A614 / A6097 Major Road Network Improvement Scheme

Options Assessment Report

Report Number: 60595614/OAR

May 2019

Quality information

Prepared by	Checked by	Verified by	Approved by
AECOM with inputs from VIA East Midlands	Daniel Godfrey Associate Director	David Elliott Associate Director	Adam Hall Associate Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
Draft V1	01/05/19	1st Draft	AH	Adam Hall	Associate Director
Draft V2	24/05/19	2nd Draft	AH	Adam Hall	Associate Director
Draft V3	28/05/19	3rd Draft	AH	Adam Hall	Associate Director
FINAL	29/05/19	FINAL	AH	Adam Hall	Associate Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name
0	Yes	Nottinghamshire County Council
0	YES	VIA East Midlands Limited

Prepared for:

Nottinghamshire County Council

Prepared by:

Daniel Godfrey
Associate Director

AECOM Infrastructure and Environment UK Limited
Royal Court
Basil Close
Derbyshire
Chesterfield
S41 7SL
UK

T: +44 (1246) 218366
aecom.com

Table of Contents

Figures

Tables

1. Introduction

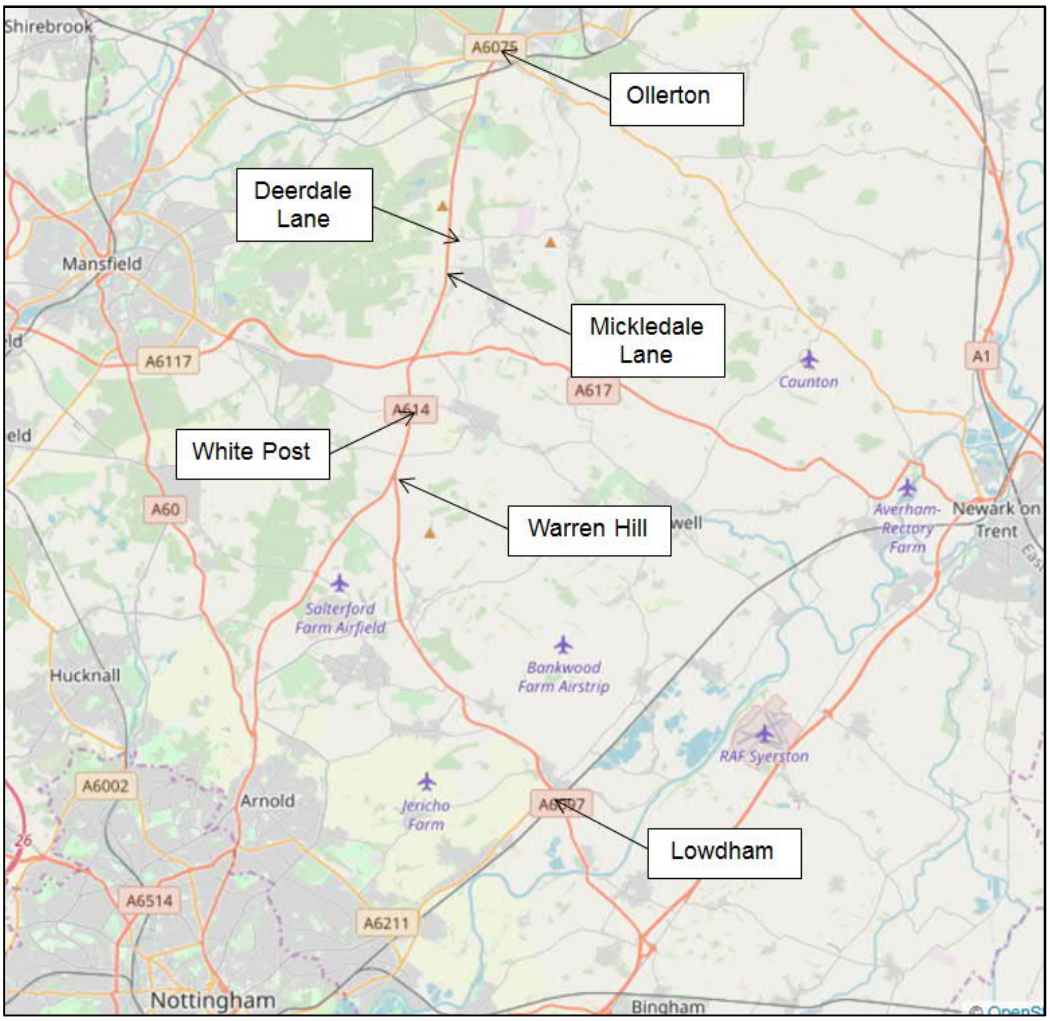
Background

1.1 Nottinghamshire County Council (NCC) is promoting junction improvements at six key locations on the A614 – A6097 corridor as a single scheme package. These junctions are:

- A614 / A616 / A6075 roundabout (hereafter referred to as the Ollerton roundabout);
- A614 / Eakring Road / Deerdale Lane crossroads (hereafter referred to as Deerdale Lane);
- A614 / Mickledale Lane crossroads (hereafter referred to as Mickledale Lane);
- A614 / Mansfield Road roundabout (hereafter referred to as the White Post roundabout);
- A614 / A6097 junction priority junction (hereafter referred to as the Warren Hill junction); and
- A6097 / A612 Nottingham Road / Southwell Road roundabout (hereafter referred to as the Lowdham Roundabout).

1.2 The locations of the junctions are shown in Figure 1.1

Figure 1.1: Junction Locations



Purpose of Report

1.3 This OAR has been prepared in accordance with Transport Analysis Guidance (TAG) Transport Appraisal Process, May 2018, which sets out the stages for Option Development and the TAG Transport Appraisal Guidance for Technical Project Managers, May 2018, which provides an outline of the OAR requirements.

1.4 TAG sets out the three stages of the Transport Appraisal Process:

Stage 1 – Option Development

Stage 2 – Further Appraisal

Stage 3 – Implementation, Monitoring and Evaluation.

1.5 The A614 / A6097 Improvement Scheme is in Stage 1 of the Transport Appraisal Process.

1.6 The purpose of this Options Assessment Report (OAR) is to report on the Option Development at each junction. Constraints and opportunities have been identified in respect of engineering feasibility (including cost), environmental factors and traffic flows.

1.7 The Option Development process is summarised below with reference to the relevant sections of this OAR:

- Step 1 – Understanding the Current Situation;
- Step 2 – Understanding the Future Situation;
- Step 3 – Establishing the Need for Intervention;
- Step 4 – Identifying Scheme Objectives;
- Step 5 – Generating Options;
- Step 6 – Initial Sifting;
- Step 7 - Development and Assessment of Potential Options;
- Step 8 – Produce Option Assessment Report; and
- Step 9 – Define Modelling and Appraisal Methodology.

Report Structure

1.8 This Options Assessment Report details the work undertaken in the Option Development process. The report is structured in the following format:

- **Section 1 - Introduction –** presents the methodology overview, a summary of the current situation (Step 1), a summary of the future situation (Step 2), the requirement for the scheme (Step 3) and sets the scheme objectives (Step 4);
- **Section 2 - Planning Policy –** discusses the suitability of the scheme in a local and national planning policy context (Step 2)
- **Section 3 to Section 8 –** report on the likely traffic, environmental and engineering issues at each junction (Step 2) and identifies possible constraints and opportunities associated with an improvement scheme.
- **Section 9 – Initial Option Assessment –** considers a wide ranging review of potential options (Step 5) at each junctions and undertakes and initial sifting exercise (Step 6).
- **Section 10 – Option Development –** development and assessment of options taken forward from the initial sifting exercise (Step 7), concluding in a preferred option at each junction.
- **Section 11 – Traffic and Economic Appraisal** – presents a summary of the economic appraisal of the combined package of improvements.

- **Section 12 – Future Considerations –** sets out the future considerations to be addressed and considered (Step 9) as the scheme progresses into Stage 2 of the Transport Appraisal Process.
- **Section 13 – Key Findings and Recommendations -** A summary of Option Development work presented.

Understanding the Current Situation

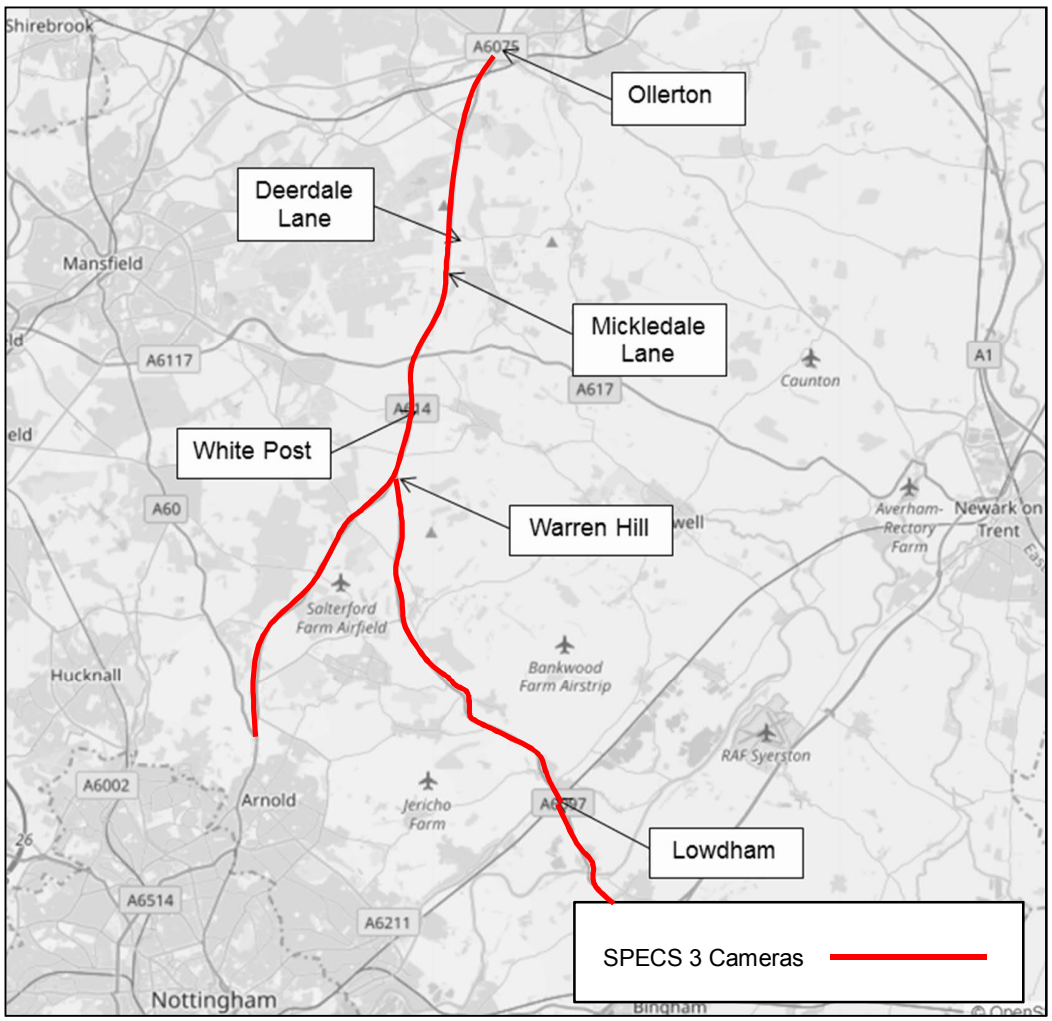
1.9 **Route Character:** The A614 is an important north-south route from Retford towards north Nottingham, with the A6097 providing a spur from the A614 to the A46 (which is a trunk road linking Leicester with Newark and Lincoln). Between the study area junctions, the A614 is a two-way single carriageway. The A6097 is a two-way single carriageway which becomes a dual carriageway through Lowdham.

1.10 The route was designated part of the Major Road Network in October 2018, a middle tier of the country's busiest and most economically important local authority A roads, sitting between the Strategic Road Network (SRN) and the rest of the local road network.

1.11 Geographically, the route sits between the A1 to the east and M1 to the west and forms a north-south route through the centre of Nottinghamshire. The route regularly acts as a diversion or alternative route during major works or incidents on the SRN.

1.12 The route previously had a poor accident record and was subjected to a major safety improvement scheme in 2012 with the route subject to a 50mph speed limit. An average speed camera system is in place on the A614 and the A6097 to enforce the speed limit (see Figure 1.2), with monitoring by pairs of SPECS 3 time-over-distance cameras which calculate the average speed of vehicles travelling in both directions. The cameras cover the A614 from Leapool Island (junction A60) to Ollerton (junction A616) and between Warren Hill (A614/A6097) and East Bridgford. The installation of the lower speed limit and safety cameras saw a reduction in the number of collisions along the route, although there is still a local perception that the route is unsafe, particularly when accessing the A614 from the side road priority junctions.

Figure 1.2 Average Speed Enforcement Area



1.13 At its northern end, the A614 serves a number of tourist attractions including: Rufford Abbey, Centre Parcs, Sherwood Pines Forest Park, Go Ape, Sherwood Forest Country Park, White Post Farm and Robin Hood's Wheelgate Family Theme Park. Indeed, within NCC's recently approved Visitor Economy Strategy (2018 – 2029), the A614 is identified as being a Key Development Project to:

- strengthen the sense of place for visitors along A614 – take advantage of investment along this growth corridor to:
  - use latest technology to create high quality, well-signed visitor route that welcomes you to the County and to Sherwood Forest; and
  - create visitor friendly bus route from Nottingham City to Sherwood Forest using existing services and Sherwood livery buses.

1.14 As such, the A614 serves a dual-economic function: facilitating regular commuter trips and local movements, and also being an important corridor for the tourist economy which will grow in future. In keeping with this, NCC has improved other junctions on the A614 route in recent years, as follows:

- the A614 / B6034 (Rose Cottage) junction was upgraded from a priority T-junction to a signalised junction with works complete in February 2013.
- the A614 / A617 roundabout junction was enlarged in September 2013.

1.15 The proposed scheme seeks to continue the strategic development of the corridor to both accommodate and facilitate economic growth. In terms of the existing arrangements at the individual junctions comprising the proposed scheme:

- **Ollerton Roundabout:** This is a six-arm standard roundabout with an Inscribed Circle Diameter (ICD) of 37.5m. One of the approach arms was made bus-only in 2010. A McDonalds restaurant and a fish restaurant (The Big Fish) have been built to the immediate south of the junction. A public house was constructed to the west of the junction in 2015. Further detail on the existing conditions at this junction is provided in Section 3; however, the Ollerton roundabout is considered to be a capacity restraint which has resulted in limits on nearby planning applications.
- **Deerdale Lane:** This is a priority crossroads with right-turn harbourages provided into each of the minor arms. Further detail on the existing conditions at this junction is provided in Section 4; however, a key concern at this location is the ability of minor-arm traffic to safely judge gaps when entering the A614 and to do so without undue delay.
- **Mickledale Lane:** This is a priority crossroads with right-turn harbourages provided into each of the minor arms. Two houses occupy the south-east corner of the junction, and a transport café is in the north-west quadrant. Further detail on the existing conditions at this junction is provided in Section 5; however, a key concern at this location is the ability of minor-arm traffic to safely judge gaps when entering the A614 and to do so without undue delay.
- **White Post Roundabout:** This is a four-arm standard roundabout with an ICD of 36m. Development is located in close proximity to the junction on all sides. Further detail on the existing conditions at this junction is provided in Section 6.
- **Warren Hill:** This is a priority controlled gyratory junction where traffic on the A6097 gives way to traffic travelling north / south on the A614. The junction layout is unusual in that traffic from the A6097 (routeing north) merging onto the A614 does so by entering the main stream on the passenger side (rather than the normal drivers side). This unusual arrangement creates a perception that the junction is unsafe. Further detail on the existing conditions at this junction is provided in Section 7.
- **Lowdham Roundabout:** This is a four-arm standard roundabout with an ICD of 42m. The A6097 entering the junction from the north and south are both of dual-carriageway standards. Further detail on the existing conditions at this junction is provided in Section 8; however, the Lowdham roundabout is considered to be a capacity restraint which has resulted in limits on nearby planning applications

1.16 A detailed examination of each location is provided within Sections 3 to 8.

Understanding the Future Situation

1.17 There are no programmed highway schemes along the A614/A6097 corridor. Improvements to the A614 – A6097 corridor are required to accommodate traffic growth in future years. For the purposes of design and subsequent economic analysis, this has been estimated from two main sources:

- a list of known land-use developments within the catchment of the corridor has been identified in liaison with NCC. Traffic information has been extracted from the Transport Assessments submitted alongside each development's planning application. The developments included were:
  - Newark & Sherwood District Council:
    - Land north of Petersmith Drive;
    - Thoresby Colliery;
    - Land East of Eakring Road (Bilsthorpe Village);
    - Kirklington Road (Bilsthorpe Village);
    - Oldbridge Way (Bilsthorpe Village);
  - Rushcliffe Borough Council:
    - Land at the former RAF Newton;
    - Chapel lane, Bingham;
  - Gedling Borough Council:
    - Park Road, Calverton;
    - Land at Teal Close;
    - Land at Chase Farm (Former Gedling Colliery);
- the Department for Transport's (DfT) National Trip End Model (NTEM) has been examined to identify the total volume of growth likely to the forecast design year. This has then been used to supplement the growth to the values identified in NTEM.

1.18 A summary of the schemes context with the national and local planning policy is presented in Section 2.

1.19 More detail regarding the future year traffic forecasting methodology is included in the Traffic and Economic Assessment Report, ref: 60595614/EAR, April 2019

Establishing the Need for Intervention

1.20 The Strategic Case for the scheme is to enable and support:

- **Improved Journey Times and Reliability –** There are regularly journey time delays at Ollerton and Lowdham roundabouts leading to extensive queuing and delays. Assessments of the scheme junctions has identified that there is also likely to be journey time delays in future years at other scheme junctions.

  There is a local perception that it is very difficult to access the A614, particularly from Deerdale Lane and Mickledale Lane in Bilsthorpe. There are observed large delays (rather than large queues) and anecdotal reports of even greater delays occurring, as joining traffic waits for suitable gaps in the A614 traffic before joining, with future growth likely to exacerbate this.

  Capacity improvements to the scheme junctions will improve journey times, lessen delays and improve journey time reliability.

- **Network Resilience** – The Midlands Connect Strategy: Powering the Midlands Engine (March 2017), identifies that a 'Resiliently Connected' network will encourage productivity and provide a reliable road network; reducing costs to businesses. The Derby, Derbyshire, Nottingham and

Nottinghamshire LEP (D2N2) has lower than average economic productivity when compared to the regional average.

The A614/A6097 forms an alternative north-south route to the A1 and M1 through the centre of Nottinghamshire, particularly during incidents or major roadworks. The A6097 between the A46 and A6097/A612 forms a designated diversion route to the A52. The A614 to the north of Ollerton Roundabout is part of a designated diversion route, along with the A616, for the A1.

Capacity improvements to the A614/A6097 corridor will support the Strategic Road Network by adding resilience to the highway network which will boost productivity and reduce costs to businesses

- **Economic Growth** – Additional capacity along the A614/A6097 corridor will drive economic growth by facilitating housing growth and creating jobs. A number of development sites along the A614/A6097 have planning conditions attached to the improvements of Ollerton and Lowdham roundabouts. Improvements at these junctions would enable 1,330 dwellings and 24,281m^2 of employment, stimulating economic growth.
- **Connectivity** - The Midlands Connect Strategy: Powering the Midlands Engine (March 2017), identifies Nottingham as a strategic Economic Hub which employs over 75,000 people in the business services sector and contributes £4 billion to the local economy. The Strategy identifies that in order to achieve ambitions of high quality end-to-end journeys, further intervention is required on the local and sub-regional networks too, rather than just the Strategic Road Network.

  Removing journey time delays and improving journey time reliability along the A614/A6097 corridor will improve connectivity to Nottingham. Particularly the capacity improvement at the A6097/A612 Lowdham roundabout, as the A612 is a key route into Nottingham from the east which currently experiences journey time delays. These improvements support The Midlands Connect Strategy outcome 'Regionally Connected: Powering the East Midlands Engine' by improving access to markets, supply chains and labour markets.

Scheme Objectives

1.21 The objectives of the package of junction improvements are aligned closely with the objectives set out in the MRN programme to:

- Reduce congestion;
- Support economic growth and housing delivery;
- Support the Strategic Road Network;
- Reducing journey time delays, particularly at peak periods; and
- Supporting all road users.

1.22 The focus at Ollerton and Lowdham is to reduce journey time delays. The focus at Deerdale Lane, Mickledale Lane, Warren Hill and White Post is to improve access from the side roads, improving road safety. The scheme is also intended to facilitate trips from future land-use development which are likely to route along the corridor and enable economic growth. The improvements along the route will add resilience to the route which will help support the SRN during major works or incidents.

2. Planning Context

Introduction

2.1 The purpose of this section is to identify the planning policy context within which the junction improvements will be taken forward. It considers policy at both a national and local level.

National Planning Policy Framework, 2019

2.2 The NPPF (February 2019) sets out the Government's planning policies for England and provides a framework to develop localised planning strategies. Paragraphs 108 to 111 set out the Government's development planning policies with respect to transport. These paragraphs emphasise the promotion of sustainable transport, although it is noted that the main focus of NPPF is on land-use planning applications rather than road schemes.

2.3 NPPF states that when considering planning applications for development, it should be ensured that:

- appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;
- safe and suitable access to the site can be achieved for all users; and
- any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.

109. Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

110. Within this context, applications for development should:

- give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;
- address the needs of people with disabilities and reduced mobility in relation to all modes of transport;
- create places that are safe, secure and attractive – which minimise the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards; · allow for the efficient delivery of goods, and access by service and emergency vehicles; and
- be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.

2.4 The key policy test in the NPPF, therefore, is that transport impacts are not 'severe'. This is confirmed by the Planning Policy Guidance (PPG) portal which states that, where the residual transport impacts of a proposed development are likely to be 'severe', this may be a reason for refusal, in accordance with NPPF.

Major Road Network

2.5 As part of the Transport Investment Strategy, the government has committed to creating a Major Road Network (MRN), which identified important national routes below the level of Strategic / Trunk Road network (managed by Highways England).

2.6 The MRN will help:

- reduce congestion;
- support economic growth and rebalancing;
- support housing delivery;
- support all road users; and
- support the Strategic Road Network.

2.7 The MRN will also allow for dedicated funding from the National Roads Fund to be used to improve the middle tier of our busiest and most economically important local authority 'A' roads. The current MRN includes both the A614 and A6097. As such, improvement of the corridor is consistent with current Government thinking on the improvement of important national 'A' roads.

Figure 2.1: Nottinghamshire Major Road Network

(Source: http://maps.dft.gov.uk/major-road-network-consultation/)

Newark and Sherwood Local Plan: Adopted Core Strategy 2011-2026

2.8 The proposed scheme is located within the district of Newark and Sherwood.

2.9 The planning application would be determined by Nottinghamshire County Council. However, as the scheme lies within the Newark and Sherwood District Council (NSDC) administrative area, NSDC would be a consultee. A key policy document used by NSDC is the Adopted Core Strategy (March 2011). This document sets out the big issues that the council and the public and private sector partners need to address over the next twenty years in the district. It sets a vision and objectives and a number of policies to help deliver the development and change identified.Para 4.48 of the Adopted Core Strategy states that:

> …"*in order to gain a clear and up to date assessment of Transport issues within the District, the Council commissioned a study by WYG in 2009. This showed that:*
>
> *Improvements to the A614 / A6075 / A616 Ollerton Roundabout junction will be required to accommodate any additional growth in the north west of the District or significant growth elsewhere; and*
>
> *Strategic highway infrastructure improvements will be required at various locations on the rural highway network within the District.*
>
> *Information from this study, including the need and potential for highway and public transport infrastructure has been incorporated into the District Council's Infrastructure Delivery Plan. The District Council will work with the Highways Agency, Nottinghamshire County Council, developers and other agencies to ensure delivery of the highway and public transport infrastructure required to support growth within the District. The Strategic Highway Infrastructure that is needed to meet the requirements of growth is set out in Appendix E.*"

2.10 Of the proposed scheme junctions, the Ollerton, Lowdham, White Post, Deerdale Lane and Mickledale Lane junctions are listed in Appendix E of the Newark and Sherwood District Adopted Core Strategy.

Nottinghamshire County Council Local Transport Plan 3 (2011 – 2026)

2.11 The Local Transport Plan (LTP) sets out Nottinghamshire County Council's transport strategy and outlines a programme of measures to be delivered over the short, medium and long term. The strategy covers all types of transport including public transport, walking, cycling, cars and freight.

2.12 The current Local Transport Plan (known as the third Local Transport Plan) covers the whole of the county and will run from 1 April 2011 to 31 March 2026.

2.13 The third Local Transport Plan is made up of two separate documents:

- the Local Transport Plan strategy which details the County Council's vision and the strategy to deliver the vision, and
- the Implementation Plan which details the transport improvements that will help deliver the strategy.

2.14 The current Implementation Plan includes a reference to pursuing *"Integrated programmes to address existing and forecast journey time delays along the A614 / A6097 corridor – including Ollerton Roundabout improvements."*

Planning Policy Summary

2.15 The A614 and A6075 are included on the new Major Road Network. Both the Newark and Sherwood Local Plan and Nottinghamshire Local Transport Plan specifically reference the corridor as requiring improvement, and such improvements would support both national and local aspirations.

3. Ollerton Roundabout: Traffic, Engineering & Environmental Factors

Study Area

3.1 The study area includes the Ollerton roundabout and its immediate approaches. The roundabout is shown in Figure 3.1. The roundabout is approximately 9 miles from Mansfield and 19 miles from Nottingham. The existing roundabout is an important intersection on the County Council's Principal Road Network.

3.2 The junction facilitates local movements from Ollerton and local tourist attractions as well as strategic trips accessing the Strategic Road Network (A1 via A614).

Figure 3.1: Ollerton Roundabout

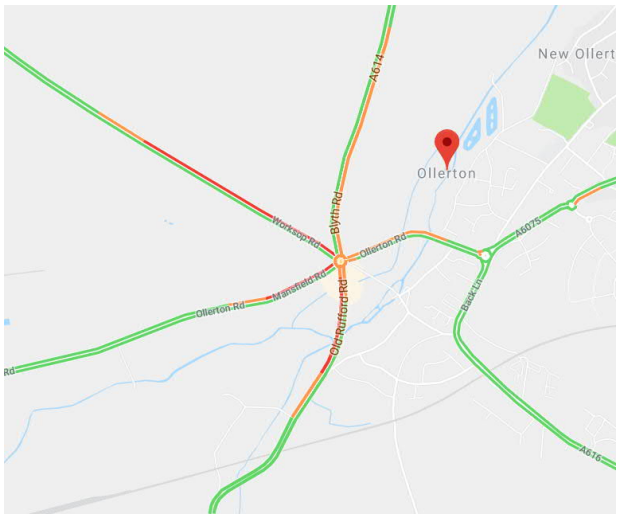
Traffic Factors

Journey Time Delays

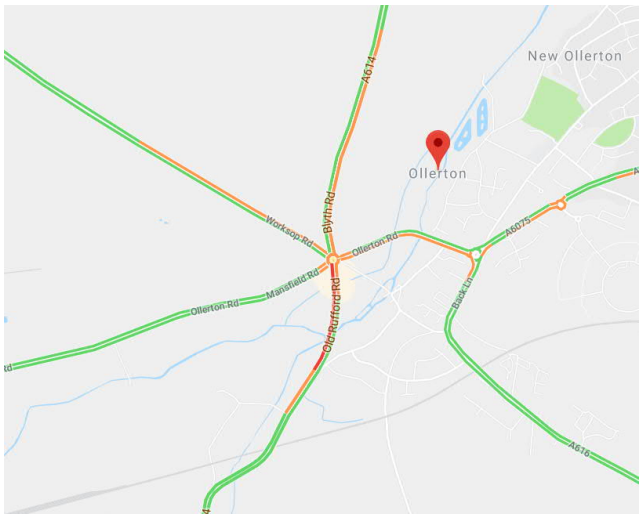
3.3 The junction currently experiences regular peak hour journey time delays and queuing.

3.4 Information from Google Traffic has been obtained from the present day (Figure 3.2). Google collects traffic data from each mobile phone running Android for which location is enabled. As such, it constitutes a data set with a very large sample. The figure below confirms the junction is subject to regular journey time delays during typical conditions in both the AM and PM peak hours.

