Evaluation of Collision Numbers and Severity

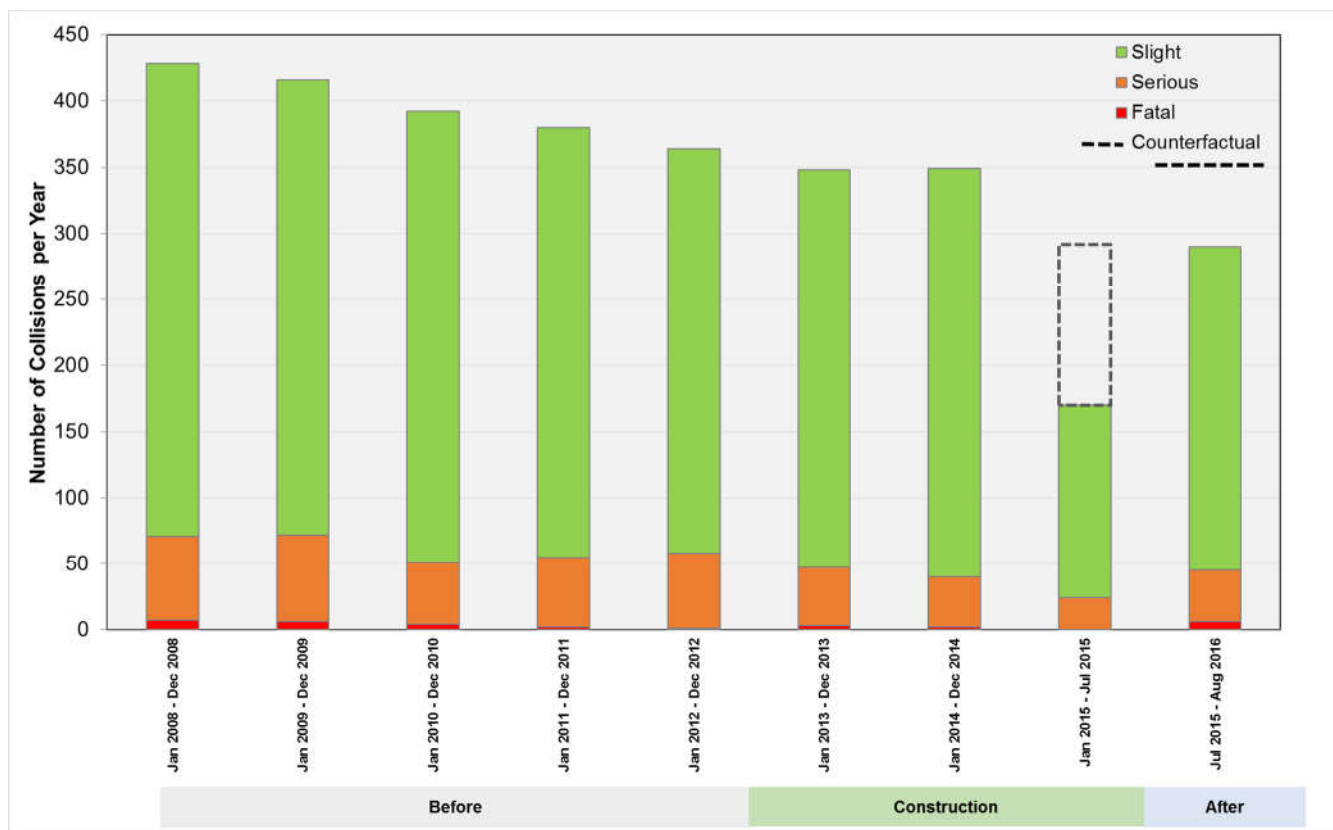
- 3.18. An evaluation of the before and after collision numbers by year for the whole of the COBA modelled area is shown in **Table 3-2** and **Figure 3-2**. This enables a direct comparison with forecast collision savings derived from COBA. The severity of a collision is defined by the most serious injury incurred.
- 3.19. The table also includes the counterfactual without scheme which is comparable to the after data. It should be noted that where periods of less than one year are displayed, the number of collisions for the period has been extrapolated to provide an equivalent number of collisions per year; the number of collisions added because of the extrapolation is shown as a dotted bar.

⁷ Defined as the links forming the A453 widening scheme.

Table 3–2 Number of Collisions by Severity in the COBA Area

Period	Time Period		Collision Severity			Total	Annual Average
	From	To	Fatal	Serious	Slight		
Pre-Scheme	Jan/2008	Dec/2008	7	64	357	428	396.0
	Jan/2009	Dec/2009	6	66	344	416	
	Jan/2010	Dec/2010	4	47	341	392	
	Jan/2011	Dec/2011	2	53	325	380	
	Jan/2012	Dec/2012	1	57	306	364	
Without Scheme Counterfactual (adjusted for background reduction)⁸						1765	353.0
Construction	Jan/2013	Dec/2013	3	44	301	348	335.6
	Jan/2014	Dec/2014	2	38	309	349	
	Jan/2015	Jul/2015	0	24	146	170	
Post Opening	Aug/2015	Jul/2016	6	39	245	290	290.0

Figure 3-2 Number of Collisions on Year by Year Basis for COBA Modelled Area



3.20. From **Table 3–2** and **Figure 3-2** it can be seen that:

- The average number of collisions recorded post opening was 290 per year, which is a 27% decrease when compared to the before period in which an average of 396 collisions were recorded per year.
- The ‘without scheme’ counterfactual collision rate (accounting for the background reduction in collisions over time) is calculated as 353 collisions per year. Compared to the post opening period collision rate this represents an annual collision saving of 63

⁸ Background factor in collision numbers for all roads 2008 - 2012 was 0.891

collisions a year, suggesting that the scheme has had a beneficial effect on the frequency of collisions along the A453 and surrounding roads in the COBA area.

- There has been an increase in the number of fatal collisions, it is however too early to determine whether this is a trend or an isolated occurrence. Furthermore, there are various other network changes and factors in the large COBA area which could have contributed to this.

A453 M1 Junction 24 to A52 Key Links Section

- 3.21. An analysis of collisions records for the A453 key links has also been undertaken to investigate the impact of the scheme on collisions on the widened A453 sections between the M1 Junction 24 and A52.

Evaluation of Collision Numbers and Severity

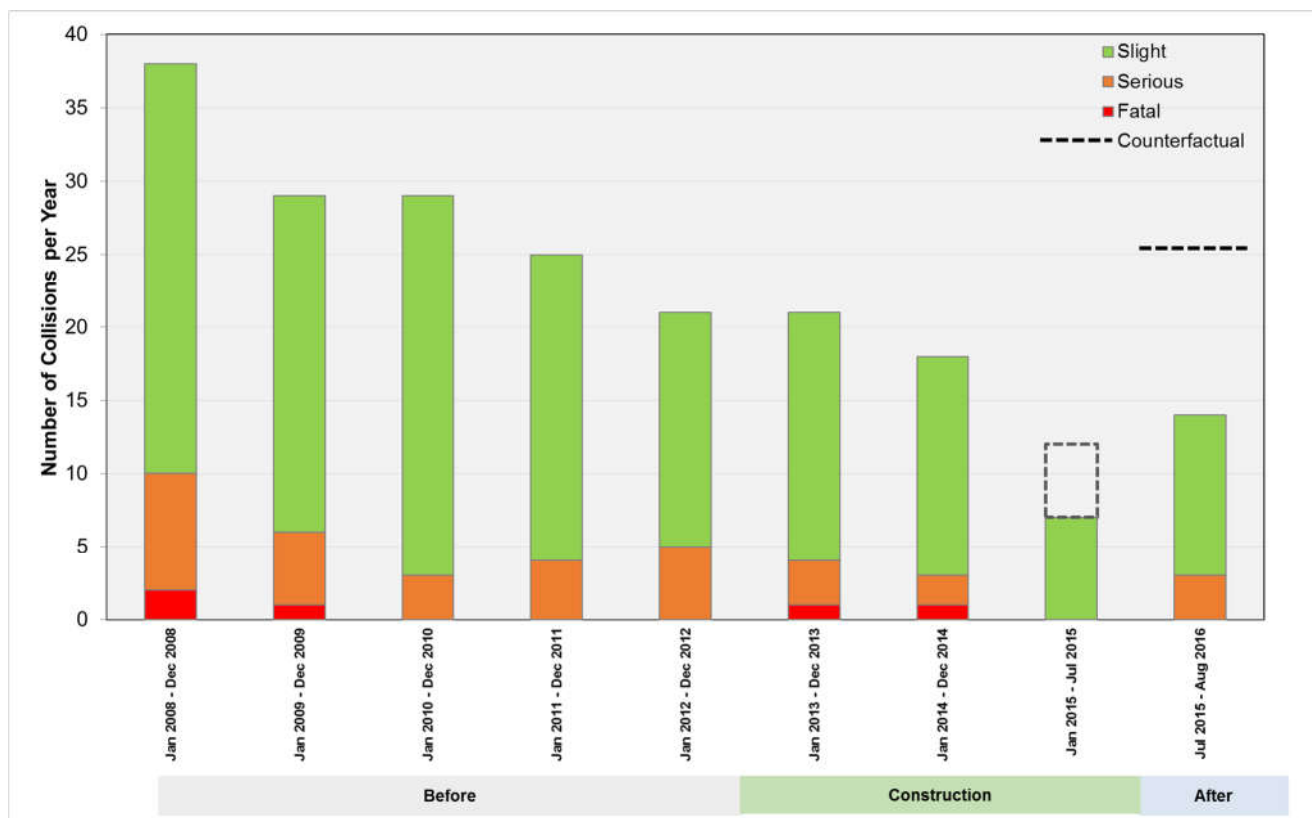
- 3.22. An evaluation of the before and after collision numbers by year for the scheme key links is shown in **Table 3-3** and **Figure 3-3**. The severity of a collision is defined by the most serious injury incurred.
- 3.23. Again, where periods of less than one year are displayed, the number of collisions for the period has been extrapolated to provide an equivalent number of collisions per year; the number of collisions added because of the extrapolation is shown as a dotted bar.

Table 3-3 Number of Collisions by Severity Scheme Key Links

Period	Time Period		Collision Severity			Total	Annual Average
	From	To	Fatal	Serious	Slight		
Pre-Scheme	Jan/2008	Dec/2008	2	8	28	38	28.4
	Jan/2009	Dec/2009	1	5	23	29	
	Jan/2010	Dec/2010	0	3	26	29	
	Jan/2011	Dec/2011	0	4	21	25	
	Jan/2012	Dec/2012	0	5	16	21	
Without Scheme Counterfactual (adjusted for background reduction)⁹						127	25.5
Construction	Jan/2013	Dec/2013	1	3	17	21	17.8
	Jan/2014	Dec/2014	1	2	15	18	
	Jan/2015	Jul/2015	0	0	7	7	
Post Opening	Aug/2015	Jul/2016	0	3	11	14	14.0

⁹ Background factor in collision numbers for all roads 2008 - 2012 was 0.897

Figure 3-3 Number of Collisions on Year by Year Basis for Scheme Key Links



3.24. From **Table 3-3** and **Figure 3-3** it can be seen that:

- The total number of collisions recorded over the post opening period was 14 in the year after opening, which is a 51% decrease when compared to the before period when an average of 28 collisions were recorded per year.
- The ‘without scheme’ counterfactual collision rate (accounting for the background reduction in collisions over time) is calculated as 25.5 collisions per year. Compared with the post opening collision rate of 14 per year, this represents an annual collision saving of 11.5 collisions per year.

Statistical Significance

- 3.25. To determine whether the change in the annual collision numbers observed before and after the scheme opened over the ‘COBA’ and the ‘Key Links’ areas are statistically significant, a Chi-squared ¹⁰test has been undertaken.
- 3.26. The statistical significance test for collision rates uses the without scheme counterfactual and post-opening number of collisions alongside AADT flows to establish whether the changes in collision rates are significant and likely to be related to the scheme or to have occurred by chance alone.
- 3.27. The statistical testing has demonstrated that the changes in collisions over the ‘COBA’ and the ‘Key Links’ areas and the change in collision rates over the ‘Key Links’ area are statistically significant and are likely to have occurred as a result of the scheme implementation. The results of the statistical significance testing are presented in **Table 3-4**.

¹⁰ The Chi-Square test is a standard statistical test which can be used to determine whether there is a good fit between a set of observed data and those results expected theoretically. In this case, the observed collision data compared with the projected counterfactual collision data.

Table 3-4 Statistical Significance Summary

Analysis Area	Chi Square Value		Statistical Significance (Based on Critical Value of 3.84 ¹¹)
	Collisions	Collision Rates	
Key Links	4.656	12.792	Statistically Significant
COBA	9.654	-	Statistically Significant

Forecast vs Outturn Collision Numbers

- 3.28. This section compares the number of observed collisions discussed earlier with those predicted to occur, as shown in **Table 3-5**. The predictions have been obtained from the COBA model for this scheme and cover the whole of the modelled area (shown previously in **Figure 3-1**).
- 3.29. No opening year forecasts for the scheme section were available, however the TFEUR 2012 does provide a summary of the expected 60-year impact for the scheme itself. A slight overall increase in collisions is forecast (<1%), but this encompasses a number of increases and decreases along the scheme. The urban section is forecast to have an overall increase (19%) over the scheme life, whereas the rural section is forecast to have a reduction (-11%) in collisions numbers.
- 3.30. For the outturn collisions, the annual average before and after the scheme opened are used for the same area as used in the COBA appraisal.

Table 3-5 Comparison of Forecast and Outturn Collisions across the COBA Area

	Annual Collisions	Central Growth
Forecast Opening Year	Do Minimum (without scheme)	427
	Do Something (with scheme)	418
	Saving (A453 Widening scheme)	9
	Saving (A453 VMS scheme)	0.2
	Total combined saving	9.2
	% Change	2.1%
Outturn Annual Average	Before Opening	396
	Without scheme (counterfactual for same period)	353
	After Opening	290
	Saving	63
	% Change	17.8%

- 3.31. **Table 3-5** shows:

- The COBA model of the scheme predicted the average number of collisions in the do minimum scenario to be 427 (central growth = average of low and high growth scenarios) which is higher than the observed pre-scheme collisions.
- The model predicted a saving of nine collisions (2.1%) in the opening year.
- Post opening, the number of collisions over the same area has decreased by an average of 63 collisions a year (17.8%) in the opening year, below that predicted for the same area. The large size of the COBA appraisal area means that changes in the wider area, not influenced by the scheme, may have masked the overall impact of the scheme. It is

¹¹ We can be 95% confident when the Chi-Square test produces a value greater than the critical value of 3.84 that the change in collisions is not because of chance alone and the scheme has had a direct impact.

possible that there are other factors which could have affected the collision numbers on the wider network.

Collision Rates

- 3.32. The number of collisions along a length of road used together with the AADT¹² for the same section can be used to calculate a collision rate, known as PIC/mvkm. This allows comparisons to be made which take into account traffic growth.
- 3.33. In this section, combined observed collision rates during the pre and post scheme periods for the key links improved by the scheme (the widened carriageway, improved/consolidated junctions and remaining bypassed sections of the old A453) are examined.
- 3.34. **Table 3–6** shows the collision rate calculated for the A453 M1 J24 to Nottingham key links observed pre and post opening.

Table 3–6 Observed Collision Rates (PIC/mvkm) for Key Links of Scheme

Observed (Pre-scheme vs. Post-opening collision rates)	Before Opening Observed	0.277
	Without scheme (Counterfactual for same period as After opening data)	0.242
	After Opening Observed	0.094
	Observed Saving	0.148 (61%)

- 3.35. **Table 3–6** shows that the observed reduction in collision rate across the scheme key links is 61%, with a saving of 0.148PIC/mvkm.

Personal Security

- 3.36. The aim of this sub-objective is to consider both the changes in security and the likely number of users affected by the changes. For highway schemes, security includes the perception of risk from damage to or theft from vehicles, personal injury or theft of property from individuals or from vehicles. Security issues may arise from the following:
- On the road itself (for example, being attacked whilst broken down).
 - In service areas/car parks/lay-bys (for example, vehicle damage while parked at a service station, being attacked whilst walking to a parked car).
 - At junctions (for example, smash and grab incidents while queuing at traffic lights).

Forecast

- 3.37. The scheme appraisal stated that a 'slight beneficial' impact was expected for Security. The AST noted that the improved carriageway standard and measures to encourage pedestrians and cyclists to use controlled crossing points would have a positive impact.

Evaluation

- 3.38. Much of the new route has been constructed in parallel to alignment of the original road. This includes lay-by provision with emergency phones. The lay-by provision is well overlooked from the main carriageway. No lighting or traffic lights were included in the 'rural'

¹² Traffic flows from the rural section of the A453 have been adopted in this calculation. Traffic flows are higher in the urban section and there are greater percentage differences along other sections of the route.

part of the scheme. Lighting is however provided in the 'urban' section. In the Clifton area, pedestrian and cycle facilities have been improved through the introduction of shared footway/cycleway provision and enhance crossing facilities. The VMS upgrade scheme has included the provision of emergency roadside telephones and CCTV to further enhance security.

- 3.39. Overall it is considered that the overall impact of the scheme is 'Slight Beneficial', as expected for Security.

Key Points – Safety

Collisions

- Analysis of observed collision data for the whole COBA study area shows a reduction (when compared to the counterfactual) of 63 collisions per year (17.8%), suggesting that the scheme has had a beneficial impact on the A453 and surrounding roads.
- Analysis of the observed collision data for the scheme key links which were directly affected by the scheme shows a reduction (when compared to the counterfactual) of 11.5 collisions a year (45.1%).

Forecast vs. Outturn Collision Savings

- The scheme was forecast to have a saving of 9 collisions (2.1%) in the opening year for the whole COBA area. When the observed data is considered (compared to the counterfactual before), a higher saving of 63 collisions (17.8%) is seen, suggesting that the benefit for the wider area has been greater than forecast.
- The changes in collisions seen for the COBA area and scheme key links are considered statistically significant, and therefore it is considered that the scheme has had a direct impact on safety.

Security

- Layby facilities with emergency phones have been installed on the new dual carriageway and are well overlooked. Lighting has not been provided in the rural section but is provided in the urban section along with NMU facilities. The overall assessment of the scheme on security is therefore slight beneficial, as expected.

4. Economy

Introduction

- 4.1. This section presents an evaluation of the scheme's performance against the DfT's economy objective, which is defined in WebTAG as:

"To support sustainable economic activity and achieve good value for money".

- 4.2. The economy sub-objectives are:

- To achieve good value for money in relation to impacts on public accounts;
- Improve transport economic efficiency for business users and transport providers;
- Improve transport economic efficiency for consumer users;
- Improve reliability; and
- Provide beneficial wider economic impacts.

- 4.3. Scheme appraisal consists of an economic assessment to determine the scheme's value for money. This assessment is based on an estimation of costs and benefits from different sources:

- Transport Economic Efficiency (TEE) benefits (savings related to travel times and vehicle operating costs).
- Collisions costs (net impact related to number and severity of collisions).
- Costs to users due to delays during construction and future maintenance periods.
- Cost of building the scheme and;
- Cost of operating the scheme over its lifetime.

- 4.4. This section provides a comparison between the outturn costs and benefits and the forecast economic impact, as well as considering the wider economic impacts of the scheme. Outturn journey time and safety economic impacts are based on analysis presented in **Chapters 2 and 3**.

Sources

- 4.5. The following information has been used to inform the economic assessment in this chapter:

- A453 Widening Traffic Forecast and Economics Update Report (TFEUR, 2012);
- DfT TUBA (Transport User Benefit Analysis) Program;
- Forecast Costs from P50 (just before start of scheme construction);
- Outturn Costs from the Regional Finance Manager in March 2017;
- A453 Variable Messaging Signs (VMS) technology scheme Pinch Point PAR, dated August 2012;
- WebTAG guidance: Carbon impact, Fuel consumption; and
- PAR 6.3 guidance¹³.

¹³ Project Appraisal Report (PAR) is Highways England's standard approach to appraisal typically used for smaller schemes based on webTAG guidance on economic assessment. It provides a basis for POPE evaluations where is not appropriate to re-run full models.

- 4.6. The appraisal report provides forecasts of the benefits for a 60-year appraisal period for the widening scheme. Forecast benefits for the VMS scheme are for a 30-year appraisal period, in line with guidance for technology schemes. All costs presented in this chapter are in 2002 prices discounted to 2002 unless otherwise stated. This is in line with the price base as used in the TFEUR.

Present Value Benefits

- 4.7. The scheme appraisal considered the economic benefits of the scheme represented in terms of present value (present value benefits – PVB) for the aspects outlined in **Table 4-1**.
- 4.8. **Table 4-1** outlines the evaluation approach undertaken in this report. A 'yes' indicates that an element has been considered in this evaluation. A 'no' indicates that the forecast impact has been used in place of a full evaluation at this stage.

Table 4-1 Economic Benefits of Scheme (2002 prices and values)

Benefits in £000 in 2002 market prices, discounted	Forecast £000's (TFEUR)	Evaluate?	Evaluation Approach
Journey Time (TEE business and consumer users)	£204,394	Yes	Outturn journey time impacts in opening year can be calculated from observed data.
Vehicle Operating Costs (VOC)	-£6,335	No	Forecast journey times or speeds not provided therefore unable to calculate outturn change in fuel consumption. Assume as per forecast.
Net impact of Delay during Construction period & Future maintenance periods: Journey time and VOC impacts	£3,322	No	Not known at this stage and not within the remit of POPE to evaluate.
Safety Benefits	£41,253 (widening) £233 (VMS)	Yes	Based on observed reduction in collision numbers, if this is statistically significant.
Carbon Benefits	-£3,996	No	Ratio between forecast and outturn opening year carbon impact used to calculate 60 year reforecast.
Indirect tax impact as a benefit	£10,218	No	Forecast journey times or speeds not provided therefore unable to calculate outturn change in fuel consumption. Assume as per forecast.
Total PVB	£249,089		

Note: All entries are in market prices, at present values discounted to 2002, in £000's.

- 4.9. Only the forecast journey time savings have been provided for the A453 scheme and not forecast DM and DS journey times. As such, it has not been possible to calculate vehicle speeds for the DM and DS scenarios.
- 4.10. Vehicle speeds are required to calculate VOC, carbon benefits and indirect tax. Furthermore, it is likely the forecasts for these relate to a wider area and not just the A453 widening scheme. It is likely that even if aggregated forecast journey times were available

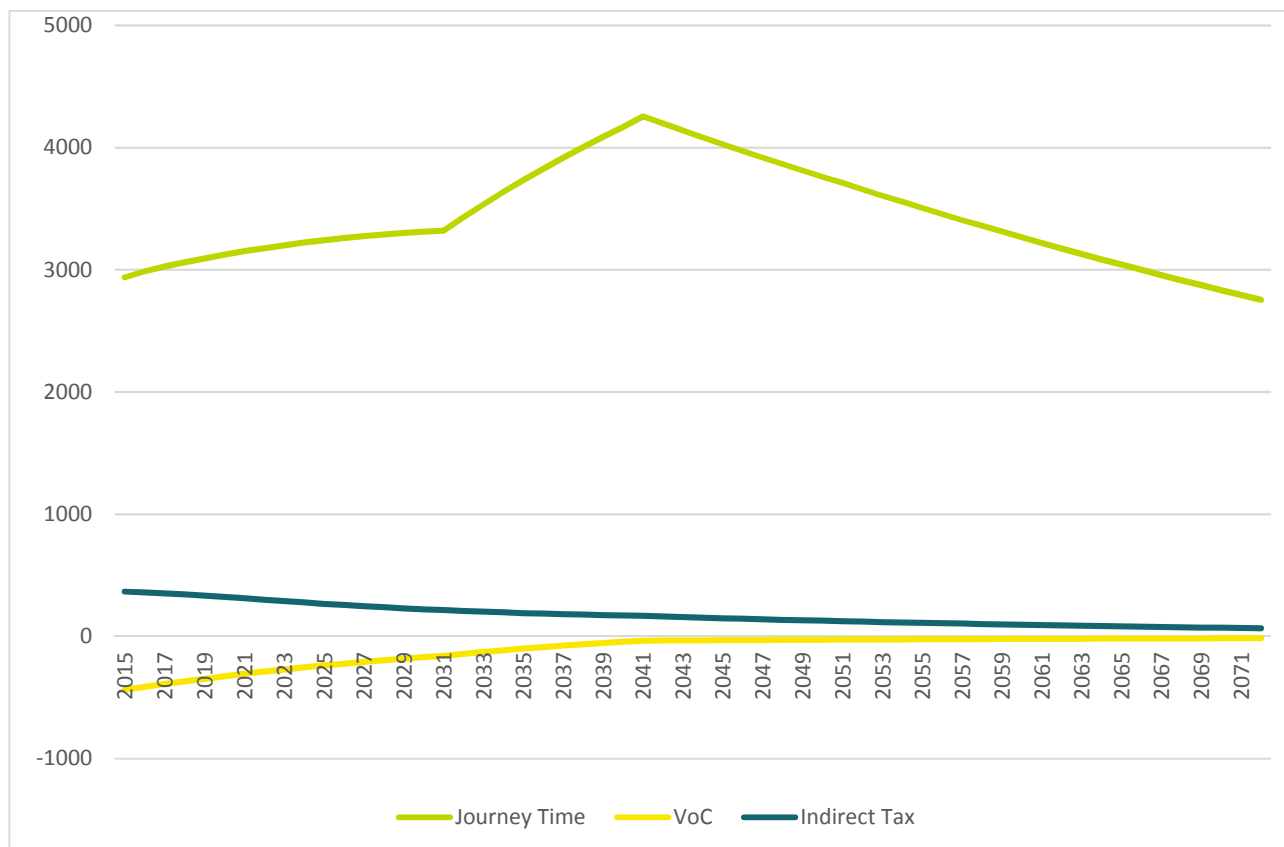
then the changes resulting from the scheme may not be indicative of the wider modelled area. For this reason, a reforecast outturn VOC, carbon benefits and indirect tax have not been calculated and the forecast values will be adopted.

Journey Time Benefits

Forecast

- 4.11. Forecast journey time savings for this scheme were extracted from the Stage 6 Client Scheme Requirements. It is assumed that these were derived from the strategic traffic modelling undertaken using the DfT TUBA (Transport User Benefit Analysis) program.
- 4.12. The following time periods (8 hours in total) were assessed as part of the strategic traffic modelling:
 - AM Peak Hour (07:30 to 08:30);
 - Inter Peak Hour (10:00 to 16:00); and
 - PM Peak Hour (16:30 to 17:30).
- 4.13. The TUBA modelling however, related to a 12-hour period. Although not specified, it is assumed to cover the following:
 - AM Peak Hour (2hrs - 07:00 to 09:00);
 - Inter Peak Hour (7 hrs - 09:00 to 16:00); and
 - PM Peak Hour (3 hrs - 16:00 to 19:00).
- 4.14. The forecast scheme life TEE benefits outlined in **Table 4-1** are presented graphically in **Figure 4-1**. This demonstrates that a significant proportion of the forecast scheme benefits were associated with the projected change in journey times.
- 4.15. Additional analysis of the TUBA forecasts provides a detailed account of the forecast journey time benefits over the 60-year scheme appraisal period (see **Figure 4-1**).

Figure 4-1 Forecast Journey Time, VOC and Indirect Tax Benefits over 60 Years (£000's)



4.16. The key points from **Figure 4-1** are:

- Only 1.4% of the journey time benefits were forecast to be achieved in the opening year (2015).
- The journey time benefits were expected to increase up to 2041 in the Core Scenario. The impact of discounting is apparent after 2041, when there is a gradual reduction in the present value year benefits being accrued from the scheme.

Evaluation

- 4.17. The POPE methodology for evaluating the economic value of the journey time benefits is based upon comparing the observed opening year vehicle hour saving with the forecast opening year vehicle hour saving.
- 4.18. As identified, TUBA modelling for the scheme was based on the journey time benefits over the whole model area. However, there has been a reduction in journey times along the scheme with an observed reduction across all time periods (both directions). Therefore, it is considered appropriate at the OYA stage to capture just the monetary value of the journey time benefits for vehicles travelling along the widened A453.
- 4.19. To calculate the economic value of the journey time benefits, the observed opening year vehicle hour saving is compared with the re-forecast opening year vehicle hour saving along the scheme section. However, it is not possible to use TUBA outputs to create a comparable forecast based on the scheme impact along the scheme section because TUBA is matrix based, and the outputs do not give any breakdown of the forecast impact by link or area.
- 4.20. The observed journey times in 2016 have been used to determine the change in journey time across the modelled time periods. The forecast journey time savings have also been used to calculate the reforecast vehicle hour savings across the modelled time periods.

- 4.21. Savings have been considered for a 12-hour weekday profile (broadly comparable with the assumed TUBA modelling period) for the following time periods:
- AM Peak Hour (07:00 to 09:00);
 - Inter Peak Hour (09:00 to 16:00); and
 - PM Peak Hour (16:00 to 19:00).
- 4.22. The 12-hour weekday profile has been annualised using the factors outlined within the TFEUR.
- 4.23. To calculate the opening year outturn monetary benefit, the following assumptions have been made:
- Traffic already travelling along the scheme section (in the before period) receives the full journey time saving observed at the one year after stage;
 - Any additional traffic receives half of the journey time benefits. This concept is known as the '*rule-of-a-half*' and is a standard economic approach; and
 - Off-peak (both weekday and weekend) periods have been omitted as no forecasts were provided for these time periods along the scheme section.
- 4.24. Forecasts based on the traffic flows and journey time information available and the observed opening year vehicle hour savings along the scheme are outlined in **Table 4-2**.