Figure 3.2: Google Maps Extracts



Typical Traffic, AM Peak Hour (Tuesday, 0830hrs)



Typical Traffic, PM Peak Hour (Tuesday, 1730hrs)

3.5 The junction is restricting economic growth and housing delivery, with the nearby Thoresby Colliery development having conditional planning limiting the quantum of development that can be delivered prior to improvements the junction.

3.6 The planning condition limits the development of the Thoresby Colliery site to 150 dwellings and 8,094m² employment developments until capacity improvements to Ollerton Roundabout occur. The scheme will allow a further 650 dwellings & 24,281m^2 of employment development to progress.

3.7 An ARCADY model has been prepared by VIA East Midlands Ltd to model the performance of this junction. ARCADY is the software tool recommended for use by the DfT to model roundabout junctions. The performance of the existing junction is shown in Table 3.1.

3.8 ARCADY software has been run using a synthesised profile and provides outputs in the form of Ratios of Flow to Capacity (RFC) and queue length (Q). A synthesised profile includes a 12.5% mid-peak 'surge' to robustly test the performance of the junction. For a new junction, a worst-arm target RFC value of 0.85 during a single time segment is preferred as this minimises the chance that queuing will occur at a new junction on opening. For existing junctions, RFC values above 0.85 are likely to produce queues which increase slowly. Above an RFC value of 1.0, a junction is more than likely to be at capacity (with resulting larger increases in queue length).

3.9 The Traffic and Economic Assessment Report (60595614/EAR), details the production of two traffic forecasts: one which *excludes* the trips of developments deemed to be dependent on the scheme (economic forecast) and one which *includes* the trips of developments deemed to be dependent on the scheme (design forecast). The design forecasts represent a higher growth scenario and have been used in the option development stages to ensure the proposed scheme junctions have sufficient capacity.

3.10 The performance of the existing junction using the design forecasts is shown in Table 3.1.

3.11 The results show that the junction will be operating over capacity in the AM and PM peak hour in 2023, and will also reach capacity in the IP hour by 2037.

Table 3.1: Performance of Existing Junction – 2023 & 2037 (Design Forecasts)

Year	AM Peak Hour		IP Peak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
2023	1.13	68	0.81	4	1.17	69
2037	1.48	277	1.02	25	1.74	349

Collisions

3.12 Three years of collision records have been obtained for the Ollerton junction (from 2015 to 2017 inclusive). These show that two personal injury collisions have been recorded at the Ollerton junction, both of which were classed as 'slight' by the police and both involved a motorcycle and a car.

3.13 A further five personal injury collisions occurred within 150m of the junction. Of these, one was a rear-end shunt (car and van), one was a single vehicle loss of control (car, with positive breath test), one was a single vehicle loss of control (motorcycle, wet road surface) and two were at the access junctions to nearby petrol filling stations (and not specifically related to the Ollerton junction). All of the collisions were classed as 'slight' by the police.

Public Transport

3.14 Services 14, 15 and Sherwood Arrow route through the Ollerton Junction. These services run every 60 minutes during a typical day.

Engineering Factors

Topography

3.15 The topography of the area is flat in general.

Land Use

3.16 In the south east and south west quadrants of the roundabout are a McDonalds restaurant and a fish restaurant (The Big Fish). In addition petrol filling stations are positioned on either side of Old Rufford Road leading into the junction from the south. A pub is in the western quadrant, and isolated housing is to the north-east of the junction.

Non-Motorised Users (NMU) Provision

3.17 No provision has been made for NMUs in the current layout. Splitter islands have been installed on some arms, though traffic signage limits the potential for their use by pedestrians. There is an opportunity to add NMU provision at this junction which aligns to the objective of supporting all road users and encouraging non-motorised travel on sustainability grounds.

Geology / Ground Conditions

3.18 The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and beyond into South Yorkshire. The Sherwood Sandstone typically gives rise to a markedly undulating topography, which apart from a few large rivers is characterised by a general absence of surface drainage. The reason that rivers such as the River Meden and River Maun maintain their flow is that their valleys lie just below the water table. A range of soil types has developed within the corridor, the majority being well-drained sandy soils.

Highway Structures

3.19 The River Maun Bridge, Ollerton, is 290m to the south of the roundabout.

Hydrogeology and the Water Environment

3.20 The River Maun flows to the south and east of the roundabout and is an Environment Agency (EA) designated 'main river' and joins with Rainworth Water on the western edge of Ollerton before flowing northwards through open countryside to join the River Meden. Much of the existing roundabout layout falls within Flood Zone 2 and 3 on the Environment Agency's flood map. Zone 2 is land having between a 1 in 100 and 1 in 1000 annual probability of river flooding whilst Zone 3 is land having a 1 in 100 or greater annual probability of river flooding. Low lying agricultural fields in the vicinity of the roundabout have been known to flood during heavy spells of rainfall.

Public Utilities

3.21 The initial C2 NRSWA enquiry confirmed that numerous utility apparatus are present within the footprint of the proposed scheme. The C2 NRSWA enquiry has established that BT, Virgin Media, STW water mains, Cadent Gas, Western Power and Zayo telecommunication plant are all present.

Environmental Factors

Air Quality

3.22 **Baseline:** The location is not within an Air Quality Management Area (AQMA) but the site is regularly reviewed by the local District Council as part of Newark and Sherwood's Air Quality Annual Status Report. The site, which is situated next to the Big Fish restaurant, did register the highest value of NO^2 within the District in 2017 but this is due to the large volume of vehicles (particularly HGVs) queueing throughout the day. Despite this the reading recorded did not exceed the annual mean NO^2 objective at this site.

3.23 **Potential Constraints:** There is potential for dust during the construction phase but this would only be temporary in nature. There are three residential properties and several commercial developments in close proximity to the works area.

3.24 **Potential Opportunities:** Removing the majority of slow moving and stationary traffic by enlarging capacity at the junction should improve air quality performance at this junction. Vehicle emissions should be reduced because vehicles are idling less and not constantly having to brake / accelerate along the A614.

3.25 To mitigate against any potential adverse impact during the construction phase best practice measures should be adopted by the contractor.

3.26 There is an opportunity for Nottinghamshire County Council to work with Natural England during the early stages of the design process to reduce air quality impacts at the junction. Natural England are working towards a Site Nitrogen Action Plan (SNAP) for Birklands & Bilhaugh Special Area of Conservation, which aims to reduce air quality impacts at this location and others in the wider Sherwood Forest area.

Cultural Heritage

3.27 **Baseline:** The Ollerton Conservation Area lies adjacent to the existing roundabout south of A616 Ollerton Road and east of the A614, Rufford Road. There are 11 Listed Buildings within a 1km radius of the site, the majority of which are found within the historic core along the western edge of Ollerton. Ten of these Listed Buildings are Grade II and one, Ollerton Hall, is Grade II*. The closest Listed Building is Ollerton Watermill and adjoining mill house 0.25km to the south east of the site.

3.28 **Potential Constraints:** The proposed scheme will impact on Ollerton Conservation Area. Appropriate design and use of high-quality materials to reflect the setting of the Conservation Area should be adopted. Six weeks' notice to the local planning authority is required prior to works to trees within Conservation Areas.

3.29 **Potential Opportunities:** This junction is located on the south eastern edge of Sherwood set within a wider landscape which provides a rich historical context. Remnants of the royal hunting forest lies to the west, Rufford Abbey, a former Cistercian monastery, to the south, with the former Ducal estates, The Dukeries, to the north. All of these are overlaid with more recent remnants of the area's mining and industrial past. Due to the key location of this proposed improved junction within Nottinghamshire, the design should seek to improve the quality of the surrounding environment within which it lies.

Landscape and Visual Impact

10.8 **Baseline:** The scheme proposals fall within the Sherwood Landscape Character Area which falls entirely within Nottinghamshire and is characterised by a wide and diverse range of landscapes including the heart of the historic Sherwood Forest and the extensive parklands and estates of the Dukeries. The area, rich with historical, ecological and landscape features, is intrinsically linked to a number of historical themes including the internationally renowned Robin Hood legend.

10.9 Within the Newark and Sherwood Landscape Character Assessment, the Sherwood Region can be divided into six distinct landscape character types and the Ollerton junction falls within the River Maun Meadowlands with plantations Policy Zone (S PZ 15). This is a narrow pastoral river corridor landscape, confined in places by riparian trees and woodlands. It has the following characteristic features.

The characteristic features of the River Maun Meadowlands with plantations Policy Zone (S PZ 15) are: -

- Narrow meandering river valley;
- West of Edwinstowe – low lying fields to the north and steeper wooded valley side to the south;
- Occasional sandstone outcrops to the southern bank;
- Arable farming on flatter areas to the east;
- Some willow, alder and riparian vegetation along the banks adjacent to the river; and
- Some views out to built edges, railway embankments, and woodland edges.

3.9 **Potential Constraints:** There are potential physical landscape impacts on landscape features such as trees, shrubs, hedgerows, heathland and grassed areas following the changes to the roundabout footprint, including on a SSSI. There are potential impacts on Meadowlands with plantations if the proposed scheme does not make reference to the landscape character of the area in which it is located.

3.10 There are potential visual impacts on high sensitivity residential receptors at the north western edge of Ollerton (to the north west of Station Road and Main Street) which are also located in a Conservation Area. There are potential visual impacts on high sensitivity recreational receptors on Public Rights of Way – Footpaths and Bridleways in the surrounding area.

3.11 **Potential Opportunities:** There are opportunities in any proposed hard and soft landscape treatment to fulfil some of the landscape actions within the Newark and Sherwood Landscape Character Assessment for this Policy Zone such as: -

- Reinforce the sense of place of the built environment by using materials and design that reflect the local character of the area.

3.12 The biodiversity net gain approach should be integral to the design proposals. The reinstatement of landscape treatment along the highway boundary, following any changes to the footprint of the junction, should be incorporated into the design proposals to compensate for existing habitat loss including from a SSSI, and changes to the landscape including the landscape character. There is scope for heathland edge restoration and grassland habitat improvement on the edge of the SSSI.

Nature Conservation

3.13 **Baseline:** Ollerton roundabout lies to the east of Sherwood Forest that consists of a range nature conservation sites from international to local importance. To the north west of the existing roundabout is Birklands West and Ollerton Corner Site of Special Scientific Interest (SSSI) beyond which is Birklands and Bilhaugh SSSI. The site is within a SSSI Impact Risk Zone. There are five Local Wildlife Sites within a 2km radius of the site and 2 Local Nature Reserves (LNR). Sherwood Heath LNR lies to the north of the A6075, Ollerton Road, north west of the existing roundabout. Several habitats, e.g. hedgerows, lowland heath, lowland dry acid grassland, are habitats of principal importance both nationally and locally.

3.14 **Potential Constraints:** Enlargement of the junction may impact on the SSSI with habitat loss of small areas of woodland, hedge and acid -neutral grass verges. Consultation with Natural England will be required. There will be disturbance to habitats and species during the construction phase potentially impacting on protected species. Appropriate mitigation should be incorporated into the design and programme of works to reduce adverse impacts.

3.15 **Potential Opportunities:** Design proposals should include enough land to fully mitigate against habitat loss, degradation, population displacement and disturbance. There is some scope for heathland edge restoration and grassland habitat improvement on edge of the SSSI.

Geology and Soils

3.16 **Baseline:** *Superficial* - Superficial deposits at the site consist predominantly of alluvium, associated with the nearby River Maun, comprising; clay, silt, sand and gravel. This sedimentary deposit formed approximately 12 thousand years ago during the Quaternary period. The alluvium is normally described as a soft to firm, consolidated, compressible silty clay however, can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.

3.17 To the Northwest and West of the site, several glaciofluvial deposits of Mid-Pleistocene age have been identified. These are a sedimentary deposit comprised of sand and gravel.

3.18 *Bedrock* - The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and into South Yorkshire. Bedrock geology in this area is comprised of the Chester Formation, a pebbly sandstone, formed between 250 and 247 million years ago during the Triassic period. This formation typically gives rise to a markedly undulating topography across the region, which apart from a few large rivers, is characterised by a general absence of surface drainage. It is thought that bedrock will be encountered at relatively shallow depths across the site.

3.19 *Structural* - There are no identified faults within influencing distance of the site, the nearest identified fault being located over 4km to the Northeast.

3.20 *Soils* - A range of soil types have developed within this corridor, the majority of which are represented by; acidic, well-drained, sandy soils, which are particularly vulnerable to leaching of nitrate and pesticide into underlying groundwaters.

3.21 *Made Ground* - There is limited potential for made ground at the site although, the incoming Ollerton Road and Newark Road both appear to have been raised above the surrounding ground level, as identified in adjacent fields.

3.22 **Potential Constraints:** There is the potential for a soft, compressible alluvial layer beneath the proposed and existing road construction. This will require further investigation to confirm its extents and properties. If found to be shallow, this may need to be excavated or may be removed with the upper layers of road construction. The existing road construction does not appear to display any structural problems associated with this soft stratum.

3.23 **Potential Opportunities:** Potentially shallow sand/sandstone bedrock removed as part of the construction may be suitable for fill at the other corridor improvement locations; however, this would require further investigation to determine suitability.

3.24 It is recommended that a comprehensive ground investigation is carried out in advance of the proposed improvement works to review the suitability of the ground for any new road construction and to identify any potential issues that may arise during the construction phase of the works.

Materials

3.25 **Baseline:** The existing road construction is likely to be founded on the sand/sandstone underlying the site. As already highlighted, there is the potential for a soft, compressible alluvial layer below the construction works which may require excavation. Ollerton Road and Newark Road both appear to have been raised above the surrounding ground level and therefore may contain unknown quantities of made ground.

3.26 There are limited contaminative land uses around the site, with the notable exception of 2no. fuel stations located to the southeast. There is the potential for localised ground contamination associated with oils and fuels from localised road traffic accidents, leakage from the adjacent fuel stations and herbicides/pesticides from agricultural use of the surrounding land. Road material lower in the construction profile may contain tar bound materials.

3.27 **Potential Constraints:** Minimal contaminated material, but likely to be localised contamination from road traffic accidents, potential leakage from fuel stations and agricultural practices in the proposed areas of new construction.

3.28 Although unlikely in the upper layers of road construction, the historic construction of the lower layers has the potential to contain tar bound materials that would most likely need to be disposed of off-site as hazardous waste.

3.29 **Potential Opportunities:** The recycling of road surface planings should be considered and could be reutilised elsewhere in the road surface construction.

3.30 Potential shallow bedrock and other clean materials e.g. sand and gravel could be imported from other sites to make up any fill volumes required, although it is likely there will be an equal cut and fill ratio at this site.

3.31 It is recommended that a Phase 1 Geoenvironmental Desktop Study and subsequent Phase 2 Geoenvironmental Site Investigation is carried out to identify and determine the nature and extent of any potential contamination with the site boundary. This will help to reduce any uncertainty during the construction phase of the works.

Noise and Vibration

3.32 **Baseline:** The study area comprises three residential properties and several commercial developments, all in very close proximity to the roundabout. The existing noise climate at the three adjacent residential properties immediately to the north of the roundabout on Blyth Road is dominated by traffic noise, both free flowing and stationary during periods of congestion on the southbound approach to the roundabout.

3.33 From examination of the DEFRA noise maps for road traffic noise, which were produced in accordance with the EU Noise Directive, the road in the vicinity of the three residential receptors has not been identified as an *Important Area*. It is possible that this is an error and that noise levels at the front facades of the three properties do already exceed the criteria used by DEFRA which is used to identify *Important Areas* requiring Highway Authorities to investigate noise mitigation options.

3.34 Further to the south east, there are several properties in Wellow Village which lie within 300m of the proposed scheme; however, these are less likely to be adversely affected by the proposals. Baseline noise levels will be established through noise surveys and modelling to support the noise impact assessment for a scheme.

3.35 The three receptors to the north are positioned in close proximity to the carriageway of the A614 Blyth Road; however, there are no known issues associated with vibration from existing traffic flows. This is unlikely to change as a result of a proposed scheme.

3.36 **Potential Constraints:** It is unlikely to be feasible to install any physical noise mitigation measures such as noise barriers to protect the frontages of the three residential receptors to the north on Blyth Road due to vehicle accesses and loss of light / outlook.

3.37 It may be difficult to construct an improved junction within acceptable noise levels if works take place during the night time. Liaison will be required with the local environmental health department to establish acceptable noise limits and an assessment of construction noise will need to be undertaken to inform the noise impact assessment.

3.38 **Potential Opportunities:** There is potential to lay low noise road surfacing within the scheme extents; however, this may have limited benefit at the receptor locations due to nature of vehicle movements approaching and exiting the roundabout where noise associated with braking and acceleration may dominate more than rolling tyre noise.

3.39 There may be an opportunity to install physical mitigation in the form of noise barriers to the south of the three receptors to mitigate noise impacts at the side façade of the most southern property and garden areas of all three properties

3.40 There is potential to install noise insulation in the residential properties in advance of construction period if they meet the qualifying criteria in the Noise Insulation Regulations. Eligibility for noise insulation is to be determined through noise impact assessment.

People and Communities

3.41 **Baseline:** The existing junction and road network provides access to immediately adjacent businesses; two fast food restaurants, filling station and to the publicly accessible Sherwood Heath local nature reserve, which shares a car park with the Alders public house / restaurant. Pedestrian and cycle access to these amenities from Ollerton and to the wider Sherwood Forest area to the north and west is impeded by the lack of crossing facility and narrow footway around the existing junction.

3.42 There is a small residential outlier comprises several bungalows and gardens which extends north on A614 from the existing junction.

3.43 Agricultural land to north east and south west of the existing junction is designated as grade 3 agricultural land. Land to north and east (Sherwood heath) is classed as non-agricultural land; however, except for the Alders pub and car park, this land has a designation as a SSSI. Grazed land extending immediately to the east of the existing roundabout and north of Newark Road, has no agricultural land designation, but is used for horse grazing.

3.44 **Potential Constraints:** Traffic disruption will occur during the construction phase Traffic disruption would only be temporary and can be mitigated by suitable traffic management techniques.

3.45 **Potential Opportunities:** It is likely it will provide numerous jobs for local people during the construction stage and also construction spend in the local area whilst the works are on site. The main objective of the project is to unlock the economic potential of this corridor which in turn will stimulate the local economy and create additional jobs long term.

3.46 There is the opportunity to improve pedestrian / cycling facilities by introducing formal crossing points which will encourage leisure opportunities and may encourage more people to walk to and from Ollerton. This would provide a valuable linkage between Ollerton and the public house / restaurant west of the roundabout and also provide safer crossing for pedestrians and cyclists wishing to access Sherwood Heath and the wider

Sherwood Forest area beyond. The linkage to the bridleway crossing Sherwood Heath should be ensured and enhanced.

3.47 The development of the new Sherwood Forest visitor centre at Edwinstowe and development of the former Thoresby Colliery site into mixed housing, recreation and employment use is likely to increase the demand for sustainable transport linkages between Ollerton and Edwinstowe. Safe crossings of the A614 and widening of the footway between Ollerton and Edwinstowe would contribute towards this.

Water and Drainage

3.48 **Baseline:** The River Maun flows to the south and east of the roundabout and is an Environment Agency (EA) designated 'main river' and joins with Rainworth Water on the western edge of Ollerton before flowing northwards through open countryside to join the River Meden. Much of the existing roundabout layout falls within Flood Zone 2 and 3 on the Environment Agency's flood map. Zone 2 is land having between a 1 in 100 and 1 in 1000 annual probability of river flooding whilst zone 3 is land having a 1 in 100 or greater annual probability of river flooding. Low lying agricultural fields in the vicinity of the roundabout have been known to flood during heavy spells of rainfall.

3.49 **Potential Constraints:** Any enlargement of the junction would bring it closer to adjacent residential and retail properties, and new drainage proposals would therefore need to be mindful of the increased flooding risks associated with any increase in impermeable surfaces created. A brief overview of the topography suggests longitudinal falls from the approach arms of the roundabout are generally towards the roundabout thus limiting the scope to direct rainwater away from the roundabout. Scope to regrade approach vertical alignments is limited due to existing property threshold levels and existing vertical grades being quite steep in places. Details of the existing drainage systems are not known at this stage and further investigation in to the type and locations is needed to establish whether these systems could be reutilised/ upgraded to drain the additional runoff created. Water Authority surface/ combined systems are not present thus restricting the choice to utilise these systems. The governing water authority Trent Valley Internal Drainage Board (TVIDB), Environment Agency (EA) or Nottinghamshire County Council's Flood Risk Team may need to approve additional discharge in to nearby watercourses, this may be limited to greenfield runoff where additional volumes would need to be attenuated.

3.50 **Potential Opportunities:** Reuse and upgrade of existing drainage systems should be considered a first choice; however, this will be dependent on the condition and capacity of the existing system. Further detailed investigation in to the type, location and outfall of the existing drainage systems and ground permeability details will be necessary to determine if existing systems could be reutilised / upgraded or whether soakaway options are viable.

3.51 If the junction is re-configured, any new spaces created could be used for a storage/infiltration pond or an underground cellular crate storage/infiltration tank. The creation of additional green space could also benefit local ecology and help promote landscaping opportunities. Discharge into the existing system of ditches, limited to green field runoff, also could prove a viable option.

Health Impact Assessment

3.52 The consideration of Health Impact Assessment (HIA) takes into account such determinants as housing quality and design, access to healthcare services and other social infrastructure, Access to open space and nature, Air Quality, noise and neighbourhood amenity, accessibility and active travel, crime reduction and community safety, access to healthy food, access to work and training, social cohesion and neighbourhoods, minimising the use of resources and climate change. Some of these determinants would be examined at the next stage of assessment, although some e.g. crime reduction and community safety would most likely be scoped out as not relevant.

3.53 **Baseline:** This site consists of a 6-arm single lane roundabout, with five A-class roads intersecting. Heavy traffic volumes with standing traffic contribute to air quality issues. Currently there is very poor connectivity for Non-Motorised Users (NMU) around the roundabout causing severance issues for this group from the recreational resource of Sherwood Forest. A total of 7 minor accidents have been recorded at this location in

the 3-year period 2015-2017. The current facility provides moderately good access to goods, services and employment for motorised users.

3.54 **Potential Constraints:** Any enlargements of the junction could increase the potential for accidents and will create a more significant hazard for on-road cyclists. This will also create some further impact on pedestrians where no additional signalised crossings are proposed. There remains the potential risk of air quality and noise to human receptors as part of the proposed scheme.

3.55 **Potential Opportunities:** The provision of formal signalised crossings would reduce the severance of Ollerton from the recreational facility of Sherwood Forest and should reduce the potential for accidents to Non-Motorised Users (NMU) trying to navigate this busy intersection. The proposed scheme should bring about improvements in health should there be a decrease in noise and air contaminant levels to local receptors through improved flow. Improved NMU circulation around the junction should create greater social connectivity and access to goods, places and services.

Climate Change Adaption & Mitigation

3.56 **Baseline:** Projected changes to average climatic conditions and associated severe weather events (such as heavy and / or prolonged precipitation, storm events and heatwaves) have the potential to impact on the proposed scheme and the surrounding built and natural environment. With reference to Meteorological Office Data, the scheme lies within the defined 'Midlands' region. The climate of this region sees mean annual temperatures of between 8°C and 10°C with July being the warmest month with temperatures typically in the region of 22°C. The region is relatively dry with rainfalls of between 600mm to 800mm per year.

3.57 **Potential Constraints:** Projected changes to average climatic conditions and associated severe weather events have the potential to impact on the scheme and the surrounding built and natural environment. All construction and operational activities and materials associated with the proposed scheme would result in Greenhouse Gas emissions contributing to a negative impact on the climate.

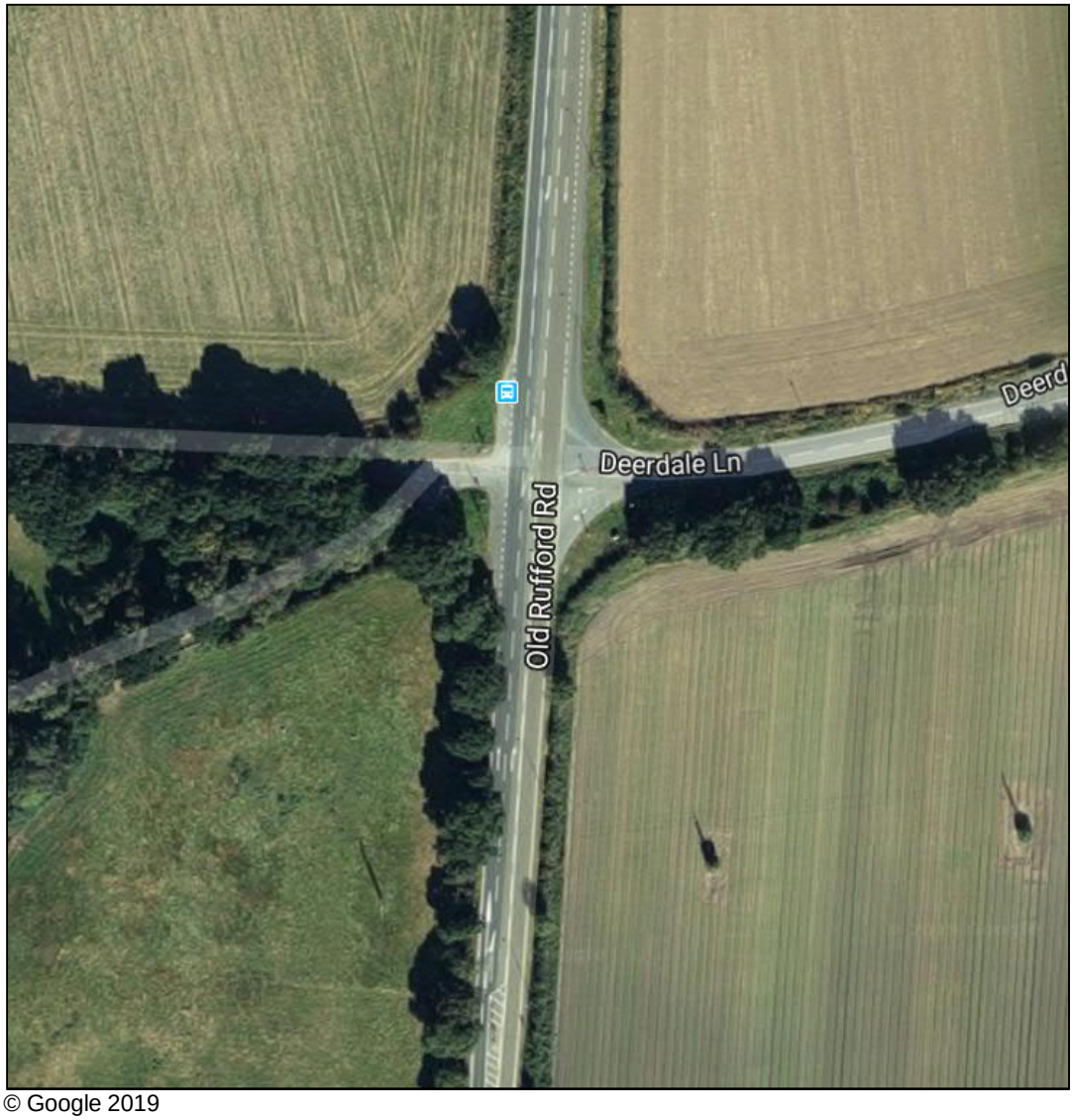
3.58 **Potential Opportunities:** There is potential that the scheme can be designed to be 'future proof' i.e. the design can take into account projected climate changes such as increased temperature and rainfall to ensure minimal impact as a result of this. For example species can be selected for any proposed soft landscape treatment that will tolerate a minor increase in temperature.

4. Deerdale Lane: Traffic, Engineering & Environmental Factors

Study Area

4.1 The study area includes the Deerdale Lane junction and its immediate approaches. The junction is shown in Figure 4.1. The junction is a priority controlled crossroads to the west of the village of Bilsthorpe. The A614 runs north-south, is street lit and has a 50mph speed limit with SPECS camera enforcement. To the west, Deerdale Lane is a narrow road leading to a small number of private properties and the former Rufford colliery site. To the east, Deerdale Lane leads to the village of Eakring and the industrial areas on the former Bilsthorpe colliery site to the north of Bilsthorpe village.