Table 4-2 Opening Year Vehicle Hour Savings

	Opening Year Vehicle Hour Saving (hours)
Re-Forecast	248,417
Observed (OYA)	304,216
% Difference	22%

- 4.25. **Table 4-2** demonstrates that the opening year observed vehicle hour saving is 22% higher than the reforecast opening year vehicle hour saving. This is consistent with the findings in Section 2 of this report, which demonstrated that the scheme appraisal process underestimated journey time improvements along the A453.

Monetisation of Journey Time Benefits

- 4.26. The methodology outlined below was applied to the forecast and observed opening year vehicle hour savings to calculate a re-forecast 60-year journey time benefit to be included in the BCR.
- The observed vehicle hours saved in the opening year on the scheme was calculated using observed traffic flows, observed speeds and observed journey times.
 - The forecast vehicle hours saved in the opening year on the scheme was calculated using the forecast journey time savings for the time period applied to the forecast traffic flows.
 - The predicted monetary vehicle hour benefit was extracted from the TFEUR for the whole appraisal area.
 - The difference between the forecast opening year vehicle saving and the observed opening year vehicle saving (presented in **Table 4-2**) along the scheme was used to uplift the forecast opening year monetised benefit from the TUBA appraisal. This

assumes that the journey time savings over the scheme section are representative of the wider model area.

- The Profile Method (in line with current POPE methodology) was then used to factor the observed opening year benefits to the full 60-year appraisal period.
- The Profile Method applies the absolute difference between the forecast and observed benefits in the opening year to the TUBA profile for the remaining appraisal period.
- The advantage of the Profile method is that it takes into account the difference between observed and modelled benefits in the first year as an absolute difference rather than proportionally. For example, observed benefits in the first year may be 50% higher than modelled but, in absolute terms, this difference may be much less significant in later years when benefits could be significantly higher.

4.27. The monetisation of the journey time benefits along the scheme are outlined in **Table 4-3**. These results are conservative as they have been calculated using a 12-hour weekday profile over the scheme section whereas benefits are likely to be realised during off-peak periods.

Table 4-3 Forecast and Outturn Journey Time Benefits

Benefits in £000's 2002 market prices, discounted	Forecast Opening Year (£000's)	Outturn Opening Year (£000's)	Forecast 60 Year Scheme Life (£000's)	Outturn Reforecast 60 Year Scheme Life (£000's)
Total	£2,939	£3,599	£204,394	£221,731

4.28. The TUBA assessment forecast that the monetary journey time benefits over the 60-year appraisal period would be £204.394m (2002 prices and values). Using the Profile Method, the outturn monetary benefit over the 60-year appraisal period is £221.731m.

4.29. This higher than forecast benefit is primarily due to larger journey time savings than forecast.

Safety Benefits

Forecast

4.30. Forecasts of the schemes impact on safety have been obtained from the A453 Widening TFEUR (September 2012), which detailed the forecast safety impact of the scheme. The forecast collision saving has been achieved by calculating the total cost of collisions over the COBA network for the Do Something (DS) scenario and subtracting these from the total cost of collisions in the Do Minimum (DM) scenario. As part of this calculation, collision costs were calculated for each link type in the model study area for every year within the appraisal period (2015 to 2074). The collision costs have then been summed to provide a total collision cost in the DM and DS over the whole appraisal period.

4.31. Personal Injury Collision (PIC) numbers and casualty numbers have also been calculated for every link in the model network for every year in the appraisal period, and then summed to give total PIC and casualty numbers in the DM and DS scenarios by slight, serious and fatal casualties.

4.32. As shown in the safety section of this report, the predicted collision saving for the opening year was 9.2 PICs over the model study area.

4.33. According to the TFEUR, the predicted collision saving over the 60-year scheme appraisal period was 369 PICs over the wider model study area, with a small increase of 10 collisions

over 60 years for the key links. The associated monetary safety benefits over the wider model study area was forecast to be £40.904m (£41.253m when safety impacts of construction and maintenance are included). No monetary benefits were provided for only the key links.

Evaluation

- 4.34. Outturn safety benefits are monetised in POPE if the change is considered statistically significant. As shown previously in this report, the changes observed over both the COBA and key links area are statistically significant, and therefore it is likely that these changes can be linked to the scheme.
- 4.35. The methodology for evaluating the outturn of economic value of benefits arising from safety benefits is based on a comparison of observed and forecast changes to the number of collisions over the opening year period, considering the counterfactual scenario for pre-scheme data. It is assumed that the observed safety impact for the first-year post-opening is indicative of what will be achieved over the remainder of the 60-year appraisal period. The ratio between the number of collisions saved in the first year to the forecast 60 year benefits is then used to generate a re-forecast of economic benefits.
- 4.36. To monetise the savings, the following methodology has been followed:
- Calculating the net difference between the forecast opening year saving and the annual average observed collision savings in the COBA area, allowing for the counterfactual scenario.
 - Monetising the net difference using the PAR method, which values collisions saved by road type and enables capitalisation over 60 years based on expected traffic growth.
 - Calculating the 60-year outturn benefits for the whole area by combining the forecast from COBA (for the whole study area) with the outturn assessment of the net difference.

Table 4-4 Comparison of Forecast and Re-forecast collision benefits

Central Growth Forecast (COBA Area)	Forecast Collision Saving in opening year	(a)	9.2
	Forecast value of saving (60 years, central traffic growth)	(b)	£41.25m
Observed COBA Area	Annual Average Collision Pre-Scheme	(c)	396
	Annual Average Collision Pre Scheme (Counterfactual 0.89 applied)	(d)	353
	Annual Average Collision Post-Scheme	(e)	290
	Average Annual Collision Saving (based on adjusted counterfactual)	(f) = (d) - (e)	63
	Net Difference between forecast and observed	(f) – (a)	53.8
	Monetisation of net difference for opening year	(h)	£4.09m
	Monetisation of (f) into 60-year impact of net difference between forecast and observed (using PAR 5 guidance)	(i)	£105.26m
	Outturn 60-year benefit	(b) + (i)	£146.51m

- 4.37. **Table 4-4** shows the evaluation of monetary benefits, with all values shown in 2002 prices discounted to 2002. It demonstrates that the re-forecast 60-year monetary safety benefits for the COBA area are much higher than forecast.
- 4.38. Whilst this change over the COBA area is considered statistically significant, there have been a number of other changes on the road network included in the COBA area which may have contributed to this improvement and to attribute it all to this scheme would be over optimistic given the limited amount of data, and the smaller saving observed on the key links. As such, an alternative monetary saving has been calculated based on the observed saving on the scheme key links which, whilst conservative, ensures that other changes on the network do not contribute to overclaimed benefits.
- 4.39. This revised monetary value is based on the opening year saving of 11.5 collisions, and capitalised using the PAR approach above, but not related to an original forecast impact.
- 4.40. This results in a conservative outturn safety benefit of £34.52m over 60 years.

Summary of Present Value Benefits (PVB)

- 4.41. A cost benefit analysis of a major scheme requires all benefits to be considered for the whole of the appraisal period and they need to be expressed on a like-for-like basis, which is termed

Present Value. This is the value today (or at a consistent date) of an amount of money in the future. In cost-benefit analysis, values in different years are converted to a standard base year by the process of discounting to allow comparison of benefits. A comparison of the forecast and outturn benefits is presented in **Table 4-5**.

Table 4-5 Summary of Present Value Benefits (PVB)

Benefit Stream		Benefits £000's 2002 market prices, discounted to 2002		% Difference
		Forecast	Outturn Estimate	
Journey Time (TEE business and consumer users)		£204.394m	£221.731m	+8%
Vehicle Operating Costs (VOC)		-£6.335m	-£6.335m	-
Impact of delay during the construction period & Future maintenance periods: Journey time and VOC impacts		£3.322m	£3.322m	-
Safety Benefits	A453 Widening	£41.253m	£34.515m	-17%
	A453 VMS	£0.233m		
Carbon Benefits		-£3.996m	-£3.996m	-
Indirect tax impact as a benefit		£10.218m	£10.218m	-
Total PVB		£249.089m	£259.454m	+4%

- 4.42. The outturn benefits presented in **Table 4-5** have been calculated by extending the first-year benefits to a 60-year benefit stream on a comparable basis with the forecasts.

Scheme Costs

- 4.43. Costs of the scheme are also considered for the full appraisal period of 60 years such that they can be compared with the benefits over the same period (see **Table 4-6** for the as spent investment costs converted to 2002 prices). Investment costs are considered in terms of a common price base of 2002 for comparison with forecast. For comparison with the benefits, overall costs are expressed in terms of present value, termed Present Value Cost (PVC) later in this chapter.

Table 4-6 Investment Costs in 2002 Prices (£m)

Investment Costs	Forecast	Outturn	% Difference
A453 Widening	£119.887m	£124,882m	+4%
A453 VMS	£0.718m	£0.400m	-44%
Total	£120.606m	£125.282m	+4%

- 4.44. This shows that the outturn investment cost of the scheme is slightly higher than that forecast.

Present Value Costs (PVC)

- 4.45. Cost benefit analysis of a major scheme requires all the costs to be considered for the whole of the appraisal period and they need to be expressed on a like-for-like basis with the benefits. This basis is termed Present Value. Present Value is 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.
- 4.46. This section compares the forecast costs of the scheme as of the start of the construction period with the actual spend as of March 2017, (the date the cost was provided by the Regional Finance Manager). Costs are also considered for the full appraisal period of 60 years to allow comparison with the benefits over the same period.
- 4.47. At the time which this scheme was appraised, the impact of the scheme on net indirect tax revenue raised by central Government over the 60-year appraisal period was included as part of the benefits, rather than as part of the costs as had previously been the approach.
- 4.48. Scheme costs in the appraisal also covered the future costs of Traffic-Related and Non-traffic related maintenance for the Do Minimum and Do Something scenarios. The additional infrastructure put in place by the scheme was forecast to have a higher maintenance cost than the existing (Do Minimum) infrastructure. For evaluation purposes, the net difference in these costs have been assumed to be as the original forecast.
- 4.49. **Table 4-7** presents the investment costs as Present Value for use in the BCR.

Table 4-7 Investment Costs as Present Value (£m)

Present Value £m (costs in 2002 market prices, discounted)		Forecast	Outturn
A453 Widening	Investment Costs	£101.138m	£103.717m
	Net impact on Future maintenance cost	£1.033m	£1.033m
A453 VMS	Investment Costs	£0.575m	£0.320m
	Operating costs (30 years)	£0.141m	£0.141m
Total PVC		£102.887m	£105.211m

Benefit Cost Ratio (BCR)

- 4.50. 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.
- 4.51. 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.
- 4.52. **Table 4-8** compares the forecast and outturn costs and benefits.

Table 4-8 Forecast vs. Outturn Benefit Cost Ratio (BCR)

All in 2002 market prices, discounted to 2002		Forecast (£m)	Outturn (£m)	
	PVC - A453 Widening & VMS	£102.887m	£105.211m	
Benefits	Journey Time (TEE business and consumer users)	£204.394m	£221.731m	
	Vehicle Operating Costs (VOC)	-£6.335m	-£6.335m	
	Delay During Construction period & Future maintenance periods: Journey time and VOC impacts	£3.322m	£3.322m	
	Safety Benefits	A453 Widening	£41.253m	£34.515m
		A453 VMS	£0.233m	
		Combined	£41.486m	
Carbon Benefits	-£3.996m	-£3.996m		
	PVB subtotal	£238.871m	£249.236m	
	Indirect Tax Revenue	£10.218m	£10.218m	
BCR (with indirect tax in PVB)		2.42	2.47	

- 4.53. It can be seen from **Table 4-8** that the BCR is marginally higher than forecast due to higher than expected journey time benefits. Although it should be noted that this is a conservative estimate based on the reforecast safety benefits calculated as part of this report. A BCR of 2.47 represents high value for money according to DfT guidance.
- 4.54. It should be noted that the BCR ignores non-monetised impacts. In the Transport Business Case, 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 Forecasts

- 4.55. It is inherently difficult to isolate wider economic impacts which could be attributed to the scheme. However, the scheme may have assisted local and regional socio-economic aspirations.

Forecast

- 4.56. The AST for this scheme did not assess the wider economic impacts associated with the scheme.

Evaluation

- 4.57. The client scheme requirements included objectives that the scheme should support Government Transport Policy, economic activity and local development plans and accessibility.

- 4.58. Evidence presented in this report demonstrates that journey times and journey time variability have improved along the scheme. These improvements will have benefits for congestion potentially enabling development and aspirations in local development plans. The scheme has also improved and facilitated access for those travelling on foot, by bicycle and accessing public transport facilities, as summarised in later chapters.

- 4.59. At this stage, there is no evidence however to suggest that the scheme has increased the enablement of development. As such, the overall assessment of the impact on of the scheme on the wider economy is likely to be beneficial at this stage. Further assessment of the long-term impact of the scheme on the wider economy will be considered at the Five Years After POPE stage.

Key Points – Economy

Present Value Benefits

- The outturn journey time benefits of £221.731m are higher than the forecast journey time benefits of £204.394. This is mainly due to the observed journey time savings being higher than forecast.
- The observed reduction in collisions in the post opening period was statistically significant over both the key scheme links and the wider COBA area. However, since the forecast collision savings over the key scheme links were not provided and since the savings over the wider COBA area could potentially be attributed to other network interventions, the PAR method has been applied to the outturn savings over the key scheme links. This provides a conservative outturn recalculation of £34.515m, less than the forecast of £41.486m.
- It has not been possible to calculate an outturn monetary value for carbon and vehicle operating costs.
- Overall the outturn PVB is 4% higher than forecast.
- It has not been possible to calculate an outturn value for indirect tax.

Costs

- Outturn investment costs were 4% higher than forecast at £125.282m.

Benefit Cost Ratio

- Taking indirect tax as a benefit, the scheme achieves a BCR of 2.47 which shows the scheme is delivering high value for money.

Wider Economic Impacts

- Due to the inherent difficulty in isolating the wider economic impacts of the scheme, it has not been possible to conclude whether the scheme has had a direct impact on stimulating local economic activity. However, it is likely that the scheme has had a beneficial impact.

5. Environment

Assessment

- 5.1. An Environmental Impact Assessment (EIA) for the scheme was undertaken and reported in an Environmental Statement (ES) published in 2009. Although further updates were made to the Traffic Forecasting and Economic Appraisal in 2012, it is understood that no updates were made to the ES except for an updated noise assessment.
- 5.2. For each of the environmental sub-objectives considered by the ES, the evaluation in this chapter assesses the environmental impacts predicted in the scheme's AST and ES against those observed one year after opening.
- 5.3. In the context of the AST and ES forecasts and using evidence collected one year after (OYA) opening, this chapter presents:
 - A record of any significant changes to the scheme that have taken place since publication of the ES;
 - An evaluation of the effectiveness of the mitigation measures implemented as part of the scheme; and
 - A summary of key impacts against all the ten environmental WebTAG sub-objectives.

Data Collection

- 5.4. The following documents/ data have been used in the compilation of this environmental chapter of the OYA report:
 - Environmental Statement January 2009 Volumes 1, 2 and Non-Technical Summary;
 - Appraisal Summary Table (May 2012);
 - Environmental Impact Assessment Traffic Noise and Vibration June 2012 (Revision 3);
 - Noise Insulation Survey data 2013;
 - Archaeological information including various Post-excavation Assessment Reports and Proposed Publication Synopsis;
 - Grass Cutting Regime and Visibility Splay Maintenance Obligations;
 - Handover Environmental Management Plan (HEMP) As-Built amendments Rev Z02 November 2015;
 - Health & Safety File 2015 version; and
 - Highways England scheme newsletters.
- 5.5. A list of the background information specifically requested and received to help with the compilation of this report is included in **Appendix C**.

Site Visit

- 5.6. As part of the OYA evaluation, a site visit was undertaken in early September 2016. The visit included the taking of photographs to provide a photographic record of the scheme and to provide comparison views with selected ES photomontages – these are shown in **Appendix D**.

Consultation

5.7. Statutory environmental bodies, County, Borough/District/City and Parish councils, and other relevant organisations were contacted as part of the OYA evaluation regarding their views on the impacts they perceive the scheme has had on the environment and are summarised in **Table 5-1**, below and covered in more detail within the individual sub-topics in this section.

Table 5-1 Summary of Environmental Consultation Responses

Organisation	Field of Interest	Comments at OYA
Natural England	Biodiversity & Landscape	Responded that NE had no comments to make regarding the scheme.
Historic England	Heritage	Raised concerns relating to the location of a sub-contractor compound area considered to be contra to the EIA and located directly adjacent to the Glebe Farm scheduled monument in an area highly likely to include further remains of national importance.
Environment Agency	Water	Commented on flooding, biodiversity and pollution control.
Nottinghamshire County Council	General	<p>For PRoWs the route was considered to be generally successful. Some issues with regard to adjacent landowners were also noted.</p> <p>With regard to archaeology, in general the scheme seemed to progress well, however, the use of the Glebe Farm scheduled monument as a compound and the resulting damage is a concern.</p> <p>Unable to provide any detailed biodiversity response, but noted that it would be the responsibility of Highways England to check that the biodiversity actions and conditions of permission have been successfully implemented.</p> <p>The County Council as Lead Local Flood Authority does not have any observations.</p>
Leicestershire County Council	General	<p>In broad terms, considered that the scheme catered adequately for the archaeological issues encountered. Not been made aware of the completed report, or archive.</p> <p>Unable to comment on biodiversity.</p>
Nottingham City Council	General	No response received.
Rushcliffe Borough Council	General	<p>No concerns about the historic environment impacts of the scheme and not aware of any unforeseen impacts. Not been made aware of any archaeological reporting.</p> <p>Biodiversity impacts likely to be as expected (as far as known) but would require monitoring/survey information to confirm.</p> <p>Generally new planting is in keeping with the local landscape character, overtime the landscaping should help mitigate the scheme, but at the present time it is too immature to have any real effect.</p> <p>Provision for NMUs considered an improvement.</p> <p>Also commented on noise, AQ and drainage.</p>

North West Leicestershire District Council	General	No response received.
Kegworth Parish Council	General	Considered it to be an excellent project professionally carried out by the Contractors who worked closely with local residents. Improved journey times, fewer delays/congestion, provides a safer route.
Ratcliffe on Soar Parish Council	General	No response received.
Thrumpton Parish (Meeting)	General	Provided feedback on various aspects including noise, landscape, biodiversity and PRowS. Disappointed that the West Leake contractor's compound has not been restored and with the increase in fly tipping. Also raised concerns about impacts on Barton Lane.
Barton in Fabis Parish Council	General	No response received.
Gotham Parish Council	General	No response received.
Canal & Rivers Trust	Water	No response received.
Trent Valley IDB	Drainage	No response received.
Trent Rivers Trust	Water	No response received.
Leicestershire and Rutland Wildlife Trust	Biodiversity	No response received.
Nottinghamshire Wildlife Trust	Biodiversity	Confirmed that it was represented on the Ecology Group for the scheme prior to construction and was directly involved in the development of the badger mitigation design, but has not received any of the badger monitoring reports or any other monitoring information.

Animal Mortality

- 5.8. The Highways England Area 7 network management team has also been consulted with regard to animal mortality figures, but at the time of writing no data has been provided.

Traffic Forecast Evaluation

- 5.9. 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.

- 5.10. The ES noted that the A453 east of the M1 was an important regional trunk road and a major route between Nottingham, the M1 and East Midlands Airport. The existing road was severely congested at peak hours, with unreliable journey times, a poor safety record and maintenance difficulties. It carried between 24,000 (rural section) and 31,000 (urban section) vehicles per day and a high proportion of heavy goods vehicles (up to 11% in the urban section and up to 20% in the rural section, compared with a national average of 10% on rural trunk roads). It was forecast, at the time the ES was prepared, that the number of vehicles using the A453 would increase by up to 1,000 a day by 2012 and by up to 4,000 a day by 2027.
- 5.11. With regard to traffic speeds; the ES noted that there would be a 70mph speed limit in the rural section and a 40mph speed limit in the urban section.
- 5.12. Traffic flows were expected to increase significantly with the scheme. **Table 5-2** below shows the 2006 existing flows on the A453 in the rural and urban sections, including the percentage of heavy goods vehicles (HGVs) and the ES predicted flows for the opening year (winter 2012) and design year (2027) with the scheme. To compare with the OYA observed flows, the ES predicted flows have been interpolated¹⁴ to get proxy forecasts for 2016.

Table 5-2 Traffic flow AADT with HGV %: Forecast and Observed¹⁵

Location	Existing	With Scheme (DS) ES forecast (% HGV)		ES Forecast Interpolated to 2016	Observed OYA		
	2006	2012	2027		2016	Difference	% Difference
Rural section	23,000 (19%)	34,000 (13%)	44,000 (11%)	36,700	34,400	-2,300	-6%
Urban section	30,000 (12%)	37,000 (10%)	48,000 (10%)	39,900	43,500	3,600	9%

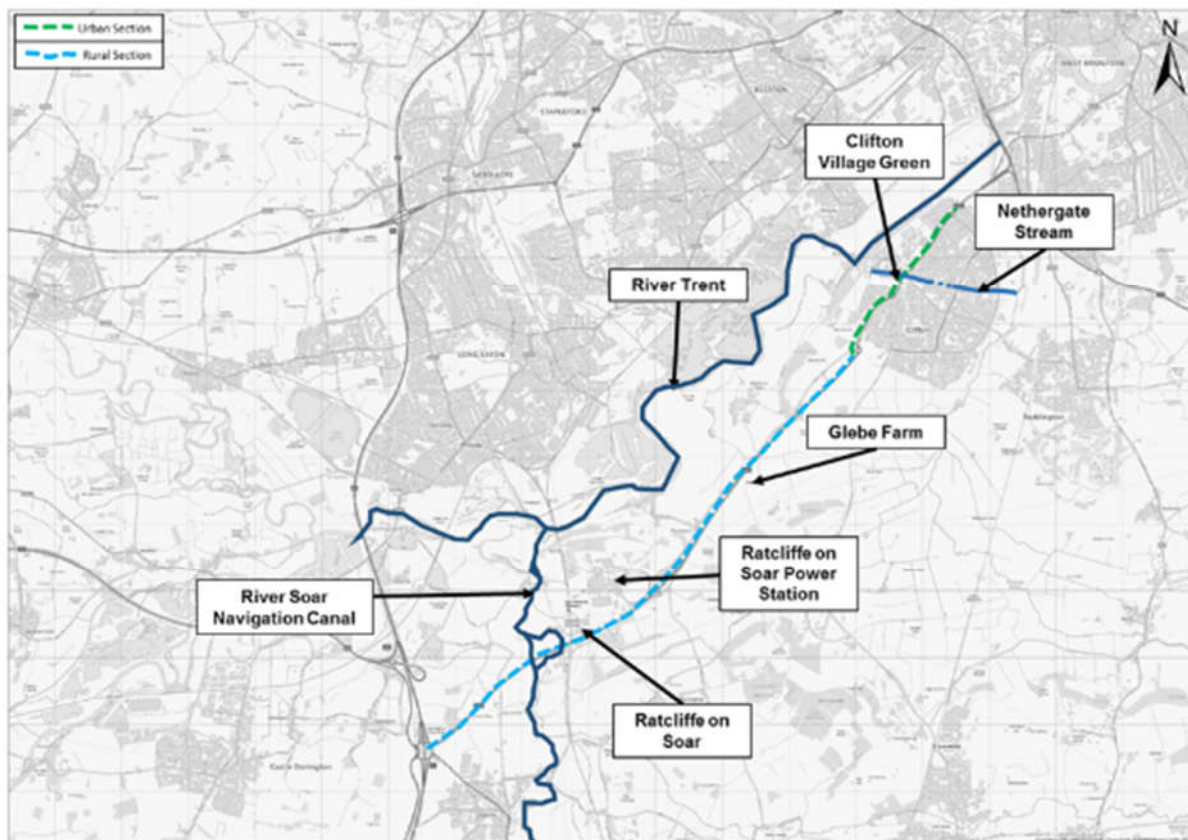
One Year After Environmental Assessment

- 5.13. Included in this section is a brief summary of statements from the AST and ES evaluations which have been included to provide the context for the OYA evaluation.
- 5.14. The key environmental features that are discussed in this chapter are shown in **Figure 5-1**. This should be read in conjunction with **Figure 1-2**.

¹⁴ This has been carried out assuming a linear relationship between the traffic flows presented for the 2012 (assumed opening year in the ES) and 2027 (assumed future year in the ES).

¹⁵ Based on ES Volume 1, Section 1: Introduction, Part 2: The Project Table 1.2.1: Traffic Flows AADT with HGV% (in brackets).

Figure 5-1 Key Environmental Features (not to scale)



Noise

Forecast

Appraisal Summary Table

- 5.15. The AST summary of key impacts stated that properties near the existing A453 in urban areas around Clifton were predicted to experience an increase in noise levels as a result of the proposed widening scheme, with the facades of 169 properties facing the proposed scheme predicted to experience an increase in noise levels greater than 5dB. Noise levels at some properties on the Nottingham Road-Clifton Lane route to the Crusader roundabout and on the Barton-in-Fabis turn off from the A453 were predicted to experience a reduction in noise levels.
- 5.16. Three schools (Glapton Primary & Nursery, Whitegate Primary and Dovecote Primary) were predicted to experience an increase in noise levels between 1.7 and 2.9dB considered to be a negligible impact.
- 5.17. The AST also expected that 200 properties would qualify for noise insulation in accordance with the 1975 Noise Insulation Regulations.

Environmental Statement

- 5.18. It was noted in the ES that existing background noise levels along the A453 were dominated by road traffic and that noise levels used in the computer model ranged from 53.3 dB – 68.3 dB in the rural area and between 56.6dB – 78.5dB in the urban area. Generally, with the scheme in the design year, there was predicted to be a net increase in noise as a result of the forecast increase in traffic. Almost all the increases in noise would be within the 1-3dBA

range considered to be 'slight negative' t16; a number of locations would experience 'moderate negative' increases of between 3-4.9 dBA and a small number of locations large negative increases of between 5-9.9 dBA. Overall the increase in noise levels was assessed as being of slight to moderate significance.

- 5.19. Beneficial effects of traffic decreases would result in slight to very large positive decreased noise levels experienced by 188 locations in the 'Do Something' design year scenario in comparison with 2 in the 'Do Minimum' scenario.
- 5.20. Noise mitigation measures identified in the ES stated that a low noise surface would be used throughout the scheme and noise attenuation barriers at the following locations;
- A 1.8 m high replacement barrier adjacent to Meden Close in Clifton;
 - A 2.5 m high barrier to replace the 1.8m high fence taken out by the road widening adjacent to Morgan Mews/Cavell Close;
 - An additional 3m high barrier constructed on top of the cutting slope to the north-east of the proposed Mill Hill roundabout to reduce noise levels in the grounds of the Lark Hill Retirement Village: consisting of a 1.5 m earthwork topped with a 1.5 m fence.
- 5.21. In other locations where there were predicted to be significant noise increases, it is understood from the ES that noise attenuation barriers were not included where they would create unacceptable impacts in their own right i.e. landscape/townscape impact, visual impact and on personal security grounds.
- 5.22. The ES predicted that some properties would benefit from reduced noise whilst for others there would be an increase in noise levels. In particular, some properties on the Nottingham Road-Clifton Lane route to the Crusader Roundabout and on the Barton-in-Fabis turn off from the A453 would benefit from reduced noise, whereas the largest increases were predicted at properties close to the Farnborough Road junction. Overall it was predicted that there would be a net increase in properties experiencing increased traffic noise as a result of the predicted increase in traffic using the improved A453.
- 5.23. In some locations, in particular along Barton Lane and Clifton Lane, noise levels would reduce as a result of traffic using the A453 rather than diverting on to other routes to avoid congestion. Nearby villages including Kingston on Soar and Gotham would benefit in this way, where there could be very large reductions of up to 10 decibels (dB).
- 5.24. Overall there was expected to be an increase in vibration nuisance levels to 271 properties and a reduction to 138 properties, but increases would be well below the level likely to cause any damage to buildings.
- 5.25. A preliminary estimate of properties likely to be eligible for noise insulation showed that 222 properties were likely to qualify under the Noise Insulation Regulations. A detailed assessment would be undertaken based upon flows immediately prior to construction of the road.

Updated EIA Traffic Noise and Vibration June 2012

- 5.26. An updated assessment was undertaken prior to construction and reported in June 2012, with overall changes to the local noise climate assessed to be in line with those identified in the ES. In terms of numbers, the EIA predicted that 6,160 properties and other relevant locations would experience an increase in nuisance levels in the 'Do Something' scenario (in comparison with 3,382 properties and other relevant locations in the 'Do Minimum' scenario). 920 properties and other relevant locations would experience a decrease in nuisance levels in the 'Do Something' scenario (in comparison to 41 in the 'Do Minimum'

¹⁶ In accordance with the criteria given in ES Table 2.7.1. Classification of Magnitude of Noise Impact Criteria

scenario). The EIA notes that the worst case increases from the 'do something' 2015 and 2031 scenarios for each receptor were used for the increase in nuisance levels (i.e. the largest change used in the results table in the EIA).

- 5.27. The EIA identified a maximum of 209 properties likely to be eligible for mitigating works including improved glazing under the Noise Insulation Regulations and a further 23 properties were identified that, despite falling outside of the error margins described in the EIA, were suggested for noise mitigation works. Four properties due to their location were not suggested for mitigation works.
- 5.28. Increases in the amount of vibration nuisance were expected to be negligible and well below the level likely to cause any damage to buildings.

Consultation

- 5.29. Rushcliffe Borough Council Environmental Health Team responded that it was not aware of any unacceptable environmental effects due to the scheme; however, they commented that they had no tangible evidence to base this upon.
- 5.30. Thrumpton Parish Meeting responded that local opinion is split on noise – “*some think the shielding / tarmac have reduced it, others do not*”.

Evaluation

- 5.31. POPE is not aware of information which would confirm the Road Surface Influence (RSI) value of the new road surfacing incorporated into the scheme, and with regard to properties eligible for noise insulation, it is not clear from information provided (a Noise Insulation Survey spreadsheet – final estimates with 2013 data) what the actual number of properties receiving noise insulation is.
- 5.32. Based on the as-built plans and site visit, acoustic barriers have been provided at the locations identified in the ES, (see Figures below), however, details of the insulation performance properties have not been provided to POPE (i.e. the BS EN 1794-2 result provided by the noise barrier manufacturer). Scheme plans indicate that at Medan Close the centre line of the hedge should be set 1.5m from the acoustic fence, presumably to allow for any future maintenance of the fence. It will be important that the hedge is managed appropriately to allow for access whilst retaining the planting. This aspect could be reconsidered at FYA.



Acoustic barriers at Medan Close, Clifton (Figure 5.2 left) with new hedge planting in front and at Morgan Mews/Cavell Close (Figure 5.3 right) at the Green Lane junction.



Figure 5.4 view from Fox Covert Lane towards Mill Hill roundabout with acoustic barrier located on top of the cutting earthworks. As built plans indicate that it is a 2.0m high fence on earthworks.

5.33. 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; as can be seen by the comparison of the predicted and observed AADT flows in **Table 5-2**, above, the data indicates that the observed AADT traffic flows are within these parameters and it is considered that the effects of the scheme on the noise climate are likely to be **as expected**.

Table 5-3 Evaluation Summary: Noise

Sub-Objective	Noise	Assessment
AST	Quantitative assessment - Estimated Population Annoyed in 15th Year after Opening (2030): Without Scheme 2,666 With Scheme 3,042 Net Noise Annoyance +376 people. With the scheme in place 519 properties would experience increased noise levels of more than 3dB in 2030 compared to the baseline Do Minimum situation in 2030. 8 properties would experience reductions in noise levels of more than 3dB in 2030 compared to the baseline Do Minimum situation in 2030.	(From NTS) Noise levels would reduce at some locations but increase at others; with most increases between 1-3dB. Insignificant increase in vibration. Overall slight to moderate adverse effect
EST	Noise mitigation measures have been implemented. Based on available information, traffic flows are in line with predictions.	As expected.

Local Air Quality

Forecast

Appraisal Summary Table

5.34. The AST stated that there would be no exceedances of the Nitrogen dioxide (NO₂) and Particulate Matter (PM₁₀) Air Quality Objectives (AQO) at the A453 Corridor. Only one exceedance of NO₂ AQO at receptor NCC1¹⁷ at Nottingham Air Quality Management Area

¹⁷ 8 Beeston Road

3 (AQMA) (this receptor exceeded NAQ in 2010, but with scheme showed a reduction of $0.09\mu\text{g}/\text{m}^3$ in 2015). There would be increases in NO_2 in two AQMA's by a maximum of $0.17\mu\text{g}/\text{m}^3$; decreases in NO_2 in six AQMA's by a maximum of $0.48\mu\text{g}/\text{m}^3$. There would be a net regional increase in total PM_{10} emissions of 0.578 tonnes. Overall there would be a negligible impact on air quality.

Environmental Statement

- 5.35. The ES predicted that the scheme would generally result in slight increases in NO_2 and PM_{10} exposure at receptors closest to the road along the A453 corridor. Despite this general increase, no receptors in the A453 corridor were predicted to be exposed to exceedances of any of the National Air Quality Objectives.
- 5.36. Beyond the A453 corridor the scheme was predicted to result in a slight increase in NO_2 exposure at receptors in two Air Quality Management Areas in Rushcliffe (AQMA 1 & AQMA 2), one in Nottingham (AQMA 2) and one in North West Leicestershire (AQMA 1). The scheme was predicted to result in a slight reduction in NO_2 exposure at receptors in three Air Quality Management Areas in Broxtowe (AQMA 1, AQMA 2 & AQMA 4), one in Nottingham (AQMA 1) and one in Erewash (AQMA 1). Receptors in all of the AQMAs were predicted to meet the NO_2 national air quality objective in 2012. The overall significance of the air quality effect of the scheme on receptors in AQMAs in the region was considered to be neutral.
- 5.37. The ES forecast exposure to NO_2 and PM_{10} for properties within 200m of roads affected by the proposed scheme would be as follows;
- 13,304 would experience reductions in NO_2 , 6,080 increases and overall exposure to NO_2 would slightly increase;
 - 12,587 would experience reductions in PM_{10} , 5,043 increases and overall exposure to PM_{10} would slightly reduce.
- 5.38. The scheme would result in a slight negative effect on receptors near to the road scheme, but would be of benefit to air quality in the study area. Overall there would be a neutral effect on air quality.

Consultation

- 5.39. Rushcliffe Borough Council Environmental Health Team responded that it undertakes monitoring for NO_2 within the Rushcliffe Borough Area using diffusion tubes and two real time monitors and currently has annual means for three AQMA's for NO_2 being exceeded along busy roads. The Annual Status Report for this current year has not yet been completed, however, RBC has not noted any significant increase in NO_2 at sites being monitored in 2015 or in provisional 2016 data. Assessed compliance levels at monitoring sites have generally shown a slight downward trend or have maintained levels that would be considered expected and the AQMA 2 (the A52 to the Nottingham Knight Island) continues to comply for at least the sixth year and RBC intends to continue with the revocation of this area in 2017.

Evaluation

- 5.40. POPE methodology states that if observed after opening traffic flows identified by POPE vary by more than +/- 1000 vehicles AADT, or by +/- 200 HGV AADT; or daily speed by 10kph; or peak hour speeds by 20kph from those predicted, it would be assumed that local air quality is likely to be either 'worse than' or 'better than' expected.
- 5.41. Based on the information presented in this evaluation, it is therefore concluded that the effects of the scheme in terms of local air quality are likely to be better than expected along the rural section, but worse than expected along the urban section. Further analysis should be undertaken at FYA when monitoring data over a longer period would be available.

Table 5-4 Evaluation Summary: Air Quality

Sub-Objective	Air Quality	Assessment
AST	Quantitative assessment - Properties with improved PM₁₀ 10,930; worse 6,158; no change 2,296. Change in overall exposure +218 Properties with improved NO₂ 11,675; worse 7,630; no change 79. Change in overall exposure +420 All figures for Opening Year 2015 Qualitative -Change in overall exposure in Opening Year 2015: +218 PM₁₀ ; +420 NO₂	Overall negligible impact on air quality
EST	The scheme was expected to result in a slight negative effect on receptors near to the road scheme, but would be of benefit to air quality in the wider area, with a neutral effect overall. Based on traffic flow information this is likely to be the case	Air Quality is likely to be better than expected along the rural area, but potentially worse than expected along the urban area, however any increase in emissions as a result of higher traffic flows may be offset by reduced congestion as a result of the scheme.

Greenhouse Gases

Forecast

Appraisal Summary Table

- 5.42. The AST stated that a 0.06% increase in road traffic emissions of carbon dioxide was forecast in the Opening Year (2015) with the scheme compared to without the scheme.

Environmental Statement

- 5.43. The forecast set out in the ES was based on the A453 multi-modal study area which included the East Midlands and beyond and so covered a large geographic area. The forecast was derived from the TUBA modelling. A summary of the forecast appraisal extracted from the ES is provided in **Table 5-5**.

Table 5-5 Forecast Greenhouse Gas Impacts (figures expressed as tonnes per year)

	Do Minimum - 2006	Do Minimum - 2012	Do Something - 2012	2006 Do Minimum – 2012 Do Something	2012 Do Minimum – 2012 Do Something
CO ₂	1,435,130	1,415,133	1,415,821	19,309	-688
Carbon ¹⁸	391,399	385,945	386,133	5,266	-188

Environmental Statement (2009)

- 5.44. An increase of 0.05% in carbon emissions was forecast in the Environmental Statement between the Do Minimum and Do Something scenarios in the opening year.

¹⁸ Factored CO₂ to carbon using the atomic masses of 44 and 12, respectively. 1 tonne of Carbon = 3.67 tonnes of CO₂

Evaluation

- 5.45. Since the forecast for greenhouse gas emissions was calculated using TUBA, it is not possible to calculate a like-for-like outturn. Therefore, the Design Manual for Roads and Bridges (DMRB) spreadsheet-based Screening Method has been utilised to calculate the difference between carbon levels on the A453 scheme section both pre and post scheme.
- 5.46. It has not been possible to undertake the calculations to determine a forecast for the scheme for comparison since only journey time savings were provided (and therefore it has not been possible to determine forecast speeds). Therefore, this evaluation only draws a comparison between the pre and post scheme outturn carbon levels based on observed traffic flows and speed information. The 2012 pre-scheme observed traffic levels have been factored to 2016 levels to provide a suitable basis for comparison. The 2012 data has been factored using observed trends for East Midlands 'A' roads using **Table 2-1**¹⁹.
- 5.47. The calculated outturn change in carbon emissions in the opening year (expressed in tonnes per year) over the scheme links is presented in **Table 5-6**.

Table 5-6 Outturn Carbon (tonnes/year) – Scheme Links

	Factored 2016 Pre-Scheme Observed	2016 Post-Scheme Observed	Difference	
			Net	Percentage
Carbon	8,247	9,076	+829	+10%

- 5.48. It is not possible to evaluate against the forecast due to the difference in study area. In summary:

Table 5-7 Evaluation Summary: Greenhouse Gases

Sub-Objective	Greenhouse Gases	Assessment
AST	The AST stated that a 0.06% increase in road traffic emissions of carbon dioxide (tonnes per year) was forecast in the Opening Year (2015) with the scheme compared to without the scheme.	-
EST	An increase in carbon levels was forecast in the opening year over the modelled area. An increase in carbon emissions has been calculated in the opening year over the scheme based on observed data. Not able to provide a like-for-like comparison due to different study areas.	-

Landscape and Townscape Effects

Forecast

Appraisal Summary Table

Landscape

- 5.49. The AST stated that generally the landscape was considered to be 'ordinary' and of local value. It noted that the offline section, including lighting at Mill Hill Roundabout had a minor urbanising effect on open farmland, affecting the setting of historic moorland at Clifton

¹⁹ Traffic flows on East Midlands 'A' roads have typically increased by 7.1%.

Pastures and Barton Moor. Overall, the impact of the scheme on Landscape would be **slight adverse**.

Townscape

- 5.50. The AST stated that the urban section would retain similar characteristics to the existing, situation retaining the majority of trees and open areas. The Nottingham University frontage would be improved. More of the Clifton Conservation Area would be affected by widening but it was expected that impacts would be reduced by detailed design with potential enhancement. Overall, the impact of the scheme on Townscape would be **slight adverse**.

Environmental Statement

- 5.51. The ES included townscape within the landscape and visual effects topic chapter. No part of the study area was protected by any statutory landscape designation, the route would pass through the Nottingham – Derby Green Belt but would not affect the openness of the Green Belt. The study area was characterised in the ES into five scheme landscape (SLCA) and five townscape (TCA) character areas (see **Appendix E**). Overall the quality / condition of the landscape and townscape was considered ordinary with low value/sensitivity.
- 5.52. The NTS summarised the scheme effects on landscape and townscape as follows;
- Between the M1 and Ratcliffe on Soar Power Station, the proposed road would follow the route of the existing A453 through the flat arable fields in the valley washlands of the River Trent and River Soar. Some roadside vegetation would require removal but this would be replanted. It was noted that the widened road would be a major feature in an area already dominated by the existing A453 and the Power Station. The road would also be closer to some isolated farms which would experience moderately adverse visual impact;
 - Between the Power Station and Thrumpton, the proposed road would follow the route of the existing A453 through the undulating Nottinghamshire Wolds landscape, where wooded hills and pastures were distinctive. Large areas around the parkway and West Leake junctions would be densely planted in keeping with the character of the landscape;
 - Where the proposed route would divert from the existing A453 between Thrumpton and Clifton, it would create a new road corridor through a less undulating and more open landscape than to the west of Thrumpton. It would avoid the mature landscape around the Barton Lodge junction, and land between the old and new A453 roads would be planted to enhance the landscape and help screen views from the village, Barton Lodge and Keepers Cottage. Glebe Farm would experience significant visual impact until planting matured. South of Clifton, the road would be lower down the ridge than the existing A453 and boundary hedges and occasional roadside planting would help restore the more enclosed character that used to exist in this landscape. Mill Hill Roundabout would be in cutting to reduce its impact, but lighting around the junction would make it an obvious feature; and
 - Through Clifton the scheme would follow the route of the existing road, avoiding demolition of any buildings. The majority of existing trees and shrubs, such as on screen mounds near Crusader Roundabout, would be retained, although there would be some loss of large trees at Green Lane Junction. Widening the road through Clifton would bring it closer to some properties, where there would be significant visual impact.

Mitigation

- 5.53. The scheme was designed to minimise impact on the landscape by following the route of the existing road and retaining roadside vegetation where possible. Replacement planting would be in keeping with the character of the landscape. Measures to reduce visual impact included putting the road in a cutting, retaining existing vegetation and providing screen mounds, and

new dense planting e.g. at the large junctions. New lighting would be restricted to the junctions within the rural section, and would be designed to minimise light spillage.

- 5.54. Detailed design would minimise impacts on the Clifton Village Green and Conservation Area. New planting in the urban section would include ornamental species and some trees would be planted as a larger size than in the rural section. Improvements agreed with Nottingham University along the road frontage would enhance the townscape character in this area by providing new railings, trees, shrubs and entrance signs.

Summary

- 5.55. The ES stated that all landscape and townscape effects as a result of the A453 Widening scheme were predicted to be slight adverse when the road was opened, compared to the situation in 2012 without the road. In the design year 2027 some mitigation measures would have matured to reduce some landscape effects, but overall effects would remain **slight adverse**.
- 5.56. In the rural section, there would be significant visual impact to some properties in Ratcliffe on Soar, Dowell's Barn, Winking Hill Farm and Glebe Farm. Widening the road through Clifton would inevitably bring it closer to some properties where there would be significant visual impact. Overall the ES assessed the effects of the scheme as **slight adverse**.

Consultation

- 5.57. Rushcliffe Borough Council (RBC) provided comments on the section of the A453 in Rushcliffe (i.e. not the section through Clifton which is within Nottingham City Council). RBC observed that in terms of the landscape planting the larger belts of tree planting do fit in with the character of the area and are most prominent around the power station where there are numerous small copses of trees nearby, the area closer to Clifton has less tree planting which again is in keeping with the local character.
- 5.58. RBC considers that when planting belts of trees it is preferable to avoid planting them in rows as it shows they were deliberately planted, whereas trees naturally grow in random clumps and that at the junction by the Power Station heading east there is a raised bund with rows of trees oriented towards the road, the rows are really prominent and are visible for a long distance. Over time as the canopies develop and trees are thinned out the rows will become less pronounced, but at the present time it does detract from the planting. RBC considers that given time the landscaping will help mitigate the scheme, but at the present time it is too immature to have any real effect, this is especially true of the hedgerow planting.
- 5.59. RBC also commented that the impact is as expected; screening vegetation is not yet mature enough to impact, therefore currently the scheme has a major impact along its length, particularly in the rural areas, however this will hopefully soften as the vegetation matures. The impact of lighting is considered to be as expected.
- 5.60. Thrumpton Parish (TP) commented that;
- The A453 is a major road which cuts through the landscape – in a pretty rural setting (power station / pylons aside) so has had a negative impact on the character and quality of the local landscape. However, much has been done to soften/shield and mask the visual impact of the road (earth banking, some cuttings etc.) and try to minimise the visual impact and there has been a lot of planting. It will take a long time to screen / soften views to the power station;
 - New embankments have been positive and hide some of the road, although much is still exposed. There was a lot of first year failure of the planting (although this was just all refreshed and added to in the last couple of months). Main disappointment was a lack of (granted more expensive) semi-mature trees. It's mainly all been small whips planted in volume;

- A lot of trees/large bushes, mature hedges were “clear felled” ahead of earth-working, and people in the village felt that much more could have been done to retain existing vegetation. Some of the smaller woods were cut back quite far from the road (SLCA 2 - South of A453 Kingston on Soar to Gotham) when they could have been kept further out, near the road. Might be a safety issue, but they are a long way away from the road edge. Some of these perhaps could have been saved / worked around with better planning, imagination or slight inconvenience;
- The timber barriers / fencing work well and fit nicely in the rural setting, but TP would have liked to see more hedges alongside and also note that there has been recent hedge planting. Much of the extensive hedgerow planting only seems to have happened in the last few months – was not done with the other planting;
- With regard to the appropriate use of materials; some of the route (an example being around Mill Hill roundabout) feels a bit urban and the big yellow/grey boxes (like a road grit box) are very visible and stand out in the rural setting.
- TP considers that the urban section has ‘improved the quality of the local landscape – with the improvements on the edge of road, greening, planting, banking and the changes (improvement, modernisation, updating of street furniture etc.) improving what was a scruffy entrance to the city. In a few years this will be even better’. However, it also considers that the Mill Hill to Crusader Roundabout section could do with much more planting (Fox Covert side / left hand side as you head into Nottingham), as it is now quite exposed and open;
- The new railings, trees, shrubs and entrance signs along the University frontage look very good, but many mature trees were removed to shift a fence slightly further back. Sadly not all of the old decorative cast iron fencing on the opposite side of the road was repaired/replaced which TP considers a shame;
- With regard to lighting TP notes that people were concerned the road would be lit up and therefore bright / light polluting, but considers that this is not been the case; and
- TP is concerned about the current state of the scheme contractor’s West Leake rural compound which, it says, appears abandoned and has been left, still fenced (unsympathetically) and un-cleared. It is considered an eyesore, attracts fly tipping, acts as an overnight lorry park and generally ‘sticks out like a sore thumb’ as it is surrounded by farmland. TP notes that the other two rural compounds (Mill Hill and near the M1) were returned to agriculture. TP considers it a very disappointing impact of the scheme which undoes a lot of the hard work elsewhere. TP have provided some photos of this area and these have been forwarded to Highways England.

Evaluation

- 5.61. This section presents an overview of the scheme at OYA with more detail in landscape **Appendix E**, including selected ES photomontages and OYA comparison views.
- 5.62. As expected, the widened rural section of the A453 is a major feature in the landscape, removal of some areas of existing vegetation has in the short term opened up views to the road corridor and traffic particularly HGVs and Thrumpton Parish considers that more of the existing vegetation could have been retained. Earthworks including cuttings help integrate the road into the local landscape and in the longer term landscape planting should filter/screen views. Anti-glare fencing has been installed between Green Street and the A453 to provide headlight screening between the two carriageways (**Figure 5.6**). Thrumpton Parish would have liked to see more of the larger size trees planted.
- 5.63. The offline section has created a new road corridor within a relatively open landscape and as expected is lower down the ridge than the existing A453 (see Photomontage 3a in **Appendix D**); in time, the new hedges and occasional roadside planting should help restore the more enclosed character that used to exist in this landscape. Earthworks at the Mill Hill roundabout help reduce its impact on the wider landscape (**Figure 5.5**).



Figure 5.5 (left) Earthworks and lighting at Mill Hill roundabout on approach from ‘old’ A453 now the local access road with Lark Hill retirement village centre view beyond landscaped bund

Figure 5.6 (right) Green Lane anti-glare 2.0m close board timber fence; the A435 is between the fence and highway earthworks with new planting visible

- 5.64. The urban section has widened the existing road corridor, whilst avoiding encroaching into Clifton Village Green and required remodelling of junctions; as expected there has been loss of existing vegetation and the road is closer to some properties. Where possible existing mature tree screening has been retained which continues to provide a landscape framework and visual separation from adjacent residential areas. Improvements to the University frontage are in place, however, the introduction of various elements of highway infrastructure including cabinets, yellow grits bins, vertical elements such as traffic lights, toucan crossings and lighting columns all add to the visual clutter along the route corridor.
- 5.65. With regard to lighting, the M1 J24 and the urban section of the route were already lit. As expected the rural section remains generally unlit, with new lighting provided at the Parkway and West Leake grade separated junctions and it has been upgraded within the urban section, including the Mill Hill roundabout. Lighting columns are visible vertical elements at OYA; these should become less prominent as the landscape planting becomes more established, softening views. The ES noted that lighting at junctions would make them more obvious features in the landscape and this is likely to be the case particularly at night within the rural section of the route, although there are also sources of existing light which will be apparent in the landscape e.g. the power station complex. A night time evaluation has not been undertaken for this OYA study (if considered appropriate this could be undertaken at FYA). As expected, new / additional traffic signals have been installed at the re-modelled junctions in Clifton. New signage has been provided, including two MS4 signs, two emergency telephones and CCTV cameras with associated infrastructure. The ES does not specifically mention MS4 signs and CCTV²⁰ but noted that conventional signage appropriate to a dual two lane all-purpose carriageway would be provided including 1 mile and ½ mile advance direction signs on the embankment approach to M1 Junction 24 and elsewhere where appropriate. It is considered that the new large scale signs and additional vertical elements have contributed to an urbanisation of the route.
- 5.66. Offsite planting by agreement has been undertaken at the following locations (based on the as built plans and HEMP) with 3 years aftercare included within the scheme contract and a further 22 years maintenance (7 years for Hillside Cottage) to be provided by the landowners. It was possible for an overview of some plots at OYA (September 2016) from adjacent public roads as illustrated in **Table 5-8**. Offsite planting at two locations; (Hillside Cottage and Lark Hill retirement village) was not viewed at OYA as planting was within the curtilage of the private residence/development.

²⁰ This formed part of the A453 VMS Pinch Point scheme.

Table 5-8 Offsite Planting locations

North of A453 between Manor Road, Barton in Fabis and Keeper's Cottage

Two areas of linear belts of tree / shrub planting off Manor Road along field boundaries within rabbit fenced plots. There was no evidence of recent maintenance e.g. weed free circles although it seems likely the plot had been cut at some point and plants appeared to be establishing, although it was not possible to view plots in any detail.



Alongside existing A453 now de-trunked between Mill Hill and Barton Lodge at various locations on north and south side

Plots and hedges in place with variable establishment and some locations overgrown. No evidence of recent maintenance, dead plants will need to be replaced and shelters required hand weeding.



North of A453 between Mill Hill Spinney and Fox Covert

Two hedgerow locations with variable establishment at OYA ranging from poor (possibly contributed to by lack maintenance as illustrated in view left below) and as expected (view right).



South of A453 between Crusader Roundabout and Man of Trent public house

Existing hedgerow removed to accommodate footway and new bus stop with replacement planting provided by new offsite planting to screen properties on Glendale Avenue from the A453.

Views below illustrate retained mature hedge with new hedge linking in which will take many years to provide a similar screening function, with properties on Glendale Avenue visible. Hedgerow establishment is variable.



OYA view (below) from A435 with new bus stop and properties on Glendale Avenue beyond.



Barton Green Play Area and Crusader Public House

At Barton Green Play area a 1.8m high green Paladin fence and new hedge were proposed to fill a gap along the play area boundary. At the Crusader PH there would be amenity grassland with 3 standard trees and wild daffodil bulbs.

At OYA the hedge at Barton Green play area is in place although some dead plants were evident and the protective strained wire fence had been breached. The Paladin fence has been provided although a panel was missing, possibly due to vandalism; at the time of the OYA visit the boundary was therefore not secure, with access possible onto the A453 footway. This issue was reported to the Highways England Area 7 team for action.



View below (looking towards PH from crossing point at junction) illustrates standard trees and amenity grassland in place at the Crusader PH. Bulbs not viewed as OYA visit did not coincide with flowering season.



Green Lane Junction

Tree and ornamental shrub planting was proposed on an area of existing grassed open space to soften and filter views from properties on Daleshead Road (see photo below), with Extra Heavy Standard (EHS) trees at the junction.

At OYA it was noted that 8 EHS trees have been planted at the junction and appear to be establishing satisfactorily. However, the as built plans include a note to the effect that the other area of proposed offsite tree and ornamental shrub planting was not taken forward at the request of Nottinghamshire CC (area illustrated below).



Opposite Nottingham Trent University

Native species hedgerows was proposed at the edge of the mature tree belt, with mixed bulb planting naturalised within the mature tree belt. Varied establishment was noted at OYA including areas of slow

growth, apparent lack of maintenance and dead plants. Naturalised bulbs were not visible at the time of the OYA site visit which was not at the time of flowering for the winter/spring varieties.



Farnborough Road Junction

Tree and shrub planting proposed to provide visual screening of the road from properties on Fleam Road north of A435, with new hedgerow along edge of existing mature tree belt south of A453, with mixed bulb planting within the existing tree belt. Planting within the fenced plot generally appeared to be establishing satisfactorily, occasional replacements required and maintenance activities evident. Plant spacing identified at 1.75m centres and the plot will take time to develop sufficiently to provide a visual screen. (Naturalised bulbs were not viewed as the OYA did not coincide with flowering time). Hedgerow generally establishing and maintenance in place.



Establishment and Condition of Planting

- 5.67. The HEMP states that the scheme includes a 5-year maintenance period, and includes a 12 Month Landscape Maintenance Programme identifying the annual landscape maintenance requirements including timescales and criteria for monitoring compliance. It notes that all general maintenance operations during the Aftercare period are specified in the Landscape and Ecology Appendices to the Specification. The HEMP also includes information relating to landscape works to be undertaken during the longer-term maintenance phase as detailed in the 20-year landscape and ecology management summary programme (HEMP Appendix D).
- 5.68. It is understood that tree root damage occurred during construction through the urban section, and locations are included on a set of marked up plans (HEMP Appendix E). Reasons include stockpiled topsoil over roots, damage during drainage works and installation of ducts. Protective fencing was a scheme requirement noted on the site clearance drawings. Potential longer term effects could include reduced visual screening should trees lose vigour. This aspect could be reconsidered at FYA.
- 5.69. At the time of the OYA site visit establishment of planting within plots in the rural section was variable (see **Figure 5.7 to 5.10**) with areas of slower growth and dead plants, including some of the standard size individual trees at the roundabouts within the large-scale junctions. It is presumed that all dead plants will be subject to replacement as identified in the HEMP (and as noted by Thrumpton Parish Meeting in the consultation section above, some of this may have been actioned since the OYA visit). Aftercare maintenance within rural plots was in place, including weed free circles, although there was evidence of weed infestations within grassed areas outside plots, some shelters/spiral guards required up-righting and evidence of rabbit burrows within the embankment slopes at the Cattle Creep underpass near M1 J24. It was also noticed that an area of highway planting in the vicinity of the Cedar Isle property appears to have been 'customised' and overall growth appeared slow (**Figure 5.9**).



Figure 5.7 (left) and Figure 5.8 (right) Typical planting plot and hedge establishment at OYA



Figure 5.9 (left) planting near Cedar Isle and Figure 5.10 (right) illustrating slower growth plot/hedge

- 5.70. In the urban section, planting has generally been implemented as expected, although it was noted that some of the larger size trees were showing signs of die back / failure, and hedge growth at the edge of retained existing vegetation was variable, with some dead plants. With regard to maintenance, there was evidence of weed control having been carried out, however, in some locations it was noted that planting would benefit from the removal of weeds/grass growth, spirals were not maintained upright / supporting canes were broken and guards required hand weeding. POPE cannot comment on the success or otherwise of the bulb planting as the site visit timing was outside the winter/spring flowering period. Further detail is included in the landscape appendix.
- 5.71. At OYA it was noted that grass verges / visibility splays had been cut, as had amenity grass areas in the urban section. Open grass outside rural plots and species rich / wildflower /wet grassland did not appear to have been cut at the time of the site visit but based on the cutting regime within the HEMP these areas were due to be cut as follows;
- Amenity grass in the rural section twice a year in April and late September;
 - Wildflower areas once per year in October with cuttings removed off site; and
 - Species Rich Grassland areas annually in late August.