Figure 4.1: Deerdale Lane

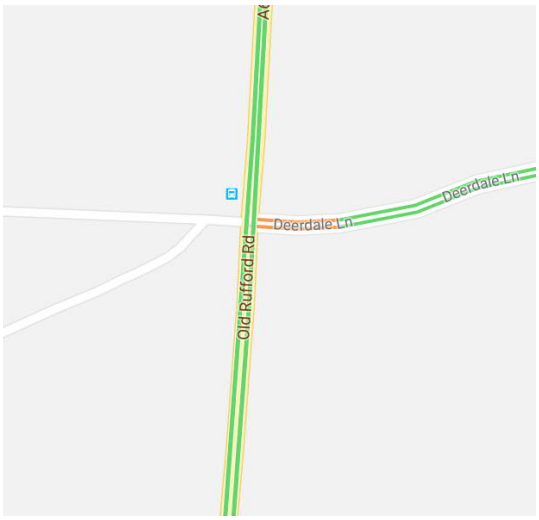


Traffic Factors

Journey Time Delays

4.2 Typical present day traffic conditions from Google Traffic has been obtained for the AM and PM peak hours on a typical weekday and is presented in Figure 4.2. This shows that modest journey time delays to Deerdale Lane in both peak hours.

Figure 4.2: Google Maps Extracts



Typical Traffic, AM Peak Hour (Tuesday, 0830hrs)

Typical Traffic, PM Peak Hour (Tuesday, 1730hrs)

4.3 The local perception of this junction is that it is very difficult to access the A614 from Deerdale Lane, with anecdotal reports of large delays (rather than large queues), as joining traffic waits for suitable gaps in the high speed A614 traffic before joining. Waiting times to access the A614 from Deerdale Lane are variable, resulting in poor journey time reliability for road users.

4.4 A PICADY model has been prepared by VIA East Midlands Ltd to model the performance of this junction. PICADY is the software tool recommended for use by the DfT to model priority junctions (including crossroads).

4.5 PICADY software has been run using a synthesised profile and provides outputs in the form of Ratios of Flow to Capacity (RFC) and queue length (Q). A synthesised profile includes a 12.5% mid-peak 'surge' to robustly test the performance of the junction. For a new junction, a worst-arm target RFC value of 0.85 during a single time segment is preferred (or 0.75 in a rural location) as this minimises the chance that queuing will occur at a new junction on opening. For existing junctions, RFC values above 0.85 are likely to produce queues which increase slowly. Above an RFC value of 1.0, a junction is more than likely to be at capacity (with resulting larger increases in queue length).

4.6 The Traffic and Economic Assessment Report (60595614/EAR), details the production of two traffic forecasts: one which *excludes* the trips of developments deemed to be dependent on the scheme (economic forecast) and one which *includes* the trips of developments deemed to be dependent on the scheme (design forecast). The design forecasts represent a higher growth scenario and have been used in the option development stages to ensure the proposed scheme junctions have sufficient capacity.

4.7 The performance of the existing junction using the design forecasts is shown in Table 4.1.

4.8 The results show that the junction will continue to operate well below capacity in both 2023 and 2037.

Table 4.1: Performance of Existing Junction – 2023 & 2037 (Design Forecasts)

Year	AM Peak Hour		IP Peak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
2023	0.28	1	0.16	0	0.30	1
2037	0.47	1	0.17	0	0.37	1

4.9 As noted in paragraph 4.3, the local perception of the junction is worse than the typical conditions, and future growth along the route corridor, including known development in Bilsthorpe is likely to exacerbate this perception.

Collisions

4.10 Stakeholders report a perception of road safety issues at Deerdale Lane, relating to the judgement of gaps when leaving the minor arm and entering the A614, particularly for right-turning traffic.

4.11 Three years of collision records have been obtained for the Deerdale Lane junction (from 2015 to 2017 inclusive). These show that only one personal injury collision has been recorded at this junction, which was classed as 'slight' by the police. The collision involved two cars, one of which was turning right from the minor arm onto the A614, and an ahead moving vehicle on the A614.

Public Transport

4.12 Services 227 and Sherwood Arrow route through the Deerdale Lane Junction. Bus 227 runs once in each direction on Wednesdays and Fridays, whilst the Sherwood arrow runs every 60 minutes during a typical day.

Engineering Factors

Topography

4.13 The topography within this section of the scheme can be described as uneven with a number of hidden dips on the A614 as you approach the junction from the south; the most significant being 2m in height from top to bottom. This issue resulted in the A614 requiring a speed limit change back in 2011 following a serious accident with six fatalities in 2009. Any improvements will require a significant amount of fill to achieve a vertical alignment compliant with *Design Manual for Roads and Bridges* (DMRB) design standards. The volume of fill is 9,000m^3 but is not expected to create any major engineering challenges.

Land Use

4.14 The site is bounded on all sides by agricultural land.

Non-Motorised Users (NMU) Provision

4.15 No provision for NMUs has been made at this junction. There is an opportunity to add NMU provision at this junction which aligns to the objective of supporting all road users.

Geology/Ground Conditions

4.16 The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and beyond into South Yorkshire. The Sherwood Sandstone typically gives rise to a markedly undulating topography, which apart from a few large rivers is characterised by a general absence of surface drainage. The reason that rivers such as the River Meden and River Maun maintain their

flow is that their valleys lie just below the water table. A range of soil types has developed within the corridor, the majority being well-drained sandy soils.

Highway Structures

4.17 There is a railway bridge (disused mineral line) 740 metres to the south of the junction.

Hydrogeology and the Water Environment

4.18 Rainworth Water is approximately 320m to the east of the junction which is a watercourse and a tributary of the River Maun near Rainworth, Nottinghamshire.

Public Utilities

4.19 A NRSWA C2 enquiry has highlighted the following utility services which will require significant diversion works: BT on A614 and Inkersall approaches, HV electricity (33kV) running east-west across A614S approximately 80m south of the junction, Virgin Media, water supplies and a Zayo fibre telecoms cable running north-south in A614 east verge.

Environmental Factors

Air Quality

4.20 **Baseline:** The location is not within an Air Quality Management Area (AQMA). There is one residential property approximately 150m south west of the junction.

4.21 **Potential Constraints:** The introduction of a new junction that creates delays to the A614 traffic at this location may potentially generate more emissions compared to the previous junction arrangement. Stop/start traffic tends to generate more emissions than smooth flowing traffic.

4.22 Potential for dust during the construction phase but only temporary in nature and the closest receptor is 150m away and well shielded by vegetation.

4.23 **Potential Opportunities:** To mitigate against any potential adverse impact during the construction phase, best practice measures should be adopted by the contractor.

4.24 Smoother and consistent journey speeds across the whole corridor will ultimately reduce vehicle emissions because vehicles are idling less and not constantly having to brake/accelerate along the A614.

Cultural Heritage

4.25 **Baseline:** There are no listed buildings or conservation areas within a 1km radius of the site. The closest heritage asset is Rufford Abbey, a Registered Garden (Grade II) that lies just over 0.9km to the north east of the site.

4.26 **Potential Constraints:** There will be no potential direct physical impacts on known heritage assets. It is possible that works (excavations) may reveal unknown archaeological constraints during the construction phase.

4.27 **Potential Opportunities:** Works should reinstate the historic field pattern and replace and strengthen existing tree cover that is part of the wider setting of the Sherwood and the surrounding estate farmlands landscape.

Landscape and Visual Impact

4.28 **Baseline:** The scheme falls within the Sherwood Landscape Character Area which falls entirely within Nottinghamshire and is characterised by a wide and diverse range of landscapes including the heart of the historic Sherwood Forest and the extensive parklands and estates of the Dukeries. The area, rich with historical, ecological and landscape features, is intrinsically linked to a number of historical themes including the internationally renowned Robin Hood legend.

4.29 Within the Newark and Sherwood Landscape Character Assessment, the Sherwood Region can be divided into six distinct landscape character types and the Deerdale Lane junction falls within the Old Clipstone Estate Farmlands Policy Zone (S PZ 09). This is an enclosed, gently rolling estate landscape characterised by an ordered pattern of fields, roads and woodlands.

4.30 The characteristic features of Old Clipstone Estate Farmlands Policy Zone (S PZ 09) are as follows: -

- Gently undulating topography;
- Coniferous forestry plantation with broadleaved margins;
- Intensive arable farming in medium regular geometric fields;
- Very small patches of deciduous woodland;
- Poor internal field boundaries, stronger road hedge boundaries with isolated mature trees, mainly Oak;
- Isolated farms of red brick core with modern agricultural buildings; and
- Heathland character, apparent to road verges and along disused mineral railway lines .

4.31 **Potential Constraints:** There are potential physical landscape impacts on landscape features, such as trees, shrubs, hedgerows, heathland and grassed areas. There are potential impacts on the landscape character of the Estate Farmlands if the proposed development does not make reference to the landscape character of the area in which it is located.

4.32 There are potential visual impacts on high sensitivity residential receptors in the vicinity of Robin Hood Farm to the east of the site. There are potential visual impacts on high sensitivity residential receptors at the north western edge of Bilsthorpe (Mickledale Close) although these are likely to be screened by vegetation along the disused mineral railway line. There are potential visual impacts on high sensitivity recreational receptors on Public Rights of Way – Footpaths and Bridleways in the surrounding area, and from the disused mineral railway line which is used as a Multi User Route

4.33 **Potential Opportunities:** There are opportunities in any proposed hard and soft landscape treatment to fulfil some of the landscape actions within the Newark and Sherwood Landscape Character Assessment for this Policy Zone such as:-

- Create opportunities for restoring areas of heath land where appropriate

4.34 The biodiversity net gain approach should be integral to the design proposals. The reinstatement of landscape treatment along the highway boundary following widening of the road junction should be incorporated into the design proposals to compensate for existing habitat loss, and changes to the landscape including the landscape character.

Nature Conservation

4.35 **Baseline:** There are seven non-statutory designated sites (LWSs) within a 2km radius of the site. Deerdale Lane junction lies approximately 0.5km east of a large Local Wildlife Site Clipstone Forest Area LWS. It is made up of mixed plantation woodland, heathland acid, grassland. Cutt's Wood LWS lies just under 1km to the north east.

4.36 **Potential Constraints:** There will be no direct impact on designated sites. There may be the loss of small areas of habitat supporting protected species, (e.g. hedgerows) as well as trees within the highway verge. Further ecological surveys for protected species will be required.

4.37 **Potential Opportunities:** The Biodiversity net gain approach should be integral to the design proposals. The reinstatement of new hedges and hedgerow trees along highways boundary following any widening of the junction should be incorporated into the design proposals to compensate for existing habitat loss.

Geology and Soils

4.38 **Baseline:** *Superficial* – There are no superficial deposits located within the boundary of the site. The nearest is an area of alluvium, associated with Rainworth Water, located approximately 140m east of the site boundary.

4.39 *Bedrock* - The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and into South Yorkshire. Bedrock geology in this area is comprised of; the Chester Formation, a sandstone, pebbly (gravelly), formed between 250 and 247 million years ago during the Triassic period. This formation typically gives rise to a markedly undulating topography across the region, which apart from a few large rivers, is characterised by a general absence of surface drainage. It is thought that bedrock will be found at relatively shallow depths across the site.

4.40 *Structural* - There are no identified faults within influencing distance of the site.

4.41 *Soils* - A range of soil types have developed within this corridor, the majority of which are acidic, well-drained sandy soils, particularly vulnerable to leaching of nitrate and pesticide into underlying groundwaters.

4.42 *Made Ground* - There is limited potential for made ground at the site.

4.43 **Potential Constraints:** There are no easily identifiable constraints at this stage. The existing road construction does not appear to show any issues with ground conditions.

4.44 **Potential Opportunities:** Potentially shallow sand/sandstone bedrock removed as part of the construction may be suitable for fill at the southern side of the site, although potential volumes will be minimal and will require further investigation to determine suitability.

Materials

4.45 **Baseline:** The existing road construction is likely to be founded on the sand/sandstone underlying the site.

4.46 There are limited contaminative land uses around the site although, there is the potential for localised contamination associated with oils and fuels from road traffic accidents and herbicides / pesticides from agricultural use of the surrounding land. Road materials lower in the construction profile may contain tar bound materials.

4.47 **Potential Constraints:** Minimal contaminated material however, there is the potential for localised contamination associated with road traffic accidents and agricultural practices in any proposed areas of new construction.

4.48 Although unlikely in the upper layers of road construction, the historic construction of the lower layers has the potential to contain tar bound materials that would most likely need to be disposed of off-site as hazardous waste.

4.49 There is likely to be a significant deficit of fill material required to complete this scheme.

4.50 **Potential Opportunities:** The recycling of road surface planings should be considered and could be reutilised elsewhere in the road surface construction.

4.51 Potential shallow bedrock and other clean materials e.g. sand and gravel could be imported from other sites to make up any fill volumes needed.

Noise and Vibration

4.52 **Baseline:** The study area comprises one residential property approximately 150m to the south west of the junction. The existing noise climate is dominated by traffic noise free flowing in both directions. There are no other significant noise sources in the area. There are no other residential receptors within the 300m study area. The baseline noise level will be established through noise survey and modelling to support the noise impact assessment for the scheme.

4.53 Given the distance to the nearest receptor there will be no existing vibration impacts, or adverse impacts due to the proposed alterations.

4.54 **Potential Constraints:** The introduction of a new junction that creates delays to mainline traffic at this location may create a perceptible change to the character of road traffic noise due to braking and acceleration noise.

4.55 The detailed design may require High Friction Surfacing to be laid on approaches which may also alter the character of rolling traffic noise in free-flow.

4.56 **Potential Opportunities:** There is potential to lay low noise road surfacing within the scheme extents, which may be beneficial when traffic is free flowing; however, when vehicles are slowing down on the approach to the junction (or accelerating away), noise associated with braking and acceleration may dominate more than rolling tyre noise.

People and Communities

4.57 **Baseline:** This junction is in an isolated agricultural setting, surrounded by grade 3 agricultural land.

4.58 Deerdale Lane west of the A614 is a minor lane providing access only to activity and paintball centres. It runs due west emerging as Eakring Road in Mansfield adjacent to Mansfield golf club, Sherwood Pines forest and the former Rufford Colliery site. The lane also links to a restricted byway which provides access to Sherwood Pines near Centre Parcs holiday village. Due to lack of rights of way east of the A614, the potential to provide or improve linkage with the rights of way network would seem greater at the Mickledale Lane junction immediately south.

4.59 Deerdale Lane to the east of the A614 provides access to the north of Bilsthorpe including businesses located on the business park occupying the former Bilsthorpe Colliery.

4.60 **Potential Constraints:** Any enlargement of the junction will result in the loss of grade 3 agricultural land north and south of the junction.

4.61 **Potential Opportunities:** The construction of the A614 scheme package will be classed as a major transport project. As such it is likely it will provide numerous jobs for local people during the construction stage and also construction spend in the local area whilst the works are on site. The main objective of the project is to unlock the economic potential of this corridor which in turn will stimulate the local economy and create additional jobs long term. In particular, it will improve access to businesses located immediately east of this junction in Bilsthorpe and Eakring village.

Water and Drainage

4.62 **Baseline:** Rainworth Water is approximately 320m to the east of the junction which is a watercourse and a tributary of the River Maun near Rainworth, Nottinghamshire.

4.63 **Potential Constraints:** An overview of historical topographical survey data and mapping information suggests the adjoining fields are generally at a lower level compared to the carriageway. Care should therefore be taken in respect of any junction enlargement to ensure adjoining green field run off is intercepted adequately. Adequacy of the existing discharge/outfall options may prove challenging as from initial preliminary investigations it appears only roadside ditches may be present. Further detailed investigation in to the type, location and outfall of the existing drainage systems and ground permeability details will be necessary to determine if existing systems could be reutilised / upgraded or whether soakaway options are viable. The governing water authority Trent Valley Internal Drainage Board (TVIDB), Environment Agency (EA) or Nottinghamshire County Council's Flood Risk Team may need to approve additional discharge in to nearby watercourses, this may be limited to greenfield runoff where additional volumes would need to be attenuated. Any widening of the existing junction requires areas of adjoining private agricultural land to place the proposed infrastructure including embankments and ditches.

4.64 **Potential Opportunities:** Reuse and upgrade of existing drainage systems should be considered a first choice; however, this will be dependent on the condition and capacity of the existing system, detailed drainage surveys with respect to type and location should be commissioned to verify. Additional infiltration / storage

systems may be required if it is proven existing drainage discharge systems, mainly consisting of road side ditches are limited which could also provide some improvement to the current arrangement.

Health Impact Assessment

4.65 **Baseline:** This site consists of a crossroads with major priority to A614 traffic travelling north / south. Heavy traffic volumes on the A614 make access across this junction difficult but this is unlikely to create any significant air quality issues. There is poor connectivity for Non-Motorised Users (NMU) across this junction, but this has less bearing as there are very few residential properties close to this junction. Recreational users are likely to be the only NMU's using this junction and it is anticipated that a majority of these would be more experienced road cyclists from smaller communities to the east. Only 1 minor accident has been recorded at this location in the 3-year period 2015-2017. The current facility is a limited interchange for access to goods, services and employment.

4.66 **Potential Constraints:** There are limited potential risks from air quality and noise to human receptors. There are no significant walking and cycling issues expected as a result of any proposal.

4.67 **Potential Opportunities:** Improved lines of sight approaching this junction should significantly reduce the likelihood of collisions and accidents. Provision if improved informal pedestrian crossing points could be considered at this location.

Climate Change Adaption & Mitigation

4.68 **Baseline:** Projected changes to average climatic conditions and associated severe weather events (such as heavy and / or prolonged precipitation, storm events and heatwaves) have the potential to impact on the proposed scheme and the surrounding built and natural environment. With reference to Meteorological Office Data, the scheme lies within the defined 'Midlands' region. The climate of this region sees mean annual temperatures of between 8°C and 10°C with July being the warmest month with temperatures typically in the region of 22°C. The region is relatively dry with rainfalls of between 600mm to 800mm per year.

4.69 **Potential Constraints:** Projected changes to average climatic conditions and associated severe weather events have the potential to impact on the scheme and the surrounding built and natural environment. All construction and operational activities and materials associated with the proposed scheme would result in Greenhouse Gas emissions contributing to a negative impact on the climate.

4.70 **Potential Opportunities:** There is potential that the scheme can be designed to be 'future proof' i.e. the design can take into account projected climate changes such as increased temperature and rainfall to ensure minimal impact as a result of this. For example species can be selected for the proposed soft landscape treatment that will tolerate a minor increase in temperature.

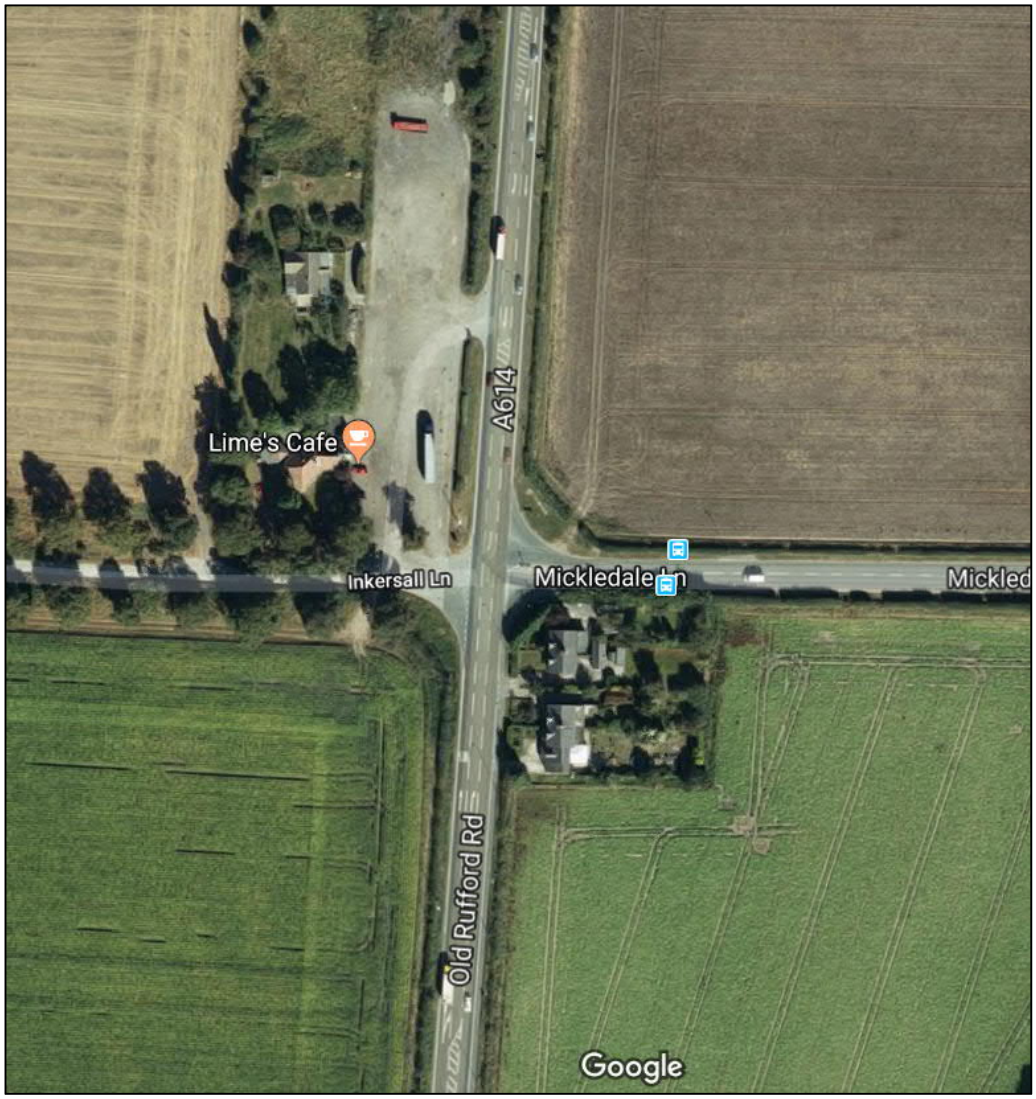
5. Mickledale Lane: Traffic, Engineering and Environmental Factors

Study Area

5.1 The study area includes the Mickledale Lane junction and its immediate approaches. The junction is shown in Figure 5.1. The current layout is less than a mile from the village of Bilsthorpe and lies just under 15 miles to the north of Nottingham. The AADT just south of this junction is 18,750.

5.2 The existing junction is currently a priority controlled 4 arm crossroads junction with the side roads giving way to the A614 traffic flows. It's situated in a rural location but the junction itself is street lit and the A614 (Old Rufford Road) has a 50mph speed limit with SPECS camera enforcement.

Figure 5.1: Mickledale Lane

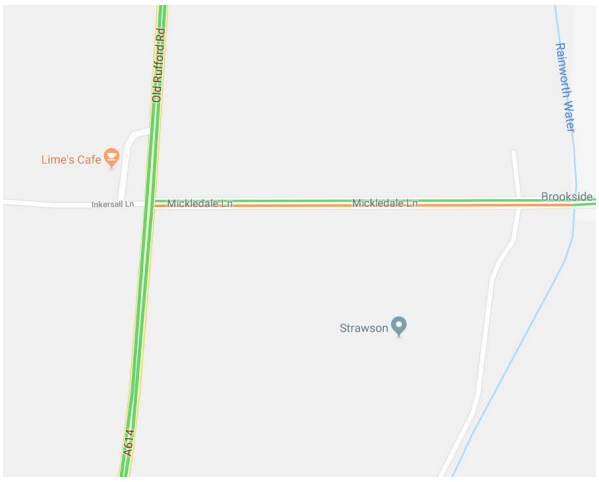


Traffic Factors

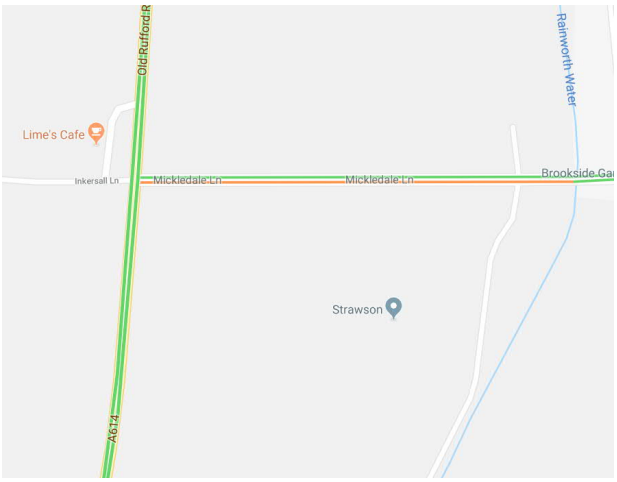
Journey Time Delays

5.3 Typical present day traffic conditions from Google Traffic has been obtained for the AM and PM peak hours on a typical weekday and is presented in Figure 5.2. This shows that modest journey time delays to Mickledale Lane in both peak hours.

Figure 5.2: Google Maps Extracts



Typical Traffic, AM Peak Hour (Tuesday, 0830hrs)



Typical Traffic, PM Peak Hour (Tuesday, 1730hrs)

5.4 The local perception of this junction is that it is very difficult to access the A614 from Mickledale Lane, with anecdotal reports of large delays (rather than large queues), as joining traffic waits for suitable gaps in the high speed mainline traffic and trips exiting the Lime's Cafe before joining. Waiting times to access the A614 from Mickledale Lane are variable, resulting in poor journey time reliability for road users.

5.5 A PICADY model has been prepared by VIA East Midlands Ltd to model the performance of this junction.

5.6 The Traffic and Economic Assessment Report (60595614/EAR), details the production of two traffic forecasts: one which *excludes* the trips of developments deemed to be dependent on the scheme (economic forecast) and one which *includes* the trips of developments deemed to be dependent on the scheme (design forecast). The design forecasts represent a higher growth scenario and have been used in the option development stages to ensure the proposed scheme junctions have sufficient capacity.

5.7 The performance of the existing junction using the design forecasts is shown in Table 5.1.

5.8 The results show that the junction will continue to operate well below capacity in both 2023 and 2037.

Table 5.1: Performance of Existing Junction – 2023 & 2037 (Design Forecasts)

Year	AM Peak Hour		IP Peak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
2023	0.41	1	0.18	0	0.36	1
2037	0.55	1	0.20	0	0.45	1

5.9 As noted in paragraph 5.4, the local perception of the junction is worse than the typical conditions, and future growth along the route corridor, including known development in Bilsthorpe is likely to exacerbate this perception.

Collisions

5.10 Stakeholders report a perception of road safety issues at Mickledale Lane, relating to the judgement of gaps when leaving the minor arm and entering the A614, particularly for right-turning traffic.

5.11 Three years of collision records have been obtained for the Mickledale Lane junction (from 2015 to 2017 inclusive). These show that four personal injury collisions have been recorded at this junction, all of which were classed as 'slight' by the police and all of which involved cars.

5.12 Two collisions involved shunts as vehicles slowed / stopped to turn into the minor arms from the A614, one involved two cars both turning right (one into the A614, one into the minor arm) and one involved a right-turning car and an ahead moving car. All of the collisions therefore involved turning movements at this junction.

Public Transport

Services 227 and Sherwood Arrow route through the Mickledale Lane Junction. Bus 227 runs once in each direction on Wednesdays and Fridays, whilst the Sherwood arrow runs every 60 minutes during a typical day.

Engineering Factors

Land Use

5.13 Isolated houses have been constructed in the south-east quadrant of the junction, and a transport café and parking area is located in the north-west quadrant of the junction. Other than these buildings, the junction is surrounded by agricultural land. Inkersall Lane is a narrow road leading westwards from the junction to a small number of private properties and the former Rufford Colliery site. To the east, Mickledale Lane leads to the centre of Bilsthorpe village.

Non-Motorised Users (NMU) Provision

5.14 Footpaths are available (provided between 2011 and 2016) on both sides of the junction, and a dropped crossing and refuge have been provided to assist crossing movements to the north of the junction. Inkersall Lane is a Public Right of Way, Bridleway (Rufford BW5).

5.15 Route Number 645 of the National Cycle Network lies 210 metres to the north of the junction and is a traffic free route. The route follows the disused mineral line and terminates just south of Kirklington.

5.16 There is an opportunity to improve NMU provision at this junction which aligns to the objective of supporting all road users.

Geology / Ground Conditions

5.17 The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and beyond into South Yorkshire. The Sherwood Sandstone typically gives rise to a markedly undulating topography, which apart from a few large rivers is characterised by a general absence of surface drainage. The reason that rivers such as the Meden and Maun maintain their flow is that their valleys lie just below the water table. A range of soil types has developed within the corridor, the majority being well-drained sandy soils.