Summary

- 5.72. Based on the information available, mitigation measures have generally been implemented in line with proposals including earthworks, however, although existing vegetation has been retained Thrumpton Parish would have liked to see a more targeted approach which might have enabled more vegetation to have been kept. Planting areas are beginning to establish, although there are areas of slower growth/dead plants and some replacement planting will be required to ensure that landscape objectives are met in the longer term. It is too soon at OYA for planting to provide any screening for the route and as expected the scheme currently has a major impact along its length, particularly in the rural areas, At the time of the OYA site visit some planting and grassed areas required attention. Continued aftercare and management throughout the maintenance period will be essential if planting and the various grassland/wildflower areas are to achieve their targets. It is too soon to fully evaluate the effectiveness of mitigation and it is suggested that this aspect should be considered further at the FYA stage.
- 5.73. The HEMP notes that damage to some tree roots occurred during construction through the urban section and any loss of vigour in these existing retained trees could impact on the visual impact for residential areas and the overall green framework of the road corridor.
- 5.74. Thrumpton Parish have raised concerns about the former West Leake contractor's compound area remaining in an unrestored state. It is understood that the location of the compound was subject to a separate planning application i.e. outside of the main contract works. However, Disruption Due To Construction section of the ES includes reference to both the urban and the rural compound areas and for those in the rural section notes that final location would be determined once approval to construct the scheme was achieved and that an environmental assessment of options would be undertaken in order to determine the most favourable location, subject to landowner agreement. The ES indicates that compound areas were required temporarily during construction. It also notes that 'operation of the site compound would include the procedures to minimise environmental impacts, one of which states; 'restoration and end use proposals - built elements and hard standings would be removed and the topsoil would be replaced, reseeded and managed as appropriate'. It seems, therefore, that at the time of the ES it was expected that compound areas would be temporary and returned to their former state after use. It would appear at this OYA stage that this has not happened and this aspect should be reconsidered at FYA.
- 5.75. It is therefore considered that the landscape/townscape and visual amenity effects of the scheme are **worse than expected** at this stage, and ongoing establishment should be revisited at FYA.

Table 5-9 Evaluation Summary: Landscape and Townscape

Sub-Objective	Landscape / Townscape	Assessment
Landscape AST	Generally 'ordinary' landscape of local value. Offline section, including lighting at Mill Hill Roundabout has minor urbanising effect on open farmland, affecting the setting of historic moorland at Clifton Pastures & Barton Moor.	Slight adverse
Townscape AST	Urban section retains similar characteristics as existing, retaining the majority of trees and open areas. The University frontage will be improved. More of the Clifton Conservation Area will be affected by widening but impacts reduced by detailed design with potential enhancement.	Slight adverse
EST	Based on the information available, mitigation measures have generally been implemented although establishment at OYA appeared variable, with areas of slower growth and dead plants requiring replacement, including some of the larger	Worse than expected

	<p>size feature trees. Concerns have been raised locally that the former West Leake compound area remains in an unrestored state – revisit at FYA. The HEMP notes that through the urban section, damage occurred to some tree roots with the potential for longer term impacts through loss of screening. Large scale signs implemented as part of a separate Technology Scheme have contributed to an urbanisation of the rural section of the route.</p> <p>Continued aftercare and management throughout the maintenance period will be essential if planting/grasslands are to achieve their targets, particularly as there was evidence at OYA that some planting and grassed areas required attention. It is too soon to fully evaluate the effectiveness of the mitigation objectives including landscape integration, visual screening, visual amenity and enhancing the built environment and it is suggested that this aspect should be considered further at the FYA stage.</p>	
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Cultural Heritage

Forecast

Appraisal Summary Table

- 5.76. The AST stated that 29 archaeological / heritage sites had been identified, of which 12 would be directly affected but only two completely lost. The sites were generally of medium value, with two of high value. No Scheduled Monuments (SM) would be directly affected. Mitigation including detailed excavation and evaluation prior to construction would be undertaken. There would be minor impacts on the setting of 12 Listed Buildings, including Clifton Dovecote SM, 7 locally listed buildings, 2 Conservation Areas and Clifton Pastures / Barton Moor historic landscape. Overall, the AST assessed the impact of the scheme on the heritage resource as **moderate adverse**.

Environmental Statement

Archaeology

- 5.77. The ES confirmed that desk studies and a programme of archaeological fieldwork was undertaken to inform the ES. A total of 29 sites of an archaeological nature were identified and the investigations revealed that there was widespread activity in the study area from the Middle Stone Age (Mesolithic) through to the medieval period with a number of artefacts having been found including Roman pottery and prehistoric flint, close to Glebe Farm Roman Villa SM. A rare Anglo-Saxon site was also identified²¹, along with a previously unknown Iron-age settlement site.
- 5.78. The scheme would affect some known archaeological sites. The ES confirmed that further excavation and recording would be undertaken before road construction began and that the mitigation strategy would provide a full record of archaeological features within the scheme. The presumption would be for preservation in-situ, but where impact on archaeological and cultural heritage resources was unavoidable, appropriate investigation to achieve preservation by record would be carried out on a site by site basis. Where design details were not finalised at the time of the ES, mitigation for these areas would be considered once the final details were available.

²¹ Site 3 close to the road corridor identified as an Iron Age, Roman and Saxon site

- 5.79. **Pre-Construction Mitigation** - The ES stated that given the amount of evaluation that had already been undertaken to inform the project, the preferred mitigation for the majority of known sites was 'Strip, Plan and Excavate' prior to the start of construction on a number of identified sites (Sites 1, 2, 3, 7, 9, 12 & 29). Excavation and appropriate sampling/dating of the palaeochannel²² at Site 3 would also be required. Full archaeological excavation was proposed at one site – an enclosure complex at Clifton affected by the offline route (Site 28)²³.
- 5.80. **During Construction Mitigation** –A detailed watching brief was proposed for known areas of archaeology (parts of sites 3, 4, 9, 11, 15 & 27) and across the offline section of the scheme not covered by other mitigation. A standard watching brief during groundworks for all previously undisturbed areas, not already mitigated for was suggested in order to record any unforeseen archaeological deposits.
- 5.81. Twelve areas of known archaeological interest would be affected and the ES assessment concluded that there would be a **Moderate Adverse** effect on the archaeology sub-topic after mitigation.

Listed Buildings

- 5.82. The ES noted that Listed Buildings and those with local heritage interest included;
- Ratcliffe on Soar - Holy Trinity Church Grade I and Manor Farmhouse Grade II. Three other buildings listed as having local character and heritage including Riverside Farm;
 - Clifton Village and Green and Conservation Area - 22 listed buildings in Clifton (two Grade I, one Grade II* and the others Grade II). Ten of the listed buildings, including a SM Dovecote were already close to the existing A453 and within the Conservation Area. There were also a further ten buildings of local interest including a smithy to the south of the green, all within the Conservation Area;
 - Barton in Fabis Village – The village is based around St George's Church Grade I, There are four Grade II listed including the Rectory. The Dovecote at Manor Farm is listed and has SM status. In addition there are four buildings of local interest;
 - Thrumpton Village and Conservation Area - 18 listed buildings mostly clustered in the north-west corner of the village and 11 buildings of local interest all within a Conservation Area. Although the medieval and post-medieval features are common survivals in local villages, the 18th century estate buildings are rarer; and
 - Other Buildings - Winkling Hill Farm lies south of Ratcliffe Power Station. The value of the building was stated as low.
- 5.83. The ES noted that no historic buildings would be directly affected by the scheme, however there would be a slight visual and aural impact on the setting of some buildings and conservation areas, although it was noted that their settings were already compromised by the existing main road and many of the villages were screened by existing mature vegetation. Mitigation would include screening and landscaping to reduce noise and visual effects. Overall, the ES assessed that there would be a **Slight Adverse** effect on the setting of historic buildings after mitigation.

Historic Landscape

- 5.84. With regard to the historic landscape the ES noted that there would be;

²² Deposits of unconsolidated or semi-consolidated sedimentary rocks deposited in ancient, currently inactive river and stream channel systems.

²³ Possible Iron Age/Romano-British settlement at Grove Farm, Clifton

- a **slight adverse** effect on Clifton Conservation Area, Park and Village Green (the Conservation Area is based around the Village Green and the old village but extends to the adjacent A453 junction); and
 - a **neutral effect** on Thrumpton Park (unregistered park to the north-west of Thrumpton village), Clifton Hall (registered historic park and garden on the bank of the River Trent some distance north of the scheme) and Ratcliffe on Soar Power Station (a prominent feature of the Trent valley landscape and considered to be of local value).
- 5.85. With regard to Historic Landscape Characterisation it was noted that in general much of the fields and pasture along the line of the A453 had been modified since World War II and were part of a continually changing and evolving landscape. However, the proposed offline section at Mill Hill would be clearly visible from the open areas of Clifton Pasture and Barton Moor (a survival of pre-enclosure field patterns i.e. remnants of historic open fields²⁴) and would have some impact on the setting of these unenclosed areas and the view of them from Mill Hill.
- 5.86. To mitigate impacts on historic landscapes, sensitive scheme design including planting was proposed. Siting of an interpretation board overlooking Clifton Pasture and Barton Moor would be considered to aid understanding of the historic landscape. The ES assessment of the Historic Landscapes sub-topic was that there would be a **Slight Adverse** effect on the historic landscape, of both the online and offline sections, after mitigation.

Overall Assessment

- 5.87. The overall ES assessment on the cultural heritage assets as a result of the scheme was that after mitigation there would be a **Moderate Adverse** effect.

Consultation

- 5.88. Historic England responded that it 'had significant issues with the installation of the subcontractor pavement batching plant at Glebe Farm'. Historic England considers that this was sited contra to the EIA and appeared to be due to the operation not able to be accommodated on the main compound. They state that this subcontractor compound was directly adjacent to the scheduled area which is highly likely to include further remains of national importance and was a significant failing of control of what was in Historic England's view a part of the scheme yet failed to be controlled in line with the EIA.
- 5.89. With regards to decommissioning of the batching plant, Historic England says that it took the view that there was less overall risk in leaving the new yard in place at the request of the farmer so that he could utilise it and get stored equipment off the scheduled area, rather than have further disturbance in lifting the surface. It would however have been much better had the batching plant not been situated at Glebe Farm.
- 5.90. Nottinghamshire County Council (NCC) responded that in general it considers the scheme to have progressed well, however it also notes 'one big issue' is that Glebe Farm Scheduled Monument was used by one of the contractors to store equipment and lorries at the latter part of the scheme implementation, which caused some damage to the Scheduled monument. Otherwise NCC considers there was a relatively good level of evaluation and the mitigation works were adequate.
- 5.91. Leicestershire County Council considers that the scheme's impacts upon archaeological remains were adequately identified and addressed and that in broad terms, the scheme catered adequately for the archaeological issues encountered. It is not aware of any

²⁴ Case Study: A453 Widening (M1 J24 to A52 Nottingham) Application of Historic Landscape Characterisation for the EIA Nov 2007 to July 2008

unforeseen impacts on heritage resources and was not aware of the completed report, or archive.

- 5.92. Rushcliffe Borough Council (RBC) commented that in its opinion the works have managed to avoid any notable impact upon standing heritage assets (buildings etc.) and have been well separated from known designated archaeological sites, and has no concerns about the historic environment impacts of the scheme. Unable to comment on the pre-construction evaluation. RBC is not aware of any unforeseen impacts and does not believe that RBC was made aware of any issues encountered during construction.
- 5.93. RBC also mentioned that it has not seen anything in terms of reporting or publication of archaeological findings. It notes that for the A46 RBC received a copy of the published archaeological findings, and assumes for the A453 this has been provided to Nottinghamshire County Council only.

Evaluation

Archaeology

- 5.94. POPE has sourced OYA evaluation information from the archaeological consultant's online reporting²⁵ which notes that between September 2012 and February 2013 a series of excavations were carried out in advance of works to upgrade the A453. Two areas to the south of the existing A453 between Barton in Fabis and Clifton were found to contain significant archaeological remains (Sites 7 and 28).
- 5.95. The results of the Strip, Map and Record investigations revealed archaeological remains in the north-eastern section of the scheme (Sites 7 and 12); although only Site 7 included closely datable, significant remains requiring further analysis. The other sites (1, 2, 3, 9a and 9b) did not contain any archaeological remains and no further work was warranted.
- 5.96. The further investigations at Site 7 revealed 'a Middle Iron Age enclosed settlement (an enclosure, a roundhouse and a line of pits/post holes for a palisade). The archaeological report states that evidence suggests that all of the features at this site relate to a single phase of occupation during the Middle Iron Age. Pottery was the main type of find, but animal bone and environmental remains were also recovered. There was no indication that the settlement continued into the later Iron Age'.
- 5.97. Site 28 lay 1.2 km from Site 7 and on slightly higher ground. The archaeological investigations and post-excavation assessments at Site 28 established²⁶ that this is a significant multi-phased Site, which was continuously occupied from the late Iron Age into the Romano-British period. It was a rural Romano-British enclosed farmstead rather than a highly Romanised site.
- 5.98. The further investigation revealed that 'the earliest occupation dated to the later Iron Age, just prior to the Roman Conquest. Two phases of activity were identified'. 'Both phases of activity produced pottery and animal bone and assemblages of charred plant remains, and each included an inhumation burial. Radiocarbon analysis indicates that the earliest burial was carried out between 10 BC–130 AD at 95% probability while the other was probably late 2nd century or 3rd century AD (140–330 AD at 95% probability)'.

Archive and Publication

- 5.99. As noted in above, the assessment reports and other archaeological specialist reports are available online and based on this online information it is understood that full details of the fieldwork and the post-excavation analysis are contained in the site archive which has been deposited with the Nottingham City Museum and Art Gallery (accession code NCMG2013-

²⁵ <http://www.wessexarch.co.uk/projects/A453/specialist-reports>

²⁶ Site 28, A453 Widening Scheme, Nottinghamshire Post-excavation Assessment Report April 2013

9) and that project information has also been deposited with the Archaeology Data Service (OASIS identifier 186768).

- 5.100. With regard to the publication of the findings and analysis it is also understood that an account of the results would be published in volume 119 (for 2015) of the Transactions of the Thoroton Society of Nottinghamshire and this would appear to be the case; volume 119 contents includes a paper entitled 'Iron Age and Romano-British Sites along the A453 between Barton in Fabis and Clifton, Nottinghamshire'.

Historic Buildings

- 5.101. Based on as built information, consultee responses and the OYA site visit it is considered that the effects of the scheme on historic buildings are;
- Ratcliffe on Soar – the ES expected that there would be negligible impact on the setting of Holy Trinity Church and Manor Farm, this is likely to be the case as they are set well back from the A453 although views may be more open due to loss of existing roadside vegetation. A minor adverse impact was predicted on the setting of Riverside Farm as new earthworks at the river crossing would be closer than the existing road and this is considered to be as expected at OYA. Garden planting and existing vegetation help filter any views;
 - Clifton Village and Conservation Area - the ES noted that the buildings and green at Clifton were already set within a busy modern landscape including the existing A453. However, substantial remodelling of the junction would have a Minor Adverse impact on the setting of the historic buildings, particularly the forge on the south side of the road. At OYA this is considered to be as expected – the junction, which is at the eastern edge of the Conservation Area has been substantially remodelled, mature trees have been retained where possible, including at the edge of the Clifton Green which helps preserve the setting of the Dovecote SM, and new tree planting and seeding implemented as part of the landscape design;
 - Barton in Fabis Village - the ES predicted a negligible impact as the new section of road would run south of the existing A453 at this point and would have no impact on the setting of the Dovecote SM or most of the buildings and this seems to be the case at OYA;
 - Thrumpton Village and Conservation Area – a negligible impact was predicted as the village would be mainly unaffected by the scheme with most of the listed buildings away from the road line with very little change to their setting, and this is the case at OYA. There would be slightly more of an impact (Minor Adverse) on the three buildings of local interest closer to the A453 within the Conservation Area on Barton Lane - Wood Farm and Manor Farm Cottage are unlikely to have been affected due to intervening vegetation. Fields Farmhouse had first floor views to traffic on the existing A453, existing hedges have been retained and new planting provide as part of the scheme. It is too soon to evaluate the effectiveness of this in terms of filtering views and plant establishment should be reconsidered at FYA;
 - Other buildings – Minor adverse impact was predicted for Winking Hill Farm as the considerable alteration to the junction would bring the road closer to the building – the farm is set back from the junction and extensive woodland planting has been implemented as part of the scheme which should in time provide visual screening – the ongoing establishment of planting should be reconsidered at FYA.

Historic Landscapes

- 5.102. Online section –the existing A453 already ran through and severed the historic landscape and it is considered that the scheme has not greatly affected the character of the adjacent landscape. New planting including woodland / shrub areas and hedgerows have been implemented and should in time provide a landscape setting for the road and reduce visual effects on the historic landscapes.

- 5.103. Offline Section – runs through arable farmland and includes the new junction at Barton Lane. The planting undertaken as part of the road scheme was designed to be in keeping with the existing landscape – i.e. in small blocks or linear belts, which together with existing roadside hedgerows and the few field boundaries might help to restore some of the early 19th century character to the area. Mitigation has been implemented as expected although it is too soon to be able to comment on its contribution to restoration of landscape character.
- 5.104. The de-trunking of the A453 to a local road has, as expected, returned it to a more rural environment and allows open views across the lowland landscape to Clifton Pasture and Barton Moor (see Photomontage 3a comparison views in **Appendix D**). The ES stated that consideration would be given to siting an interpretation board along the local route, which would help members of the public to enjoy the view and to understand the history of the visible landscape. It is understood that a decision was taken by Highways England during construction that an interpretation board would not be provided.
- 5.105. Clifton Conservation Area, Park and Village Green - The ES noted that although the park, northern part of the Conservation Area and the Green would remain untouched, the character of this landscape particularly south of the road which includes the Forge and lies within the southern edge of the conservation area would be impacted by the new scheme. The village was already located within a busy, urban landscape but the restructuring of the junction has extended the road space and opened up some views. Retention of mature trees at the edge of the green has helped preserve the setting of the green and retain as much of the local character of the old village as possible.
- 5.106. As expected there has been no impact on Thrumpton Park and Clifton Hall historic parks and gardens as they are located well away from the scheme; or on the locally valued feature of Ratcliffe Power Station.

Summary

- 5.107. Historic England and Nottinghamshire County Council had ‘significant issues’ with the siting of a compound directly adjacent to Glebe Farm scheduled area and considers that all aspects of the scheme should have been controlled in line with the EIA. Apart from this unforeseen impact which is considered to be **worse than expected**, it would appear that mitigation has been undertaken in line with the ES recommendations including detailed excavation and evaluation. Based on the information available, the results have been published and deposition of the archive addressed. Impacts on historic buildings and historic landscapes are considered to be in line with forecasts at this stage. It is therefore considered that the effects of the scheme on the heritage resource are likely to be generally **as expected** at OYA. However, it is too soon to fully evaluate the successful establishment of planting in mitigating the effects of the scheme on the setting of the historic buildings and landscapes and it is suggested that ongoing growth should be reconsidered at FYA.

Table 5-10 Evaluation Summary: Heritage and Historic Resources

Sub-Objective	Heritage and Historic Resources	Assessment
AST	29 archaeological / heritage sites have been identified. 12 will be directly affected but only 2 completely lost. Generally medium value but 2 high value, but no Scheduled Monuments (SM) directly affected. Mitigation including detailed excavation and evaluation prior to construction. Minor impacts on the setting of 12 Listed Buildings, including Clifton Dovecote SM, 7 locally listed buildings, 2 Conservation Areas and Clifton Pastures / Barton Moor historic landscape.	Moderate adverse
EST	Consultees had serious concerns with the siting of a compound adjacent to Glebe Farm scheduled area. Apart from this unforeseen impact, archaeological mitigation undertaken in line with ES, results published and archive deposited.	Likely to be as expected overall and worse than expected for the

	Impacts on historic buildings and historic landscapes are considered to be in line with forecasts at this stage. However, successful establishment of planting in mitigating the effects of the scheme on the setting of the historic buildings and landscapes should be reconsidered at FYA	scheduled area at Glebe Farm
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Ecology & Nature Conservation

Forecast

Appraisal Summary Table

- 5.108. The AST stated that Barton in Fabis Fishponds Site of Importance for Nature Conservation (SINC) would be enhanced by new water vole habitat. There would be indirect effects to five other SINCs and the Lockington Marshes Special site of Scientific Interest (SSSI), which would be neutralised by new planting. Wildlife underpasses and fencing would improve safety for protected species but there would be a slight risk of road deaths to barn owl and birds. The AST noted that the scheme would provide a net increase in vegetation and habitats over time. Overall, the AST assessed the impact of the scheme on biodiversity as **neutral**.

Environmental Statement

Designated Sites

- 5.109. The ES noted that no Sites of Special Scientific Interest (SSSI) or other statutorily designated sites would be directly affected by the scheme. There might be some indirect effects from removal of trees and hedges which connected to six locally important sites. These habitats were considered to be of local value as connecting habitats to support the ecological value of the statutory designated areas, as part of the wider ecological network. However, it was considered that any impacts would be negligible and temporary and would be offset by new planting.

Non-Statutory Designated Sites

- 5.110. There were no non-statutory designated Sites of Importance for Nature Conservation (SINCs) within the scheme boundaries. There were several SINCs in close proximity or connected to the proposed scheme (see Biodiversity **Appendix F** for details). There would be slight adverse impact to six local SINCs but this was expected to be temporary and reversible.
- 5.111. Within Leicestershire (to the west of the River Soar) the ES notes that Sites of Importance for Nature Conservation were known as Local Wildlife Sites and that none of these sites occurred within the study area.

Protected and Important Fauna

- 5.112. The ES noted that a range of species were recorded during field surveys including: Otter; Water Vole; Bats; Badger; Brown Hare; Barn Owl; Breeding Birds; Amphibians and Reptiles, and Invertebrates. (see Biodiversity **Appendix F** for details).

Important and Other Habitats

- 5.113. The ES noted the following important habitats in the study area and unlikely to experience any direct or indirect effects;
- Lowland Meadow – two areas of relatively species-rich grassland identified on land to the south of the power station and also at Barton Lodge; and

- Species-rich hedgerow - at Winking Hill Farm with the eastern extent of the hedge close to the proposed West Leake junction.

- 5.114. Other habitats identified included arable land, roadside verges, roadside broadleaf and mixed plantation woodland, coniferous plantation within the Ratcliffe Power station boundary, species poor (hawthorn dominated) roadside and farmland hedgerows, roadside drainage ditches lost to the new carriageway on areas of parallel widening and increases in culvert length affecting watercourse crossing the A453. These habitats were considered locally important as together they constituted a network of vegetation which contrasted with the open arable landscape and linked other more valuable and extensive areas of woodland and hedgerow habitat.
- 5.115. Within the urban section the ES noted that an estimated 100m of mature hedgerow would be lost along the frontage of Nottingham Trent University. Although species poor and fragmented it represented the only mature vegetation feature alongside the road.

Mitigation Measures

- 5.116. The ES stated that no specific mitigation measures were necessary for statutory designated sites of nature conservation value as they would not be affected. No rare plant species or habitats would be affected and the route was designed to avoid protected species. Wildlife underpasses would be provided beneath the road and boundary fencing would improve safety for protected species. Bat boxes would be provided along the River Soar. Improved ditch habitat would be provided for Water Vole. Mitigation measures are summarised in in Biodiversity **Appendix F**.
- 5.117. Replacement Planting and Habitat Creation - overall, it was considered in the ES that due to replacement planting and habitat creation as indicated in **Table 5-11** below, the scheme corridor was likely to experience increases in flora and fauna diversity in the immediate locality in the medium to long term as the new planting matured. Sources of seed and plant stock would be native and of regional provenance where practicable. It is understood that a source of trees from the National Forest local seed source programme had been identified which included species such as oak, ash and rowan.

Table 5-11 Estimated Areas of Habitat Planting along the Proposed Scheme compared with Areas to be Removed²⁷

Habitat Type	Area to be removed	Area Planted/Sown	Net Gain
Broadleaf/mixed plantation woodland	5.7ha	13.8ha	8.1ha
Amenity Grassland	3.2ha	32.5ha	29.3ha
Scrub	2.1ha	0.8ha	-1.3ha
Species-rich hedgerow	0 lin. metres	13,700 lin. m	13,700 lin. m
Pond/marginal habitats	0.01ha	9.1ha	9.09ha
Species-rich grassland	0	4.6ha	4.6ha

²⁷ Taken from ES Volume1 Section 2: Environmental Topics Part 4: Ecology and Nature Conservation Table 2.4.4

Monitoring Programme

- 5.118. The ES stated that a re-survey and monitoring programme would be undertaken 12 months prior to construction, during construction and within a 5-year aftercare period following completion. The monitoring programme prior to construction would focus on the presence of protected and/or notable species including water vole, otter, badger, bats and barn owl.
- 5.119. Monitoring during construction would be undertaken to ensure that mitigation measures were being implemented in accordance with the environmental design and that adequate protection measures were in place to protect retained ecological interests.
- 5.120. Monitoring during the aftercare period would be undertaken primarily to assess the success of the environmental design and would include monitoring of otter and water vole activity, bat activity and badger movements across the completed scheme. Breeding bird surveys would also be undertaken in areas which supported higher densities of notable species prior to construction to confirm the nature and scale of predicted effects within the ES.

Summary

- 5.121. Effects in relation to designated sites and protected species were considered to be neutral (with the exception of water vole assessed as moderate beneficial in the medium to long term). Dualling of the A453 would increase the barrier effect of the road through the increase in carriageway width, continuous concrete safety barrier in the central reserve (in the rural section) and traffic flows which would be offset by local biodiversity gains through the provision of new and enhanced habitats such as species-rich hedgerows, grassland and wetland, and the re-profiling of ditches. The overall significance of effects on ecology and nature conservation was assessed as neutral.

Consultation

- 5.122. The Environment Agency commented that 'it has no evidence that there has been any negative impact to biodiversity as a result of the scheme, however, it has been anecdotally noted that the number of wildlife road kills has reduced, possibly due to the mammal passes which have apparently been installed. Having said that, the concrete barrier which runs through the central reservation will prevent mammals from passing to the other side of the road should they be fortunate enough not to get hit by a car. Consideration should be given to ensuring that appropriate mammal crossings and potentially green bridges are installed on similar major road schemes to further reduce wildlife mortalities and enhance biodiversity'.
- 5.123. Leicestershire County Council was pleased to have been given the opportunity to provide feedback but confirmed that the scheme had only a very short section in Leicestershire, and as such, were unable to comment as they had not been involved in any ecological matters connected with the road.
- 5.124. Nottinghamshire County Council's ecologist was unable to provide any detailed response to the request for feedback, but noted that it would be the responsibility of Highways England to check that the biodiversity actions and conditions of permission have been successfully implemented.
- 5.125. Rushcliffe Borough Council (RBC) considers that ecology impacts and mitigation 'are as expected, as far as known. No direct impacts to protected sites were expected, but probable impacts to protected species / species of importance were expected, but no data for the impact or otherwise is currently available to RBC, which they note requires survey work for the next 5 years to establish' – RBC has received no monitoring or reporting data and therefore is unable to comment at this time and is unaware if this work is being carried out.
- 5.126. With regards choice of grassland species, RBC recommended that a calcareous wildflower grassland mix was used especially in the Ratcliffe Power Station – Barton Moor areas due to the underlying Gypsum, however RBC does not know if this option was implemented (see

evaluation section below). For lighting, although RBC considers the landscape impacts of lighting to be as expected, it does not know if lighting has impacted on bat populations.

- 5.127. Thrumpton Parish (TP) said that it could not really comment on grassland diversity – other than ‘it looks more lawn than meadow’. It also considers that the very sudden, very drastic loss of woodland, trees and hedgerows across the wider site ahead of construction must have had a major negative impact (which as noted in the landscape section above TP is of the opinion could have been reduced / phased). However, TP also notes that the road ‘has some better boundaries, so maybe the impact has been lowered (e.g. with the badger fencing) than before despite the volume and speed of traffic increasing’.
- 5.128. TP has no information relating to mitigation or how effective measures have been. However, they note a significant increase in the number (or visibility) of birds of prey around the rural section and a nesting site under/in one of the new bridges; and that the Brown Hares are back around the Thrumpton cutting.
- 5.129. Nottinghamshire Wildlife Trust (NWT) confirmed that it was represented on the Ecology Group for the scheme prior to construction and was directly involved in the development of the badger mitigation design, but has not received any of the badger monitoring reports and expected to have received them by now. NWT also notes that it has not received any other monitoring information and would be interested in habitat establishment (botanical survey) or surveys of any other features included in the scheme (e.g. ponds or nest boxes).

Evaluation

- 5.130. With regard to the comment received by RBC relating to the use of calcareous grassland; the scheme landscape specification stated that seed mixes with species composition appropriate for the site conditions would be used e.g. where the soil was alkaline (pH above 7) a calcareous grassland seed mix should be used. It specified that the landscape contractor should carry out a pH test of the topsoil in each area of species rich grassland along the scheme and chose an appropriate species rich mix from those listed in the specification. The full specification including individual mixes has not been made available to POPE at OYA and the as built plans do not specifically identify particular mixes only general areas of amenity, low maintenance, species rich or wet grassland. It is suggested that species rich grassland could be considered in more detail at FYA when further information confirming mixes used on site and pH testing undertaken, could be available.
- 5.131. Based on the as built drawings and OYA site visit it would appear that habitats have been provided in line with proposals. Underpasses suitable for use by wildlife, e.g. badgers, have been included in the scheme, as has mammal exclusion fencing. Further information on mitigation and evaluation is included in the Biodiversity **Appendix F** to this report. Not all culverts /underpasses were visited at OYA but based on as built information it is possible that C7 and C8 are not as wide as expected in the ES. It was noted that wildlife underpass WU 4 appears to be a separate mammal tunnel adjacent to the drainage culvert (rather than the proposed combined culvert with mammal ledge) however the highway boundary fence has not be aligned around the back of the underpass entrance to allow any mammals using the tunnel to access the adjacent fields i.e. they appear to be fenced in to road corridor. This also may be the case at underpass WU2. (Illustrated in Figures overleaf).



Figure 5.11 (left) illustrates HB fencing with mammal tunnel entrance within highway verge area. Figure 5.12 (right) is close up of the mammal tunnel entrance WU4.



Figure 5.13 Illustrates wildlife underpass WU2 which appears to exit into a fenced planting plot



Figure 5.14 Illustrates well vegetated ditch at Pond M

- 5.132. The pre-scheme 2010 Great Crested Newt report confirmed that no GCN were found during surveys and no mitigation or compensation works were required. The 2010 Badger report confirmed the presence of badger and that mitigation would be required, with ongoing monitoring of any potential setts to be directly impacted by the scheme. No further

information has been made available to POPE regarding any re-survey / monitoring programme immediately prior to construction or during construction. The HEMP details the ecological monitoring and maintenance to be undertaken during the aftercare period summarised in **Table 5-12** below, however, at the time of writing no post completion survey/monitoring/maintenance information has been made available and POPE cannot comment further on the effectiveness of the biodiversity mitigation measures. It is suggested that this aspect should be considered further at FYA when it would be hoped that the relevant information would be available.

Table 5-12 HEMP Ecological Monitoring and Maintenance 5 Year Aftercare Plan

Ecological Feature	Action Required	Timing and Year Required
Hedgerows (including important hedgerows) Monitoring and Management	Update survey of the Species Rich Hedgerow forming the northern boundary of Winking Hill Farm (approx. Ch 3980 to 4250). Any temporary fencing to be removed and appropriate remedial action required to maintain the hedgerows integrity and species diversity.	1x survey April – September 2015
Invasive Species Management	Invasive Species include Himalayan balsam and giant hogweed. Ragwort has also been identified along the scheme and is to be dealt with as per DEFRA Code of Practice.	Post Completion 2015
Badgers	A453 2013-2015 Badger Mitigation Report – a summary of all badger setts effected and the mitigation works carried out during the construction of the A453.	Post June 2015
	Post construction badger mitigation check – a walkover survey undertaken to confirm any temporary badger mitigation (i.e. closed board fencing) has been removed and permanent badger mitigation has been installed correctly including artificial badger setts, badger fencing and culverts.	1x Post Completion 2015
	Monitoring badger fatalities - records of dead badgers will be obtained annually from the local badger group to identify potential breaches in badger fencing or where additional fencing is required.	November – December annually 2015 - 2020
	Annual monitoring of badger resistant fencing.	October – January annually 2015 - 2020
	Annual monitoring of mammal culverts and underpasses, to confirm use and species using them.	Ay time annually 2015 - 2020
	Maintenance of badger resistant fencing and culverts / underpasses where breaches in the	October - February

	fence or maintenance to the culvert / underpasses is identified during the annual monitoring. This will continue to discourage badgers from attempting to cross the A453 carriageway.	(following badger fence and culvert monitoring) annually 2015 - 2020
	Update badger sett surveys at the existing badger setts along the A453. To include monitoring of badger activity at the new artificial badger sett, culverts and bridges.	1x survey per year. September – May annually 2015 - 2020
Bats	Update bat roost emergence / swarming surveys to be carried out at bridge B5 – Floodspan. Two survey occasions per year.	2 x surveys every 2 years. Late April – September 2015, 2017 and 2019
	Bat activity surveys to be carried out along the A453. Bat surveys should repeat, where practical and safe to do so, the survey route carried out prior to construction to monitor the change in bat activity post construction. Survey methodology should be in line with the current Bat Conservation Survey Methodology Guidelines. Two survey occasions per walked transect per year. Automated surveys to be carried out on two occasions using one detector per transect.	Late April – September 2015, 2017 and 2019
	Five bat boxes to be installed on trees along the A453 2 on Long Lane north of A453 and 3 at Drift Lane Plantation.	Anytime in 2015
	Annual monitoring to take place by a Natural England licensed bat worker. Where repairs are required a replacement box will be added.	1x per year. Late April – September annually 2015 - 2020
Breeding birds	Breeding bird survey to take place at chainages 4250-4600, 6150-6600, 6750-7200 and at Nethergate Stream every 2years.	1st in March/ April and 2nd in May/ June 2015, 2017 and 2019
Barn Owl	Annual consultation with the local barn owl group to obtain barn owl road casualty records. Where repeat casualties are recorded remedial action through habitat management / tree planting may be appropriate.	November – January annually 2015 - 2020
Water voles	Water vole monitoring - Update surveys for water vole along the River Soar, throughout ditches that cross the A453 between Thrumpton and Barton-in Fabis (including flood alleviation area at Ch 6300-6600).	1x per year. Late March – October annually 2015 - 2020

	Habitat monitoring - Update assessment of the water vole habitat created with the flood alleviation area at Ch 6300-6600.	1x per year. April–September annually 2015 - 2020
	Habitat management, i.e. vegetation cutting and plant restocking, at the new waterbodies created in the flood alleviation area at Ch 6300-6600	As required following water vole habitat monitoring annually 2015 - 2020
All receptors	Annual reports summarising the findings of the monitoring provide recommendations for future management and maintenance. Issue to Highways England.	Once per year annually 2015 - 2020
	5 Year Aftercare Report summarising the findings of the monitoring and management to assess the overall success of the environmental design. Supplied to Highways England for approval and then passed onto stakeholders such as Nottinghamshire and Leicestershire County Councils, Nottingham City Council, Wildlife Trust and Environment Agency.	Once all monitoring surveys completed 2020

Animal Mortality

- 5.133. No animal mortality data has been received from the Area 7 network management team for evaluation by this study; it is suggested that this aspect could be reconsidered at the FYA stage. However, the EA notes that anecdotally the number of wildlife road kills may have reduced possibly due to the mammal passes included within the scheme and suggests that on similar major road schemes where solid central reserve barriers are in place, consideration should be given to ensuring that appropriate mammal crossings and potentially green bridges are installed to further reduce wildlife mortalities and enhance biodiversity.

Summary

- 5.134. Based on the as built plans and site visit at OYA it appears that mitigation measures have generally been implemented as expected for habitats. POPE has no information relating to species. It would appear that highway fencing may not be aligned to accommodate mammal underpass entrance/exits and it is possible that culverts C7 and C8 are narrower than expected in the ES although this would need to be confirmed at FYA.
- 5.135. In the absence of animal mortality data and any post-opening survey/monitoring information, it is not possible to fully evaluate the effects of the scheme on species and habitats and these aspects should be considered further at FYA, when it would be expected that the findings of the survey/ monitoring requirements and other monitoring reports identified in **Table 5-12** above, should be available. Therefore, although the impact of the scheme on biodiversity is likely to be **as expected** (i.e. neutral), further information is required to confirm.

Table 5-13 Evaluation Summary: Biodiversity

Sub-Objective	Biodiversity	Assessment
AST	Barton in Fabis Fishponds SINC will be enhanced by new water vole habitat. Indirect effects to 5 other SINC's and the Lockington Marshes SSSI, which will be neutralised by new planting. Wildlife underpasses and fencing improve safety for protected species but slight risk of road deaths to barn owl and birds. scheme provides net increase in vegetation and habitats over time.	Neutral
EST	Habitats provided in line with proposals. Mammal tunnels and fencing incorporated into the scheme. Insufficient post-opening survey / monitoring / maintenance information has been available to evaluate the effects of the scheme and biodiversity should be considered further at FYA.	Likely to be as expected although further information would be required to confirm

Road Drainage and the Water Environment

Forecast

Appraisal Summary Table

- 5.136. The AST stated that the scheme crosses the River Soar Navigation (canal), the River Soar, Nethergate Stream and several smaller surface waters. There would be no impact on surface or groundwater quality, but flows in Nethergate Stream would increase. Mitigation would reduce the risk of pollution from spillage. Flood compensation would be provided. The AST concluded that the scheme would have a **neutral** impact on the water environment overall.

Environmental Statement

- 5.137. The ES noted that the A453 crosses watercourses at seven locations between the M1 and the A52 in Nottingham, including the main watercourses of the River Soar, Fairham Brook and Nethergate Stream (all of which discharge into the River Trent), and smaller streams and ditches. Between the M1 and the River Soar it crosses the River Soar floodplain and runs close to the River Trent floodplain near Barton in Fabis. Water quality of the main watercourses was considered good and classified as being of high to very high importance²⁸.
- 5.138. Approximately 40% of the route corridor passes over a Non-Aquifer, and 60% overlies Minor Aquifers of intermediate / high soil leaching potential. The scheme is not located within a Source Protection Zone. Groundwater's were considered of low / medium importance.
- 5.139. Lockington Marsh was identified as an area of potential sensitivity because it is an SSSI. However, due to its location amongst a network of drainage ditches adjacent to the River Soar, approximately 2km downstream of the A453 carriageway, the expectation was that the ditches would dry up in summer months when runoff concentration would be greatest, and therefore it was unlikely that Lockington Marsh would be significantly impacted by runoff discharges as pollutants would settle out or simply not reach the marsh.
- 5.140. Potential impacts to the water environment during the operational phase were identified as;

²⁸ The ES states that significance of the hydrological and hydrogeological features was established based upon criteria in DMRB Table 5.3 – Estimating the Importance of Water Environment Attributes, reproduced In the ES Vol 2, Section 2, Part 10: Road Drainage and the Water Environment as Table 2.10.1

- **Surface water quality impacts** - arising from the operation of the road and largely concerned with the discharge of routine runoff to receiving surface watercourses and groundwater i.e.as a result of a spillage accident or ongoing discharges of lower concentration of routine runoff;
- **Surface water flows** - significant impact upon surface water flows of the three main watercourses crossed by the A453 were considered unlikely. Five balancing ponds were to be provided to attenuate discharge flow rates. Surface watercourses would receive greater volumes of routine runoff resulting in increased channel flows. The increase would be most significant in Nethergate Stream;
- **Groundwater quality** - likely to undergo negligible to moderate impacts resulting from the operation of the scheme and the discharge of routine runoff to ditches which do not maintain permanent surface flows; and
- **Groundwater flows** – potential to be disrupted due to construction of foundations and increased areas of low permeability groundcover.

Mitigation Measures

- 5.141. Proposed drainage would be via a combination of open surface water channels, combined kerb drainage systems and filter drains for the main A453 carriageway, with a combination of filter drains, kerbs and gullies for the side roads. Five balancing ponds and extensive lengths of vegetated ditches would be provided to attenuate and clean storm water runoff prior to discharge at the rural outfalls. The balancing ponds would also have secondary functions to enhance ecological habitat and provide visual amenity.
- 5.142. To mitigate the small increase in unrestricted flows from the scheme improvements along the upstream open reach of the Nethergate Stream, proposed works included removal of an existing footbridge culvert, some re-profiling of the watercourse cross section and some localised lowering of the adjacent verge areas to provide additional flood storage capacity.
- 5.143. Other mitigation measures proposed within the urban section were the use of oversize pipes, and provision of penstock valves / bypass oil separators, and catchpits at regular intervals to allow removal of coarse suspended solids.
- 5.144. The ES noted that the new embankments across the River Soar floodplain would reduce the area of land available for storing flood water and to compensate for this, the scheme included an equivalent volume of new flood storage by lowering ground levels in two areas of farmland.

Summary

- 5.145. As a result of the proposed mitigation measures it was expected that there would be no significant adverse effects on surface water or groundwater quality from normal run-off or accidental spillages. The continued use of the uncontrolled discharge directly into Nethergate Stream would marginally increase its flow at peak times, but proposals to improve the watercourse and lower adjacent ground would provide additional storage if flooding occurred.
- 5.146. Overall the effect of the scheme on the water environment was assessed as Neutral.

Consultation

- 5.147. The Environment Agency (EA) responded with regard to flooding that it has not been made aware of any impacts that have worsened or improved the fluvial situation in the vicinity of the new road scheme.
- 5.148. Re pollution control, whilst EA does not have any specific monitoring data confirming this, it is likely that mitigation measures will have been effective in reducing/avoiding impacts on the water environment, in particular where mitigation measures were installed where none

previously existed. With regards to the River Soar and River Trent, EA does not have enough data under the current cycle of the Water Framework Directive to determine whether there have been any changes to water quality. However, it is unlikely that the scheme will have had a measurable impact on these water bodies due to their size and the influence of other impacts on water quality. EA is not aware of any pollution incidents relating to highway runoff since completion of the scheme.

- 5.149. Nottinghamshire County Council responded that as Lead Local Flood Authority it does not have any observations to make with regards the scheme.
- 5.150. Rushcliffe Borough Council Environmental Health Team responded that it is not aware of any issues relating to the quality of local water courses as a result of the scheme improvements.
- 5.151. Thrumpton Parish commented that balancing ponds seem to have been a great success, attracting a lot of bird life adding another dimension to the scheme. They also queried that 'none appear to have been planted and this could be an area for improvement (e.g. reeds etc.)'. NB: The OYA site visit observed planting at the pond margins is in place, and as per the landscape design there are limited areas of shrubs/trees with areas of species rich /wet grassland.

Evaluation

- 5.152. Based on the OYA site visit and As Built information, it would appear that the scheme drainage has been implemented as expected; carriageway widening required the renewal of much of the existing drainage system, and where it was retained it has been improved by upgrading the spillage containment capability at drainage outfall locations. In the rural section balancing ponds have been provided to attenuate the runoff from the increased pavement area. In the urban section, attenuation is provided by oversized pipes and hydro-brake controls. Figure 5.15 and 5.16 illustrate drainage ditches, and an example of vegetation clearance required at culverts, noted at various locations. Figures 5.17 to 5.20 illustrate the balancing ponds with well vegetated margins and, as identified in the ES, they were designed to have a secondary function to enhance ecological habitat and provide visual amenity and they seem to have achieved this.
- 5.153. It is also understood that at Parkway Junction, Ash Road, which is the link road for the grade separated junction, lies below the level of the adjacent watercourse and the road is drained by a pumping station situated to the south of the Parkway Junction bridge.



Figure 5.15 (left) Highway drainage ditch at western end of the urban section near Mill Hill roundabout. Figure 5.16 (right) illustrates rural ditch at Pond M with some vegetation clearance required to maintain free flow at the culvert entrance.



Balancing ponds at the West Leake junction Figure 5.17 (left) and Parkway junction Figure 5.18 (right)



Figure 5.19 (left) Balancing Pond M and Figure 5.20 (right) Balancing Pond N (both near Manor Lane on the LAR). Some algal bloom evident at Balancing Pond N.

- 5.154. The A453 runs on embankment from M1 J24 to Parkway Junction across the River Soar floodplain. The areas adjacent to the embankment are liable to flooding and paths across the A453 route for floodwater are provided by the Soar Navigation Canal Bridge, the River

Soar Bridge and two flood relief spans. As expected the two flood compensation areas adjacent to the route have been provided as part of the scheme to replace the volume lost by the creation of the carriageway embankments. (and 5.22 below).



Figure 5.21 (left) flood spans near Long Lane and Figure 5.22 (right) River Soar flood spans



Figure 5.23 (left) River Soar Navigation canal bridge and Figure 5.24 (right) new River Soar bridge (existing bridge to right)

- 5.155. During the early stages of construction, a report 'Proposals for Clearance of Existing Watercourses November 2013' identified locations on the watercourses downstream of the drainage outfalls from the A453 with potential problems due to lack of maintenance and where improvement/clearance works could be carried out²⁹ to improve the performance of the outfalls, and reduce the potential for any future disputes. This report was updated in 2015 to include the condition of the off-site watercourses at the time of handover to the managing agent (Appendix E Post Handover Re-inspection November 2015 to update the 2014 survey findings) and where issues were still evident suggested that Highways England take up outstanding matters with the relevant drainage authority who should contact the riparian owner. POPE is not aware of the current status of any ongoing actions/discussions. However, no issues have been raised relating to drainage by any of the consultees who have provided feedback at OYA. It was noted at OYA that several ditches/outfalls would benefit by clearance of debris/vegetation (Figure 5.27).
- 5.156. With regard to Nethergate Stream the as built landscape design confirms that the stream banks have been re-profiled and additional marginal habitat has been provided. It was observed during the OYA site visit that several of the EHS trees appeared to have died and

²⁹ NB: presumably by the riparian owners

vegetation at drainage outfalls might require removal to avoid impeding flows. There was evidence along the stream that water levels had been high at some time. (Figure 5.25).



Figure 5.25 (left) Shows the remodelled and vegetated Nethergate Stream with evidence of previous high water levels. Figure 5.26 (right) illustrates one of the failed EHS trees.



Figure 5.27 Example of culvert outfall at Nethergate stream which would benefit from clearance

5.157. POPE is not aware that there have been any pollution incidents as a result of the scheme or that mitigation measures are working other than as intended. Based on the information available it is considered that the overall effect of the scheme on the water environment is likely to be **as expected** although further detail would be required to confirm and it is suggested that the water environment is reconsidered at FYA.

Table 5-14 Evaluation Summary: Water Environment

Sub-Objective	Water Environment	Assessment
AST	Scheme crosses the River Soar Navigation (canal), the River Soar, Nethergate Stream and several smaller surface waters. There will be no impact on surface or groundwater quality, but flows in Nethergate Stream will increase. Mitigation reduces risk of pollution from spillage. Flood compensation will be provided.	Neutral
EST	Mitigation is in place and facilities appear to be functioning as intended. However, there was evidence that some outfalls would benefit from vegetation removal.	Likely to be as expected

Physical Fitness

Forecast

Appraisal Summary Table

- 5.158. The AST Physical Activity entry stated that more walking and cycling would be encouraged by providing a continuous NMU route between Clifton and Long Lane, locations to cross the A453 safely at grade separated junctions in the rural section and improvements to controlled crossing facilities in Clifton. The impact of the scheme on NMUs was assessed as **slight beneficial**.

5.158.1.1. Environmental Statement

- 5.159. The *Pedestrians, Cyclists, Equestrians, and Community Effects* chapter of the ES identified that there was an extensive network of public rights of way (PROW) and local roads used by NMUs within the study area. However, it was generally accepted that the existing A453 acted as a barrier to east/west NMU movements, particularly in the rural section between M1 J24 and the proposed Mill Hill roundabout. This was said to be due to the limited formal and/or grade separated crossing provisions and the inherent safety concerns with crossing the live carriageway of a trunk road. There were more extensive provisions for NMUs in the urban section, including footways, cycleways and formal crossing facilities.
- 5.160. It was noted that a number of PROW would be affected by the scheme and proposals had been developed to not only minimise impacts on the NMU network but to improve amenity and provide better connectivity than the existing network, thus reducing severance. A continuous route for NMUs would be provided alongside 90% of the scheme between Clifton and Long Lane, making use of sections of de-trunked road and linking the nearby residential areas of Clifton and Long Eaton to key destinations such as the proposed Parkway Station, East Midlands Airport, the Power Station and the proposed NET Line 2 Park and Ride³⁰.
- 5.161. The scheme would also incorporate safe and convenient grade separated crossing points along the rural section where PROWs cross the A453 as well providing additional controlled crossing points and additional pedestrian and cycle facilities in the urban section.
- 5.162. The existing A453 between Thrumpton and Clifton would be de-trunked to provide a safer route for NMUs and the local community. Severance effects would be reduced by the provision of new grade-separated junctions across the widened road.
- 5.163. The ES expected that amenity for NUMs would improve, more people would be encouraged to walk and cycle and overall the effects would be **slight beneficial**.

Consultation

- 5.164. Nottinghamshire County Council (NCC) responded that in its opinion, generally the route was successful for rights of way. NCC achieved all its wishes to improve the local network with the inclusion of a second safe crossing of the A453 linking to Green Lane (old A453), creation of a circular route and additional links to previously unused sections of the network. Most access points were left as gaps rather than installing gates. Gates were not needed and the non-installation means less issues for riders when using the route and less to maintain for the landowner or Highways England, a definite plus.
- 5.165. NCC also raised the following issues;
- Lack of information for landowners about the (new) public rights on their land, their obligations and responsibilities with regard to the right of way (such as gates where they exist);

³⁰ Nottingham Express Transit Extension (NET2) Park & Ride Site

- Lack of understanding by landowners and Parish councils with regard to the use/access along the old Barton Lane, now subject to illegal vehicle traffic as a cut through from Barton to Gotham which is causing a safety issue for the public;
 - Unforeseen level of use at Glebe Farm which has badly affected the surface of the Private Means of Access / Bridleway and has implications for the safety of the public given the speed of the frequent private traffic movements; and
 - Lack of negotiation/agreement/understanding with landowners about vehicular gates on new routes and their willingness to comply with or close them for everyone's benefit.
- 5.166. Rushworth Borough Council considers that the provisions for pedestrians, cyclists and equestrians are an improvement on facilities that existed prior to the scheme, making it easier and safer to travel from east to west and to cross the A453 north to south.
- 5.167. Thrumpton Parish considers that *'the cycle route (once it was sorted) has been a major improvement for people in Barton and Thrumpton (and more widely) and provides much safer passage to the station, Kegworth and beyond – and the use of the old A453 into Nottingham. This has been a big plus for the village'*.

Evaluation

- 5.168. No NMU survey has been undertaken specifically for this study by POPE. It is understood that a construction phase NMU audit was undertaken (at the time of writing this has not been made available to POPE), which might have provided some further insight into the issues raised by NCC.
- 5.169. As expected a continuous pedestrian / cycle route has been provided alongside the scheme between Long Lane in the rural section and Farnborough Road in the urban section. In the rural section this also includes some bridleway provision. The old A453 between Thrumpton and Clifton has also been retained as a local road as expected, and this allows safer route for NMUs. The NMU route links into the wider PRoW network with signs in place and during the OYA visit walkers, cyclists and horse riders were seen to be using the facilities at various locations. Safe crossing of the A453 in the rural section is provided via the grade separated junctions, underpasses and bridleway bridge. In the urban section signalised crossing points are in place.



Figure 5.28 Looking east towards Thrumpton bridleway bridge along NMU route

- 5.170. It was noted during the OYA site visit that a bollard had been retrofitted to the NMU route where it crosses the canal and there was evidence of vehicle use. It was also noted that the

maintenance layby on the A453 westbound had a direct access onto the NMU route and at the time of the site visit there was no gate in the highway boundary fence; it was considered possible that the tarmac maintenance track could be mistaken for a NMU route, particularly at night or could allow stray animals onto the A453. It is understood that subsequently this gap has been closed with a section of 4 rail and post fencing with stile allowing pedestrian access from Maintenance Layby. Other locations throughout the scheme were also noted where gates appeared to be missing, however, based on the consultation response from NCC it would appear that this has been a policy decision. NCC considers it has reduced issues for horse riders using the route and will require less maintenance.



Figure 5.29 (left) Bollard retrofitted presumably to restrict unauthorised vehicle use on the NMU route.

Figure 5.30 (right) shows the tarmac maintenance route with open access to the A453 (which has subsequently been closed)



Figure 5.31 example of access point left as gap rather than installing gates along the NMU route.

5.171. Based on the OYA site visit, as built information and consultation responses it is considered that the impact of the scheme is generally as expected. There appear to be some examples of vehicle use of the NMU route which require further investigation. It is suggested that Physical Activity is reconsidered at FYA when it would be expected that further information (e.g. post opening NMU Audits or Vulnerable User Studies) would be available.

Table 5-15 Evaluation Summary: Physical Activity

Sub-Objective	Physical Activity	Assessment
AST	More walking and cycling will be encouraged by providing a continuous NMU route between Clifton and Long Lane,	Slight beneficial

	locations to cross the A453 safely at GSJs in the rural section and improvements to controlled crossing facilities in Clifton.	
EST	Provision for pedestrians, cyclists and equestrians has improved NMU facilities including safer crossing of the A453 and links to the wider NMU network. Apparent localised vehicle use of the NMU route.	As expected

Journey Ambience/Quality

- 5.172. The journey ambience sub-objective considers traveller care (facilities and information), traveller views (the landscape through which the traveller passes, the ability to view the landscape, and features of particular interest) and traveller stress (frustration, fear of potential accidents, and route uncertainty).

Forecast

Appraisal Summary Table

- 5.173. The AST Journey Quality entry stated that the higher design standard including grade separated junctions and separation of NMUs would reduce stress despite predicted increases in traffic flows and speed in the rural area. Lay-bys, signs and facilities would remain similar to existing resulting in a neutral impact on traveller care. Views were also considered to be neutral. Overall the impact of the scheme was assessed as **large beneficial**.

Environmental Statement

- 5.174. The ES considered journey ambience within the Vehicle Travellers topic.
- 5.175. **Traveller Views Rural Section** – views from the road were noted to be generally intermittent with a combination of long distance and closer views of the open, undulating arable countryside, woodland blocks and road side tree belts. Built structures were features in the landscape, including Ratcliffe Power Station.
- 5.176. **Traveller Views Urban Section** - properties on both sides of the road, major roundabout junctions at Crusader and Green Lane, the Crusader and Man of Trent public houses, petrol filling station and buildings within the Nottingham Trent University (NTU) campus provided an urban feel to this section of the widening scheme. However, there were also noted to be areas of vegetation and open spaces within the urban section which provided relief and some slightly longer distance views from the road.
- 5.177. **Traveller Stress Rural and Urban Sections** – considered high due to the frustration of users being unable to make good progress along the route during congested periods, and due to the fear of potential accidents. High speeds, the high volume of traffic including HGVs, the lack of physical separation between traffic flows in both directions, side roads and private access directly on to the trunk road, and the possible conflict of traffic with pedestrians, cyclists or equestrians were the main factors leading to fear of accidents.
- 5.178. **Traveller Care** was not generally considered a problem due to the presence of existing lay-bys and good signage, and the facilities available at the petrol filling station in Clifton and the nearby motorway services at M1 J23A. New lay-bys would be provided on the A453 in a similar position to existing lay-bys, and other services would not be affected by the scheme.

Summary

- 5.179. The overall impact on vehicle travellers was considered by the ES to be *Better*, and the overall significance of impact *Large Beneficial* due to the high numbers of travellers affected

(defined as more than 10,000 per day). **Table 5-16** in the evaluation section below summarise the ES predicted effects on Journey Ambience with evaluation at OYA.

Consultation

- 5.180. Rushworth Borough Council notes that following the scheme improvements, it is continuing to receive reports of fly tipping occurring around the A453 in areas of low public access. This comment is echoed by Thrumpton Parish who consider that there has been a big increase in fly tipping e.g. at the top of Fox Covert Lane and some of the tarmacked access points for ponds etc.
- 5.181. Kegworth Parish Council provided comments including that the scheme has:
- Eliminated delays and congestion, reduced travel time between J24 and Clifton by 50%, provided a quality road surface and considers that what was previously a dangerous road with numerous accidents has been transformed into a safe and pleasant route to travel;
 - The journey time to Nottingham is significantly reduced and there is no need to go to Nottingham from Kegworth via Gotham. The A453 is a very worthwhile addition to our local network; and
 - Nottingham has now become so much more accessible and a destination since the widening scheme.

Evaluation

Traveller Care

- 5.182. The existing level of traveller care has been maintained, with replacement lay-bys on the A453 provided and continued access to the existing local facilities, including the Clifton Service Station and motorway services at M1 J23A. It is likely that the upgraded signage will have improved driver information as expected.

Traveller Views

- 5.183. It was expected that views from the road would be similar to the existing views within the rural section, once replacement planting had time to establish, which would also retain open or intermittent views of the countryside for driver interest. Landscape planting has been implemented and in time should mature to integrate the route into the local landscape. Within the urban section existing vegetation has been retained where possible, with new planting in place and improvements to the University frontage.

Traveller Stress

- 5.184. Following the road improvements, the scheme expected traveller stress for users of the A453 and surrounding local roads to improve as frustration due to delays and fear of potential accidents were expected to reduce. The provision of general travel information and services would be similar to existing, and this is the case at OYA.
- 5.185. Based on information within the traffic sections of this study, journey times have improved, likely to be as a result of improved congestion and higher speed limits and safety has improved with fewer accidents overall since scheme opening. It is also likely that the provision of the separate NMU route alongside the scheme and the possibility for use of the de-trunked old A453 near Barton by NMUs will have helped reduce potential conflicts with traffic.

Summary

- 5.186. Based on the information presented in this evaluation, it is considered that the effects of the scheme on Journey Quality are likely to be generally **as expected**. Consultees have raised fly tipping as an issue locally occurring around the A453 in areas of low public access.

5.187. **Table 5-16** and **Table 5-17** below, summarise the evaluation of the Scheme's impact on Traveller Factors and Journey Quality respectively.

Table 5-16 Evaluation Summary: Traveller Factors³¹

Factor	Sub-Factor	ES Forecast			OYA Evaluation
		Better	Neutral	Worse	
Traveller Care	Cleanliness	N/A			N/A
	Facilities		✓		Neutral as expected
	Information	✓			Better as expected
	Environment	N/A			N/A
Traveller Views			✓		Neutral as expected
Traveller Stress	Frustration	✓			Better as expected
	Fear of potential accidents	✓			Better as expected
	Route Uncertainty		✓		Neutral as expected

Table 5-17 Evaluation Summary: Journey Quality

Sub-Objective	Journey Quality	Assessment
AST	Higher design standard including GSJs and separation of NMUs will reduce stress despite predicted increases in traffic flows and speed in rural area. Lay-bys, signs and facilities similar to existing thus neutral impact on traveller care. Views also neutral.	Large Beneficial.
EST	The existing level of traveller care has been maintained. It is likely that driver stress will have improved due to improved journey times and reduced congestion. The NMU route should also help reduce conflicts with traffic. Traveller views in the rural section are currently open but as planting matures it will integrate the route into the local landscape.	As expected.