Highway Structures

5.18 There is a railway bridge (disused mineral line) 210 metres to the north of the junction and Red Bridge carries the A614 over the Rainworth River (approximately 650m to the south of the junction).

Hydrogeology and the Water Environment

5.19 The junction is approximately 650m away from Rainworth Water which is a watercourse and a tributary of the River Maun near Rainworth, Nottinghamshire.

Public Utilities

5.20 A NRSWA C2 enquiry has highlighted the following utility services which may require significant diversion works: BT on all four approaches, HV electricity (33kV) running north-south in west A614 verge, HV electricity (11kV) in two verges, Virgin Media and Zayo fibre cable.

Environmental Factors

Air Quality

5.21 **Baseline:** The location is not within an Air Quality Management Area (AQMA).

5.22 The study area comprises four residential properties which lie immediately adjacent to the south eastern corner of the junction fronting onto Old Rufford Road. To the north-west corner of the junction is The Limes café and a further residential receptor set back from the roadside by approximately 35m with an intervening informal car / lorry parking area associated with the neighbouring café.

5.23 **Potential Constraints:** The introduction of a new junction that creates delays to mainline traffic at this location may potentially generate more emissions compared to the previous junction arrangement. Stop / start traffic tends to generate more emissions than smooth flowing traffic.

5.24 Potential for dust during the construction phase but only temporary in nature.

5.25 **Potential Opportunities:** To mitigate against any potential adverse impact during the construction phase best practice measures should be adopted by the contractor.

5.26 Smoother and consistent journey speeds across the whole corridor will ultimately reduce vehicle emissions because vehicles are idling less and not constantly having to brake/accelerate along the A614.

Cultural Heritage

5.27 **Baseline:** There are no listed buildings or conservation areas within a 1km radius of the site.

5.28 **Potential Constraints:** There will be no potential direct physical impacts on known heritage assets. It is possible that works (excavations) may reveal unknown archaeological constraints during the construction phase.

5.29 **Potential Opportunities:** Works should reinstate the historic field pattern and replace and strengthen existing tree cover that is part of the wider setting of the Sherwood and the surrounding estate farmlands landscape.

Landscape and Visual Impact

5.30 **Baseline:** The scheme proposals fall within the Sherwood Landscape Character Area which falls entirely within Nottinghamshire and is characterised by a wide and diverse range of landscapes including the heart of the historic Sherwood Forest and the extensive parklands and estates of the Dukeries. The area, rich with historical, ecological and landscape features, is intrinsically linked to a number of historical themes including the internationally renowned Robin Hood legend.

5.31 Within the Newark and Sherwood Landscape Character Assessment, the Sherwood Region can be divided into six distinct landscape character types and the Mickledlale junction falls within Old Clipstone Estate

Farmlands Policy Zone (S PZ 09). This is an enclosed, gently rolling estate landscape characterised by an ordered pattern of fields, roads and woodlands.

5.32 The characteristic features of Old Clipstone Estate Farmlands Policy Zone (S PZ 09) are as follows:

- Gently undulating topography;
- Coniferous forestry plantation with broadleaved margins;
- Intensive arable farming in medium regular geometric fields;
- Very small patches of deciduous woodland;
- Poor internal field boundaries, stronger road hedge boundaries with isolated mature trees, mainly Oak;
- Isolated farms of red brick core with modern agricultural buildings; and
- Heathland character, apparent to road verges and along disused mineral railway lines.

5.33 **Potential Constraints:** There are potential physical landscape impacts on landscape features, such as trees, shrubs, hedgerows, heathland and grassed areas following widening of the road junction. There are potential impacts on the landscape character of the Estate Farmlands if the proposed development does not make reference to the landscape character of the area in which it is located.

5.34 There are potential visual impacts on high sensitivity residential receptors at the junction of Mickledale Lane and the A614. There are potential visual impacts on high sensitivity residential receptors at the north western edge of Bilsthorpe (Mickledale Close). There are potential visual impacts on high sensitivity recreational receptors in the surrounding area.

5.35 **Potential Opportunities:** There are opportunities in any proposed hard and soft landscape treatment to fulfil some of the landscape actions within the Newark and Sherwood Landscape Character Assessment for this Policy Zone such as:-

- Create opportunities for restoring areas of heath land where appropriate

5.36 The biodiversity net gain approach should be integral to the design proposals. The reinstatement of landscape treatment along the highway boundary following any widening of the road junction should be incorporated into the design proposals to compensate for existing habitat loss, and changes to the landscape including the landscape character.

Nature Conservation

5.37 **Baseline:** There are six non-statutory designated sites (LWSs) within a 2km radius of the site. Clipstone Forest Area LWS lies approximately 0.8km west of the existing junction and is made up of predominantly coniferous plantation woodland, with small pockets of heathland and acid grassland. Southwell Trail Local Nature Reserve lies approximately 1km to the south east of the site.

5.38 **Potential Constraints:** There will be no direct impact on designated sites. There is likely to be the loss of small areas of habitat supporting protected species, (e.g. hedgerows) as well as trees within the highway verge. Further ecological surveys for protected species will be required.

5.39 **Potential Opportunities:** The Biodiversity net gain approach should be integral to the design proposals. The reinstatement of new hedges and hedgerow trees along highways boundary following any widening of road junction should be incorporated into the junction design to compensate for existing habitat loss.

Geology and Soils

5.40 **Baseline:** *Superficial* – There are no superficial deposits located within the boundary of the site. The nearest is an area of alluvium, associated with Rainworth Water, located approximately 300m east of the site boundary.

5.41 *Bedrock* - The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and into South Yorkshire. Bedrock geology in this area is comprised of the Chester Formation, a sandstone, pebbly (gravelly), formed between 250 and 247 million years ago during the Triassic period. This formation typically gives rise to a markedly undulating topography across the region, which apart from a few large rivers, is characterised by a general absence of surface drainage. It is thought that bedrock will be found at relatively shallow depths across the site.

5.42 *Structural* - There are no identified faults within influencing distance of the site.

5.43 *Soils* - A range of soil types have developed within this corridor, the majority of which being acidic, well-drained sandy soils, particularly vulnerable to leaching of nitrate and pesticide into underlying groundwaters.

5.44 *Made Ground* – The site extends significantly into the boundary of the Limes Café, located to the northwest of the site. There is potential for contaminated made ground in this location.

5.45 **Potential Constraints:** There is likely to be a significant amount of made ground requiring disposal from the Limes Café site. The existing road construction does not appear to show any issues with ground conditions.

5.46 **Potential Opportunities:** Potentially shallow sand / sandstone bedrock removed as part of the construction may be suitable for fill at the southern side of the site, although potential volumes will be minimal and will require further investigation to determine suitability.

Materials

5.47 **Baseline:** The existing road construction is likely to be founded on the sand / sandstone underlying the site.

5.48 There are limited contaminative land uses around the site although there is the potential for localised contamination associated with oils and fuels from road traffic accidents and herbicides / pesticides from agricultural use of the surrounding land. Road materials lower in the construction profile may contain tar bound materials.

5.49 **Potential Constraints:** The Lime's Café to the northwest of the site presents a potential contamination risk. Due to the site's age and the apparent phased repair of the bitumen surface within the carpark, it is the potential for tar bound materials within the car park's construction. There is also a risk of asbestos, used as fill in the car park construction, and potential risk of oil and fuel spillage due to the large volumes of HGVs regularly parked at this location. Beyond the café site, there is the potential for localised ground contamination associated with road traffic accidents and agricultural practices on the surrounding land.

5.50 Although unlikely in the upper layers of road construction, the historic construction of the lower layers has the potential to contain tar bound materials that would most likely need to be disposed of off-site as hazardous waste.

5.51 **Potential Opportunities:** The recycling of road surface planings should be considered and could be reutilised elsewhere in the road surface construction.

5.52 Potential shallow bedrock and other clean materials e.g. sand and gravel could be imported from other sites to make up any fill volumes needed.

Noise and Vibration

5.53 **Baseline:** The study area comprises four residential properties which lie immediately adjacent to the south eastern corner of the junction fronting onto Old Rufford Road. To the north-west corner of the junction is The Limes Café and a further residential receptor set back from the roadside by approximately 35m with an intervening informal car/lorry parking area associated with the neighbouring café.

5.54 The existing noise climate for receptors to the south east is dominated by traffic noise, free flowing in both directions along the A614 with occasional acceleration noise from vehicles turning into and out of Mickledale Lane when gaps in traffic occur. The existing noise climate for the receptor to the north-west is also dominated by traffic, free-flowing in both directions along the A614 with occasional noise from car / lorry movements in the adjacent car park.

5.55 From examination of the DEFRA noise maps for road traffic noise, which were produced in accordance with the EU Noise Directive, the road in the vicinity of the residential receptors has not been identified as an *Important Area*. It is possible that this is an error and that noise levels at the front facades of the four residential receptors do already exceed the criteria used by DEFRA which is used to identify *Important Areas* requiring Highway Authorities to investigate noise mitigation options.

5.56 The four receptors to the south east of the junction with Mickledale Lane are positioned in close proximity to the carriageway; however, there are no known issues associated with vibration from existing traffic movements. This is unlikely to change as a result of the proposed highway alterations.

5.57 **Potential Constraints:** Physical mitigation in the form of noise barriers are unlikely to be feasible for properties immediately adjacent to Old Rufford Road to south east corner of junction due to vehicle accesses and loss of light / outlook.

5.58 There may be a perceptible change to the character of road traffic noise due to braking and acceleration noise, if the preferred scheme introduces delays to mainline traffic.

5.59 The detailed design may require High Friction Surfacing to be laid on approaches to stop lines which could also alter the character of rolling traffic noise in free-flow.

5.60 **Potential Opportunities:** There is potential to lay low noise road surfacing within the scheme extents, which may be beneficial when traffic is free flowing; however, when vehicles are slowing down on the approach to the improved junction (or accelerating away) noise associated with braking and acceleration may dominate more than rolling tyre noise reducing the overall benefit of low noise surfacing.

5.61 There may be an opportunity to install noise barriers to protect residential property to the north-west; however, the benefit may be limited due to vehicle movements within the intervening car/lorry park associated with the neighbouring café.

People and Communities

5.62 **Baseline:** There are no publicly accessible spaces, abutting the junction. A bridleway follows the line of Inkersall Lane which joins the A614 opposite Mickledale Lane. This provides access westwards into Sherwood Pines Forest, with its associated recreation opportunities. Immediately north of the land effected by the proposed junction improvements, however, there is a recreational route. This is part of the Sustrans Network and runs east west linking Bilsthorpe village to Sherwood Pines and the Mansfield cycle network. The cycle route crosses the A614 on a former railway bridge and is on embankment in the vicinity of the main road. It runs roughly parallel to the Inkersall Lane bridleway.

5.63 A transport café lies immediately north of the junction improvements. Residential properties abut the junction to the east. There is grade 3 agricultural land immediately abutting the western highway boundary, which is part of an environmental stewardship scheme.

5.64 **Potential Constraints:** The proposed junction improvements may result in the loss of land forming part of the frontage and car park of the Limes Café. There may also be loss of grade 3 agricultural land.

5.65 **Potential Opportunities:** The construction of the A614 scheme package will be classed as a major transport project. As such it is likely it will provide numerous jobs for local people during the construction stage and also generate construction spend in the local area whilst the works are on site. The main objective of the project is to unlock the economic potential of this corridor which in turn will stimulate the local economy and create additional jobs long term.

5.66 There is the potential opportunity to provide better linkage between Bilsthorpe and the bridleway running west from the A614 to recreational area of Sherwood Pines by improving crossing for pedestrians and cyclists. There is a further opportunity to provide linkage from this bridleway to the Sustrans route immediately to the north of the proposed junction improvements; however, the cost of ramped access up the embankment may not justify the potential gain.

Water and Drainage

5.67 **Baseline:** Rainworth Water is approximately 320m to the east of the junction which is a watercourse and a tributary of the River Maun near Rainworth, Nottinghamshire.

5.68 **Potential Constraints:** An overview of mapping information suggests the adjoining fields to the west of the A614 are at a higher level compared to the highway, with the fields to the east at a lower level. Care should be taken with any proposed widening required for a larger junction to ensure adjoining green field run off is intercepted adequately. The proximity of residential properties and the Limes Café car park could restrict options to install new or enlarge existing drainage systems. Adequacy of the existing discharge / outfall options may prove challenging as from initial preliminary investigations it appears only roadside ditches may be present. Further detailed investigation in to the type, location and outfall of the existing drainage systems and ground permeability details will be necessary. The governing water authority Trent Valley Internal Drainage Board (TVIDB), Environment Agency (EA) or Nottinghamshire County Council's Flood Risk Team may need to approve additional discharge in to nearby watercourses, this may be limited to greenfield runoff where additional volumes would need to be attenuated. Any widening of the existing junction would require areas of adjoining private agricultural land and potentially Limes Café car park.

5.69 **Potential Opportunities:** Reuse and upgrade of existing drainage systems should be considered a first choice; however, this will be dependent on the condition and capacity of the existing system, detailed drainage surveys should be commissioned to verify. Additional infiltration / storage systems may be required if it is proven existing drainage discharge systems, mainly consisting of road side ditches are limited which could also provide some improvement to the current arrangement.

Health Impact Assessment

5.70 **Baseline:** This site consists of a crossroads with major priority to A614 traffic travelling north / south. Heavy traffic volumes on the A614 make access across this junction difficult but this is unlikely to create any significant air quality issues. There is some connectivity for Non-Motorised Users (NMU) across this junction via means of footways and a central refuge just north of the junction. The expected level of NMU is expected to be low to medium with the majority of these being local walkers from Bilsthorpe looking to access Sherwood Pines. Cyclists are likely to favour the off-road route multi user route along the old mineral line from Bilsthorpe to Sherwood Pines. Two turning collision accidents have been recorded at this location in the 3-year period 2015-2017. The current facility is a limited interchange for access to goods, services and employment.

5.71 **Potential Constraints:** There are potential risks from air quality and noise to human receptors as part of the proposed scheme. Access provision for walkers from Bilsthorpe needs to be retained. There are no significant cycling issues expected.

5.72 **Potential Opportunities:** Improved lines of sight approaching this junction should significantly reduce the likelihood of collisions and accidents. Provision of improved informal pedestrian crossing points should be considered at this location.

5.73 The proposed scheme may bring about improvements in health should there be a decrease in noise and air contaminant levels to local receptors through better controlled flow.

Climate Change Adaption & Mitigation

5.74 **Baseline:** Projected changes to average climatic conditions and associated severe weather events (such as heavy and / or prolonged precipitation, storm events and heatwaves) have the potential to impact on the proposed scheme and the surrounding built and natural environment. With reference to Meteorological Office Data, the scheme lies within the defined 'Midlands' region. The climate of this region sees mean annual

temperatures of between 8°C and 10°C with July being the warmest month with temperatures typically in the region of 22°C. The region is relatively dry with rainfalls of between 600mm to 800mm per year.

5.75 **Potential Constraints:** Projected changes to average climatic conditions and associated severe weather events have the potential to impact on the Scheme and the surrounding built and natural environment. All construction and operational activities and materials associated with the proposed scheme would result in Greenhouse Gas emissions contributing to a negative impact on the climate.

5.76 **Potential Opportunities:** There is potential that the scheme can be designed to be 'future proof' i.e. the design can take into account projected climate changes such as increased temperature and rainfall to ensure minimal impact as a result of this. For example species can be selected for the proposed soft landscape treatment that will tolerate a minor increase in temperature.

6. White Post Roundabout: Traffic, Engineering and Environmental Factors

Study Area

6.1 The study area includes the White Post roundabout and its immediate approaches. The roundabout is shown in Figure 6.1. The roundabout is less than 8 miles away from Mansfield and 12 miles from Nottingham.

6.2 The current layout is a four arm roundabout with the A614 running north-south. The Mansfield Road (west) arm has a children's theme park situated 200m away from the junction and also leads to Rainworth and the town of Mansfield. The Mansfield Road (east) leads to the village of Farnsfield.

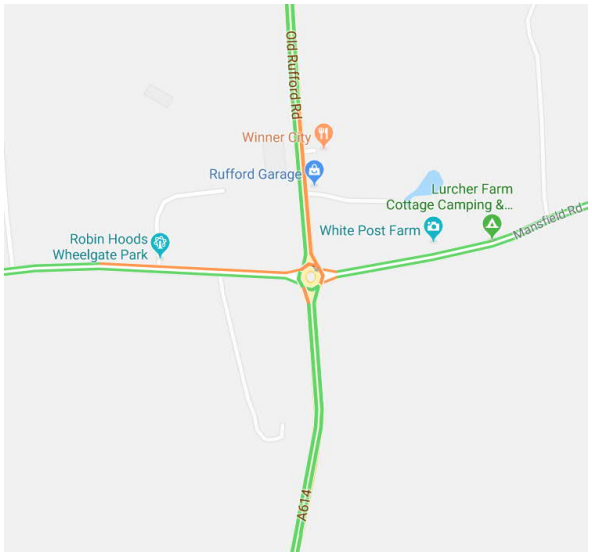
Figure 6.1: White Post Roundabout

Traffic Factors

Journey Time Delays

6.3 Typical present day traffic conditions from Google Traffic has been obtained for the AM and PM peak hours on a typical weekday and is presented in Figure 6.2. This shows that modest journey time delays to the A614 southbound and Mansfield Road eastbound in the AM peak hour and the A614 southbound and northbound in the PM peak hour.

Figure 6.2: Google Maps Extracts



Typical Traffic, AM Peak Hour (Tuesday, 0830hrs)

Typical Traffic, PM Peak Hour (Tuesday, 1730hrs)

6.4 An ARCADY model has been prepared by VIA East Midlands Ltd to model the performance of this junction.

6.5 The Traffic and Economic Assessment Report (60595614/EAR), details the production of two traffic forecasts: one which *excludes* the trips of developments deemed to be dependent on the scheme (economic forecast) and one which *includes* the trips of developments deemed to be dependent on the scheme (design forecast). The design forecasts represent a higher growth scenario and have been used in the option development stages to ensure the proposed scheme junctions have sufficient capacity.

6.6 The performance of the existing junction using the design forecasts is shown in Table 6.1.

6.7 The results show that the junction will operate at capacity in both the AM and PM peak hours in both 2023 and 2037.

Table 6.1: Performance of Existing Junction – 2023 & 2037 (Design Forecasts)

Year	AM Peak Hour		IP Peak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
2023	0.89	8	0.53	1	0.96	16
2037	1.06	55	0.61	2	1.12	91

Collisions

6.8 Three years of collision records have been obtained for the White Post junction (from 2015 to 2017 inclusive). During this period, no recorded personal injury collisions have occurred at this junction over this period.

Public Transport

6.9 Services 28 and Sherwood Arrow route through the Deerdale Lane Junction. These services run every 60 minutes during a typical day.

Engineering Factors

Land Use

6.10 Commercial (pub, garage, etc.) and residential property borders this junction on all sides.

Non-Motorised Users (NMU) Provision

6.11 Footpaths are available on each of the roads leading to the junction, and a pedestrian refuge (with dropped crossings) has been provided on the A614 (N) arm. There is a PROW footpath to the south of the junction (FarnsfieldFP19).

Geology/Ground Conditions

6.12 The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and into South Yorkshire. Bedrock geology in this area is comprised of the Chester Formation, a sandstone, pebbly (gravelly), formed between 250 and 247 million years ago during the Triassic period. This formation typically gives rise to a markedly undulating topography across the region, which apart from a few large rivers, is characterised by a general absence of surface drainage. It is thought that bedrock will be found at relatively shallow depths across the site.

Highway Structures

6.13 There are no known highway structures in close proximity to the White Post Roundabout.

Hydrogeology and the Water Environment

6.14 The junction is approximately 300m away from Rainworth Water which is a watercourse and a tributary of the River Maun near Rainworth, Nottinghamshire.

Public Utilities

6.15 Services will not be affected by proposals within the tight footprint of the junction.

Environmental Factors

Air Quality

6.16 **Baseline:** The location is not within an Air Quality Management Area (AQMA).

6.17 **Potential Constraints:** The land-use constraints noted above mean that a significant enlargement of the junction is considered unlikely. As such, the proposed scheme will have no adverse impact on air quality emissions.

6.18 **Potential Opportunities:** Smoother and consistent journey speeds across the whole corridor will ultimately reduce vehicle emissions because vehicles are idling less and not constantly having to brake/accelerate along the A614.

Cultural Heritage

6.19 **Baseline:** There are no Listed Buildings or Conservation Areas within a 1km radius of the site. The nearest designated site is Farnsfield Conservation Area and a scheduled ancient monument which lie 1.5km to the east and 1.6km south east of the site respectively.

6.20 **Potential Constraints:** There should be no potential direct physical impacts on known heritage assets.

6.21 **Potential Opportunities:** Materials should be appropriate to local vernacular buildings. Lighting replacement to prevent upward spill would reflect the rural location of this junction.

Landscape and Visual Impact

6.22 **Baseline:** The scheme proposals fall within the Sherwood Landscape Character Area which falls entirely within Nottinghamshire and is characterised by a wide and diverse range of landscapes including the heart of the historic Sherwood Forest and the extensive parklands and estates of the Dukeries. The area, rich with historical, ecological and landscape features, is intrinsically linked to a number of historical themes including the internationally renowned Robin Hood legend.

6.23 Within the Newark and Sherwood Landscape Character Assessment, the Sherwood Region can be divided into six distinct landscape character types and the White Post junction falls within the Oxton Village Farmlands Policy Zone SPZ 07. This is a gently rolling, in places industrialised agricultural landscape characterised by a traditional pattern of small villages and farms.

6.24 The characteristic features of the Oxton Village Farmlands Policy Zone are:-

- Gentle undulating topography;
- Intensive arable farming in large geometric fields;
- Small patches of deciduous and coniferous woodland;
- Poor internal field boundaries, stronger road hedge boundaries with isolated mature trees mainly oak;
- Isolated farms of red brick core with agricultural buildings;
- Heathland character, apparent to road verges, heathland species present along disused railway lines;
- Settlement of Oxton with historic red brick and pan-tiled core; and
- Concentration of leisure facilities at White Post Farm at the junction of A617/A614.

6.25 **Potential Constraints:** There are no potential physical landscape impacts on landscape features.

6.26 There are potential visual impacts on high sensitivity residential receptors such as detached properties at the junction between the A614 and Mansfield Road / Farnsfield Road; and isolated farms. There are also potential

visual impacts on medium sensitivity receptors at leisure facilities located around this junction such as a Public House, Wheelgate Park and White Post Farm Centre. There are potential visual impacts on high sensitivity recreational receptors on Public Rights of Way such as footpaths and bridleways in the surrounding area

6.27 **Potential Opportunities:** Opportunities to gap up existing field boundaries and provide native species planting to improve habitat connectivity and ecosystem services (air quality) around the junction, should be incorporated into the design proposals.

Nature Conservation

6.28 **Baseline:** There is one non-statutory designated site (LWS) within a 2km radius of the site. This is Farnsfield Disused Railway Local Wildlife Site which lies just under 0.4km north of the site. This LWS is also a Local Nature Reserve (Southwell Trail LNR) which extends north up to Bilsthorpe and east to Southwell.

6.29 **Potential Constraints:** There will be no direct impact on designated sites. There is the potential for disturbance to protected species if the works area for maintenance operations impact on adjacent land and/or road verges.

6.30 **Potential Opportunities:** Opportunities to gap up existing field boundaries and provide native planting to improve habitat connectivity and ecosystem services (air quality) around the junction should be incorporated in the design proposals.

Geology and Soils

6.31 **Baseline:** *Superficial* - There are no superficial deposits located within, or close to, the boundary of the site.

6.32 *Bedrock* - The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and into South Yorkshire. Bedrock geology in this area is comprised of the Chester Formation, a sandstone, pebbly (gravelly), formed between 250 and 247 million years ago during the Triassic period. This formation typically gives rise to a markedly undulating topography across the region, which apart from a few large rivers, is characterised by a general absence of surface drainage. It is thought that bedrock will be found at relatively shallow depths across the site.

6.33 *Structural* - There are no identified faults within influencing distance of the site, with the nearest being over 2.5km to the southeast.

6.34 *Soils* - A range of soil types has developed within this corridor, the majority of which being; acidic, well-drained sandy soils, particularly vulnerable to leaching of nitrate and pesticide into groundwaters.

6.35 *Made Ground* - There is limited potential for made ground at the site.

6.36 **Potential Constraints:** None identified.

6.37 **Potential Opportunities:** None identified

Materials

6.38 **Baseline:** The existing road construction is likely to be founded on the sand / sandstone underlying the site.

6.39 There are limited contaminative land uses around the site although, there is the potential for localised contamination associated with oils and fuels from road traffic accidents, a garage / vehicle hire business located to the south-west of the roundabout and herbicides / pesticides from agricultural use of the surrounding land. Road materials lower in the construction profile may contain tar bound materials.

6.40 **Potential Constraints:** None identified

6.41 **Potential Opportunities:** None identified

Noise and Vibration

6.42 **Baseline:** There are several commercial receptors located immediately adjacent to the roundabout as well as 3-4 residential receptors. The existing noise climate is dominated by road traffic at the nearest façade of all receptors.

6.43 There are no known issues associated with vibration from existing traffic movements.

6.44 **Potential Constraints:** There is very limited space around the roundabout for any physical noise mitigation measures. In addition, such measures may not be feasible due to vehicle accesses, loss of light / outlook.

6.45 **Potential Opportunities:** There is potential to lay low noise road surfacing within the scheme extents; however, this may have limited benefit at the receptor locations due to nature of vehicle movements approaching and exiting the roundabout where noise associated with braking and acceleration may dominate more than rolling tyre noise.

People and Communities

6.46 **Baseline:** The existing White Post roundabout is surrounded on all sides by commercial and tourist land uses; farm park, restaurant and theme park to the north, garage and pub- restaurant to the south, with residential properties beyond.

6.47 There is a bridleway / footpath which is the eastern extent of the Southwell Trail, a multiuser recreational route, which joins the A614 approximately 150m north of the existing roundabout. The route descends steeply to the road changing from bridleway to footpath as a result. There is no current provision for users of the trail to extend their journey west of the A614 or to exist safely onto the road. There is a footpath crossing the A614 approximately 100m to the south of the proposed junction.

6.48 The agricultural land classification to the south and north is grade 3. This is unlikely to be impacted by the proposals unless any land take extends beyond the existing built development immediately surrounding the existing junction.

6.49 **Potential Constraints:** The proximity of existing commercial property to the junction constrains potential spatial extent of improvements.

6.50 Agricultural land loss is unlikely to be an issue unless the extent of the scheme extends beyond the current built development.

6.51 **Potential Opportunities:** The construction of the A614 scheme package will be classed as a major transport project. As such it is likely it will provide numerous jobs for local people during the construction stage and also construction spend in the local area whilst the works are on site. The main objective of the project is to unlock the economic potential of this corridor which in turn will stimulate the local economy and create additional jobs long term.

6.52 There is potential opportunity to improve the safety of pedestrians crossing the A614 along the footpath to the south of the junction. There is also potential to provide better linkage between the bridleway on the Southwell trail and the White Post businesses and quiet road network beyond. The economic viability of these opportunities in relation to the benefit delivered would have to be considered.

Water and Drainage

6.53 **Baseline:** The junction is approximately 300m away from Rainworth Water which is a watercourse and a tributary of the River Maun near Rainworth, Nottinghamshire.

6.54 **Potential Constraints:** Alterations to the existing arrangement is not proposed at this location which would affect the existing drainage system.

6.55 **Potential Opportunities:** Where necessary cleanse existing drainage systems present within limit of works area.

Health Impact Assessment

6.56 **Baseline:** This site consists of a 4-arm single lane roundabout, with two A-class roads and two B-class roads intersecting. There are moderately high traffic volumes due to recreational attractions at this location but limited standing traffic issues that would contribute to poorer Air Quality. There is some limited connectivity for Non-Motorised Users (NMU) around the roundabout on the northern arm via means of footways and a central refuge to facilitate transfer between recreational sites. No separate provision for cyclist exists who negotiate the small roundabout on the main carriageway. No collisions have been recorded at this location in the 3-year period 2015-2017. The current facility provides moderately good access to goods, services and employment and recreational opportunities for motorised users.

6.57 **Potential Constraints:** There are potential risks from air quality and noise to human receptors as part of the proposed scheme. Access provision for pedestrians around the roundabout could be further improved. Issues for cycling are likely to remain the same.

6.58 **Potential Opportunities:** Improvements to pedestrian circulation and connectivity around the roundabout would reduce further reduce the potential for accidents at this interchange and improve access to goods, places and services.

Climate Change Adaption & Mitigation

6.59 **Baseline:** Projected changes to average climatic conditions and associated severe weather events (such as heavy and / or prolonged precipitation, storm events and heatwaves) have the potential to impact on the proposed scheme and the surrounding built and natural environment. With reference to Meteorological Office Data, the scheme lies within the defined 'Midlands' region. The climate of this region sees mean annual temperatures of between 8°C and 10°C with July being the warmest month with temperatures typically in the region of 22°C. The region is relatively dry with rainfalls of between 600mm to 800m per year.

6.60 **Potential Constraints:** Projected changes to average climatic conditions and associated severe weather events have the potential to impact on the scheme and the surrounding built and natural environment. All construction and operational activities and materials associated with the proposed scheme would result in Greenhouse Gas emissions contributing to a negative impact on the climate.

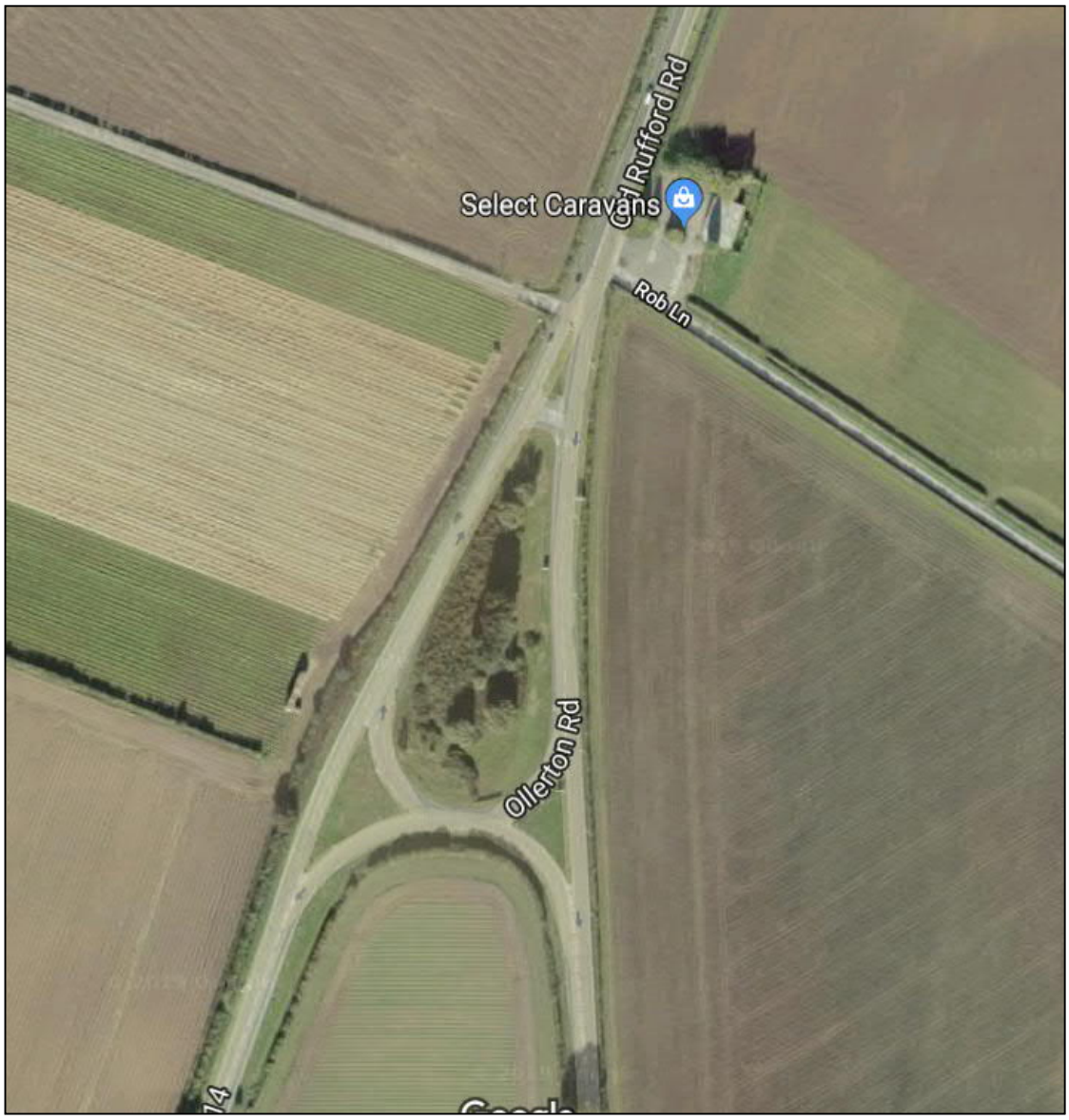
6.61 **Potential Opportunities:** There is potential that the scheme can be designed to be 'future proof' i.e. the design can take into account projected climate changes such as increased temperature and rainfall to ensure minimal impact as a result of this. For example species can be selected for the proposed soft landscape treatment that will tolerate a minor increase in temperature.

7. Warren Hill: Traffic, Engineering and Environmental Factors

Study Area

7.1 The study area includes the Warren Hill junction and its immediate approaches. The junction is shown in Figure 7.1. The existing junction is a non-standard 3 arm gyratory. The Old Rufford Road carries 17,950 vehicles a day (AADT) with Ollerton Road carrying 6,250 AADT.

Figure 7.1: Warren Hill



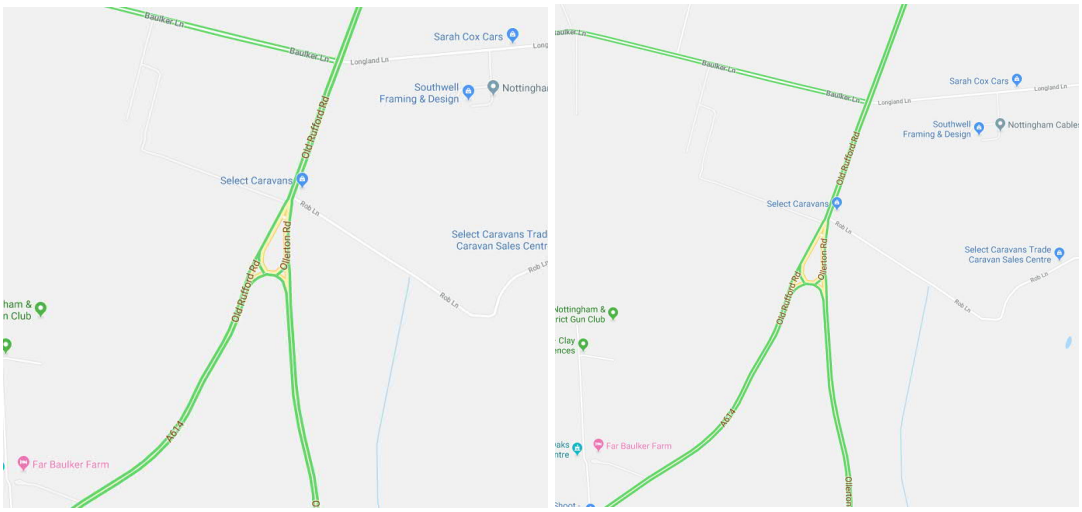
© Google

Traffic Factors

Journey Time Delays

7.2 Typical present day traffic conditions from Google Traffic has been obtained for the AM and PM peak hours on a typical weekday and is presented in Figure 7.2. This shows that currently there are minimal journey time delays at the junction.

Figure 7.2: Google Maps Extracts



Typical Traffic, AM Peak Hour (Tuesday, 0830hrs) Typical Traffic, PM Peak Hour (Tuesday, 1730hrs)

7.3 A PICADY model has been prepared by VIA East Midlands Ltd to model the performance of this junction.

7.4 The Traffic and Economic Assessment Report (60595614/EAR), details the production of two traffic forecasts: one which *excludes* the trips of developments deemed to be dependent on the scheme (economic forecast) and one which *includes* the trips of developments deemed to be dependent on the scheme (design forecast). The design forecasts represent a higher growth scenario and have been used in the option development stages to ensure the proposed scheme junctions have sufficient capacity.

7.5 The performance of the existing junction using the design forecasts is shown in Table 7.1.

7.6 The results show that the junction will continue to operate below capacity in 2023, but that in 2037 the junction is expected to operate above capacity in the AM and PM peak hours.

Table 7.1: Performance of Existing Junction – 2023 & 2037 (Design Forecasts)

Year	AM Peak Hour		IP Peak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
2023	0.70	2	0.39	1	0.79	4
2037	0.87	6	0.50	1	0.97	14

Collisions

7.7 Stakeholders report a perception of road safety issues at Warren Hill, relating to the unusual junction layout. Traffic from the A6097 (routeing north) merges onto the A614 by entering the main stream on the passenger side (rather than the normal driver's side).

7.8 Three years of collision records have been obtained for the Warren Hill junction (from 2015 to 2017 inclusive). Two personal injury collisions were recorded at the junction. Both collisions were classed as 'serious' by the police. One involved a single vehicle (car), and the other involved a car and a pedal cycle.

Public Transport

7.9 The Sherwood Arrow service routes through Warren Hill Junction. This service had a frequency of every 60 minutes during a typical day.

Engineering Factors

Land Use

7.10 A caravan sales site is located to the immediate north of the junction, though the rest of the junction is surrounded by agricultural land.

Non-Motorised Users (NMU) Provision

7.11 No provision for NMUs has been made at this junction. There is a PROW BOAT (Rob Lane – OxtonBOAT No11) just to the north of the junction.

Geology/Ground Conditions

7.12 The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and beyond into South Yorkshire. The Sherwood Sandstone typically gives rise to a markedly undulating topography, which apart from a few large rivers is characterised by a general absence of surface drainage. The reason that rivers such as the River Meden and River Maun maintain their flow is that their valleys lie just below the water table. A range of soil types has developed within the corridor, the majority being well-drained sandy soils.

Highway Structures

7.13 There are no known highway structures at this location.

Hydrogeology and the Water Environment

7.14 The junction is approximately 650m away from Dover Beck which is a watercourse and a tributary of the River Trent near Caythorpe, Nottinghamshire.

Public Utilities

7.15 A NRSWA C2 enquiry has highlighted the following utility services which may require significant diversion works: BT, Virgin Media and Severn Trent Water.

Environmental Factors

Air Quality

7.16 **Baseline:** The location is not within an Air Quality Management Area (AQMA). No residential receptors in close proximity to the study area.

7.17 **Potential Constraints:** Potential for dust during the construction phase but only temporary in nature and no residential receptors in close proximity to the works area.

7.18 **Potential Opportunities:** To mitigate against any potential adverse impact during the construction phase best practice measures should be adopted by the contractor.

7.19 Smoother and consistent journey speeds across the whole corridor will ultimately reduce vehicle emissions because vehicles are idling less and not constantly having to brake/accelerate along the A614.

Cultural Heritage

7.20 **Baseline:** There are no Listed Buildings or Conservation Areas within a 1km radius of the site. A scheduled ancient monument lies 0.8km to the east of the site.

7.21 **Potential Constraints:** There will be no potential direct physical impacts on known heritage assets. It is possible that works (excavations) may reveal unknown archaeological constraints during the construction phase.

7.22 **Potential Opportunities:** Materials should be appropriate to local vernacular buildings. Lighting replacement to prevent upward spill would reflect the rural location of this junction.

Landscape and Visual Impact

7.23 **Baseline:** The junction falls within the Sherwood Landscape Character Area which falls entirely within Nottinghamshire and is characterised by a wide and diverse range of landscapes including the heart of the historic Sherwood Forest and the extensive parklands and estates of the Dukeries. The area, rich with historical, ecological and landscape features, is intrinsically linked to a number of historical themes including the internationally renowned Robin Hood legend.

7.24 Within the Newark and Sherwood Landscape Character Assessment, the Sherwood Region can be divided into six distinct landscape character types and the White Post junction falls within the Oxton Village Farmlands Policy Zone SPZ 07. This is a gently rolling, in places industrialised agricultural landscape characterised by a traditional pattern of small villages and farms.

7.25 The characteristic features of the Oxton Village Farmlands Policy Zone are:-

- Gentle undulating topography;
- Intensive arable farming in large geometric fields;
- Small patches of deciduous and coniferous woodland;
- Poor internal field boundaries, stronger road hedge boundaries with isolated mature trees mainly oak;
- Isolated farms of red brick core with agricultural buildings;
- Heathland character, apparent to road verges, heathland species present along disused railway lines;
- Settlement of Oxton with historic red brick and pan-tiled core; and
- Concentration of leisure facilities at White Post Farm at the junction of A617 / A614.

7.26 **Potential Constraints:** There are potential physical landscape impacts on landscape features such as trees, shrubs, hedgerows, heathland and grassed area if the footprint of the junction changes. There are potential impacts on the landscape character of the Village Farmlands if the proposed development does not make reference to the landscape character of the area in which it is located.

7.27 There are potential visual impacts on residential receptors such as isolated farms. There are potential visual impacts on high sensitivity recreational receptors on Public Rights of Way such as bridleways in the surrounding area

7.28 **Potential Opportunities:** There are opportunities in any proposed hard and soft landscape treatment to fulfil some of the landscape actions within the Newark and Sherwood Landscape Character Assessment for this Policy Zone such as: -

- Create opportunities for restoring areas of heath land where appropriate

7.29 The biodiversity net gain approach should be integral to the design proposals. The reinstatement of landscape treatment along the highway boundary following any changes to the junction footprint should be incorporated into the design to compensate for existing habitat loss, and changes to the landscape, including landscape character. Any lands within the highway boundary that are released could be used for habitat creation, tree planting and heathland creation.

Nature Conservation

7.30 **Baseline:** There are seven non-statutory designated sites (LWSs) within a 2km radius of the site, the majority of which lie to the south. The closest LWS is Combs Wood LWS around 1.4km to the east of the site. Combs Wood is also an Ancient Woodland site.

7.31 **Potential Constraints:** There will be no direct impact on designated sites. However, there may be disturbance and removal of habitat potentially used by protected species on the existing island and adjacent road verges.

7.32 **Potential Opportunities:** The biodiversity net gain approach should be integral to the design proposals. Any lands within the highway boundary that are released could be used for habitat creation, tree planting and heathland creation.

Geology and Soils

7.33 **Baseline:** *Superficial* - There are no superficial deposits located within, or close to, the boundary of the site.

7.34 *Bedrock* - The area is closely associated with a broad belt of Permo-Triassic sandstones which run northwards through the length of Nottinghamshire and into South Yorkshire. Bedrock geology in this area is comprised of; the Chester Formation, a sandstone, pebbly (gravelly), formed between 250 and 247 million years ago during the Triassic period. This formation typically gives rise to a markedly undulating topography across the region, which apart from a few large rivers, is characterised by a general absence of surface drainage. It is thought that bedrock will be found at relatively shallow depths across the site.

7.35 *Structural* - There are no identified faults within influencing distance of the site, with the nearest being located approximately 1.5km to the southwest.

7.36 *Soils* - A range of soil types has developed within this corridor, the majority of which are; acidic, well-drained sandy soils, particularly vulnerable to leaching of nitrate and pesticide into groundwaters.

7.37 *Made Ground* - There is limited potential for made ground at the site.

7.38 **Potential Constraints:** There are no easily identifiable constraints at this stage. The existing road construction does not appear to show any issues with ground conditions.

7.39 **Potential Opportunities:** Potentially shallow sand / sandstone bedrock removed as part of any construction may be suitable for fill at the other corridor improvement locations. This will require further investigation.

Materials

7.40 **Baseline:** The existing road construction is likely to be founded on the sand / sandstone underlying the site. There is limited potential for made ground across the site.

7.41 There are limited contaminative land uses around the site although there is the potential for localised contamination associated with oils and fuels from road traffic accidents and herbicides/pesticides from agricultural use of the surrounding land. Road materials lower in the construction profile may contain tar bound materials.

7.42 **Potential Constraints:** Minimal contaminated material; however, there is the potential for localised contamination associated with road traffic accidents and agricultural practices in the proposed areas of new construction.

7.43 Although unlikely in the upper layers of road construction, the historic construction of the lower layers has the potential to contain tar bound materials that would most likely need to be disposed of off-site as hazardous waste.

7.44 **Potential Opportunities:** The recycling of road surface planings should be considered and could be reutilised elsewhere in the road surface construction.

7.45 Potential shallow bedrock and other clean materials e.g. sand and gravel could be imported from other sites to make up any fill volumes needed.

Noise and Vibration

7.46 **Baseline:** There is one commercial development located to the north of the junction however there are no residential receptors within 300m.

7.47 **Potential Constraints:** N/A

7.48 **Potential Opportunities:** N/A

People and Communities

7.49 **Baseline:** This junction is in an isolated rural setting, surrounded on all sides by agricultural land. Approximately 50m north of the junction extent is a caravan business adjacent to a farm access which is also the line of a public byway, Rob Lane. The junction is surrounded by Grade 3 agricultural land.

7.50 **Potential Constraints:** If the junction is reconfigured, there may be permanent loss of agricultural land, with further land being temporarily taken out of production during construction.

7.51 **Potential Opportunities:** The construction of the A614 scheme package will be classed as a major transport project. As such it is likely it will provide numerous jobs for local people during the construction stage and also construction spend in the local area whilst the works are on site. The main objective of the project is to unlock the economic potential of this corridor which in turn will stimulate the local economy and create additional jobs long term.

7.52 Due to the lack of onward connectivity to a wider network, there is limited need to provide improvements to road crossing or the junction of Rob Lane with the A614 for rights of way network users.

Water and Drainage

7.53 **Baseline:** The junction is approximately 650m away from Dover Beck which is a watercourse and a tributary of the River Trent near Caythorpe, Nottinghamshire.

7.54 **Potential Constraints:** Referencing online mapping data, the adjoining land mainly compromises of agricultural fields and is generally at a lower level compared to the existing road layout. This suggests intercepting ditches would be present at the bottom of the embankments. Enlargement of the existing systems may require 3rd party land, however the large green spaces created in the new arrangement could offer space for storage systems needed. Adequacy of the existing discharge / outfall options may prove challenging as from initial preliminary investigations it appears only roadside ditches may be present. Further detailed investigation in to the type, location and outfall of the existing drainage systems and ground permeability details will be necessary. The governing water authority Trent Valley Internal Drainage Board (TVIDB), Environment Agency (EA) or Nottinghamshire County Council's Flood Risk Team may need to approve additional discharge in to nearby watercourses, this may be limited to greenfield runoff where additional volumes would need to be attenuated.

7.55 **Potential Opportunities:** Where necessary existing drainage systems present within limit of works area should be cleansed. Reuse and upgrade of existing drainage systems should be considered a first choice; further detailed investigation in to the type, location and outfall of the existing drainage systems and ground permeability will be necessary. Additional infiltration / storage systems may be required if it is proven existing drainage discharge systems, mainly consisting of road side ditches are limited, further detailed investigations are to be commissioned to verify. Space could be created to install storage systems.

Health Impact Assessment

7.56 **Baseline:** This site is a large major gyratory roundabout interchange with dual lane filters. High traffic volumes are a result of the convergence of two main arterial routes, but the current layout significantly reduces any issue of standing traffic. There are no provisions for Non-Motorised Users (NMU) around the roundabout and due to its large scale and dual lanes, without clear views of all parts of interchange, this is a significant hazard for cyclists. However, a lack of close residential communities and no existing Rights of Way crossing the interchange area suggest this is a very low level issue. Two collisions have been recorded at this location in the 3-year period 2015-2017 (both serious) with 1 involving a cyclist.

7.57 **Potential Constraints:** There are no significant walking issues expected. There are limited potential risks from air quality and noise to human receptors.

7.58 **Potential Opportunities:** The change from the existing gyratory roundabout to a more standard form with clear lines of sight is likely to reduce the existing level of collisions.

Climate Change Adaption & Mitigation

7.59 **Baseline:** Projected changes to average climatic conditions and associated severe weather events (such as heavy and/or prolonged precipitation, storm events and heatwaves) have the potential to impact on the proposed scheme and the surrounding built and natural environment. With reference to Meteorological Office Data, the scheme lies within the defined 'Midlands' region. The climate of this region sees mean annual temperatures of between 8°C and 10°C with July being the warmest month with temperatures typically in the region of 22°C. The region is relatively dry with rainfalls of between 600mm to 800mm per year.

7.60 **Potential Constraints:** Projected changes to average climatic conditions and associated severe weather events have the potential to impact on the Scheme and the surrounding built and natural environment. All construction and operational activities and materials associated with the proposed scheme would result in Greenhouse Gas emissions contributing to a negative impact on the climate.

7.61 **Potential Opportunities:** There is potential that the scheme can be designed to be 'future proof' i.e. the design can take into account projected climate changes such as increased temperature and rainfall to ensure minimal impact as a result of this. For example species can be selected for the proposed soft landscape treatment that will tolerate a minor increase in temperature.

8. Lowdham Roundabout: Traffic, Engineering and Environmental Factors

Study Area

8.1 The study area includes the Lowdham roundabout and its immediate approaches. The roundabout is shown in Figure 8.1. Lowdham Roundabout is 9 miles from Nottingham. The existing 4 arm roundabout has an ICD of 43m. The A612 approach and exit arms only cater for single lane approaches and single lane exits. The entries have localised entry flaring on the immediate approaches to the roundabout. The A6097 is a dual carriageway which has 2 lane approaches and 2 lane exits on both the south east and north west arms

8.2 The A60197/A612 Lowdham Roundabout is a key junction on the County Council's strategic road network and, as such, large volumes of traffic pass through it on a daily basis. The layout currently accommodates over 30,000 vehicular movements a day. The A6097 is a key artery linking the A46 in the south to the A614 / A617 (Mansfield) in the north. The A612 provides a key route from Nottingham in the south to the towns of Southwell and Newark in the north and east. The junction currently experiences significant journey delays (especially during the morning and evening peaks) because of insufficient capacity to cater for current traffic demands.

Figure 8.1: Lowdham Roundabout

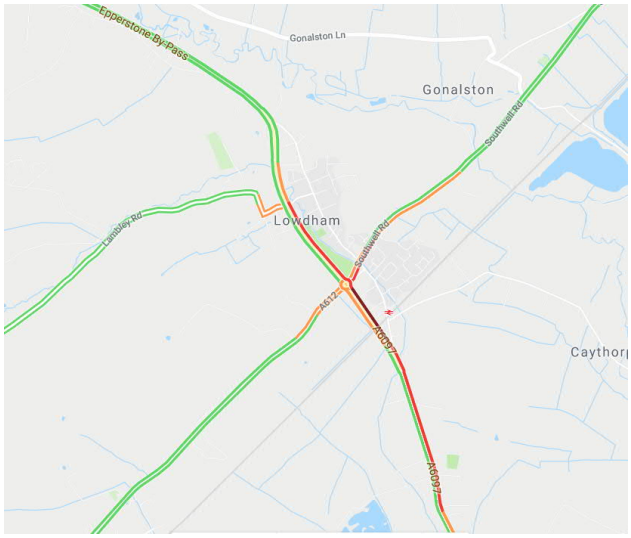
© Google 2019

Traffic Factors

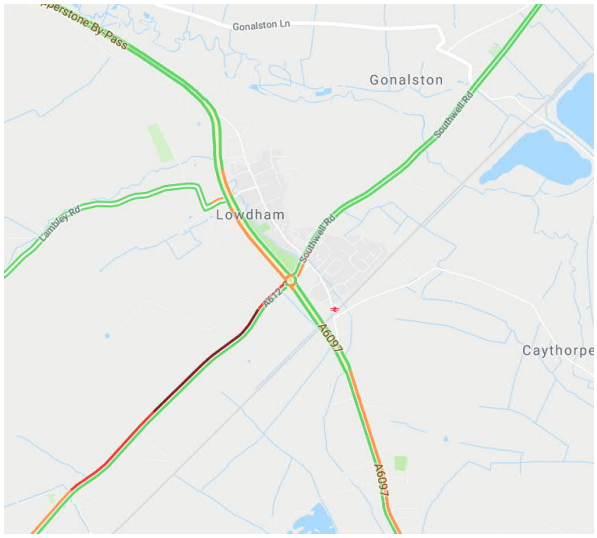
Journey Time Delays

8.3 Typical present day traffic conditions from Google Traffic has been obtained for the AM and PM peak hours on a typical weekday and is presented in Figure 8.2. This shows that currently there are large journey time delays at the junction, particularly on the A6097 southbound, Epperstone Road and Nottingham Road approaches to the junction in the AM peak. The Nottingham Road approach to the junctions typically has large journey time delays in the PM peak hour.

Figure 8.2: Google Maps Extracts



Typical Traffic, AM Peak Hour (Tuesday, 0830hrs)



Typical Traffic, PM Peak Hour (Tuesday, 1730hrs)

8.4 The junction is restricting economic growth and housing delivery, with the nearby Teal Close development having conditional planning, limiting the quantum of development that can be delivered prior to improvements the junction.

8.5 The planning condition limits the development of the Teal Close site to 150 dwellings until capacity improvements to Lowdham Roundabout occur. The scheme will allow a further 680 dwellings to progress.

8.6 The Traffic and Economic Assessment Report (60595614/EAR), details the production of two traffic forecasts: one which *excludes* the trips of developments deemed to be dependent on the scheme (economic forecast) and one which *includes* the trips of developments deemed to be dependent on the scheme (design forecast). The design forecasts represent a higher growth scenario and have been used in the option development stages to ensure the proposed scheme junctions have sufficient capacity.

8.7 An ARCADY model has been prepared by VIA East Midlands Ltd to model the performance of this junction. The performance of the existing junction using the design forecasts is shown in Table 8.1.

8.8 The results show that the junction will operate at capacity in both the AM and PM peak hours in both 2023 and 2037, with large queues predicted in the PM peak hours.

Table 8.1: Performance of Existing Junction – 2023 & 2037 (Design Forecasts)

Year	AM Peak Hour		IP Peak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
2023	0.90	8	0.58	1	1.32	118
2037	1.16	35	0.67	2	1.49	230

Collisions

8.9 Three years of collision records have been obtained for the Lowdham junction (from 2015 to 2017 inclusive). During this period, five personal injury collisions were recorded. Two of the collisions were classed as 'serious' by the police and three were classed as 'slight'. All collisions involved a pedal cycle (two involving collisions with vans, and three with cars).

Public Transport

8.10 Services 856, 100 and 26 route through Lowdham Junction. Service 100 operates approximately every 30 minutes during a typical day, whilst service 856 operates four times per day. Service 26 is a school service, providing 2 services in the AM Peak and 2 services in the PM peak.

Engineering Factors

Land Use

8.11 Residential dwellings have been constructed in the junction's eastern and southern quadrants, and a cricket pitch is to the north of the junction. To the west, the junction is bordered by agricultural land.

Non-Motorised Users (NMU) Provision

8.12 Footpaths have been provided around the junction, and splitter islands are available to assist pedestrians crossing (albeit that they are also occupied by signage). However, tactile paving is not present, and the junction is therefore not compliant to Disability Discrimination Act (DDA) standards. There is a PROW footpath (LowdhamFP2) to the south of the junction.

8.13 There is an opportunity to improve NMU provision at this junction which aligns to the objective of supporting all road users.

Geology/Ground Conditions

8.14 The solid bedrock of the area comprises mudstone and siltstone of the Gunthorpe and Radcliffe Members. Soils are identified as loamy and clayey floodplain soils with naturally high groundwater.

Highway Structures

8.15 There are no known highway structures in the immediate vicinity of the junction but is just over 300m from a railway / bridge structure to the east.

Hydrogeology and the Water Environment

8.16 Lowdham lies adjacent to the Cocker Beck which is a tributary of the River Trent. The current roundabout location is within Flood Zone 3 so a flood risk assessment will be required as part of the forthcoming planning application. The Environment Agency is currently developing options to mitigate against flood risk within the local area. The Lowdham Flood Risk Management Scheme is being progressed by the EA to reduce flood risk

from the Cocker Beck. Lowdham has experienced a number of flooding episodes in 1999 and 2007. The proposed scheme will reduce the likelihood of flooding to 178 households for events up to 1 in 100 year (1% AEP).

Public Utilities

8.17 The C2 NRSWA enquiry has established that British Telecom, Virgin Media, Severn Trent water mains, Cadent Gas and Western Power plant are present and affected by the proposals.