³¹ Based on ES Volume 1, Section 2: Environmental Topics, Part 9: Vehicle Travellers Table 2.9.3: Significance of Effects on Journey Ambience

Key Points – Environment

Noise and Local Air Quality

- Based on the available traffic flow information it is likely that local noise impacts are as expected and air quality is better than expected on the rural section and worse than expected on the urban section (although any increase in emissions as a result of higher traffic flows may be offset by reduced congestion as a result of the scheme).

Greenhouse Gases

- There has been a 10% increase in carbon emissions on the scheme links in the opening year following the implementation of the scheme.

Landscape and Townscape

- Based on the information available, mitigation measures have generally been implemented in line with proposals and are broadly establishing at OYA, although there were areas of variable / slower growth and dead plants requiring replacement, including some of the larger size feature trees, to ensure that landscape / townscape objectives are met in the longer term.
- Continued aftercare and management throughout the maintenance period will be essential if planting is to achieve its targets, particularly as there was evidence that some planting and grassed areas required attention. It is too soon to fully evaluate the effectiveness of mitigation and it is suggested that this aspect should be considered further at the FYA stage.
- Thrumpton Parish is concerned about the current state of the contractor's West Leake rural compound which, in its opinion, appears abandoned and has been left, still fenced (unsympathetically) and un-cleared, whilst the other two rural compounds have been returned to agriculture.

Heritage & Historic Resource

- Historic England and Nottinghamshire County Council had serious concerns with the siting of a contractors compound adjacent to Glebe Farm scheduled area. Apart from this unforeseen impact on archaeology; mitigation has been undertaken in line with the ES recommendations, the results have been published and deposition of the archive addressed.
- Impacts on historic buildings and historic landscapes are considered to be in line with forecasts at this stage. It is therefore considered that the effects of the Scheme on the heritage resource are likely to be as expected overall. However, it is too soon to fully evaluate the successful establishment of planting in mitigating the effects of the Scheme on the setting of the historic buildings and landscapes and it is suggested that ongoing growth should be reconsidered at FYA.

Biodiversity

- In the absence of animal mortality data and post-opening survey / monitoring / maintenance information, it is not considered possible to fully evaluate the effects of the Scheme on either species or habitat at this stage of the POPE process; these aspects should be considered further at FYA, when it would be hoped that the expected survey / monitoring reports should be available.

Water Environment

- There is no evidence to suggest that the facilities are functioning in any way other than as expected, but further detail would be required to confirm. However, there was evidence that some outfalls would benefit from vegetation removal.

Physical Activity

- Based on the OYA site visit, as built information and consultation responses it is considered that the impact of the scheme on Physical Activity is generally as expected. There appear to be some examples of vehicle use of the NMU route and gaps within the highway boundary fence which require further investigation.

- NCC also raised issues regarding a lack of understanding and information provided to landowners and Parish Councils for certain aspects of the PRow /NMU provisions. It also comments on the unforeseen level of use of the Glebe Farm route.

Journey Quality

- The effects of the Scheme on Journey Quality are likely to be generally as expected.
- Consultees report that following the scheme improvements, fly tipping is occurring around the A453 in areas of low public access.

6. Social Impacts Evaluation

Introduction

- 6.1. WebTAG guidance, current at the time of scheme appraisal, described social impacts as those covering the human experience of the transport system, and its impact on the social factors which are not considered as part of the economic or environmental assessment. This includes the following social factors.
- Collisions
 - Physical Activity
 - Security³²
 - Severance
 - Journey Quality
 - Option and Non-Use Values
 - Accessibility
 - Personal Affordability
- 6.2. Collisions and security were considered in Section 3 of this report, and Physical Activity and Journey Quality in Section 5. This section considers the remaining social factors, and draws upon the Appraisal Summary Table (AST, 2012).

Access to Services, Severance and Option Values

- 6.3. The scheme AST stated that these sub-objectives were not assessed stating the following:
- Access to Services: - The scheme provides improved access to the East Midlands Parkway Railway Station and the recently constructed NET Park and Ride site at Clifton for those accessing by private vehicle and those without a car. In line with guidance, no SDI analysis has been carried out.
 - Severance: - The scheme comprises the provision of a continuous NMU route from Clifton to Long Lane and improved crossing facilities in Clifton. As there were no disproportionate adverse effects from any of the assessed social groups, the severance impacts were not considered sufficient to extend the assessment to a full SDI analysis.
 - Option Values: - Widening of the A453 was deemed to be unlikely to produce any significant changes in existing transport services.
 - Affordability: - The SDI analysis showed that the scheme would have a large beneficial impact (in terms of vehicle operating costs) on the most deprived regional impact group. All other groups showed an adverse impact.
- 6.4. No further evaluation has been undertaken based on the above for these sub objectives.

³² Security has been considered in the Safety Chapter of this report.

7. Other Impacts

Background

- 7.1. The AST states that wider impacts have not been evaluated. There are however objectives relating to policy, economic growth, development and NMU/public transport accessibility, as follows:
- To deliver the scheme in a way which supports the delivery of the Government's transport policy objectives.
 - To enhance NMU facilities through Clifton, and provide a new NMU route between Clifton and Kegworth.
 - To improve access to public transport, considering safety and to ensure the shortest practical desire line is provided.
 - To support sustainable economic activity and local development plans.
 - To provide support to spatial and transport policies consistent with emerging local plans for the Nottingham and Rushcliffe areas.
 - To facilitate future access to the NET2.
 - To facilitate/improve access to the East Midlands Parkway Railway Station.
 - To improve access between Nottingham and East Midlands Airport.
 - To improve access to Nottingham Trent University while reducing conflict with through traffic on the A453.
- 7.2. The scheme has been considered in line with relevant policy appropriate at the time the scheme was initially evaluated. This has been extracted from the Environmental Statement Volume 1 (January 2009) – Part 13.

Policy Review

- 7.3. This section looks at the scheme in relation to national and regional policies to determine whether the above scheme objectives have been met.
- 7.4. A qualitative evaluation of the scheme in relation to policy has been undertaken and summarised in **Table 7–1**.
- 7.5. The scheme was forecast overall to support economic growth and development in line with regional and national policy.
- 7.6. The scheme has also supported multi-modal accessibility providing enhanced NMU facilities, as well as providing access to the NET park and ride site at Clifton and enhanced access to the Parkway Railway Station.
- 7.7. It is considered that the scheme has helped support the objectives set out above. It cannot however be concluded categorically that the scheme has supported local plan development.

Table 7-1 Scheme Alignment with National, Regional and Local Policy (valid at time of appraisal, 2009 and reproduced from the ES)

Policy	Authority	Interest	Aims	Comments	Forecast Impact
National Policy					
The Future of Transport Government White Paper	Department for Transport	Review of Transport issues in the UK and a view for change leading up to 2030	A transport network that meets the challenges of a growing economy and increasing demand for travel whilst achieving environmental objectives. Improved road network Fast, reliable and efficient rail network service. Reliable, flexible and convenient bus services.	A453 route provides essential link between Nottingham and the local airport, a new station to be constructed at Ratcliffe on Soar and proposed NET system south of Clifton. The A453 scheme will create new sections of footway and cycleway for Non-Motorised Users (NMUs).	Beneficial
Transport 2010	UK Government	Improve the transport networks in the UK	A transport system that provides: modern, high quality public transport; more light rail systems and attractive bus services; high quality park and ride schemes; improved transport links; a modern train fleet; well-maintained road network; fully integrated public transport information, safer and more secure transport accessible to all; a transport system that makes less impact on the environment.	A453 M1- Nottingham is noted as a priority. The A453 proposals seek to implement part of the Multi Modal Studies recommendations, such as linking the Parkway station and the proposed NET system south of Clifton. The A453 project proposals are designed to reduce road congestion and link with other sustainable alternative modes to reduce the reliance on car journeys.	Beneficial
PPG13: Transport	National Government	Transport	The objectives of this guidance are to integrate planning and transport at the national, regional, strategic and local level to; promote more sustainable transport choices, accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling, and reduce the need to travel, especially by car.	The A453 improvement is to cater for deficiencies in the existing capacity and route by providing a range of sustainable means of transport, as well as improvements for Non-Motorised users along the route. E.g. cycleway, footways etc. The A453 scheme has been designed to keep disturbance within acceptable limits however, some disturbance is likely. The new road is not expected to provide greater impacts than the existing one. There is potential for an improvement in the local environment resulting from the smoother flow of traffic.	Beneficial
Regional Policy					
East Midlands Regional Spatial Strategy (RSS8 March 2005) <i>Regional Transport Strategy:</i> Policy 15, 16, 43 and 49-51 <i>Regional Economic Strategy:</i> Various <i>Draft Regional Plan:</i> Policy 13, 14, 42 and 50) <i>Sub-Regional Transport Strategy:</i> Policy 4	Government Office for the East Midlands (GOEM)	Regional advice on housing, economy & regeneration, natural & cultural resources, regional transport strategy and monitoring and review.	Sustainable development of the region's economy, infrastructure, transport, housing and so on.	RSS covers a variety of subject areas. Impact not scored to avoid double counting.	Beneficial
Transport Plans					

Transport Plan For Greater Nottingham 2006/7 to 2010/11 (March 2006) 'Air Transport' Section and 'NET 2' Section	Nottingham City Council	Future transport strategy and investment plans for 2006 -2011.	Improve links to employment and services by improving public transport, tackling congestion reducing air pollution and improving road safety.	The northern 2/3 of the A453 falls within this area. The A453 proposals form wider solutions including public transport improvements and improved links to EM Airport as well as additional capacity on the trunk road. The 'big picture' identified within the plan promotes the A453 proposals as such they are strategically important.	Beneficial
Leicestershire Local Transport Plan 2006-2011 (March 2006)	Leicestershire County Council	Transport Strategy for Leicestershire	to achieve a transport system for Leicestershire meeting requirements for access and economic development in a sustainable way and improves people's quality of life.	The plan recognises that the A453 widening is top level priority at a regional level.	Beneficial
County Structure Plans					
Accessibility and Transport Policy 10	As above	New roads, road improvements and traffic management	Alterations are permitted if they improve environment, encourage walking improve road safety and public transport.	Proposals fulfil the criteria in this policy	Beneficial
Accessibility and Transport Policy 13	As above	East Midlands airport	Operational needs of airport are covered	A453 proposals will improve access to the airport	Beneficial
Leicestershire, Leicester and Rutland Structure Plan	Leicestershire County Council, Leicester City Council, Rutland County Council	Policies and Development in three areas	Strategic Planning Framework for development and use of land consistent with national and regional policy.	A small part of A453 falls within Leicestershire.	N/A
Nottinghamshire and Nottingham Joint Structure Plan (Feb 2006) Policy 1/1, 5/3, 5/4, 5/9 and 5/11	Nottinghamshire County Council and Nottingham City Council	Policies for the area	Growth of the area, reflecting RSS8.	The plan will be replaced by a review of the RSS covering period up to 2026. Impact not scored to avoid double counting.	Beneficial

8. Conclusions

- 8.1. To conclude this evaluation, this section of the report summarises how the A453 widening scheme is meeting the objectives specified in the Client Scheme Requirements.
- 8.2. **Table 8-1** presents an evaluation of the scheme's objectives using the evidence presented in this report.

Table 8-1 Summary of the Schemes Success against Objectives at OYA

Objective (Source: Client Scheme Requirements)	Has the objective been achieved?	
To provide maximum value for money against its whole life costs in accordance with the Department's WebTAG Guidance (BCR adjusted for non-monetised impacts should be greater than 2).	Outturn BCR of 2.47.	✓
To deliver the scheme in a way which supports the delivery of the Government's transport policy objectives.	The policy review has demonstrated that the scheme accords with relevant national policy.	✓
To address the safety problems identified in the Challenges and Issues section of this document and should significantly reduce current accident levels for all road users including non-motorised users.	Initial results show that the number of collisions in the area has reduced compared against that before and the severity measurement of these collisions has decreased post-scheme opening. However, it is too early at this stage to be confident in the findings.	Too early to be conclusive. Further evaluation required at five years after.
To minimise the detrimental environmental effects of the scheme, in particular the adverse impacts on air quality and noise, and offset by mitigation measures where technically feasible and economic to do so, taking account of costs, availability of funding and statutory obligations.	-	✓
To protect the built and natural environment through mitigating the potentially adverse impact of adding additional capacity, meeting current environmental standards and taking opportunities to enhance poor environmental features where appropriate and taking into account value for money.	-	Too early to be conclusive. Further evaluation required at five years after.
To protect watercourses from pollution during and after construction.	-	✓
To support sustainable economic activity and local development plans.	Due to the inherent difficulty linking these impacts to the scheme, it has not been possible to conclude whether the scheme has had a direct impact on stimulating local economic activity. However, the increased capacity	Partial - Unable to be conclusive.

	provided by the scheme is likely to support development and growth.	
To provide an additional lane in each direction to reduce traffic congestion, reduce frequency of incidents and improve journey time reliability.	Overall, Journey Times along the scheme and variability in journey times have improved.	✓
To enhance NMU facilities through Clifton, and provide a new NMU route between Clifton and Kegworth.	New NMU route and facilities have been provided as per design.	✓
To improve access to public transport, considering safety and to ensure the shortest practical desire line is provided.	Access to NET and EM Parkway Railway Station has been provided.	✓
To provide support to spatial and transport policies consistent with emerging local plans for the Nottingham and Rushcliffe areas.	Due to the inherent difficulty linking these impacts to the scheme, it has not been possible to conclude whether the scheme has had a direct impact on stimulating local economic activity. However, the increased capacity provided by the scheme is likely to support development and growth in the Nottingham and Rushcliffe areas.	Partial - Unable to be conclusive.
To facilitate future access to the NET2.	The Mill Hill roundabout provides an access point to the Park and Ride site at Clifton. Improved journey times along the A453 have also reduced travel times for those that access the Park and Ride site.	✓
To facilitate/improve access to the East Midlands Parkway Railway Station.	The provision of a new grade separated junction providing access to East Midlands Parkway Railway Station has improved access. Furthermore, improvements to journey times along the A453 have reduced travel times for those accessing the station along the A453.	✓
To improve access between Nottingham and East Midlands Airport.	The A453 provides a key link between Nottingham and East Midlands airport. Improved journey times and reduced variability in journey times along this corridor aid access.	✓
To improve access to Nottingham Trent University while reducing conflict with through traffic on the A453.	The provision of new vehicular access points has helped to reduce conflict with through traffic on the A453.	✓

Appendices

Appendix A. Client Scheme Requirements

Number	Objectives (as per DfT CSR - Apr 2013)	Notes	Consider?
1	<i>To reduce congestion with solutions that provide additional capacity, increase journey time reliability and ensure the safe and economic operation of the trunk road while minimising scope.</i>	The objective relates to achieving these with solutions whilst minimising scope. We therefore understand that this relates to scheme development. POPE is only concerned with evaluating the scheme that was built - therefore Objective 13 covers these topics for the built scheme.	N
2	<i>The scheme is designed to suit the requirements of ongoing maintenance, the needs of HA's Network Delivery and Development Directorate and to minimise whole life costs.</i>	Maintenance is not part of POPE methodology. (At one year after opening assessment of costs is not possible, and it is assumed that forecast costs are captured in the future maintenance forecasts).	N
3	<i>The project aims to provide maximum value for money against its whole life costs in accordance with the Department's WebTAG Guidance (BCR adjusted for non-monetised impacts should be greater than 2).</i>	Note - this is presented in terms of a re-forecast outturn BCR estimate, rather than as an achieved/not achieved objective.	Y
4	<i>The scheme has improved on AST assessment results produced during the Options Phase where possible within the constraints of affordability, other than a marginal reduction in BCR.</i>	This objective relates to scheme development/options stage - we only evaluate the built scheme, and therefore cannot include this as an objective.	N
5	<i>To deliver the scheme in a way which supports the delivery of the Government's transport policy objectives.</i>		Y
6	<i>To support growth in the region.</i>	Current POPE methodology only includes qualitative evaluation - e.g., if journey times improve then the area may become more attractive to businesses/commuters. Qualitative statements will be made where possible.	N
7	<i>The scheme addresses the safety problems identified in the Challenges and Issues section of this document [CSR] and should significantly reduce current accident levels for all road users including non-motorised users.</i>		Y
8	<i>To minimise the detrimental environmental effects of the scheme, in particular the adverse impacts on air quality and noise, and offset by mitigation measures where technically feasible and economic to do so, taking account of costs, availability of funding and statutory obligations.</i>		Y
9	<i>Protecting the built and natural environment through mitigating the potentially adverse impact of adding additional capacity, meeting current environmental standards and taking opportunities to enhance poor environmental features where appropriate and taking into account value for money.</i>		Y
10	<i>To protect watercourses from pollution during and after construction.</i>	Post construction only	Y
11	<i>The scheme to maximise the return on public investment.</i>	This appears to be a scheme development objective. A re-forecast BCR will be calculated based on observed benefits and actual costs - and can reflect against BCR>2 in number 3 above.	N
12	<i>Supporting sustainable economic activity and local development plans.</i>		Y
13	<i>Providing an additional lane in each direction to reduce traffic congestion, reduce frequency of incidents and improve journey time reliability.</i>		Y
14	<i>To enhance NMU facilities through Clifton, and provide a new NMU route between Clifton and Kegworth.</i>		Y
15	<i>To improve access to public transport, considering safety and to ensure the shortest practical desire line is provided.</i>	This objective has no measurable elements. Objectives 22, 23 and 24 are however more specific and therefore easier to measure. We can however include this objective and provide a similar conclusion as for Objectives 22-24 based on qualitative comment. Shortest practical desire line will not be assessed.	Y
16	<i>Ensure HA NDD are consulted and agree with the scheme design and operation.</i>	This evaluation looks at the post opening period whereas this objective relates to design/construction.	N
17	<i>Ensure that the adjacent LHA and Emergency Services have input to the scheme design and construction methodology.</i>	This evaluation looks at the post opening period whereas this objective relates to design/construction.	N
18	<i>Provides support to spatial and transport policies consistent with emerging local plans for the Nottingham and Rushcliffe areas.</i>	This would be covered by the overall policy review planned for Objective 12 but can provide this objective separately.	Y
19	<i>To contribute to the HA's target of achieving a 20% saving in cost, compared with the previously approved baseline central estimates, across the portfolio of 6 major growth schemes added to the HA's programme in the Chancellor's 2011 Autumn Statements.</i>	Not part of POPE methodology.	N
20	<i>To meet or exceed a 10% saving in future costs from 2011/12 onwards compared with the previously approved baseline central estimate.</i>	Not part of POPE methodology.	N
21	<i>To provide safe and efficient TM measures and route diversions to minimise disruption to the travelling public during construction of the scheme.</i>	Not part of POPE methodology.	N
22	<i>To facilitate future access to the NET2.</i>		Y
23	<i>To facilitate/improve access to the EM Parkway Railway Station.</i>		Y
24	<i>To improve access between Nottingham and EM Airport.</i>		Y
25	<i>To improve access to Nottingham Trent Uni while reducing conflict with through traffic on the A453.</i>		Y

Appendix B. Appraisal Summary Table (AST) and Evaluation Summary Table (EST)

Table 1. Appraisal Summary Table (AST)

A453 Widening M1 Junction 24 to A52 Nottingham							
Impacts	Summary of Key Impacts	QUANTITATIVE MEASURE		Qualitative	Monetary 3(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers.	Journey time savings accrue to users, due to reduced journey times. There is a small vehicle operating cost benefit (equivalent to 4.5% of business user time benefits). Construction and maintenance savings accrue, due to maintenance travel time savings. Business user travel time savings in opening year (2015) due to scheme: AM = £0.303m IP = £0.962m PM = £0.570m Total person-hours saved by business users in opening year (2015) due to scheme = 166,000 hrs	Value of journey time changes (£)	£145.264m		Total PVB attributed to business users and transport providers: PVB = £151.054m	Not carried out in accordance with HA TAME SDI guidance.
			Net journey time changes (£)				
			0 – 2 min	2-5 min >5min			
			£56.383m	£77.49 4m £11.387m			
		* Note that the numbers above are from TUBA only, so exclude savings during construction and maintenance (savings split by size of time saving are not available in version of QUADRO used) Business user travel time & vehicle operating costs benefits PVB =£151.836m Business User benefits during construction & maintenance PVB = -£0.781m					
	Reliability impact on Business users	Not assessed. INCA cannot currently be used to assess single carriageway roads and it is not therefore possible to assess the relative performance of the with and without scheme scenarios.	-	-	-		
	Regeneration	Scoping exercise has demonstrated that there are no regeneration impacts.	-	-	-		
	Wider Impacts	Scoping exercise has demonstrated that there are no wider impacts.	-	-	-		
Environment	Noise	Properties near the existing A453 in urban areas around Clifton are predicted to experience an increase in noise levels as a result of the proposed widening scheme. The facades of 169 properties facing the proposed scheme are predicted to experience an increase in noise levels greater than 5dB. Noise levels at some properties on the Nottingham Road-Clifton Lane route to the Crusader roundabout and on the Barton-in-Fabis turn off from the A453 are predicted to experience a reduction in noise levels. There are predicted to be moderate adverse impacts upon those within the lower and middle regional income quintiles, slight adverse impacts on the highest regional income quintile and slight beneficial impacts upon the 60-80% quintile. Three schools (Glapton Primary & Nursery, Whitegate Primary and Dovecote Primary) are predicted to experience an increase in noise levels between 1.7 and 2.9dB considered to be a negligible impact.	Estimated Population Annoyed without Scheme in 15th Year after Opening (2030): 2666 Estimated Population Annoyed with Scheme in 15th Year after Opening (2030): 3042 Net Noise Annoyance in 15th Year after Opening (2030): +376 people With the Scheme in place 519 properties would experience increased noise levels of more than 3dB in 2030 compared to the baseline Do Minimum situation in 2030. 8 properties would experience reductions in noise levels of more than 3dB in 2030 compared to the baseline Do Minimum situation in 2030.	It is expected that 200 properties will qualify for noise insulation in accordance with the 1975 Noise Insulation Regulations.	NPV = -£8,872,582	Moderate Adverse impact on the 0% - 20%, 20% - 40% and 40% - 60% most deprived regional income quintiles. Slight Beneficial impact on the 60% - 80% regional income quintile. Slight Adverse impact on the 80% -100% regional income quintile. Negligible impact on 3 schools (within the children's social group)	
	Local Air Quality	No exceedances of the NO ₂ and PM10 Air Quality Objectives (AQO) at A453 Corridor. Only 1 exceedance of NO ₂ AQO at receptor NCC1 at Nottingham AQMA 3 (this receptor was exceeded NAQ in 2010, but with scheme showed a reduction of 0.09µg/m ³ in 2015). Increases in NO ₂ in 2 AQMA's by a max. of 0.17µg/m ³ ; decreases in NO ₂ in 6 AQMA's by a max of 0.48 µg/m ³ . Net regional increase in total PM10 emissions of 0.578 tonnes. Overall negligible impact on air quality.	Properties with improved PM10 10,930; worse 6,158; no change 2,296 Properties with improved NO ₂ 11,675; worse 7630; no change 79. All figures for Opening Year 2015	Change in overall exposure in Opening Year 2015: +218 PM10; +420 NO ₂		Slight to Moderate Adverse impact across all income quintiles.	
	Greenhouse Gases	The scheme will result in a reduction of road traffic emissions of carbon dioxide between the baseline year and opening year due to ongoing improvements in vehicle emission technology and the continuing development of cleaner fuels. However, over the life of the scheme emissions will increase due to an increase in fuel consumption with the scheme in place, caused by changes in the distance and speeds travelled by vehicles. Carbon emission benefits: due to user fuel consumption during operation = -£4.273m during construction and maintenance fuel consumption = £0.277m	Change in non-traded carbon over 60y (CO ₂ e) 144,169 tonnes Change in traded carbon over 60y (CO ₂ e) 0	.06% increase in road traffic emissions of carbon dioxide (tonnes per year) in the Opening Year (2015) with the scheme compared to without the scheme	Total PVB attributed to Greenhouse Gases: PVB = -£3.996m NPV of carbon dioxide emissions= -£6,239,830		
	Landscape	Generally, 'ordinary' landscape of local value. Offline section, including lighting at Mill Hill Roundabout has minor urbanising effect on open farmland, affecting the setting of historic moorland at Clifton Pastures & Barton Moor	-	Slight Adverse	-		
	Townscape	Urban section retains similar characteristics as existing, retaining the majority of trees and open areas. The University frontage will be improved. More of the Clifton Conservation Area will be affected by widening but impacts reduced by detailed design with potential enhancement.	-	Slight Adverse	-		
	Heritage of Historic resources	29 archaeological / heritage sites have been identified. 12 will be directly affected but only 2 completely lost. Generally medium value but 2 high value, but no Scheduled Monuments (SM) directly affected. Mitigation including detailed excavation and evaluation prior to construction. Minor impacts on the setting of 12 Listed Buildings, including Clifton Dovecote SM, 7 locally listed buildings, 2 Conservation Areas and	-	Moderate Adverse	-		
	Biodiversity	Barton in Fabis Fishponds SINC will be enhanced by new water vole habitat. Indirect effects to 5 other SINCS and the Lockington Marshes SSSI, which will be neutralised by new planting. Wildlife underpasses and fencing improve safety for protected species but slight risk of road deaths to barn owl and birds. Scheme provides net increase in vegetation and habitats over time.	-	Neutral	-		

	Water Environment	Water Environment Scheme crosses the River Soar Navigation (canal), the River Soar, Nethergate Stream and several smaller surface waters. There will be no impact on surface or groundwater quality, but flows in Nethergate Stream will increase. Mitigation reduces risk of pollution from spillage. Flood compensation will be provided.	-	Neutral	-	
Social	Commuting and Other users	Journey time savings accrue to users, due to reduced journey times. There is a vehicle operating cost disbenefit (equivalent to 20.4% of user time benefits). Construction and maintenance savings accrue, due to maintenance travel time savings. Commuting & other user travel time savings in opening year (2015) due to scheme: AM = £0.120m IP = £0.541m PM = £0.439m Total person hours saved by commuting & other users in opening year (2015) due to scheme = 333,000 hrs SDI analysis shows that all income groups experience positive user benefits impacts (time and Vehicle Operating Costs). The greatest share of benefits is experienced by the middle to high regional income quintiles.	Value of journey time changes (£) £59.131m Net journey time changes (£) 0-2 min £14.55m 2-5min £39.095m >5min £5.486m		Total PVB attributed to Commuting and Other users: PVB = £50.327m	All income groups experience either Slight, Moderate or Beneficial impact.
	Reliability impact on Commuting and Other users	It is not possible to compare reliability with and without the scheme in place, because INCA software cannot be used to assess single carriageway roads.	-	-	-	
	Physical Activity	More walking and cycling will be encouraged by providing a continuous NMU route between Clifton and Long Lane, locations to cross the A453 safely at GSJs in the rural section and improvements to controlled crossing facilities in Clifton.	-	Slight Beneficial	-	
	Journey Quality	Higher design standard including GSJs and separation of NMUs will reduce stress despite predicted increases in traffic flows and speed in rural area. Lay-bys, signs and facilities similar to existing thus neutral impact on traveller care. Views also neutral.	-	Large Beneficial	-	
	Accidents	Overall the A453 currently has a poor safety record with a recorded accident level 33% higher than the observed national average for similar rural roads and 23% higher than the observed national average for similar urban roads. On the rural section there are accident cluster sites at the junctions of the A453 with the entrance to Ratcliffe on Soar power station and the Barton Lane junction. On the urban section the safety record of the road is poor and frequent accidents add to delays, resulting in traffic diverting onto unsuitable minor roads. There are currently four demand-activated pedestrian crossings and a major signal controlled junction, which cater for pedestrian movements across the A453. Accidents involving pedestrians attempting to cross the road are high. The COBA assessment demonstrates large accident savings. The SDI analysis shows that the impact of the scheme on accidents provides a positive benefit to the pedestrian, cyclist and motorcyclist user groups as well as for the children, young adult and older people social groups	Accident Savings: 369 Casualty Savings: 727 Accident PVB = £40.904m Const/Maintenance = £0.349m	-	PVB = £41.253m	Moderate Beneficial impact for cyclists. Slight Beneficial impact for all other groups.
	Security	Perception of risk of personal injury will be slightly reduced due to improved carriageway standard and measures to encourage pedestrians and cyclists to use controlled crossing points. In accordance with HA TAME SDI guidance, no SDI analysis carried out.	-	Slight Beneficial	-	-
	Access to Services	The scheme will provide improved access to East Midlands Parkway Rail Station and the proposed NET (tram) Park and Ride Site for people with use of a private vehicle and those without a car. In accordance with HA TAME SDI guidance, no SDI analysis carried out.	-	Slight Beneficial	-	-
	Affordability	SDI analysis shows that the scheme will have a large beneficial impact (in terms of Vehicle Operating Costs) on the most deprived regional income group. All other income groups show an adverse impact.	-	-	-	Large Beneficial impact on the 20% most deprived regional income quintile. Moderate to Large Adverse impact on all other income groups
	Severance	Continuous NMU route from Clifton to Long Lane will cover almost 90 % of scheme, using sections of existing A453 and GSJs which are provided at all junctions in the rural section. Improved controlled crossing facilities would be provided in Clifton. As there are no disproportionate adverse effects from any of the assessed social groups, the severance impacts were not considered sufficient to extend the assessment to a full SDI analysis.	-	Rural Section: Moderate Positive change. Urban Section: Slight Positive change. Overall Assessment: Moderate Beneficial	-	-
	Option Values	Widening of the A453 is unlikely to produce any significant changes in existing transport services.	-	Neutral	-	
Public Accounts	Cost to Broad Transport Budget	The scheme will require public capital investment for construction. Small operating costs disbenefit of £1.033m due to road maintenance. *Local government funding contributions (£20m from Nottinghamshire County Council and £0.5m from Rushcliffe Borough Council) have not be taken into account	Local Government Funding PVC = £0 * Central Government Funding - Operating Costs PVC = £1.033m Central Government Funding - Investment Costs PVC = £99.460m Central Government Funding - Developer Contributions PVC = £0 Central Government Funding - Grant/Subsidy Payments PVC = £0	-	PVC = £100.493m	
	Indirect Tax Revenues	The scheme will result in an increase in indirect tax revenue over the life of the scheme. This is due to an increase in fuel consumption with the scheme in place, caused by changes in the distance and speeds travelled by vehicles	-	-	PVB = £10.087m	