Environmental Factors

Air Quality

8.18 **Baseline Conditions:** The location is not within an Air Quality Management Area (AQMA). The existing roundabout is adjacent to Lowdham village with several dozen receptors located within a 200m radius of the junction in all directions. The greatest concentration is to the east where the village centre is located.

8.19 **Potential Constraints:** There is potential for dust during the construction phase but this is only temporary in nature. Numerous residential properties are in close proximity to the works area.

8.20 **Potential Opportunities:** Removing the majority of slow moving and stationary traffic by increasing capacity at the junction should improve air quality performance at this junction. Smoother and consistent journey speeds across the whole corridor will ultimately reduce vehicle emissions because vehicles are idling less and not constantly having to brake/accelerate along the A614.

8.21 To mitigate against any potential adverse impact during the construction phase, best practice measures should be adopted by the contractor.

Cultural Heritage

8.22 **Baseline Conditions:** Lowdham Conservation Area lies 0.5km north west of the existing roundabout. The closest Listed Building is the war memorial (Grade II) which lies 130m north east of the roundabout. There are seven Listed Buildings within a 1km radius of the site all of which are Grade II apart from The Old Hall which is Grade II*.

8.23 **Potential Constraints:** There will be no direct impact on designated sites. Any tree removal will impact on the setting of the recreation ground north of the junction.

8.24 **Potential Opportunities:** Replacement tree planting and hedge reinstatement should be incorporated into the design proposals to restore the historic field boundaries.

Landscape and Visual Impact

8.25 **Baseline Conditions:** The junction falls at the boundary between the Mid Nottinghamshire Farmlands Landscape Character Area and the Trent Washlands Landscape Character Area, at the north western edge of the valley of the River Trent

8.26 Within the Newark and Sherwood Landscape Character Assessment, the Trent Washlands Landscape Character Area can be divided into two distinct landscape character types and the Lowdham junction falls at the boundary of the Trent Washlands Bulcote Village Farmlands (TW PZ 06): This is a flat low lying agricultural landscape characterised by a traditional pattern of hedged fields and nucleated village settlement.

8.27 Within the Newark and Sherwood Landscape Character Assessment, the Mid Nottinghamshire Farmlands Landscape Character Area can be divided into six distinct landscape character types and the Lowdham junction falls at the boundary of the Epperstone Village Farmlands with Ancient Woodlands (MN PZ 40) This is a varied, undulating arable landscape characterised by remnant ancient woodlands and small rural villages.

8.28 The characteristic features of the Bulcote Village Farmlands (TW PZ06) are:

- Flat, large scale intensive arable landscape;
- Medium-sized fields with hedgerows intact but fragmented in places;
- Landscape fragmented by railway;
- Linear planting along transport routes;
- Nuclear village of Bulcote with red brick and pan-tile roofed buildings to the historic core; and
- Large scale isolated farms.

8.29 The characteristic features of the Epperstone Village Farmlands with Ancient Woodlands (MN PZ 40) are:

- Very gently undulating and rounded topography;
- Medium distance views to frequently wooded skylines, although often enclosed by vegetation – hedgerow, woodland etc;
- Mixture of intensive arable fields with strongly trimmed hedges and some low intensity farming with permanent improved pasture;
- Village of Epperstone designated as a Conservation Area; and
- A number of peripheral leisure industries in vicinity of Epperstone.

8.30 **Potential Constraints:** There are potential physical landscape impacts on landscape features such as trees, shrubs, hedgerows, and grassed areas. There are potential impacts on the landscape character of Estate Farmlands if the proposed development does not take make reference to the landscape character of the area in which it is located.

8.31 There are potential visual impacts on high sensitivity residential receptors at the south western edge of Lowdham (to the south west of Station Road). There are also potential visual impacts on high sensitivity residential receptors to the north-west and south-east of A612 at the south western approach to the roundabout. There are potential visual impacts on high sensitivity recreational receptors on Public Rights of Way – Footpaths and Bridleways in the surrounding area

8.32 **Potential Opportunities:** There are opportunities in any proposed hard and soft landscape treatment to fulfil some of the landscape actions within the Newark and Sherwood Landscape Character Assessment for the two adjacent Policy Zone such as:-

- Conserve the local built vernacular and reinforce this in new development

8.33 The biodiverstiy net gain approach should be integral to the design proposals. This should include tree planting both to replace any tree removal and strengthen tree cover along hedge lines. Use of vegetation to help improve air quality around the roundabout for residential housing adjacent to the proposed development should be incorporated into the proposed design. Improved replacement lighting should be incorporated into the design proposals to reduce light spill.

Nature Conservation

8.34 **Baseline Conditions:** There are nine non-statutory designated sites (LWSs) within a 2km radius of the site.

8.35 **Potential Constraints:** There will be no direct impact on designated sites. However, there may be disturbance and removal of habitat, particularly north and west of the roundabout. Invasive species (Himalayan balsam) maybe present within highways ditches. Construction works will need to have method statement for treatment and procedures to prevent spread on and off site.

8.36 **Potential Opportunities:** The Biodiversity net gain approach should be integral to the design proposals. Tree planting both to replace any tree removal and strengthen tree cover along hedge lines. Use of vegetation to help to improve air quality around roundabout for residential housing near the roundabout should be incorporated into proposed design. Improved replacement lighting should be included within the design proposals reducing light back spill.

Geology and Soils

8.37 **Baseline Conditions:** *Superficial* - Superficial deposits at the site consist predominantly of alluvium, associated with Cocker Beck, comprising clay, silt, sand and gravel. This sedimentary superficial deposit formed approximately 12 thousand years ago during the Quaternary period. The alluvium is normally described as a soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present. Head deposits comprised of; clay, silt sand and gravel can also be found towards the site's most southern boundary.

8.38 *Bedrock* – The area is underlain by the Radcliffe Member; mudstone and siltstone and to the site's southern extent by the Gunthorpe Member; mudstone, both part of the Mercia Mudstone Group. The bedrock is Triassic in age and runs in parallel with the Chester Formation sandstones northwards through the length of Nottinghamshire and into South Yorkshire. It is thought that bedrock will be found at relatively shallow depths beneath the site.

8.39 *Structural* - There are no identified faults within influencing distance of the site, with the nearest located over 1km to the north.

8.40 *Soils* - A range of soil types has developed within this corridor, locally this is represented by a loamy clayey floodplain soil with a naturally high groundwater level.

8.41 *Made Ground* - There is limited potential for made ground at the site.

8.42 **Potential Constraints:** There is the potential for a soft, compressible alluvial layer beneath the proposed and existing road construction. This will require further investigation to confirm its extents and properties. If found to be shallow, this may need to be excavated or may be removed with the upper layers of road construction. The existing road construction does not appear to display any structural problems associated with this soft stratum.

8.43 **Potential Opportunities:** Potentially shallow mudstone / siltstone bedrock removed as part of the construction may be suitable for fill at other corridor improvement locations. This will require further investigation.

Materials

8.44 **Baseline Conditions:** The existing road construction is likely to be founded on the mudstone / siltstone bedrock underlying the site. As already highlighted, there is potential for a soft compressible alluvial layer below the construction works which may require excavation.

8.45 There are limited contaminative land uses around the site although there is the potential for localised contamination associated with oils and fuels from road traffic accidents and herbicides / pesticides from agricultural use of the surrounding land. Road materials lower in the construction profile may contain tar bound materials

8.46 **Potential Constraints:** Minimal contaminated material; however, there is the potential for localised contamination associated with road traffic accidents and agricultural practices in the proposed areas of new construction.

8.47 Although unlikely in the upper layers of road construction, the historic construction of the lower layers has the potential to contain tar bound materials that would most likely need to be disposed of off-site as hazardous waste.

8.48 **Potential Opportunities:** The recycling of road surface planings should be considered and could be to be reutilised elsewhere in the road surface construction.

8.49 Potential shallow bedrock and other clean materials e.g. sand and gravel could be imported from other sites to make up any fill volumes needed.

Noise and Vibration

8.50 **Baseline Conditions:** The existing roundabout is adjacent to Lowdham village with several dozen receptors located within a 300m radius of the junction in all directions. The greatest concentration is to the east where the village centre is located. There are several residential receptors which are immediately adjacent to the junction, fronting onto the A612 eastbound and westbound legs from the roundabout. Road traffic noise is the dominant noise source, however, the Nottingham - Lincoln railway line lies approximately 300m south of the junction. Baseline noise levels will be established through noise surveys and modelling to support the noise impact assessment for the scheme.

8.51 The south-eastern bound leg of the A6097, Lowdham Road has been identified as an *Important Area* in the road noise mapping exercise undertaken by DEFRA in accordance with the EU Environmental Noise Directive and includes the residential properties immediately adjacent to the roundabout to the east and west which front onto the A612. This requires Highway Authorities to consider potential mitigation options to reduce the existing road traffic noise impacts to nearby receptors.

8.52 There are no known issues associated with vibration from existing traffic flows. This is unlikely to change as a result of any proposed highway alterations.

8.53 **Potential Constraints:** Opportunities for physical mitigation in the form of noise barriers may be limited to the front facades of properties immediately adjacent to the roundabout due to vehicle accesses and loss of outlook/light.

8.54 It may be difficult to construct a new junction within acceptable noise levels if works take place during the night time. Liaison will be required with the local environmental health department to establish acceptable noise limits and an assessment of construction noise will need to be undertaken to inform the noise impact assessment.

8.55 **Potential Opportunities:** There is potential to lay low noise road surfacing within the scheme extents; however, this may have limited benefit at the receptor locations closest to the roundabout due to nature of vehicle movements approaching and exiting the roundabout where noise associated with braking and acceleration may dominate more than rolling tyre noise.

8.56 There may be potential to install noise barriers where land is available to the side of immediately adjacent properties to mitigate noise impacts at rear façade and garden areas.

8.57 There is potential to install noise insulation in the residential properties in advance of the construction period if they meet the qualifying criteria in the Noise Insulation Regulations. Eligibility for noise insulation is to be determined through noise impact assessment.

People and Communities

8.58 **Baseline Conditions:** The junction bordered to the north-east and south-west by village recreation ground, to the south east by residential property and to the north-west by agricultural land. There are a group of residential properties that out lie the main village built extent, to the west of Lowdham on the A612 which forms the westerly arm of the junction. A public footpath also exits onto the A612 at this point. These are connected to main village by the footway which crosses the Epperstone bypass by means of a splitter-island. This route is promoted as a shared use pedestrian / cycle path to Burton Joyce, Gedling and Nottingham. A further public footpath crosses the Epperstone Bypass north of the proposed junction improvements this links routes across field and residential properties to the west with recreation ground and village centre to the east. There is no specific provision for pedestrian to cross the dual carriageway at this point other than by using the central reservation.

8.59 The recreation ground is used for both informal recreation and sports, with small pavilion. There are public toilets in the corner of the ground, next to Southwell Road.

8.60 **Potential Constraints:** A junction improvement may result in the loss of recreation land. There is also potential loss of grade 3 agricultural land.

8.61 **Potential Opportunities:** The construction of the A614 scheme package will be classed as a major transport project. As such it is likely it will provide numerous jobs for local people during the construction stage and also construction spend in the local area whilst the works are on site. The main objective of the project is to unlock the economic potential of this corridor which in turn will stimulate the local economy and create additional jobs long term.

8.62 The junction improvements also provide opportunity for safeguarding and improving the provision of shared use route along the A612 crossing the Epperstone bypass.

Water and Drainage

8.63 **Baseline Conditions:** Lowdham lies adjacent to the Cocker Beck which is a tributary of the River Trent. The current roundabout location is within Flood Zone 3 so a flood risk assessment will be required as part of the forthcoming planning application. The Environment Agency is currently developing options to mitigate against flood risk within the local area. Lowdham has experienced a number of flooding episodes in recent years with the most recent being 2013.

8.64 **Potential Constraints:** An enlarged junction and any widening of approach and circulatory carriageways will result in increased impermeable surfaces consequently resulting in additional rainwater runoff. It is imperative that robust drainage systems are installed as the area is prone to flooding including risk to residential properties located on the immediate approaches to the roundabout. A brief overview of the topography suggests longitudinal falls from the approach arms of the roundabout are generally towards the roundabout thus limiting the scope to direct rainwater away from the roundabout. Scope to regrade approach vertical alignments is limited due to existing property threshold levels and existing vertical grades being quite steep in places. Details of the existing drainage systems are not known at this stage. Further detailed investigation in to the type, location and outfall of the existing drainage systems and ground permeability details will be necessary. The governing water authority Trent Valley Internal Drainage Board (TVIDB), Environment Agency (EA) or Nottinghamshire County Council's Flood Risk Team may need to approve additional discharge in to nearby watercourses, this may be limited to greenfield runoff rates where additional volumes would need to be attenuated. Water Authority surface/ combined systems are present; however, it is unlikely additional volumes of discharge in to these systems would be granted considering the existing flood risk.

8.65 **Potential Opportunities:** The Environment Agency (EA) are currently considering implementing substantial flood mitigation measures within the immediate area of the roundabout and further afield. Some of the works include installing culverts and ground re-profiling to create flow channels and to create additional flood water storage areas. Early discussions with the EA suggest highway runoff may be allowed to discharge into the EA proposed systems; however, further analysis and investigation in to this option is necessary. Benefits associated with both parties sharing traffic management, road space, excavations etc. are also being considered. If the option to directly discharge in to the new culvert system is not granted by the EA an alternative option would need to be considered. An alternative option could include underground storage and discharge in to the existing systems of ditches at a controlled rate. For this option areas of private fields would need to be acquired and existing systems renewed/ enlarged.

Health Impact Assessment

8.66 **Baseline Conditions:** There are high traffic volumes due to the intersection of major roads, with some standing traffic contributing to potential air quality issues. The existing road network does create a level of severance to the surrounding community but is partially mitigated by pedestrian refuges on 3 -arms of the roundabout. A shared use cycle-footway extends along the northern side of the A612, but lacks signalised crossing at the roundabout to safely connect the two sides. A total of 5 accidents have been recorded at this location in the 3-year period 2015-2017, 2 have been serious, and 3 have been minor (with all involving

cyclists). The current facility provides moderately good access to goods, services and employment and recreational opportunities for motorised users.

8.67 **Potential Constraints:** If there are no formal signalised connections for pedestrians & cyclists using the shared use cycle / footway along the A612 then this is likely to continue or increase the current level accidents. There remain potential risks from air quality and noise to human receptors as part of the proposed scheme.

8.68 **Potential Opportunities:** A signalised Toucan crossing on the northern arm of the roundabout connecting the shared use cycle / footway along the A612 would be expected to have a significant benefit on accident reduction and safer community connectivity. Provision of new service roads for residential properties around the roundabout should also reduce the likelihood of collisions. The proposed scheme may bring about improvements in health should there be a decrease in noise and air contaminant levels to local receptors through improved flow. Improvements to pedestrian circulation around the roundabout will create greater social connectivity.

Climate Change Adaption & Mitigation

8.69 **Baseline Conditions:** Projected changes to average climatic conditions and associated severe weather events (such as heavy and/or prolonged precipitation, storm events and heatwaves) have the potential to impact on the proposed scheme and the surrounding built and natural environment. With reference to Meteorological Office Data, the scheme lies within the defined 'Midlands' region. The climate of this region sees mean annual temperatures of between 8°C and 10°C with July being the warmest month with temperatures typically in the region of 22°C. The region is relatively dry with rainfalls of between 600mm to 800mm per year.

8.70 **Potential Constraints:** Projected changes to average climatic conditions and associated severe weather events have the potential to impact on the Scheme and the surrounding built and natural environment. All construction and operational activities and materials associated with the proposed scheme would result in Greenhouse Gas emissions contributing to a negative impact on the climate.

8.71 **Potential Opportunities:** There is potential that the scheme can be designed to be 'future proof' i.e. the design can take into account projected climate changes such as increased temperature and rainfall to ensure minimal impact as a result of this. For example species can be selected for the proposed soft landscape treatment that will tolerate a minor increase in temperature.

9. Initial Options Assessment

Initial Option Identification

9.1 Following the examination of the baseline conditions at each junction, the potential options that exist at each of the junctions has been identified.

9.2 A number of workshop events have taken place at Via East Midlands offices with representatives from the County Council, AECOM and Via East Midlands. DfT guidance describes how a broad range of potential options should be considered in order to ensure that the most appropriate solution to an identified problem is pursued. A matrix of potential options to improve junction performance is provided in Table 9.1, and provides a useful guide to ensure the full range of options is considered).

Table 9.1: Potential Option Intervention Matrix – Operational Enhancement

Options Considered				
	Existing Control			**Link Options**
	Priority	**Signals**	**Roundabout**	
	Widen minor arm	Review signal timings	Increase entry widths	Provide additional lanes
	Provide right-turn harbourage	Review stage arrangement	Increase circulating carriageway	Accept congestion & prioritise users (i.e. public transport priority)
	Ban Movements	Stagger pedestrian provision / Consider on-crossing detection	Provide segregated traffic lanes	Improve pedestrian / cyclist provision
	Change priority	Ban Movements	Signalise roundabout	Provide Bypass
	Convert to signals	Extend flares[1]	Replace with signalled junction	Review speed limit
	Convert to roundabout / mini-roundabout	Provide additional lanes	Accept congestion & prioritise users (i.e. public transport priority)	Road Closures (with diversions)
	Improve pedestrian / cyclist provision	Accept congestion & prioritise users (i.e. public transport priority)		Grade Separation
	Accept congestion & prioritise users (i.e. public transport priority)	Convert to roundabout / mini-roundabout		
		Provide segregated traffic lanes		

A “flare” is a short additional lane on the approach to a junction.

9.3 From the above, an initial workshop resulted in a long list of potential options, which is presented in Table 9.2 (of which some were immediately dismissed).

Table 9.2: Potential Options Longlist

No.	Name	Description	Comments	Verdict
1a	Ollerton - grade separated junction	Grade Separation to segregate conflicting movements	Expensive and large adverse impact on environment	DISMISS
1b	Ollerton Bypass	New route corridor to bypass Ollerton and remove trips from Ollerton Junction	Large Adverse impact on Environment and too much third party land	DISMISS
1c	Enlarged conventional Roundabout	Enlargement - previously assessed in 2007	Feasible to engineer within site constraints within available budget, expected increase in capacity.	Proceed to EAST
1d	Ollerton - Signals	Signalise junction - considered in 2007	Feasible to engineer within site constraints within available budget, expected increase in capacity.	Proceed to EAST
2a	Deerdale Lane - Signals	2+1 option, smaller scheme footprint	Feasible to engineer within site constraints within available budget, expected increase in capacity.	Proceed to EAST
2b	Deerdale Lane - Signals	2+2 option	Feasible to engineer within site constraints within available budget, expected increase in capacity.	Proceed to EAST
2c	Deerdale Lane - Roundabout	4 arm roundabout.	Feasible to engineer with some land take , expected increase in capacity.	Proceed to EAST
2d	Reduce speed limit on A614	Reduction in Speed Limit	Speed Limit along route reduced to 50mph in 2012	DISMISS
2e	Close Deerdale Lane	Close Deerdale Lane junction with A614. Traffic to reassign to alternative routes.	Large detours. Unlikely to be accepted by Stakeholders - closure of Deerdale Lane will see increase of HGVs through Bilsthorpe residential areas.	DISMISS
2g	Single lane dualling	Increase capacity of A614 mainline	Unfeasible without significant land take.	DISMISS
2h	Electronic Warning System	Advance warning of turning traffic	No capacity improvement	DISMISS
3a	Mickledale Lane - Signals	2+1 option, smaller scheme footprint	Feasible to engineer within site constraints within available budget, expected increase in capacity.	Proceed to EAST
3b	Mickledale Lane - Signals	2+2 option	Feasible to engineer within site constraints within available budget, expected increase in capacity.	Proceed to EAST
3c	Mickledale Lane - Roundabout	4 arm roundabout.	Feasible to engineer within site constraints with some land take including residential property, expected increase in capacity.	Proceed to EAST
3d	Physical islands	Right turn harbourage bays in A614	Old style engineering - dismissed on road safety grounds.	DISMISS
3e	Staggered junctions	Realign Mickledale Lane and Inkersall Lane to staggered configuration	Large expense with minimal benefit to side roads	DISMISS
3f	Reduce speed limit on A614	Reduction in Speed Limit	Speed Limit along route reduced to 50mph in 2012	DISMISS
3g	Close Mickledale Lane	Close Deerdale Lane junction with A614. Traffic to reassign to alternative routes.	Large detours. Unlikely to be accepted by Stakeholders	DISMISS
3h	Single lane dualling	Increase capacity of A614 mainline	Unfeasible without significant land take.	DISMISS
3i	Electronic Warning System	Advance warning of turning traffic	No capacity improvement	DISMISS
4a	White Post - capacity improvements	Widen entry lanes	Feasible to engineer with some land take, expected increase in capacity.	Proceed to EAST
4b	White Post - Signals	Signalise all arms	Feasible to engineer with some land take.	Proceed to EAST
4c	White Post - access only, 3 arm	Close entry to junction from Mansfield Road (west).	Large detours. Unlikely to be accepted by Stakeholders. Need to maintain access to businesses.	Proceed to EAST
4d	White Post - road safety	Anti-skid surfacing and maintenance	Current road anti-skid surface in poor condition.	Proceed to EAST
5a	Warren Hill - signals	A614 priority -3 arm traffic signal controlled priority junction	Feasible to engineer with minimal land take, removes unusual geometry of existing layout.	Proceed to EAST
5b	Warren Hill - roundabout	Conventional 3 arm roundabout	Feasible to engineer with minimal land take, removes unusual geometry of existing layout.	Proceed to EAST
5c	Warren Hill - signalise existing layout	Add traffic signals to existing layout	Low cost option, existing geometry unsuitable for traffic signals	DISMISS
5d	Warren Hill - T junction	Major realignment to convert to a traditional priority junction	Major works for no/limited capacity increase. Large journey time disbenefits expected.	DISMISS
6a	Lowdham - enlarged roundabout	Enlarged conventional roundabout with widen approaches	Feasible to engineer with some land take, expected increase in capacity.	Proceed to EAST
6b	Lowdham - Signals	Signalisation of all 4 arms. Increased pedestrian provision.	Feasible to engineer with some land take, expected increase in capacity.	Proceed to EAST
6c	Lowdham - grade separated junction	Grade Separation to segregate conflicting movements	Expensive and large adverse impact on environment. Requires third party land.	DISMISS

9.4 The final list of options was then reviewed in a second workshop. The purpose of the option sifting is to develop and refine the options and identify those options not appropriate for future consideration. The sift focused on the following criteria:

- Contribution to identified problems and issues, i.e. the identified scheme should provide an overall positive contribution to the identified problems and issues.
- Contribution to defined Scheme Objectives, i.e. the proposal should provide an overall positive contribution to the objectives.
- Deliverability, i.e. the intervention should be deliverable e.g. political, planning, timescales etc.
- Feasibility, i.e. the proposal should be feasible in theory e.g. physical constraints, land availability and design standards.

10. Option Development

10.1 The early assessment and sifting tool (EAST) was used to assess each option at the six different locations. EAST is a decision support tool provided by the DfT which can quickly summarise and present evidence on options in a clear and consistent format. EAST is based around the five business case model approach advocated by the DfT which includes Strategic, Economic, Managerial, Financial and Commercial. A total of 16 different scheme options were assessed at this stage. A brief description of the 16 different options considered for the corridor can be found below. Eleven options were taken forward which met the initial screening criteria with Via East Midlands preparing preliminary designs for each option whilst considering whether the options were also feasible and deliverable.

10.2 Appendix A contains the outputs of the EAST assessment.

10.3 Once a preliminary design drawing had been produced transport modelling software such as PICADY, ARCADY and LINSIG was used to assess overall junction performance.

10.4 Appendix B contains a summary of the capacity assessments which highlights the operational performance of each option considered and informs the choice of preferred options.

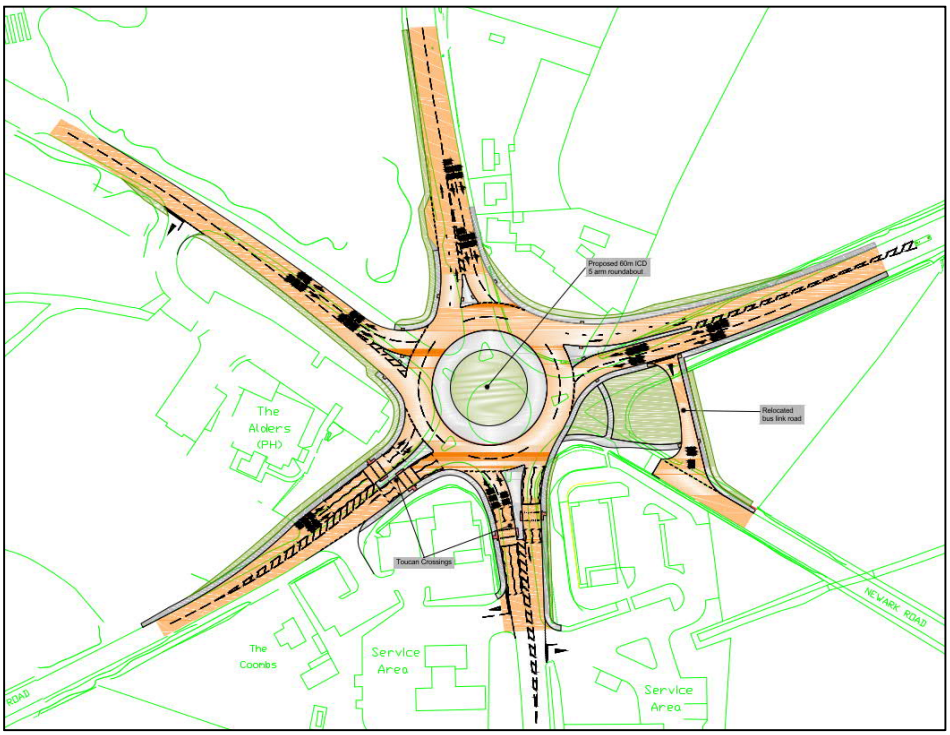
Ollerton Roundabout

10.5 In order to improve the traffic capacity of the Ollerton Roundabout consideration has only been given to possible at-grade solutions. Grade separation of the junction would be prohibitively expensive and give rise to unacceptable land-take and environmental impacts and was dismissed at a very early stage in the scheme development process. The two options assessed at the EAST stage were as follows:

Option 1c

10.6 This option has been designed as an enlarged conventional roundabout.

Figure 10.1: Ollerton Roundabout Option 1c



10.7 The roundabout option proposes five arms with the bus-only link road now realigned onto the A616 Ollerton Road arm. Two of the arms would have Toucan crossing points. Due to existing land constraints and the current alignment of the approach roads the proposal for an enlarged 60m ICD roundabout is the largest size that can be accommodated within the limit of the constraints.

Option 1d

10.8 This option considered the use of traffic signals on four of the arms and also three sets of traffic signals within the central island.

Figure 10.2: Ollerton Roundabout Option 1d

10.9 The only arm that would not be signalised is the A616 Worksop Road. The design also required the bus only link road to be diverted onto the A616 Ollerton Road so that the junction worked as a five arm signalised junction. To accommodate future demand flows the layout required significantly more land than Option 1c but the Linsig 3 modelling work did show the design had capacity for all modelled time periods.

Preferred Scheme

10.10 Both Option 1c and 1d generate significant journey time benefits over the assessment period. However, Option 1d has a bigger overall footprint resulting in a greater negative impact on a number of environmental sub-objectives including ecology, landscape, air quality and noise. Given the location near to the Ollerton Conservation Area, the preferred option is to retain a standard roundabout layout.