Table 2. Evaluation Summary Table (EST)

	Impacts	Summary of Key Impacts	QUANTITATIVE MEASURE			Monetary £(NPV)	EST score	
Economy	Business users & transport providers.	The scheme has had a positive impact on the mean journey times during all time periods, which indicates that the average journey times along the scheme have reduced post-scheme opening.	Value of journey time changes (£)	£221.731m		£221.731m		
			Net journey time changes (£)					
			-	-	-			
	Reliability impact on Business users	Improvements in day to day variability in journey times along the A453.				-		
	Regeneration	n/a		n/a		-	n/a	
	Wider Impacts	n/a		n/a		-	n/a	
Environment	Noise	Noise barriers are in place. Some properties were expected to experience an increase in noise and others a decrease. Based on traffic flow information this is likely to be the case.				-	As expected	
	Local Air Quality	The scheme was expected to result in a slight negative effect on receptors near to the road scheme, but would be of benefit to air quality in the wider area, with a neutral effect overall. Based on traffic flow information this is likely to be the case.				-	Better than expected in rural area and worse than expected in urban area.	
	Greenhouse Gases	10% increase in carbon levels over the scheme links in the opening year.	Change in non-traded carbon over 60y (CO2e)	-		-£3.996m (as forecast)		
			Change in traded carbon over 60y (CO2e)	-				
	Landscape	Based on the information available, mitigation measures have generally been implemented although establishment at OYA appeared variable, with areas of slower growth and dead plants requiring replacement, including some of the larger size feature trees.				-	Worse than expected	
	Townscape	Mature vegetation within the highway corridor has been retained where possible and continues to provide a framework for the road. The university frontage has been improved however the introduction of various elements of highway infrastructure adds to the visual clutter along the route. Some failed planting was noted at OYA and this will require replacement if the expected enhancements are to be realised by FYA				-	n/a	
	Heritage of Historic resources	Unforeseen impact at Glebe Farm scheduled area, apart from this, archaeological mitigation undertaken in line with ES, results published and archive deposited. Impacts on historic buildings and historic landscapes are considered to be in line with forecasts at this stage. However, successful establishment of planting in mitigating the effects of the scheme on the setting of the historic buildings and landscapes should be reconsidered at FYA.				-	Likely to be as expected overall	
	Biodiversity	Habitats appear to have been provided in line with proposals together with mammal underpasses and fencing. Insufficient post-opening survey / monitoring / maintenance information has been available to fully evaluate the effects of the Scheme which should be reconsidered at FYA.				-	Likely to be as expected	
	Water Environment	Mitigation is in place and facilities appear to be functioning as intended.				-	Likely to be as expected	
Social	Commuting and Other users	As for business users above.	Value of journey time changes (£)	-		Included with business		
			Net journey time changes (£)					
			-	-	-			
	Reliability impact on Commuting and Other users	Improvements in day to day variability in journey times. Monetised benefits combined with business above.				-	Included with business	
	Physical Activity	Provision for pedestrians, cyclists and equestrians has improved NMU facilities including safer crossing of the A453 and links to the wider NMU network.				-	As expected	
	Journey Quality	Improved journey times on the A453 have reduced congestion and driver frustration.				-	As expected	
	Accidents	The annual average number of collisions over the COBA Study Area have reduced by 63 since the scheme opened. The annual average number of collisions over the Key Links Analysis Area have decreased by 11.5 since the scheme opened. Results are not statistically significant.				11.5 collisions in opening year (45%)	£34.515m	
	Security	Improved carriageway standard and measures to encourage pedestrians and cyclists to use controlled crossing points have improved perception of security.				n/a	-	As expected
	Access to Services	The scheme has improved access to EM Parkway and NET Park and Ride Site at Clifton.				n/a	-	As expected
	Affordability	n/a				n/a	-	
Severance	The scheme has improved severance with provision of NMU route and new crossing facilities.				n/a	-	As expected	
Option Values	n/a				n/a	-		
Public Accounts	Cost to Broad Transport Budget	Investment cost was 4% higher than expected. Ongoing operating costs assumed as forecast.				-	£125.285m	
	Indirect Tax Revenues	The outturn impact on indirect taxation is assumed as forecast.				-	£10.218m	

Appendix C. Environment Information Requested

Information requested to evaluate the environmental sub-objectives

Environment Specific Requirements	OYA Response
Environment Statement (ES) or Stage 3 Scheme Assessment Report (SAR) or Environmental Assessment Report (EAR) including Environmental Masterplan (EMP) drawings.	Environmental Statement January 2009 Volumes 1, 2 and Non-Technical Summary
AST.	Appraisal Summary Table (May 2012)
Any amendments / updates, additional surveys or reports since the ES / SAR / EAR.	Environmental Impact Assessment Traffic Noise and Vibration June 2012 (Revision 3)
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.	-
As built drawings for landscape/ biodiversity/ environmental mitigation measures/ drainage/ fencing/ earthworks etc.	Provided
Construction Environment Management Plan (CEMP), Landscape and Ecology Aftercare Plan (LEAP), Landscape Management Plan (LMP) or Handover Environmental Management Plan (HEMP).	CEMP Grass Cutting Regime and Visibility Splay Maintenance Obligations Handover Environmental Management Plan (HEMP) As-Built Amendments Rev Z02 November 2015
Health and Safety File – Environment sections (to include all environment As-Built reports).	Health & Safety File 2015 version
Relevant Contact Names for consultation.	Provided and sourced by POPE
Archaeological Reports (popular and academic).	Wessex Archaeology on line archaeological information including Archaeological Post-Excavation Assessment Reports and Proposed Publication Synopsis April 2013. Site 28 A453 Widening Scheme M1 Junction 24 to A52 Nottingham, Nottinghamshire Archaeological Post-Excavation Assessment Report and Proposed Publication Synopsis April 2013
The Road Surface Influence (RSI) value of any low noise surface installed.	-

The insulation performance properties of any noise barriers installed (The BS EN 1794-2 result provided by the noise barrier manufacturer).	-
List of properties eligible for noise insulation.	Noise Insulation Survey spreadsheet – final estimates with 2013 data
Employers Requirements Works Information - Environment sections.	Woks Information Volume 2
Reports for any pre/ post opening survey and monitoring work e.g. for noise, biodiversity, water quality).	Badger Survey and Assessment 2009/10 (Confidential) Update Great Crested Newt Survey and Assessment 2010 Proposals for Clearance of Existing Watercourses 2015
Animal mortality data.	Not provided
Pre or Post opening Non-motorised User (NMU) Audits or Vulnerable User Surveys.	NMU Context Report 2006 NMU Audit Report (Preliminary Design Stage) Final 2009 POPE not aware whether any post opening audits / surveys undertaken
Information may be available regarding environmental enhancements to streetscape/townscape for bypassed settlements	Included as part of the landscape/townscape design as built plans
Scheme Newsletters/ publicity material/ Award information for the scheme.	Highways England scheme newsletters available on A453 archived project information CDM Innovation Award (Design for manufacturing and assembly benefited the environment) Regional H&S Award Sponsored by NEBOSH Engineering Project of the Year CEEQUAL Sustainability Performance Assessment - Excellent

Appendix D. Photomontage

Photomontage 1a – View from Ratcliffe on Soar Looking North West



PROPOSED - YEAR 0 WINTER



ACTUAL – YEAR 1 SUMMER (TREE COVER PRESENT DUE TO TIMING OF SITE VISIT)

Photomontage 2a – View from Nottingham Road Looking North West



EXISTING

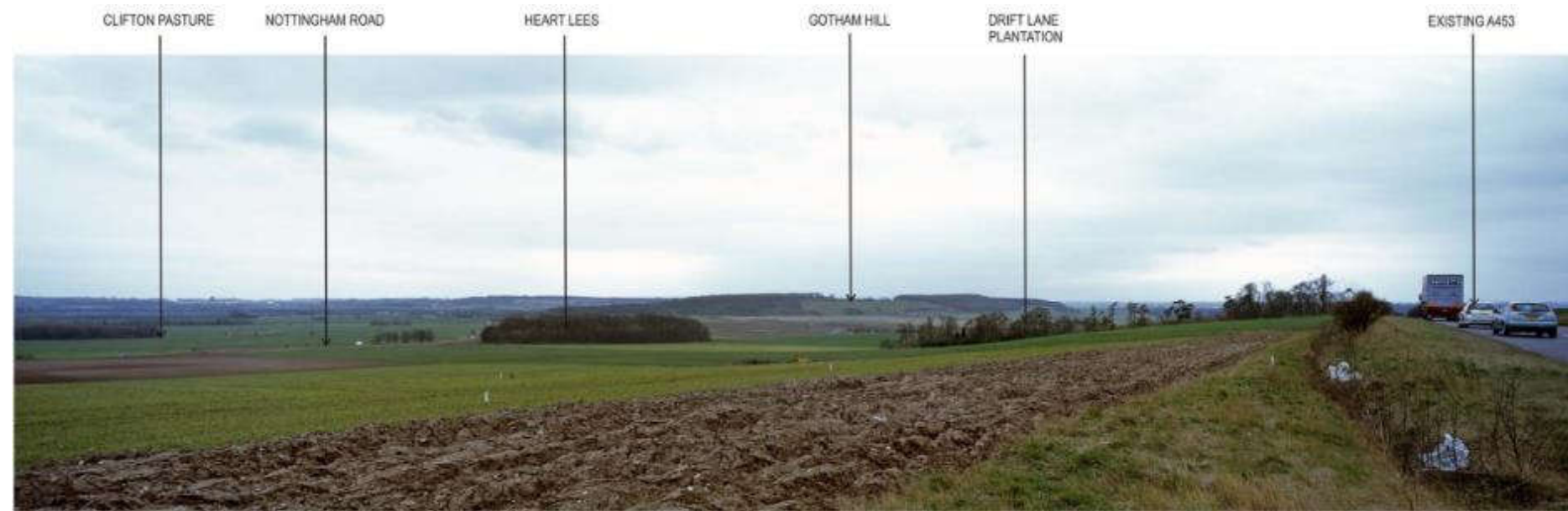


PROPOSED - YEAR 0 WINTER



ACTUAL – YEAR 1 SUMMER

Photomontage 3a – View from Existing A453 at Mill Hill Looking South



EXISTING



PROPOSED - YEAR 0 WINTER



ACTUAL – YEAR 1 SUMMER

Appendix E. Landscape Appendix

ES Key Mitigation Measures for Scheme Landscape Character Areas (SLCA) and Townscape Character Areas (TCA)	ES Predicted Impacts following Road Opening (Year 0 and Year 15)	Evaluation at OYA
<p>SLCA 1 – M1 to Ratcliffe</p> <p>Proposed woodland planting blocks within the highway boundary would replace those lost to the proposals, as well as adding to the existing pockets of woodland throughout the SLCA, and to the retained roadside vegetation which is mostly to the north of the A453.</p> <p>Hedgerows with trees along the highway boundary would link up with the existing mature hawthorn hedgerows, and would be in keeping with existing field boundary treatments in this character area.</p> <p>Some offsite hedgerow enhancements were proposed which would further help in achieving this whilst also strengthening wildlife corridors, subject to landowner permission.</p>	<p>M1 to (and including) Long Lane (ch 0 to 1400)</p> <p>Landscape impacts: the widened road and structures would impact upon the landscape to the south of the existing road including the secluded pastoral areas, with good hedgerow structure, and open arable fields with low hedges. The open nature of the raised road embankments would change the backdrop to this landscape type, typical of the area to the south of the existing A453. Replacement hedgerows with trees and woodland planting on the slip road embankments would replace such a loss and integrate the road into the landscape. Additional hedgerows would be planted in this section to redefine field boundaries and reconnect existing hedgerows. It was predicted that the resulting magnitude of landscape impact on this road section and SLCA 1 would be minor and overall significance of effect slight adverse in Year 0.</p> <p>By Year 15 planting should have reached heights of between 5m – 10m helping to restore the character of the landscape. The newly established roadside planting on the raised road embankments would help restore the backdrop to the landscape type typical of the area to the south of the existing A453.</p> <p>Landscape effects would remain slight adverse in Year 15.</p> <p>Visual impacts: this section would become a less dominant visual feature in the local landscape at Year 15 from Year 0, largely due to the increased screening potential of the roadside planting. Trees and hedgerows would provide some screening of the road from the closest properties to the south, particularly Dowell's Barn, Long Lane Farm and Willow Farm. By Year 15 the proposed A453 scheme was predicted to have similar visual impact from both north and south as existing.</p>	<p>View west from Long Lane overbrid towards M1 J24.</p> <p>As expected the A453 route corridor forms a major feature in the landscape, and for nearby properties e.g. Long Lane Farm (left of view) and Dowells Barn (centre middle distance) views are open at OYA. New hedgerow and planting plots have been implemented and appeared to be establishing. Plots on the Long Lane embankments would benefit from maintenance</p> 
	<p>Long Lane to (and including) Ratcliffe on Soar (ch 1400 to 2600)</p>	<p>View east from Long Lane bridge towards power station. New landscape planting in place which</p>


	<p>Landscape impacts: impacts would be similar to those described in the section above. Replacement hedgerows with trees and woodland planting on the south facing embankments would replace lost vegetation and integrate the road into the landscape. Additional hedgerows would be planted in this section to redefine field boundaries and reconnect existing hedgerows to the west of the River Soar. It was predicted that the resulting magnitude of landscape impact on this road section and SLCA 1 would be minor and overall significance of effect slight adverse in Year 0.</p> <p>By Year 15 planting should have reached heights of between 5m – 10m helping to restore the character of the landscape. The newly established roadside planting on the raised road embankments was expected to help restore the backdrop to the landscape type typical of the area to the south of the existing A453. Landscape effects would remain slight adverse in Year 15.</p> <p>Visual impacts: visual impact upon a number of properties in Ratcliffe on Soar would be significant as the structures would be larger and closer and screening which existed would be lost. The only mitigation at Year 0 would be that the embankments would have been seeded to grass and planted. The new hedgerows and trees would</p>	<p>should in time replace vegetation lost to the scheme.</p>  <p>View towards A453 on embankment from Ratcliffe on Soar with HGVs clearly visible at OYA</p> 
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	<p>however have little visual screening value at Year 0. By Year 15 the proposed A453 scheme would have less visual impact where adjacent embankments have been planted although the flood spans and particularly the bridges would remain more prominent than they had previously been.</p>	
	<p>Ratcliffe on Soar to (and including) West Leake Junction (ch 2600 to 4500)</p> <p>Landscape impacts: the scheme proposed large-scale replacement of the existing planting in this area. Replacement hedgerows with trees and large scale woodland planting around the Parkway Junction would replace the loss of significant areas of plantation woodland here and also in the area north of Winking Hill Farm, to integrate the road into the landscape. Additional hedgerows would be planted to redefine field boundaries and reconnect existing hedgerows to the east of the River Soar. Between the Parkway Junction and West Leake Junction hedgerows with trees to the north and hedgerows to the south will reconnect field boundaries and existing woodland blocks. Extensive woodland planting, hedgerows with trees and open grassland areas will help integrate the slip road cuttings and embankment earthworks into the landscape. It was predicted that the resulting magnitude of landscape impact on this road section and SLCA 1 would be minor and overall significance of effect slight adverse in Year 0.</p>	<p>Parkway Junction on Ash Lane underpass looking towards the power station. Power station security boundary fence to right view.</p>  <p>View below looks west at West Leake junction on slip, new hedgerow planting along highway boundary and woodland planting on embankment slopes. Areas of woodland have been retained although consultee comments from Thrumpton Parish consider that more edge planting could have been saved through more careful planning.</p>

By Year 15 established roadside planting on the raised road embankments, accommodation hedgerows and peripheral areas would restore the backdrop to the landscape type which is currently typical of the area to the south of the existing A453. Although impacts would reduce as the planting integrates the widened road, it was predicted that the resulting landscape effects on this road section and SLCA's 1 & 2 would continue as **slight adverse at Year 15.**

Visual impacts: the only mitigation at Year 0 would be that the embankments had been seeded to grass and planted. It would be critical in this area that loss of existing plantation was minimised, retained areas protected from damage during construction and woodland blocks should be retained as long as possible prior to felling. The new woodland blocks and hedgerows proposed in the scheme will have little visual screening value at Year 0 and the Power Station structures are also likely to have greater dominance in the landscape due to the absence of screen planting. By Year 15 most of this section of the proposed A453 scheme will have similar visual impact from the south as currently exists although the character of Parkway Junction in particular will necessarily remain open and more visible than at present. In good ground conditions, trees should have achieved 5 m to 10 m in height and would provide an element of the screening lost at Year 0.



	<p>This section includes the introduction of 10-12m high lighting columns with single and twin lanterns around the new junctions and along the road. Columns erected along the A453 during development of the East Midlands Parkway Station to the west of the railway will be removed, with some slight improvement in night-time views from Ratcliffe on Soar. Lighting associated with the existing facility at Ratcliffe Power Station is very apparent at night and the proposals were predicted to result in neutral change.</p>	
<p>A453 SLCA 2 - South of A453 Kingston on Soar to Gotham, and north of Ratcliffe Power Station to edge of Thrumpton</p> <p>At the Parkway Junction, woodland planting and hedgerows with trees would be in keeping with this character area, as well as helping to screen the A453 proposals. Also in this area species-rich grassland is proposed to increase the ecological value. Scattered trees would improve the visual amenity of the roundabouts.</p> <p>The character of mixed broadleaf wooded hills, mixed plantations and vegetation cover is retained through the planting of other large blocks of woodland, especially at the West</p>	<p>West Leake Junction to (and including) Thrumpton (chainage 4500 to 5600)</p> <p>Landscape impacts: the open nature of the newly constructed, dualled A453 would adversely affect this landscape character type in the local area. Woodland was prominent from West Leake Junction, the areas adjacent to Barton Lane and both embankments of the existing carriageway in this section. Significant areas of linear roadside planting would be lost as a consequence of the proposal and at Year 0, grassed embankments would be the dominant landscape feature adjacent to the more prominent carriageway. Replacement hedgerows with trees and woodland planting on the roadside embankments and cuttings would start to replace such a loss and integrate the road into the landscape. Additional</p>	<p>Views from Thrumpton NMU overbridge, illustrating new planting and hedges. Looking west - Hillside Cottage out of view to left (below)</p> 

<p>Leake junction. Hedgerows with trees planted within and along the highways boundary link in with the medium scale agricultural hedgerow boundaries.</p> <p>Both the woodland planting and hedgerows with trees combine to link together existing woodland and vegetation. Some off-site hedgerow enhancement is proposed which would further help in achieving this whilst also strengthening wildlife corridors, subject to landowner permission. The planting will be enhanced by ground modelling within the West Leake Junction.</p>	<p>hedgerows would be planted in this section to redefine field boundaries and reconnect existing hedgerows and woodland blocks (at Cottages Hill Spinney). It is predicted that the resulting magnitude of landscape impact on this road section and SLCA 2 would be minor and overall significance of effect slight adverse at Year 0.</p> <p>By Year 15, the maturing planting would restore a more enclosed road which and act as a visual barrier. The planting would help restore the character of the landscape with good hedgerow structure. Although impacts will reduce as the planting integrates the widened road, it is predicted that the resulting landscape effects on this road section and SLCA's 2, 4 & 5 would continue as slight adverse at Year 15.</p> <p>Visual impacts: the Power Station structures will have greater dominance in the landscape of this section also due to the absence of screen planting from visual receptors. The proposed dual carriageway will be closer to Hillside Cottage to the south which will have open views of the scheme. The visual impacts upon properties to the north on Barton Lane were said to be unlikely to be significant because the majority of the proposed development would be to the south of the existing carriageway. The only mitigation at Year 0 would be that the embankments had been seeded to grass and planted. The new hedgerows and trees would have little screening value at</p>	<p>Below view looking east with Glebe Farm in middle distance</p>  <p>View along 'old' Barton Lane near Manor Farm</p> 
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	<p>Year 0. However, the road being in cutting to the north of West Leake Junction would have an immediate impact at year 0, providing some screening.</p> <p>By Year 15 most of this section of the proposed A453 scheme was expected to have similar visual impact from the south as the existing although the character of West Leake Junction in particular would necessarily remain open and more visible. There would also be generally less visual impact from properties to the north on Barton Lane where significant areas of planting enhance the screening effect of retained trees and hedgerows.</p>	
<p>SLCA 3 – Clifton Pasture and Barton Moor</p> <p>The proposed scheme would not pass through this character area. However, concern was raised about the impact of the offline route on this historic landscape. Agreement was reached on the most appropriate form of mitigation to further reduce impacts of this section of the scheme, other than its alignment lower down the ridge of high ground at Brands Hill and Mill Hill than the old A453. These measures are described under SLCA 5 below.</p>		<p>Illustrated in Photomontage 3a comparisons.</p>



<p>SLCA 4 – Trent Washlands and Clifton Edge</p> <p>To reflect the open, while still more intimate character of the adjoining SLCA 5, the retained vegetation and hedgerows would be linked by the planting of new hedgerows and hedgerows with trees within the area between Thrumpton and Barton in Fabis.</p> <p>The hedgerows would be located at the toe of slopes, to enhance existing field boundaries but still keep the area open, and allow for the retention of extensive views. Woodland planting will be concentrated where the highway boundary widens out from the carriageway, for example between the proposed road and Barton Lane, Thrumpton (chainage 5900 – 6150), to aid with screening, and at existing woodland clumps and shelterbelts to provide enhancement, whilst avoiding an alteration to the openness to the area.</p> <p>An area of mitigation for ecological habitat creation will be planted with species-rich grassland to the north of the A453, between chainages 6150 to 6600. This mitigation will again be in keeping with the openness of this character area, whilst</p>	<p>Thrumpton to Manor Road (chainage 5600 to 6600)</p> <p>Landscape impacts: impacts will be concentrated at the area close to Fields Farm and Canterbury House where Barton Lane at the eastern end of Thrumpton will be modified. The start of the offline section moves the carriageway further south thus enabling retention of much of the existing roadside vegetation. However, the widened road will cut through arable fields and it is predicted that the resulting magnitude of landscape impact on this road section and SLCA's 4 & 5 would be minor and overall significance of effects slight adverse at Year 0. By Year 15, planting will integrate the road into the existing character of the landscape and will also reduce the visual prominence of the relatively wide road corridor in this local area (the combination of the start of the offline section and local access road running parallel for a short distance). Impacts would remain as slight adverse at Year 15.</p> <p>Visual impacts: the new four lane route would be located parallel with and only 15 m south of the retained section of the existing A453. This will potentially have the cumulative visual impact of a wider road corridor through the section to Manor Road. The visual impact upon Glebe Farm to the south of the offline section will be significant at Year 0 although this is the only property overlooking the</p>	<p>Looking east along local access road with traffic on the A453 visible to right of view, which creates a wide route corridor.</p> <p>New hedgerows have been planted linking into existing vegetation.</p> <p>Glebe Farm has open views to the scheme and it is suggested visual impacts should be reconsidered at FYA to consider how well planting is becoming established</p> 
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<p>introducing ecological enhancement.</p>	<p>new dual carriageway. By Year 15 planting will have matured to help screen views, in particular from Glebe Farm, and thus reduce the significance of impact.</p>	
<p>SLCA 5 - Clifton Edge and Brands Hill to Gotham Hill</p> <p>The openness of this character area has been respected by minimising planting that might interrupt views and affect the setting of the Clifton Pasture and Barton Moor area to the east. In some areas only hedgerows would be planted, keeping the area open and allowing views to the wider landscape from the A453. Localised clumps of dense roadside woodland planting would respect the landscape and help reintroduce a more enclosed character that once existed here. A substantial area of woodland planting at Barton Lane Underbridge would more than mitigate the impact of the removal of existing vegetation in this area, keeping the character of this Mature Landscape Area intact. Offsite (with landowner agreement) and slope/embankment woodland planting would replace lost vegetation at the Drift</p>	<p>Manor Road to Barton Lane (chainage 6600 to 7700)</p> <p>Landscape impacts: the main landscape impact in this section will arise from the new four lane carriageway which will be located offline and to the south of the existing A453 alignment. The new alignment will pass through agricultural land affecting the character of this local area. Small areas of tree and hedgerow planting would be lost in the area adjacent to the Barton Lane Underbridge where the existing and new carriageways would be in close proximity to each other. Proposed planting around the Barton Lane Underbridge would follow existing field boundaries which would be reinstated to redefine the extent of the Mature Landscape Area (Burrows Farm MLA 127) with woodland planting. The resulting magnitude of landscape impact is predicted to be minor and overall significance of effect slight adverse at Year 0.</p> <p>By Year 15, the maturing planting would visually unite the existing retained woodland of Brandshill Wood on the north side adjacent Barton Lodge and reinforce the extent of the MLA. Although impacts</p>	<p>Looking west from near Barton Lane underpass illustrating route corridor within the relatively open agricultural landscape. New woodland plot in foreground in vicinity of Barton Lane underpass.</p>  <p>POPE is not aware that any offsite planting took place at Drift Lane Plantation</p>


<p>Lane Plantation, reinforcing this landscape feature.</p>	<p>would reduce it is predicted that the effect upon the landscape at Year 15 will remain as slight adverse.</p> <p>Visual impacts: the new four lane route is located parallel with and between 15 m to 60 m south of the retained section of the existing A453. This would potentially have the cumulative visual impact of a wider road corridor where the new and old carriageways are located close together. There would be some loss of existing screen vegetation from the south side of the existing A453 adjacent to Keepers Cottage and Barton Lodge, although this would be minimal. Residents at Top Farm Cottage on Barton Lane would have close open views of the new carriageway. Properties on the south and western edges of Barton in Fabis would have unchanged open views to the existing A453 but visual impacts from the new route would be more limited due to its location farther away from the village, the retained trees and hedgerows and the influence of local topography. By Year 15 the visual impact of this section of the proposed A453 scheme upon Glebe Farm and on Top Farm Cottage and Shepherds Barn on Barton Lane, and adjacent areas to the south, would be less significant due to the visual screening effect of roadside trees and hedgerows.</p>	<p>As expected some individual properties and farms have open views to the scheme and visual impacts should be reconsidered at FYA</p>
	<p>Barton Lane to Clifton, Nottingham City Boundary (chainage 7700 to 9050)</p>	<p>ES Figures 2.5.4 and 2.5.5 illustrated photomontages of views from Nottingham Road looking northwest to the A453 and from the existing A453 looking south, respectively See</p>