Option	Engineering Feasibility	Traffic Capacity	Environmental Impact	Public Acceptability
1c	✓	✓	Low	High
1d	✓	✓	High	Low, as complex junction arrangement

10.11 **Preferred Option: Option 1c – Enlarged Conventional Roundabout, on environmental impact grounds.**

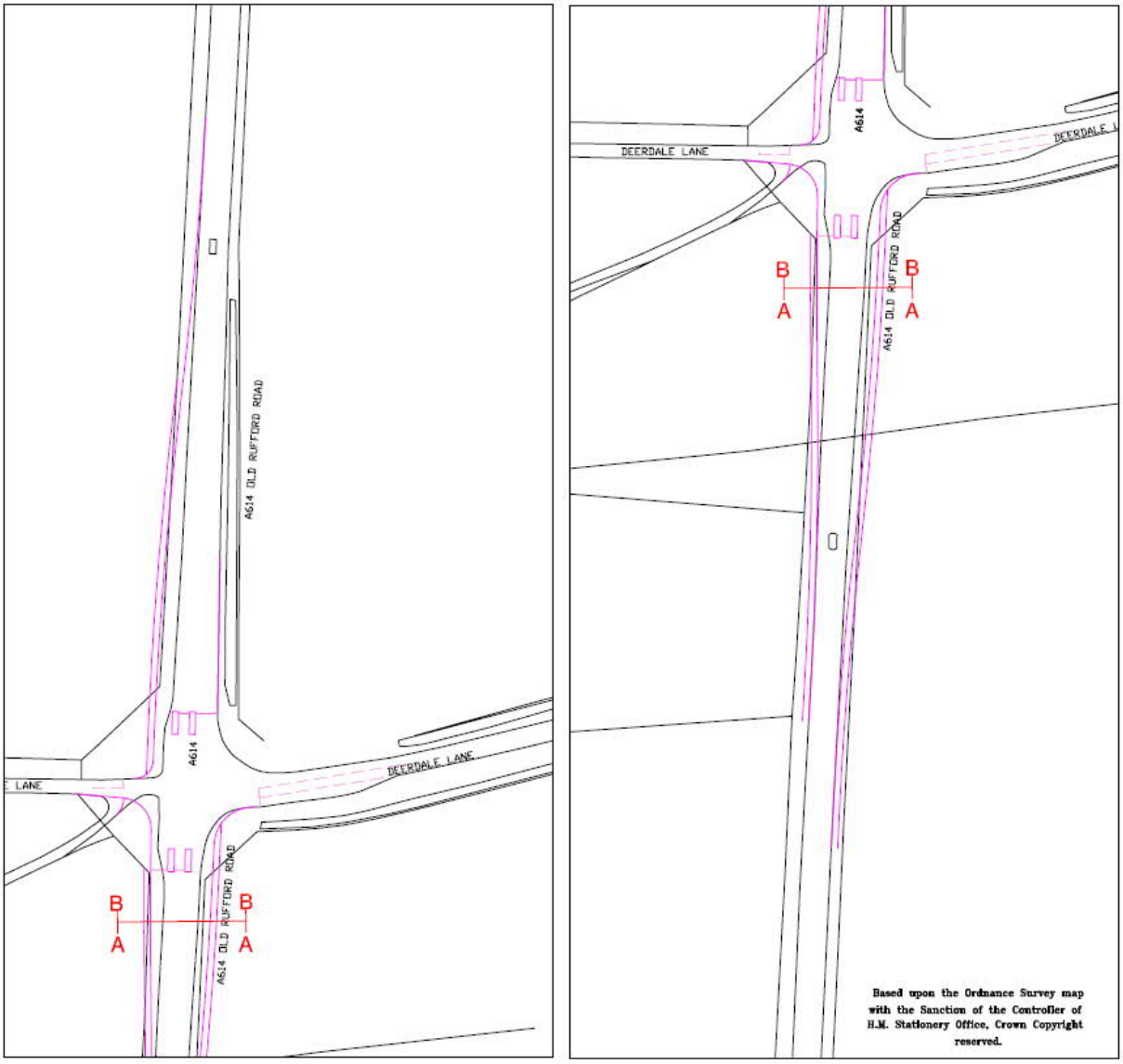
Deerdale Lane

10.12 Three options were considered in detail at the EAST stage with preliminary design options produced for each option.

Option 2a

10.13 The first option at Deerdale Lane looked at signalising the junction but with two entry lanes southbound and only one entry lane northbound. This option also required the re-profiling of the A614 South approach arm to achieve forward visibility at the junction.

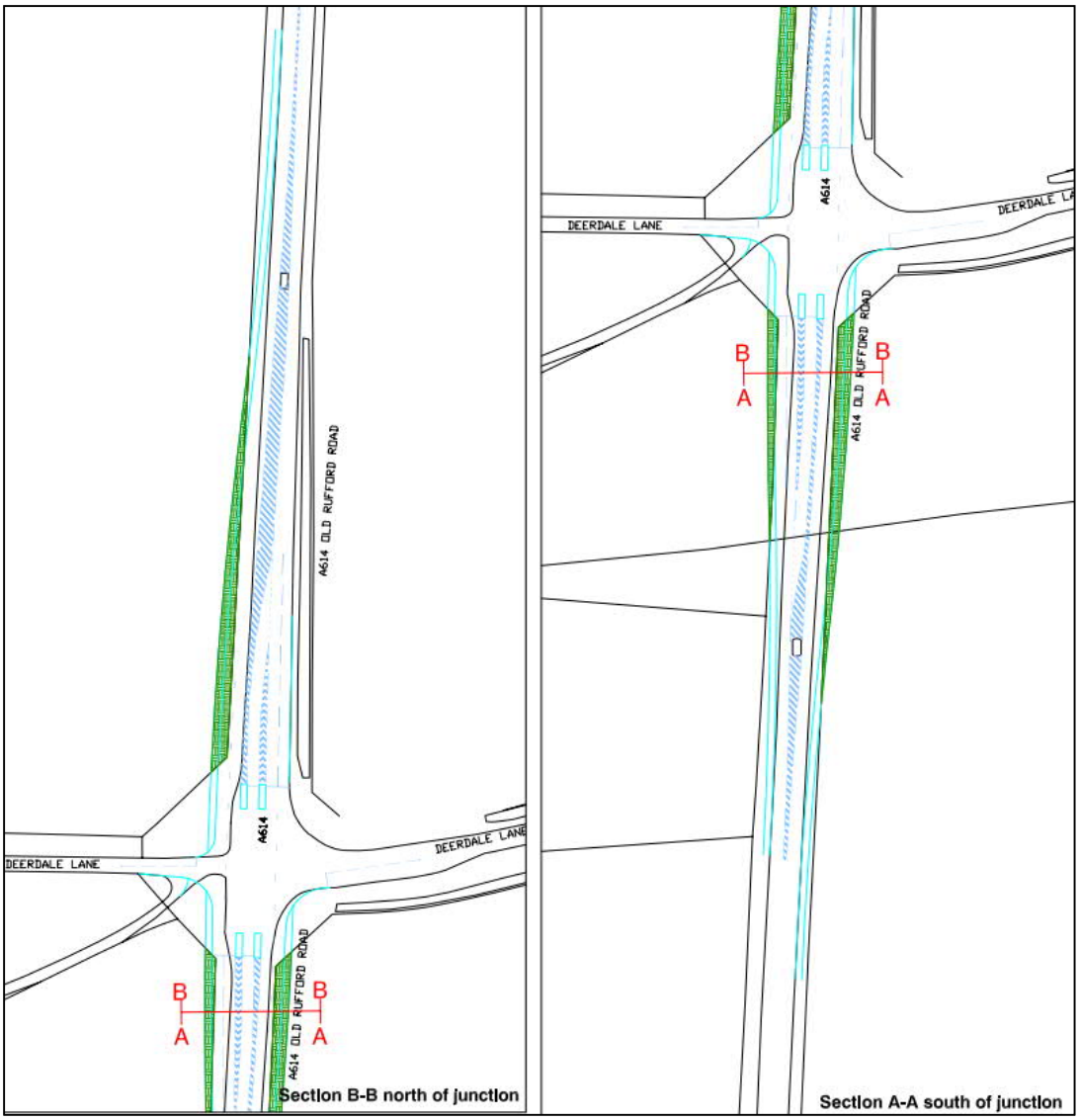
Figure 10.3: Deerdale Lane Option 2a



Option 2b

10.14 Option 2b expanded on the layout of option 2a by including two entry lanes for both A614 approaches. This option also required the re-profiling of the A614 South approach arm to achieve forward visibility at the junction.

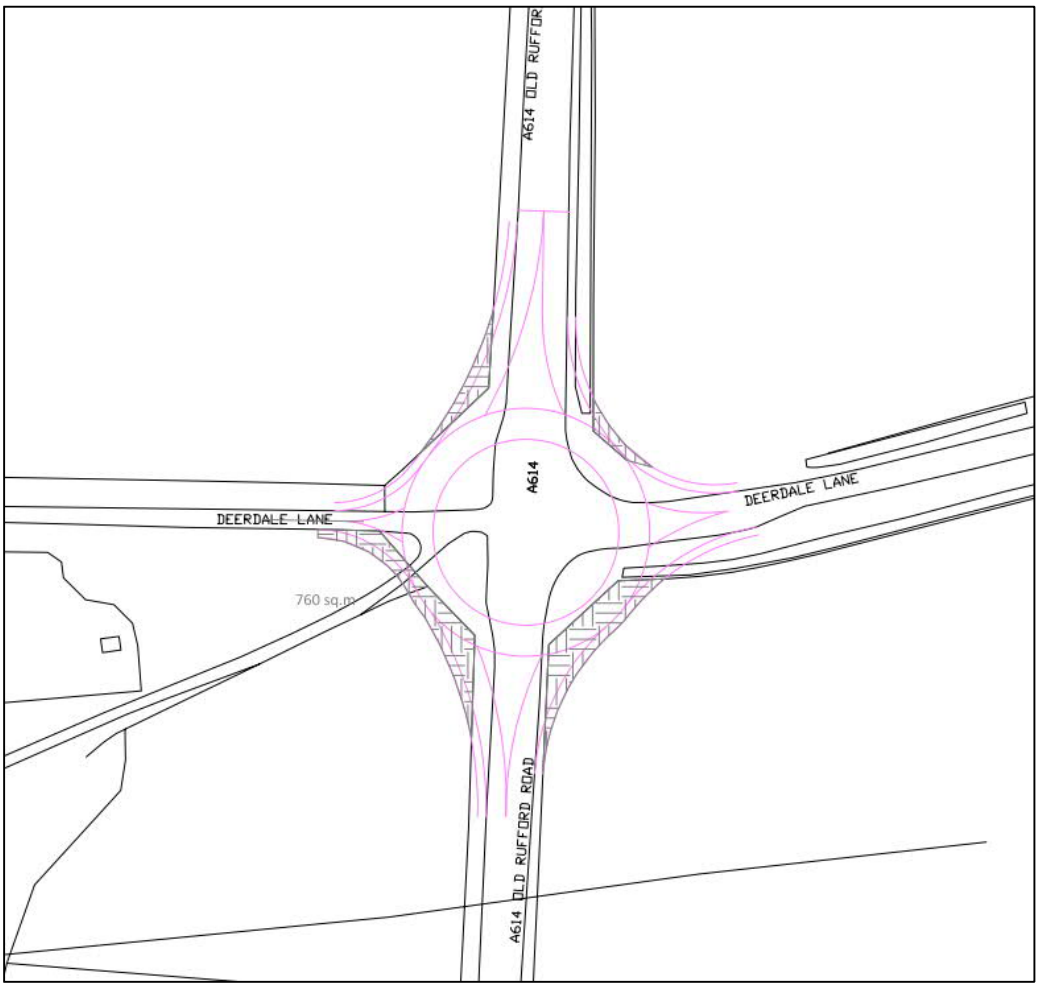
Figure 10.4: Deerdale Lane Option 2b



Option 2c

10.15 Option 2c considered constructing a conventional 4 arm roundabout at this location. This option also required the re-profiling of the A614 South approach arm to achieve forward visibility at the junction.

Figure 10.5: Deerdale Lane Option 2c



Preferred Scheme

10.16 There was very little difference in land take between Options 2a and 2b but 2b provided significantly more traffic capacity. Option 2c required the largest amount of third-party land with little additional capacity benefit. As such, and in view of the successful signalisation of the Rose Cottage junction to the immediate north of the Deerdale Lane junction and the preferred scheme at Mickledale Lane immediately to the south, the preferred option is to install traffic signals.

Option	Engineering Feasibility	Traffic Capacity	Environmental Impact	Public Acceptability
2a	✓	✓	Low	High
2b	✓	✓	Low	High
2c	✓	✓	Low	High

10.17 **Preferred Option: Option 2b – Traffic Signals (2+2), on the basis that it delivers the best balance between traffic capacity and cost.**

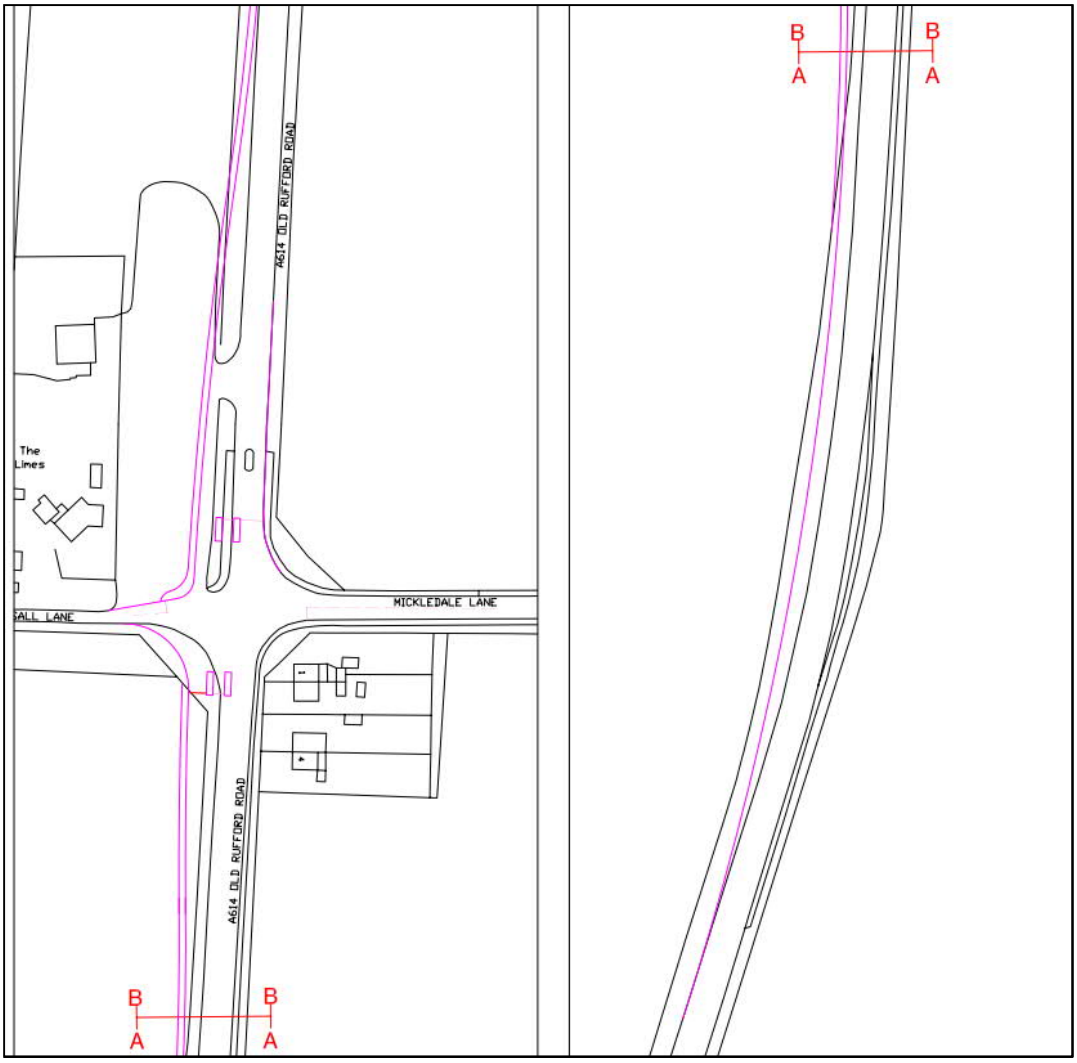
Mickledale Lane

10.18 Two considerations at this location was the impact any design would have on the operation of the Limes Café which is situated in the north western corner of the junction and also the four cottages which lie to the south east. Three options were considered at the EAST stage with preliminary design options produced for each option.

Option 3a

10.19 The first option at Mickledale Lane looked at signalising the junction but with two entry lanes southbound and only one entry lane northbound. This option requires less third-party land when compared to option 3b.

Figure 10.6: Mickledale Lane Option 3a



10.20 Previous studies for this junction have run into problems with the forward visibility to the primary traffic signal heads on the A614 approach due to the left-hand bend on the immediate approach to this junction – the visibility requirement as per DMRB was not met for a 60mph speed limit; however, since the original study the speed limit for the A614 has been reduced to 50mph which brings with it a reduction in the required forward

visibility distance. The speed limit on the A614 is also now enforced using SPECs average speed cameras so the speed of vehicles is generally well controlled. Consequently, the reduced visibility envelope can be accommodated.

Option 3b

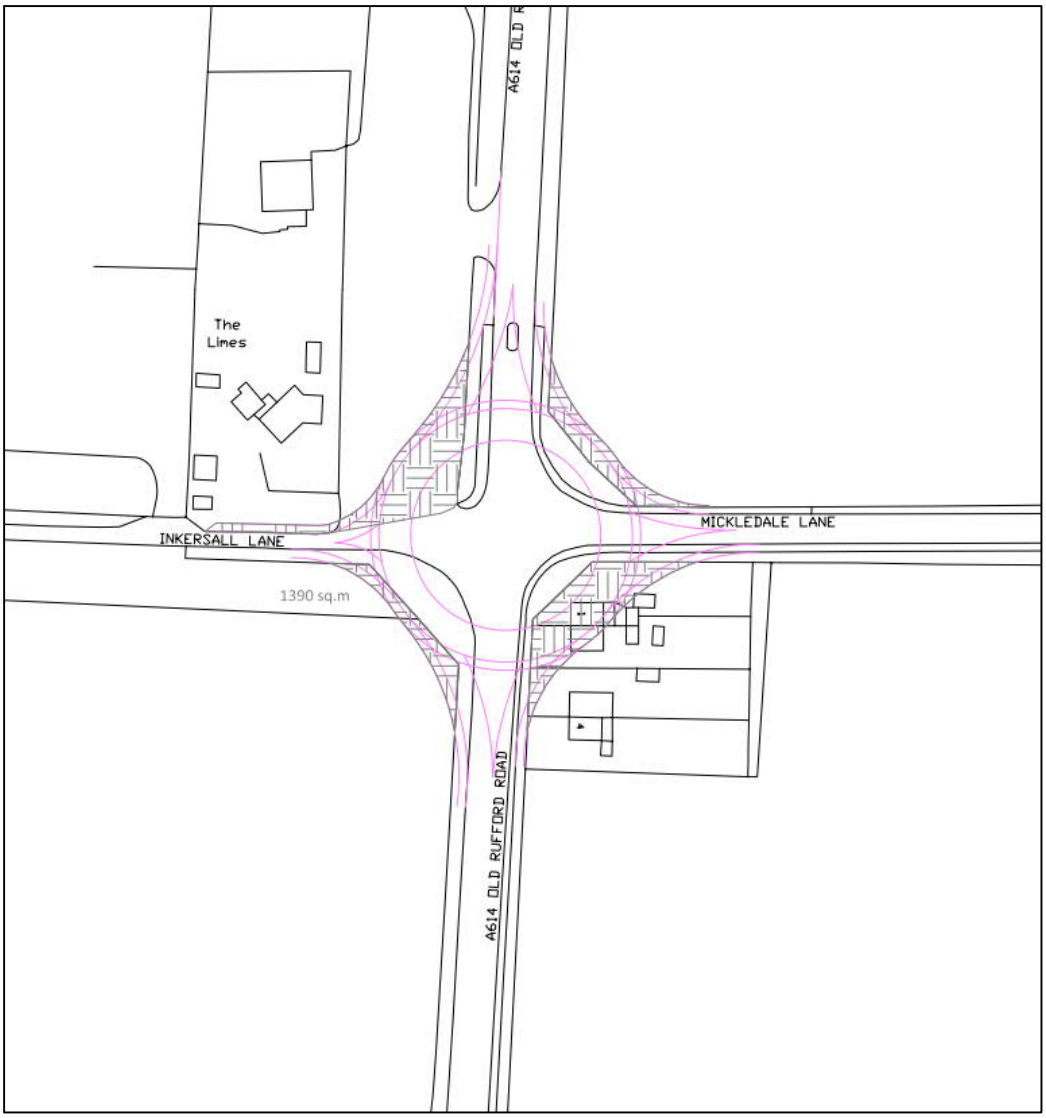
10.21 Option 3b expanded on option 3a by including two entry lanes for both A614 approaches. As per 3a the design has had to correct the forward visibility issue. This layout provided additional capacity when comparted to option 3a and reduced delays.

Figure 10.7: Mickledale Lane Option 3b

Option 3c

10.22 Option 3c considered constructing a conventional 4 arm roundabout at this location in accordance with DMRB guidance (TD16/07); however, the design required significant amounts of third-party land and did not create significant additional capacity over and above Option 3b.

Figure 10.8: Mickledale Lane Option 3c



Preferred Scheme

10.23 There was very little difference in land take between Options 3a and 3b but 3b provided significantly more traffic capacity. Option 3c required the largest amount of third-party land (including residential properties) which would not have been publicly acceptable and was dismissed on those grounds.

Option	Engineering Feasibility	Traffic Capacity	Environmental Impact	Public Acceptability
3a	✓	✓	Low	High
3b	✓	✓	Low	High
3c	✓	✓	Medium	Low (loss of residential property)

10.24 **Preferred Option: Option 3b – Traffic Signals (2+2), on cost, traffic capacity, environmental impact and public acceptability grounds.**

White Post Roundabout

10.25 Four options were assessed at the EAST stage.

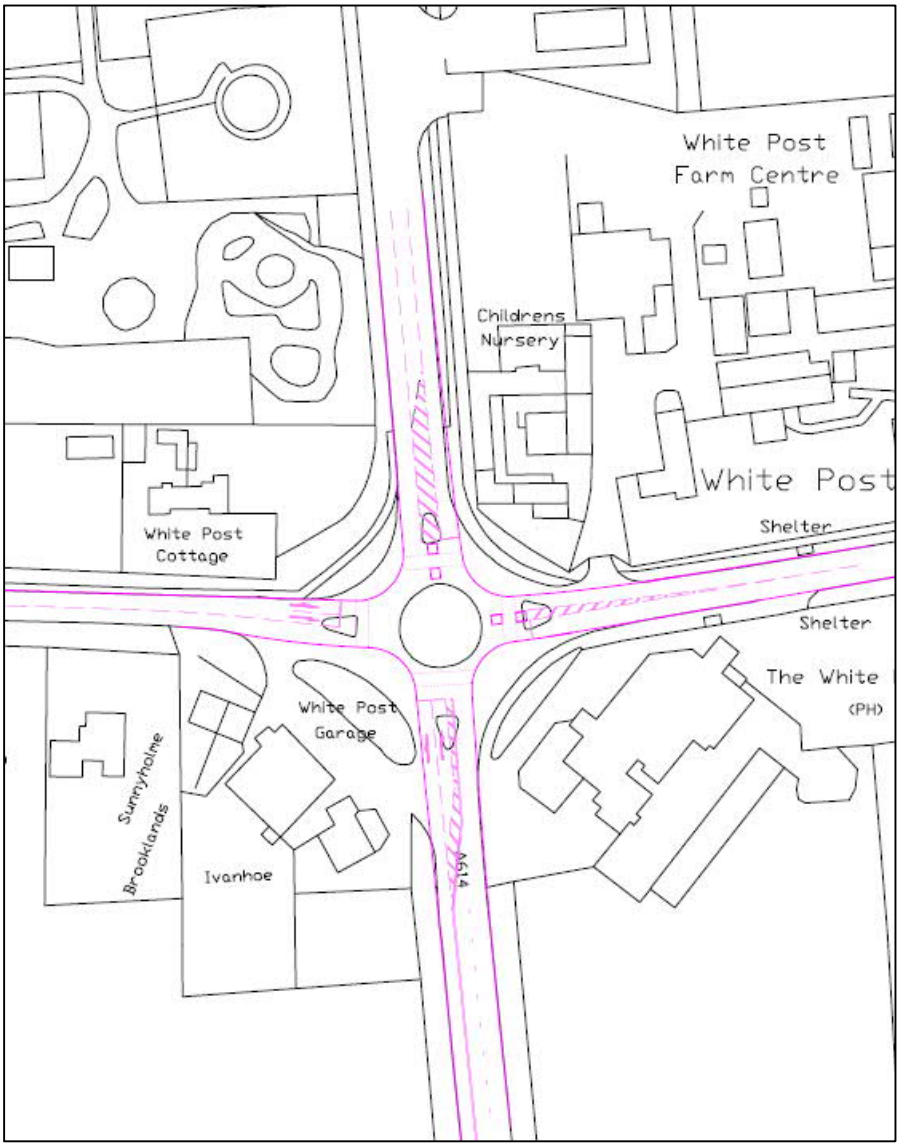
Option 4a

10.26 The first option considered at this location was to widen entry lanes on the A614 approaches but limited space within the existing highway meant that third party land would be required to ensure a meaningful scheme was delivered which would be prohibitively expensive.

Option 4b

10.27 The next option to be investigated was to signalise all four arms however it quickly became apparent following the Linsig 3 assessment that the junction was predicted to cause unnecessary delays on the A614 arms. This is shown in Figure 10.9.

Figure 10.9: White Post Option 4b



Option 4c

10.28 Option 4c considered closing the Mansfield Road arm (west) except for access so that the junction mainly functioned as a 3-arm roundabout but this was dismissed on the grounds that it would result in significant detours for those residents living in Rainworth and would be hugely unpopular if a Traffic Regulation Order (TRO) was progressed to prohibit vehicular movements on this arm.

Option 4d

10.29 The final junction considered a road safety scheme involving anti-skid road surfacing and minor maintenance improvements.

Preferred Scheme

Option	Engineering Feasibility	Traffic Capacity	Environmental Impact	Public Acceptability
4a	✗	Not tested	Not tested	Not tested
4b	✓	✗	n/a	n/a
4c	✓	Not tested	Low	Low – large detours required
4d	✓	n/a – not a congestion scheme	Low	High

Preferred Option: Option 4d – Road Safety and Maintenance Scheme.

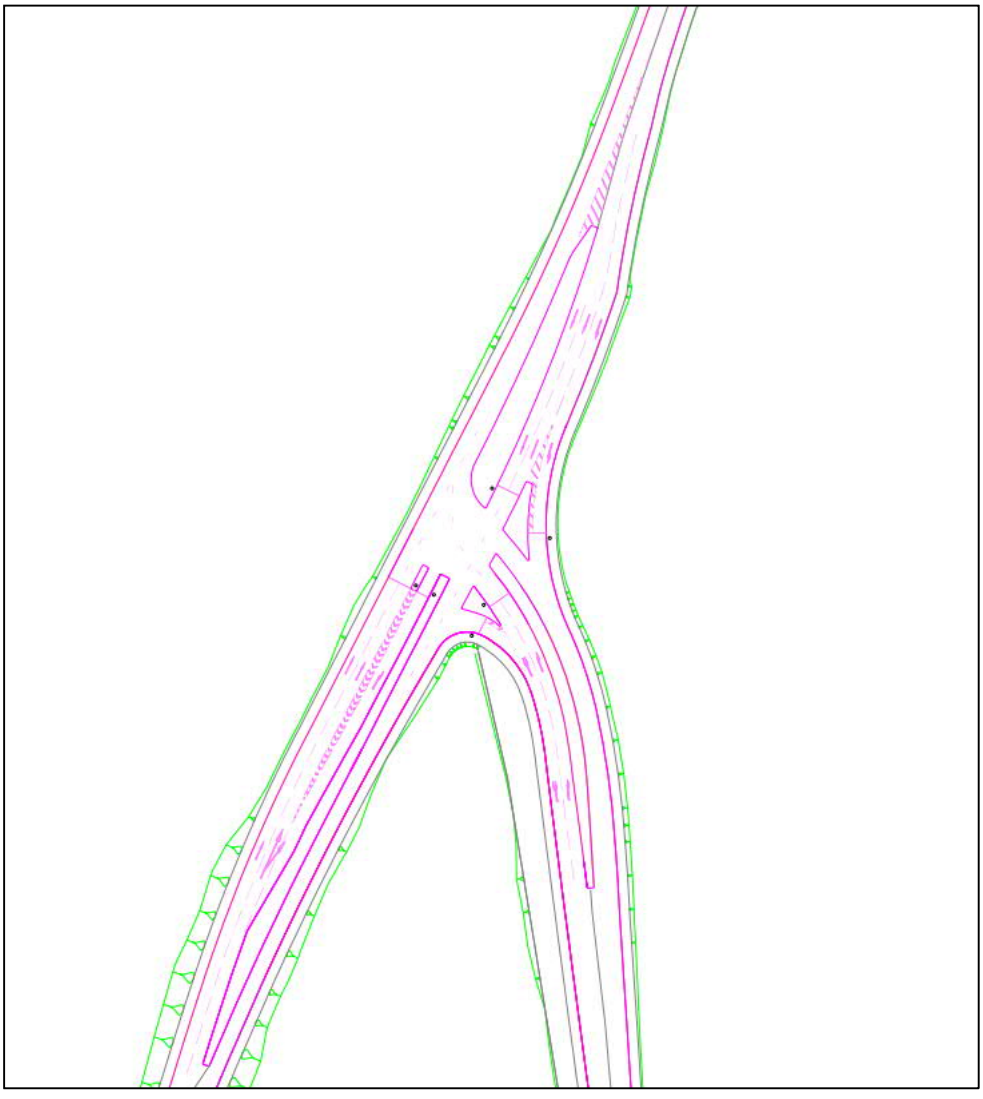
Warren Hill

10.30 Two design solutions were assessed as part of the EAST process.

Option 5a

10.31 Construction of a 3-arm signalised junction. The Linsig 3 modelling showed that the junction was predicted to perform poorly in the AM peak and result in large volumes of queueing and time delays.