	<p>Landscape impacts: the major landscape impact would arise from the new four lane carriageway offline and approximately 250 m to the south of the existing A453 alignment. The new alignment would pass through agricultural land affecting the landscape character of this local area. Small areas of tree and hedgerow planting would be lost in the area between Mill Hill Roundabout and the urban edge of Clifton where the road alignment removed the southern embankment to the existing A453. However, the new route would take vehicles off the ridgeline, and the new roundabout would be in approximately 3 metre-deep cutting, and thus would be less apparent in the landscape. The resulting magnitude of landscape impact on SLCA's 4 & 5 was predicted to be minor and overall significance of effect slight adverse at Year 0.</p> <p>By Year 15, tree planting within hedgerows along the northern boundary would become more apparent in the landscape. The trees along the southern highway boundary would mature to help recreate the more enclosed character of the landscape which once existed in this area. Although impacts would reduce it was predicted that the effect upon the landscape at Year 15 would remain as slight adverse.</p> <p>Visual impacts: In Year 0 the visual impact of the Mill Hill Roundabout would be mitigated by its position below existing ground level and because of its location beneath the crest of the hill</p>	<p>photomontage 2a and 3a in Appendix D which illustrate these sections of the route.</p> <p>New planting has been implemented as expected and visual impacts should be reconsidered at FYA by which time it is likely that planting has begun to become more established</p>
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	<p>above the surrounding receptors including residents of Lark Hill Retirement Village. Mounding and fencing along the north-eastern boundary of Lark Hill would further reduce its impact.</p> <p>Lighting columns would be seen at Year 0. Night-time effects of lighting were predicted to be slight adverse in winter for the residents of Lark Hill Retirement Village. Street lighting would be apparent in the view.</p> <p>The visual impact at Top Farm Cottage was likely to be significant at Year 0 due to the location relative to the scheme and the absence of screening from new tree and shrub planting. The proposed road scheme would be less visually dominant at Year 15 largely due to the increased height and softening effect of the proposed roadside and other mitigation planting. The proposals included extensive tree, hedgerow and woodland planting at the Mill Hill Roundabout and in the area immediately to the north where the new and existing A453 alignments meet. At Year 15, this would extend the 'green' corridor from Clifton out to the Mill Hill Roundabout through a well wooded area. By Year 15 the visual impact on Top Farm Cottage on Barton Lane and adjacent areas to the south would be less significant due to the visual screening effect of roadside trees and hedgerows. Existing views to the south from the A453 would be preserved and the nature of planting along the offline section would ensure that the longer views to East Leake, Ruddington and the</p>	
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	<p>Wolds were not unduly impeded.</p>	
<p>TCA 1 – Clifton Suburbs</p> <p>Boundary treatments of woodland planting and individual trees at the south-western section of this character area would be in keeping with the existing screen planting, keeping this section as a relatively narrow road corridor. The existing semi mature screen planting was said to be substantial enough to provide adequate screening from the proposals in the majority of this area. Some gap planting was proposed to enhance the existing vegetation, as well as providing additional screening on the southern side of the road.</p>	<p>City Boundary to (and including) the Crusader Roundabout (chainage 9050 to 9800)</p> <p>Landscape impacts: comprised townscape character areas TCA 1 & 2, considered more urban to the south of the corridor and suburban to the north of it; largely defined by density of housing which is high to the south but lower and more open to the north. The new road corridor was proposed would have more hard surfacing as a result of the widening but most of the standing vegetation and screen mounding on the north side would be retained. Therefore it was considered that the resulting magnitude of landscape impacts was likely to be minor and overall significance of effects slight adverse at Year 0.</p> <p>There would be little significant landscape change during the 15-year period</p> <p>and resulting effects likely to remain as slight adverse at Year 15.</p> <p>Visual impacts: most of the screening effects would be retained during construction and would mitigate the impact of the new carriageway layout on the receptors. At Year 0 the scheme would rely on the retention of existing trees and hedgerows because any replacement and infill planting would be too immature to fulfil any</p>	<p>A453 looking east with retained vegetation providing a framework to the road</p>  <p>Example of open views for properties in close proximity to A453</p> 

	<p>screening role. The existing road was well screened albeit with considerable seasonal variation. The proposed road scheme was unlikely to be less visually dominant at Year 15 largely due to the increased prominence of the proposed road scheme relative to the areas of peripheral planting as indicated above. Although trees planted could achieve 5 m to 10 m in height and hedgerows would mature, the planting would be limited to infilling gaps in the boundaries.</p>	
<p>TCA 2 – Crusader Roundabout</p> <p>The existing semi-mature screen planting was said to be substantial enough to provide adequate screening from the proposals in this area. The roundabout would benefit from scattered tree and shrub planting, breaking up the central space.</p>	<p>Crusader Roundabout to Green Lane (chainage 9800 to 10000)</p> <p>Landscape impacts: the major landscape impact in this section would arise from the new four lane single carriageway which would extend the impact of the road in what is a narrow landscape corridor largely enclosed on either side by mature trees and hedgerows. The landscape corridor would still be defined by trees and hedgerows from the Crusader Roundabout to the Man of Trent and Clifton Service Station but vegetation opposite these facilities would be removed which would extend the open, ‘green’ urban landscape character in this local area. It was predicted that the resulting magnitude of impacts on the landscape was likely to be minor and overall significance of effects slight adverse at Year 0 on this townscape character area.</p> <p>It was unlikely that the impact of the four-lane single carriageway in the</p>	<p>View towards Crusader roundabout with mature existing vegetation helping to define local character although road space has increased. Environmental barriers are in place (see main noise section)</p> 

	<p>local urban landscape would reduce by Year 15 as the new planting was minimal. The increase in proportion of hard surfacing would increase whilst the adjoining areas of verge and planting areas would decrease. Resulting effects were therefore considered to continue to be slight adverse at Year 15.</p> <p>Visual impacts: the changes to the junction layout at Green Lane would remove approximately 20% of the green space to the east of the Clifton Service Station. The proposed Green Lane/A453 slip road would reduce the distance from the carriageway to residential properties off Green Lane by approximately 30m where views to the proposed scheme would be close and open. A 2.5m high close boarded timber screen fence is proposed adjacent to properties on Morgan Mews and Gavell Close to replace boundary screen fencing and planting. This will provide an effective screen from ground floor rooms and reduce potential impacts. At Year 0 the scheme would rely on the retention of existing trees and hedgerows because any replacement planting will be too immature to fulfil any screening role. The proposed road scheme is unlikely to be less visually dominant at Year 15 largely due to the increased height and thus softening effect of the proposed road scheme relative to the areas of peripheral planting as indicated above.</p>	<p>View towards Green Lane junction from residents' vehicular access road – properties immediately to left of view</p> 
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<p>TCA 3 - Clifton Village – Amenity Open Spaces</p> <p>Scattered trees at the road junction will break up this expansive and bleak character area. This area will be subject to more detailed design to incorporate measures to enhance the Clifton Conservation Area, including hard landscape detailing.</p>	<p>Green Lane to Glapton Lane (Clifton Village) (chainage 10000 to 10200)</p> <p>Landscape impacts: the major landscape impact in this section will arise from the new four lane carriageway which will extend the impact of the road through the southern end of the Clifton Conservation Area. The Conservation Area is characterised by the green wedge which extends for over 400 m both sides of the existing carriageway. The loss of mature trees at the northern end of Glapton Lane will have a significant effect upon this area due to reduction of the green corridor character with the greater influence of hard surfacing and grassed verges. Retention of the mature trees on the northern side of existing road will reduce the effect of the widening on Clifton Village Green. Replacement tree and shrub planting around the road junctions will assist in integrating the scheme. The resulting magnitude of landscape impacts on TCA's 3 & 4 are predicted to be minor and overall significance of effects slight adverse at Year 0.</p> <p>It would be unlikely that the impact of the four-lane layout in the local urban landscape would be significantly reduce by Year 15 largely due to the relatively open character of this local urban A453 Widening M1 Junction 24 to A52 Nottingham landscape area. The proportion of hard surfacing will increase whilst the adjoining areas of green open space will decrease. Although replacement tree planting will be undertaken within the mitigation scheme</p>	<p>View at Green Lane junction with Clifton Conservation Area on far side, mature tree retained at edge of area. Other mature trees have been lost to the scheme and the road corridor is visually dominant in the local character as expected</p> <p>New tree planting has been provided and establishment should be reconsidered at FYA. As noted in the main landscape section, an area of ornamental planting was deleted from the scheme proposals by Highways England</p> 
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	<p>the resulting effects at Year 15 are predicted to remain as slight adverse.</p> <p>Visual impacts: changes to the junction layout at Glapton Lane would remove a number of trees opening up peripheral views across the open space area. At Year 0 the scheme would rely on the retention of existing trees and hedgerows because any replacement planting would be too immature to fulfil any screening role. The proposed road scheme was unlikely to be less visually dominant at Year 15, although proposed mitigation in the form of ornamental tree and shrub planting, bulb planting and hard surface detailing would help to integrate the road into the landscape and thus soften visual impacts.</p>	
<p>TCA 4 – Clifton Village Green</p> <p>A small area which was highway on the northern edge of the A453 would become grass verge as an addition to the Clifton Village Green. As above, the emphasis would be given to detailed design of the road infrastructure and measures to ‘soften’ the impact of the road by, for example, amenity tree and shrub planting.</p>		<p>Clifton Village Green, mature trees and grass verge soften the A453 although it appears that shrub planting was not implemented at OYA</p> 

<p>TCA 5 - Clifton Urban Greenway</p> <p>Existing vegetation would be retained where possible. Road edges would be graded into the existing margins and grassed. There was limited opportunity for replanting through this section other than the extensive offsite planting proposals which had been agreed with the University, and which would enhance the frontage to the campus with new railings, signage, hedges trees and shrubs.</p>	<p>Glapton Lane To Farnborough Road (chainage 10200 to 11000)</p> <p>Landscape impacts: the major landscape impact in this section would arise from the new four lane single carriageway, which would extend the impact of the road between the residential area to the south and the Nottingham Trent University campus to the north. A 20 m belt of mature trees dominated the south side of the proposed carriageway from a point opposite the NTU central pedestrian access to Farnborough Road, which would be retained. The loss of the entire NTU frontage hedgerow would affect the character of this section, diminishing the 'green' corridor effect on the north side exposing the large areas of playing field open space and NTU buildings to the north. The resulting magnitude of impacts on TCA 5 is predicted to be minor and overall significance of effects slight adverse at Year 0.</p> <p>The agreed offsite planting and other improvements to the University frontage will in time enhance this section when compared with the existing 'do-minimum' situation, with adverse effects remaining at slight adverse in Year 15.</p> <p>Visual impacts: the new four lane single carriageway will increase the impact of the road in what is a relatively narrow and green visual corridor. The existing</p>	<p>A453 urban route through Clifton, Nottingham University on right of view below and new frontage including new railings. The loss of the existing hedge has open up views to the University and diminished the green corridor effect.</p> 

	<p>road is relatively enclosed on either side and the consequence of the proposed scheme will be that the visual corridor is extended particularly into the University campus to the north. The changes to the NTU junction layouts and modification to the boundary with railings and planting will change the character of the northern boundary which will remain open at Year 0 because any replacement structure planting will be too immature to fulfil any screening role. The proposed road scheme is likely to be less visually dominant at Year 15 largely due to the increased height and thus softening effect of the replacement planting associated with the proposed road scheme.</p>	<p>Urban section of A453 and University of Nottingham frontage</p> 
	<p>Fabis Drive/Farnborough Road Junction (chainage 11000 to 11400)</p> <p>Landscape impacts: a section of a tree block would be lost from the Farnborough Junction to the west in order to achieve visibility splays from Farnborough Road. Only a few individual trees would be lost on the northern side of the proposed roundabout for similar reasons. The increase in proportion of hard surfacing, widened carriageway and the introduction of the roundabout in this section would have an adverse effect on the character of TCA 5 although the dominance of the existing road reduces the effect of the magnitude of change to minor and overall significance of effects slight adverse at Year 0.</p> <p>The impact of the four lane single carriageway widening</p>	<p>Farnborough Road Junction which is relatively open at OYA, tree planting will take time to become effective visually.</p>  <p>Existing retained railings and mature planting alongside A453</p> 

	<p>and the proposed roundabout in the local urban landscape is predicted to remain the same as slight adverse at Year 15. New planting would be limited and as such maturing vegetation will have little effect.</p> <p>Visual impacts: the existing road was relatively enclosed on the south side but open to the north either side of Fabis Drive. The changes to the junction layout and introduction of the new roundabout would only slightly change the character of this section. At Year 0, the local urban landscape would remain relatively open because any replacement planting would be too immature to fulfil any significant visual role. However, mitigation measures were very limited in this section and thus visual impacts in Year 15 were unlikely to change significantly to those predicted in Year 0.</p>	
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Appendix F. Biodiversity Appendix

The table below is based on information in ES Volume 1 Ecology section Tables 2.4.3 (Potential Indirect Construction Effects on Designated Sites (Connecting Habitats)) and 2.4.5 (Summary of Mitigation Proposals, Potential Impacts and Significance of Residual Effects). ES Table 2.4.5 noted that the residual effect would be the effect likely to occur after implementation of mitigation including establishment of vegetation some 5-10 years after construction.

Ecological Feature	ES Potential Effects	ES Mitigation Proposals and Residual Effect	OYA Evaluation
Designated Sites (Connecting Habitats)			
Clifton Fox Covert Woodland (LNR and SINC): tree line and hedgerow on western side of existing A453 connects the roadside habitats to the SINC	Permanent loss of c. 300m length of connecting hedgerow and trees alongside northbound existing A453 and Fox Covert Lane due to construction of new Fox Covert access road and realigned A453 (Barton Lane) into Clifton. Temporary interruption of habitat corridor alongside A453 during construction phase and until new planting established in c.5 years after completion.	Protection of existing vegetation and planting of new connecting habitats which would support the ecological value as part of the wider ecological network. Neutral. No direct impact. Loss of connecting habits of local significance replaced over time.	As expected habitat connectivity, has been reduced locally in the short term through losses of existing roadside vegetation which has also reduced the screening effect between the road and the designated woodland areas. New planting is in place but it is too soon to provide replacement connectivity and establishment should be reconsidered at FYA
River Soar SINC	Construction of the new Soar bridge and flood span would present a risk of pollution of the River.	As above. There would also be improvements to the local drainage network and attenuation and water pollution control. Neutral. No direct impact.	POPE has not been made aware of any information with regard to pollution incidents and there has been no Consultees feedback which would enable further at OYA. Reconsider at FYA
River Soar SINC: connects to Ratcliffe Cut Canal	Construction of the new canal bridge presents a risk of pollution of the River and/or the Canal.	As above.	As above
Lockington Marshes SSSI: a drainage ditch to north of March Covert drains towards the SSSI	Construction of the new carriageway would present a potential risk of pollution of the drainage network and the downstream SSSI.	As above. (ES expected that as the SSSI is approximately 0.8km downstream of the scheme, the ditches would dry up in summer months	Scheme drainage is in place and POPE has no information which would indicate that there have been any impacts on the SSSI as a result of the scheme. Reconsider at FYA.

		when runoff concentration would be greatest, and therefore it was unlikely that Lockington Marsh would be significantly impacted by runoff discharges as pollutants would settle out or not reach the marsh).	
Barton in Fabis Fish Ponds SINC; drainage ditch connects roadside drains to SINC	Construction of the new carriageway presents a potential risk of pollution of the drainage network and the downstream SINC.	As above	POPE has not been made aware of any information with regard to pollution incidents and there has been no Consultees feedback which would enable POPE to comment further at OYA.
Pond, Ratcliffe on Soar (SINC): woodland around pond on power station land	The proposed Non-motorised User (NMU) route (footpath/cycleway) would pass through this woodland and may require limited pruning of mature/dead trees for safety reasons.	Effects were considered extremely unlikely to affect integrity of the SINC site due to the low value of the SINC and small magnitude and extent of effects. Mature/dead trees would be retained. No significant effects were anticipated Neutral. No direct impact.	POPE has no specific information relating to any effects of the scheme on this SINC. The NMU route passes at the edge of the woodland set back from the A453 and it appears that generally existing vegetation has been retained.
Fairham Brook SINC: Nethergate Stream in Clifton connects to SINC	Construction of the new carriageway and Clifton Green Junction presented a potential risk of pollution of the drainage network and the downstream SINC.	Effects were considered extremely unlikely to affect integrity of the SINC site due to the low value of SINC. Accidental spillage could adversely impact on the Fairham Brook SINC but would be controlled by mitigation. Neutral. No direct impact.	Based on the information available including as built plans it would appear that improved drainage measures have been incorporated as expected including pollution prevention measures. POPE has no information relating to any pollution incidents.
Species			
Otter	Temporary and probably insignificant disturbance effects of up to one year on otter movements along	Best practice pollution control measures. Maintenance of	No information has been made available regarding any impacts on Otter during the construction period or whether the artificial otter holt

	<p>the River Soar due to bridge construction operations.</p> <p>Minor risk of obstruction of River Soar corridor and pollution of River Soar, River Trent or tributaries but controlled by mitigation.</p>	<p>access along River Soar; Monitoring to detect changes in activity or new holts in proximity to the scheme.</p> <p>Subject to landowner consent provision of artificial otter holt.</p> <p>Mammal underpasses would be incorporated including C6 designed as a box culvert (>900mm in width) to include a 500mm mammal ledge in order to minimise the barrier effect of the A453, with two further cylindrical culverts (C7 and C8) of diameter 1050mm and 1200mm respectively.</p> <p>Neutral impact</p>	<p>was provided (it was to be more than 50m from the highway boundary and the location chosen to provide adequate shelter and protection from disturbance from human activity).</p> <p>Mammal underpasses have been incorporated into the scheme although it was noted at OYA that fencing might not be aligned to allow animals to exit into adjacent countryside see main biodiversity section.</p> <p>Not all mammal tunnels were visited at OYA but based on observation where possible and the set of As Built Wildlife Underpass drawings it is likely that C6, C7 and C8 tunnels are maximum 600mm diameter and at C6 a separate tunnel has been constructed alongside the culvert which may not now incorporate a mammal ledge. As no construction or post opening survey/monitoring information has been made available POPE cannot comment further on effects on the local otter population or effectiveness of mitigation.</p> <p>Reconsidered at FYA</p>
Water Vole	<p>Loss of habitat, risk of direct harm and increased habitat fragmentation offset by mitigation measures including habitat creation</p>	<p>Best practice pollution control measures. Creation of new habitats; transfer of water vole to receptor area and population monitoring; creation of suitable habitat within new drainage network including culverts with mammal shelves.</p> <p>Moderate beneficial in the medium to long term</p>	<p>Based on the as built information it would appear that habitat creation areas have been provided, including vegetated ditches linking into Pond M. POPE has no information relating to any water vole translocation which may have been required. Comments for culverts as above.</p> <p>No survey/monitoring information provided so POPE cannot comment further.</p> <p>Reconsider at FYA</p>
Bats	<p>Indirect impacts on B5 flood span roost during construction & maintenance due to noise, lighting and</p>	<p>Timing of work to avoid most sensitive periods. Licence from NE would specify acceptable working</p>	<p>POPE has no information relating to any impacts of the scheme on bats or whether mitigation measures have been provided / are effective.</p>

	<p>obstruction of access. Loss of vegetation important for foraging and commuting. Increased risk of collision with traffic. Additional lighting. Offset by mitigation measures</p>	<p>methods. Maintenance of access to B5 roosts at all times. Provision of bat roost boxes along the river/canal corridor (subject to landowner consent). Retention of existing vegetation which could support bats. New planting to enhance habitat continuity, provide wetland and grassland foraging and provide fly routes over or under the road. Lighting would be limited to main junctions within the rural section.</p> <p>Neutral impacts.</p>	<p>Lighting has been limited to the junctions in the rural section as expected.</p> <p>Habitat creation including seasonally wet /areas of standing water and new landscape planting have been implemented.</p> <p>Planting is not established at this OYA stage sufficient to guide bats over/under the A453 – the ecological design included tall planting for this purpose. However, the landscape as built drawings make no reference to ‘tall planting’ (which would have acted as a reminder to ensure that management long term respected the ecological mitigation proposals), nor do the specific areas identified on the ecology design include the Environmental Objective Designation of EOE (Nature Conservation and Biodiversity). Generally, the hedges do not seem to include taller or larger size species; with adjacent plots often shrubs. One tall planting location (hedge north of West Leake junction) notes ‘no feathered trees proposed within hedgerow due to close proximity of proposed underground 132kV powerlines’.</p> <p>Reconsider effects on bats at FYA.</p>
<p>Badger</p>	<p>Disturbance to badger setts and potential loss of outlier setts.</p> <p>Increased risk of collision with traffic. Offset by mitigation measures.</p>	<p>Licensed disturbance and provision of artificial setts where necessary. Provision of underpasses and badger fencing along much of proposed scheme.</p> <p>Slight beneficial at local level</p>	<p>Underpasses at Cattle Creep, Ash Lane have been maintained as accessible routes for badger under the A453 as expected; the new accommodation underpass at Barton Lane is also available as is the extended NMU overbridge at Thrumpton.</p> <p>As built drawings indicate that mammal tunnels have been included and seem to be 600mm diameter - comments on otter section above.</p> <p>Badger fencing has been provided – based on the H&S File it is understood that whilst maintenance of badger fencing is the responsibility of Highways England NDD, the maintenance of the post and four rail fencing to which badge</p>

			<p>fencing is the responsibility of the landowner and that it is Highways England's intention to pass the maintenance obligation for the badger fencing on to the landowner (to be formalised in the individual land agreements with each landowner).</p> <p>No information regarding badgers has been made available to POPE at OYA and effects should be reconsidered at FYA.</p>
Brown Hare	Loss of arable habitat and risk of collision with traffic reduced by mitigation measures	<p>Badger fencing will reduce risk of hares attempting to cross the road.</p> <p>Neutral</p>	Badger fencing in place, however, POPE has no information available to comment further.
Barn Owl	Increased risk of collision with traffic and loss of grassland habitats supporting prey, offset by mitigation measures	<p>Avoidance of open grassland habitats on verges and tall planting on roadside habitats to direct flight over traffic. Provision of nest boxes away from the road (subject to landowner consent).</p> <p>Neutral.</p>	Planting is not established enough at OYA to direct flight away from traffic and this aspect should be reconsidered at FYA. POPE is not aware whether nest boxes have been provided or whether the scheme has had any impact on barn owl mortality.
Breeding Birds	Loss of nesting, shelter and foraging habitat and direct harm to birds during construction. Risk of collision with traffic during operation. Offset by mitigation measures.	<p>Timing of work to avoid nesting birds. New hedgerows and roadside planting will benefit these species; tall planting will encourage birds to cross above vehicle height but risk of collision could not be completely avoided. Noise impacts reduced through use of low noise surfacing but some unavoidable effects will remain.</p> <p>Neutral</p>	Replacement planting, including hedgerows and habitat creation areas associated with ponds, has been implemented which should in time provide suitable habitat for birds subject to continued successful establishment.
Amphibians, Reptiles & Invertebrates	No loss of breeding habitats. Some loss of terrestrial habitats and connectivity.	Increase in suitable terrestrial habitat. Small risk of collision with traffic did not justify specialist	No information relating to amphibians, reptiles or invertebrates during or post construction has been made available to POPE, it is not

		fencing, but this would be provided if surveys prior to construction discovered more species. Neutral.	possible for POPE to comment further at OYA. Reconsider at FYA
Lowland Meadow	No losses or degradation due to road construction and operation.	New verges and other habitat areas will include species-rich grassland managed to promote botanical diversity. Slight beneficial at local level	The scheme has included areas of species rich and wet grassland. POPE has no information on the current status of botanical diversity. This aspect could be reconsidered at FYA, although POPE is not aware that survey / monitoring was a scheme requirement.
Species Rich Hedgerows	No losses or degradation due to road construction and operation.	Species rich hedgerows would be protected during construction. New hedgerow planting would increase this resource in the locality. Slight beneficial at local level	The species rich hedgerow near the West Leak junction has been retained. New hedgerow planting has been implemented , establishment should be reconsidered at FYA
Other Habitats & Species (hedgerows, plantation woodlands, scrub and associated bird, mammal and invertebrate assemblages)	Losses due to construction would be predominantly arable land and existing roadside verge and plantation habitats as well as species-poor hedgerows. Wider carriageway and increased traffic levels would increase risk of mortality, particularly of birds and an increased barrier to small mammal populations. No other operational effects anticipated. Impacts compensated by mitigation proposals	New planting as it matures and habitat creation would replace losses and increase the overall resource of woodland, hedgerow, scrub, ponds and species-rich grassland. Increases in area would offset fragmentation of the wider carriageway and in the medium to long term improve linkage along the road corridor. Slight beneficial at local level	New planting and habitat creation areas have been incorporated into the scheme and should in time replace the habitats lost to the scheme as well as providing connectivity along the route corridor and with the wider countryside.

Appendix G. Glossary

AADT	Annual Average Daily Traffic. 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	Average Daily Traffic. Average daily flows across a given period.
AQMA	Air Quality Management Area.
AST	Appraisal Summary Table. 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	Automatic Traffic Count
AAWT	Annual Average Weekday Traffic. As AADT but for five days (Monday to Friday) only.
AQ	Air Quality
AQO	Air Quality Objectives
AWCS	Archaeological Works Completion Statement
AWT	Average Weekday Traffic. As ADT but for five days (Monday to Friday) only.
BCR	Benefit Cost Ratio. This is the ratio of benefits to costs when both are expressed in terms of present value i.e. PVB divided by PVC.
BS EN 1794-2	British Standard – Road Traffic Noise Reducing Devices
Bvkm	Billion Vehicle Kilometres
CCS	Considerate constructors scheme
CCTV	Closed Circuit Television
CDM	Construction Design Management
CEEQUAL	The evidence based sustainability assessment and awards scheme for civil engineering.
CEMP	Construction environmental management plan
CO ₂	Carbon dioxide
COBA	Cost Benefit Analysis. 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 accidents), and expresses the results in terms of a monetary

	valuation. The COBA model uses the fixed trip matrix unless it is being used in Accident-only mode.
Counterfactual	The use of an identified wider trend to establish a revised base for comparison.
Chi Square test	A statistical hypothesis test
CRF	Congestion Reference Flow
CWS	Country Wildlife Site
dB	Decibel, measurement of noise levels.
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and DEMand Modelling is a piece of software designed to enable the easier set up of variable demand models
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	Do Minimum. In scheme modelling, this is the scenario which comprises the existing road network plus improvement schemes that have already been committed.
DMRB	Design Manual for Roads and Bridges
DN	Do Nothing In scheme modelling, this is the scenario which comprises the existing road network.
DS	Do Something. In scheme modelling, this is the scenario detailing the planned scheme plus improvement schemes that have already been committed.
D2AP	Dual two-lane all purpose standard
EA	Environment Agency
EAR	Environmental Assessment Report
EH	English Heritage
EHS	Extra Heavy Standard
EIA	Environmental Impact Assessment
ES	Environmental Statement

EST	Evaluation Summary Table. In POPE studies, this is a summary of the evaluations of the TAG objectives using a similar format to the forecasts in the AST.
FWI	Fatalities and Weighted Injuries
FYA	Five Years After
GCN	Great crested newt
GSJ	Grade Separated Junction
HA	Highways Agency. An Executive Agency of the DfT, responsible for operating, maintaining and improving the strategic road network in England until April 2015. Now replaced by Highways England.
ha	Hectare
HE	Historic England
HCMP	Habitat Creation Management Plan
HEMP	Handover environmental management plan
HGV	Heavy Goods Vehicle
KSI	Killed or Seriously Injured. KSI is the proportion of casualties who are killed or seriously injured and is used as a measure of collision severity.
L _{a10 18h}	Noise level exceeded 10% of the time, over an 18 hour measurement period.
L _{aeq}	Equivalent continuous noise level
LBTS	Linear Belts of Trees and Shrubs
LCA	Landscape character area
LEAP	Landscape Environmental Management Plan
LLFA	Lead Local Flood Authority
LNS	Low Noise Surfacing
MAA	Maintenance Access Area
MAC	Managing Area Contractor Organisation normally contracted in 5-year terms for undertaking the management of the road network within a HA area.
Mph	Miles per hour
MVKM	Million Vehicle Kilometres
NATA	New Approach to Appraisal. The basis of the standard DfT appraisal approach when this scheme was appraised.
NCC	Nottinghamshire County Council

NE	Natural England
NET2	Nottingham Express Transit Phase 2 – Expansion plans. New route and park and ride built at Clifton and in Beeston.
NMA	Network Managing Agent
NMU	Non-Motorised User. A generic term covering pedestrians, cyclists and equestrians.
NO ₂	Nitrogen Oxide
NRTF	National Road Traffic Forecasts. 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	National Transport Model
NTEM	National Trip End Model
NTS	National Travel Survey
NTU	Nottingham Trent University
NWT	Nottinghamshire Wildlife Trust
ONS	Office for National Statistics
Outturn	Actual
OYA	One Year After
PCF	Project Control Framework – providing a robust and clearly structured process for the management and delivery of Highways England schemes.
PCD	Pollutant Containment Devices
PIC	Personal Injury Collisions
PM ₁₀	Particulate matter less than 10 micrometres in size
POPE	Post Opening Project Evaluation. The before and after monitoring of all major highway schemes in England.
Present Value	Present Value. 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	Public right of way
PVB	Present Value Benefits. Value of a stream of benefits accruing over the appraisal period of a scheme expressed in the value of a present value.
PVC	Present Value Costs. As for PVB but for a stream of costs associated with a project

RBC	Rushcliffe Borough Council
RoSPA	Royal Society for the Prevention of Accidents
RSPB	Royal Society for the Protection of Birds
RSI	Road Surface Influence
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SATURN	Congested Highway Assignment Software
SDI	Social and Distributional Impacts
SINC	Site of Importance for Nature Conservation
SLCA	Scheme Landscape Character Area
SM	Scheduled Monument
SPA	Special Protection Area
SPZ	Special Protection Zone
SRFI	Strategic Rail Freight Interchange
SSSI	Site of Special Scientific Interest
STATS19	A database of injury collision statistics recorded by police officers attending collisions.
TAR	Transport Appraisal Report
TCA	Townscape Character Area
TEE	Transport Economic Efficiency
TEMPRO	Trip End Model Program. 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.
TFEUR	Traffic Forecasting and Economics Update Report
TIS	Traffic Impact Study
TP	Thrumpton Parish
Trunk Roads	Are major roads part of the Strategic Road Network
TUBA	Transport User Benefit Appraisal
UK	United Kingdom

VISUM	Modelling Software
vpd	Vehicles per day
VMS	Variable Message Sign
VOC	Vehicle Operating Costs are the costs that vary with vehicle use, for example fuel, tyres, maintenance costs, vehicle depreciation etc.
WebTAG	DfT's website for guidance on the conduct of transport studies at http://www.webtag.org.uk/
WebTRIS	WebTRIS Database holding information on traffic flows at sites on the strategic network.

Appendix H. Tables and Figures in this Report

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