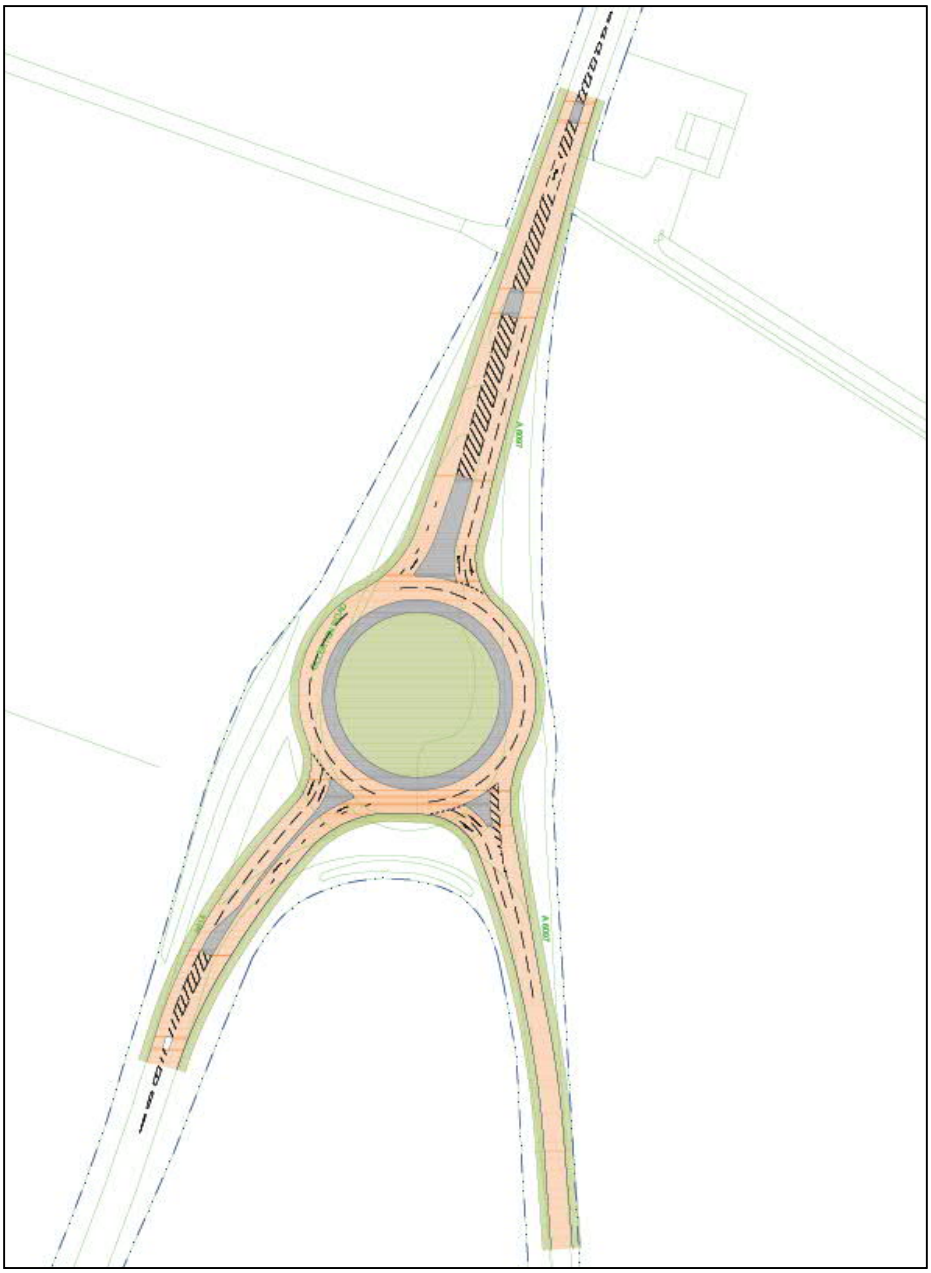
Figure 10.10: Warren Hill Option 5a



Option 5b

10.32 The enlarged conventional roundabout option does not require much third-party land with the majority of the design fitting within the existing highway boundary. The ICD for the roundabout is 85m and the proposed circulatory carriageway is 2 lanes wide.

Figure 10.11: Warren Hill Option 5b



Preferred Scheme

Option	Engineering Feasibility	Traffic Capacity	Environmental Impact	Public Acceptability
5a	✓	✗	Low	High
5b	✓	✓	Low	High

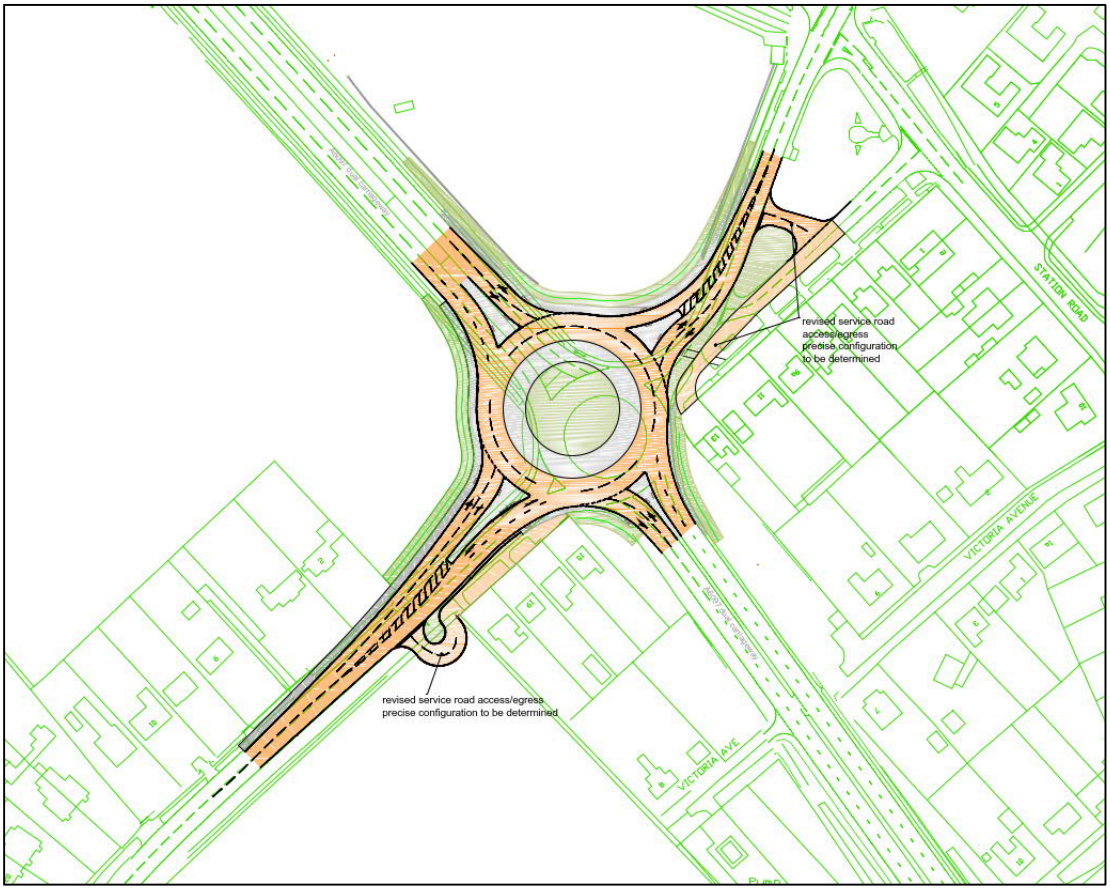
Preferred Option: Option 5b – Enlarged Conventional Roundabout, on traffic capacity grounds.

Lowdham Roundabout

Option 6a

10.33 Construction of an enlarged 4 arm conventional roundabout with an ICD of 65m. The proposed circulatory carriageway is 2 lanes wide to cater for side by side movements of all vehicles around the proposed circulatory of the roundabout.

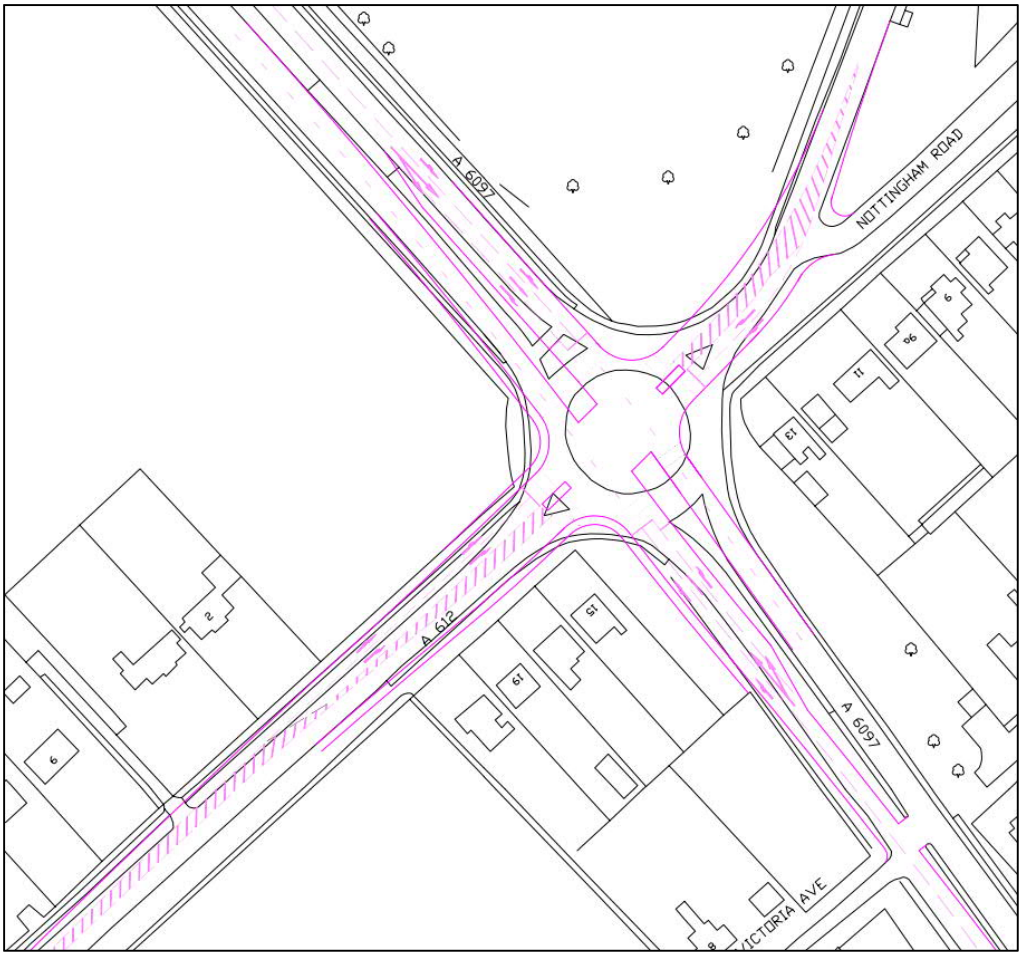
Figure 10.12: Lowdham Option 6a



Option 6b

10.34 This option included signalisation all four arms. However, the Linsig 3 modelling showed that this would cause significant delays and result in the junction being over capacity in the Design Year for both the morning and evening peak periods.

Figure 10.13: Lowdham Option 6b



Preferred Scheme

10.35 The enlarged conventional roundabout option delivers significant journey time benefits against a traffic signalled option.

Option	Engineering Feasibility	Traffic Capacity	Environmental Impact	Public Acceptability
6a	✓	✓	Low	High
6b	✓	✗	Low	High

Preferred Option: Option 6a – Enlarged Conventional Roundabout, on traffic capacity grounds.

Stakeholder Consultation

10.36 An attempt to contact all affected parties for each of the six proposals was made at a very early stage in the option development process. Via EM staff have also met with landowners who will potentially lose land and have also held meetings with NCC elected Members to discuss the options currently being considered. Formal consultation events will take place in the Summer of 2019 once design work has been finalised.

10.37 Via EM continue to engage with the Environment Agency on the two largest schemes (Ollerton and Lowdham) because they currently fall within a flood zone and will require Flood Risk Assessments as part of the planning application. A workshop event was held back in January 2019 with the Environment Agency and their consultancy hydraulic modellers to discuss implications of the EA's flood alleviation scheme at Lowdham and potentially how the two schemes could be co-ordinated to create time and cost savings.

10.38 A public website will also be set up later this year to keep the general public informed on scheme progress.

Scheme Costs

10.39 Via East Midlands has provided estimates of the costs of delivering the preferred options, identified above, at the six junctions within the scheme. These costs have also been reviewed by a contractor from the Midlands Highways Alliance, with whom both NCC and VIA EM have experience of project delivery.

10.40 Scheme estimates were provided in 2019 Q1 prices. The following items are included in the cost estimate:

- Construction Costs;
- Preparation;
- Supervision Costs; and
- Land.

10.41 Table 10.1 below presents a summary of the cost estimates at each junction.

Table 10.1: Scheme Costs Estimates

	Construction	Risk	Land	Fees	Total
Ollerton Roundabout	£5,617,680	£150,000	£850,000	£812,000	**£7,429,680**
Lowdham Roundabout	£3,925,000	£100,000	£162,000	£230,969	**£4,417,969**
Warren Hill	£3,519,474		£50,000	£250,000	**£3,819,474**
Mickledale Lane	£2,324,682		£125,000	£200,000	**£2,649,682**
Deerdale Lane	£3,254,490		£125,000	£200,000	**£3,579,490**
White Post Roundabout	£80,000		£0	£20,000	**£100,000**
Total	**£18,721,326**	**£250,000**	**£1,312,000**	**£1,712,969**	**£21,996,295**

Early Implementation Schemes and the Related Delivery of the Scheme

10.42 In order to meet the Department for Transport Major Road Network funding guidelines, the construction of the scheme should start by Q1 2021/2022 at the latest.

10.43 Table 10.2 shows the anticipated construction start dates, and opening year of each of the junctions.

Table 10.2: Construction Start Dates and Opening Years

Junction	Construction Start Date	Opening Year
Ollerton	April 2021	December 2022
Deerdale Lane	January 2023	August 2023
Mickledale Lane	June 2022	December 2022
White Post	Within 2022	Within 2022
Warren Hill	January 2023	December 2023
Lowdham	January 2024	December 2024

10.44 The following table sets out the project programme for each scheme junction.

Table 10.3: Project Programme

Task	Date
Submission of Options Assessment Report and Outline Business Case to the DfT	May 2019
Formal land negotiations commence	June 2019
Award of MRN Funding	Late June 2019
Consultation Events – 3 venues over 6 dates	July 2019
Detailed Design commences and ECI	Summer 2019 onwards
Submission of Planning Application	December 2019
Making of CPO and SRO	March 2020
Public Inquiry (if required)	October 2020
Full Approval Submission to the DfT	January 2021
Notification of Proceed to Contract (enables mobilisation)	February 2021
Construction commences – Ollerton to be first project	April 2021

11. Traffic and Economic Assessment

Introduction

11.1 The way in which the baseline traffic flow was identified, and also how the forecast traffic flows have been calculated, is fully described within the *Traffic and Economics Appraisal Report* (TEAR – 60555614/EAR). The purpose of this section is to provide an overview of this data, which has also been used in the option generation (i.e. ARCADY, PICADY and LINSIG capacity testing described in preceding sections).

Baseline Traffic Conditions

11.2 According to the document, *How the National Road Traffic Estimates are Made* (DfT, 2007), traffic counts are normally undertaken during the 'neutral' months of March, April, May, June, September and October (but outside of school holidays). This is to ensure seasonal impacts are minimised.

11.3 The Manual Classified Counts (MCCs) undertaken to support this study were undertaken on the following dates:

- Ollerton Roundabout – Thursday 29th June 2017;
- Deerdale – Wednesday 27th September 2017;
- Mickledale - Wednesday 27th September 2017;
- White Post – Thursday 11th October 2018;
- Warren Hill – Thursday 20th September 2018; and
- Lowdham – Thursday 7th June 2018.

11.4 Longer term data was also obtained from permanent traffic count sites along the A614 – A6097 corridor with which to consider seasonality.

Future Conditions

11.5 As noted in Section 1, the A614 corridor is anticipated to accommodate growth in future. Estimates from NTEM suggest growth of circa 22% to 2037 (which is the forecast year). In order to identify the pattern of growth, Transport Assessments submitted in support of key planning applications near to the corridor have been used to identify how traffic is likely to load onto the corridor in future. The list of developments includes:

- **Newark & Sherwood District Council**:
  - Land north of Petersmith Drive
  - Thoresby Colliery
  - Land East of Eakring Road (Bilsthorpe Village)
  - Kirklington Road (Bilsthorpe Village)
  - Oldbridge Way (Bilsthorpe Village)
- **Rushcliffe Borough Council**:
  - Land at the former RAF Newton
  - Chapel lane, Bingham
- **Gedling Borough Council**:
  - Park Road, Calverton
  - Land at Teal Close

- Land at Chase Farm (Former Gedling Colliery)

11.6 It should be noted that some planning permissions listed above included limits to the overall development size until improvements had been achieved at some of the scheme junctions. The traffic flows used in the OAR assume full build-out (for the purposes of design) whereas those used in the economics do not include any such dependant development.

Economics

11.7 The Traffic and Economic Appraisal Report describes in full the calculation of the Present Value of Benefits (PVB), Present Value of Costs (PVC) and overall scheme Benefit to Cost Ratio (BCR). The PVB is based on monetised savings in delay (calculated from outputs from ARCADY, PICADY and LINSIG and monetised using values in WebTAG). The PVC is based on construction cost estimates produced by Via East Midlands Ltd. for the preferred options. Table 11.1 provides a summary from the TEAR of this assessment.

Table 11.1: Analysis of Monetised Cost and Benefits (AMCB)

Impact	With Scheme
Greenhouse Gases	Not Assessed
Travel Time Savings - Business	10.057
Travel Time Savings – Commuting & Other	30.087
Collisions	-1.233
Vehicle Operating Costs	Not Assessed
Indirect tax Revenue	Not Assessed
PVB	**38.911**
PVC	**14.696**
NPV	**24.215**
BCR	**2.648**

Notes: Note: Costs appear as positive numbers. All entries are discounted to 2010 present values, in 2010 market prices; except for the BCR figures. Summary does not include monetised journey time reliability benefits.

11.8 The Department for Transport's "Value for Money Guidance" (2017, www.dft.gov.uk), describes how value for money can be categorised in four classes:

Figure 11.1: DfT Value for Money Guidance

Box 5.1 Standard Categories

(Transport cost outlays exceed revenues or cost savings)

VfM Category	Implied by…*
Very High	BCR greater than or equal to 4
High	BCR between 2 and 4
Medium	BCR between 1.5 and 2
Low	BCR between 1 and 1.5
Poor	BCR between 0 and 1
Very Poor	BCR less than or equal to 0

**Relevant indicative monetised and/or non-monetised impacts must also be considered and may result in a final value for money category different to that which is implied solely by the BCR. This chapter provides guidance on how to select the final value for money category.*

11.9 The BCR summarised in the AMCB table above, shows that the improvements deliver a positive economic case and represents High value for money.

11.10 The following impacts will likely provide additional unquantified benefits and increase the PVB benefits of the Scheme:

- Reliability benefits;
- Tourism benefits;
- An assessment of Planning Gain (Land Value Uplift) associated with the unlocking of dependant development; and
- Inclusion of vehicle operating costs.

12. Future Considerations

12.1 As the scheme develops from Stage 1 (Option Development) of the TAG Transport Appraisal Process into Stage 2 (Further Appraisal), further work will be required to develop the design and appraisal of the preferred scheme options.

12.2 This section identifies the key items from the initial engineering and environmental assessments that would require further work as part of the detailed design process.

All Junctions

- Best Practice measures to reduce air quality issues associated with construction are to be adopted.
- Recycling of road surface planings to be undertaken.
- Drainage design, including consideration of potential for additional interception / storage.
- Road Safety Audit (RSA).
- Biodiversity net gain approach should be integral to the design proposals.
- A full Health Impact Assessment (HIA) is likely to be required at Stage 2 for the proposed development. The assessment will consider the likely direct, indirect and cumulative effects associated with health and well-being, during construction and once the proposed scheme is operational. The level of assessment required will be determined at the scoping stage.

Ollerton

- Flood Risk assessment and liaison with EA.
- Confirmation of diversions / protection of utilities and services. Preliminary plans for diversions/protection and budgetary estimates were provided by each utility provider. The total cost of the diversion work is anticipated to cost in the region of £600k.
- Consideration of requirements of Ollerton Conservation Area (e.g. materials and trees).
- Consideration of hard and soft landscape treatment in terms of landscape, visual impact and biodiversity benefits.
- Consultation with Natural England will be required relating to any impact on SSSI.
- Comprehensive ground investigation survey to be undertaken.
- Phase 1 Geoenvironmental Desktop Study and Subsequent Phase 2 Geoenvironmental Site Investigation to be undertaken.
- Liaison with the local environmental health department to establish acceptable noise limits and an assessment of construction noise. Investigate low noise surfacing, and noise barriers for nearby property. Consider eligibility for Noise insulation.
- Include improved pedestrian / cycle crossings.

Deerdale Lane

- Confirmation of diversions / protection of utilities and services.

Mickledale Lane

- Access to Limes Café.
- Investigate noise barriers for nearby property.
- Investigate potential for better linkages to nearby bridleways and cycle routes.
- Confirmation of diversions / protection of utilities and services.

White Post

- Lighting replacement to prevent upward spill.
- Investigate potential to improve the safety of pedestrians crossing the A614 along the footpath to the south of the junction, and potential to provide better linkage between the bridleway on the Southwell trail and the White Post businesses and quiet road network beyond.

Warren Hill

- Lighting replacement to prevent upward spill.

Lowdham

- Flood Risk Assessment, and liaison with EA.
- Confirmation of diversions / protection of utilities and services. Preliminary plans for diversion and protection works were provided by each utility company. The total cost of the diversion work is anticipated to cost in the region of £765k.
- Liaison with the local environmental health department to establish acceptable noise limits and an assessment of construction noise. Investigate low noise surfacing, and noise barriers for nearby property. Consider eligibility for Noise insulation.
- Investigate the opportunity for improving the provision of shared use route along the A612 crossing the Epperstone bypass, including signalised Toucan crossing.
- Detail of the provision of new service roads for residential properties around the roundabout.

13. Key Findings and Recommendations

Overview

13.1 This OAR has been prepared in accordance with Transport Analysis Guidance (TAG) Transport Appraisal Process, May 2018, which sets out the stages for Option Development and the TAG Transport Appraisal Guidance for Technical Project Managers, May 2018, which provides an outline of the OAR requirements.

13.2 This Options Assessment Report (OAR) details the Option Development at each junction, in line with the TAG Transport Appraisal Process. Constraints and opportunities have been identified in respect of engineering feasibility (including cost), environmental factors and forecast future traffic flows.

Conclusions and Recommendations

13.3 After following the Transport Appraisal Process for Option Development, the following options have been identified as the preferred options at each of the scheme junctions:

- Ollerton Roundabout – Enlarged Conventional Roundabout;
- Deerdale Lane – Traffic Signal junction
- Mickledale Lane – Traffic Signals junction
- White Post Roundabout - Road Safety and Maintenance Scheme
- Warren Hill – Convert to Conventional Roundabout
- Lowdham - Enlarged Conventional Roundabout;

13.4 As a package of schemes, the improvements will support both the Scheme and Major Road Network programme objectives by:

- Supporting economic growth and housing delivery by facilitating planned development along the A614;
- Supporting the Strategic Road Network by providing resilience to the A614 route, enabling the route to act effectively as an alternative route in the event of major works or incidents;
- Reducing journey time delays and improving journey time reliability, particularly at peak periods, by providing additional capacity at junctions predicted to operate above capacity in future years; and
- Supporting all road users by improving the A614/A6097 route for drivers and including improved NMU facilities at the scheme junctions.

13.5 The combined package of improvements delivers a Present Value of Benefits (PVB) of £38.9 million, a Present Value of Costs (PVC) of £14.7 million, a Net Present Value (NPV) of £24.2 million and a Benefit Cost Ratio (BCR) of 2.6 which is expected to increase if unquantified benefits were considered.

13.6 The package of improvements delivers a positive economic case and represents High value for money in accordance with the DfT's Value for Money guidance.

13.7 As the scheme develops from Stage 1 (Option Development) of the TAG Transport Appraisal Process into Stage 2 (Further Appraisal), further work will be required to develop the design and appraisal of the preferred scheme options. This work includes:

- Junction specific issues;
- Future environmental appraisal and monitoring;
- Stakeholder engagement; and
- Detailed design considerations.

Appendix A – EAST Assessment

		Overall			Strategic									Economic											
Unique Ref. No.	Delete option?	Name / No.	Date	Description	Identified problems and objectives of the option	Scale of impact	Scale of impact - Comments	Fit with wider transport and government objectives	Wider transport and government objectives - Comments	Fit with other objectives	Fit with other objectives - Comments	Key uncertainties	Degree of consensus over outcomes?	Degree of consensus over outcomes? - Comments	Economic Growth	Economic growth - Comments	Carbon emissions	Carbon emissions - Comments	Socio-distributional impacts and the regions	Socio-distributional impacts and the regions - Comments	Local environment	Local environment - Comments	Well being	Well being - Comments	Expected VfM Category	Expected VfM Category - Comments
1	Delete	1.1 Ollerton Roundabout	20/03/2019	Enlarged conventional roundabout	Congestio	5. Significant impact		5. High		5. High			3		5. Green		4. Amber/green		4. Amber/green		3. Amber		5. Green		2. High 2-4	
2	Delete	1.2 Ollerton Signals	20/03/2019	Traffic Signals - enlarged	Congestio	4		5. High		5. High			3		3. Amber		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		4. Low 1-1.5	
3	Delete	2.1 Deerdale Lane 2+1 Signals	20/03/2019	Traffic Signals 2 lanes + 1 lane	Perceived	3		5. High		4			3		2. Red/ami		2. Red/am		3. Amber		2. Red/ami		4. Amber/g		5. Poor <1	
4	Delete	2.2 Deerdale Lane 2+2 Signals	20/03/2019	Traffic Signals 2 lanes + 2 lane	Perceived	3		5. High		4			3		3. Amber		2. Red/am		3. Amber		2. Red/ami		4. Amber/g		4. Low 1-1	
5	Delete	2.3 Deerdale Lane Roundabout	20/03/2019	4 arm roundabout	Perceived	3		5. High		4			3		4. Amber/green		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		4. Low 1-1.5	
6	Delete	3.1 Mickledale Lane 2+1 signals	20/03/2019	2 lane + 1 lane signals	Perceived	3		5. High		4			3		3. Amber		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		5. Poor <1	
7	Delete	3.2 Mickledale Lane 2+2 signals	20/03/2019	2 lane + 2 lane signals	Perceived	3		5. High		4			3		2. Red/amber		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		4. Low 1-1.5	
8	Delete	3.3 Mickledale Lane Roundabout	20/03/2019	4 arm roundabout	Perceived	2		5. High		4			3		2. Red/amber		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		4. Low 1-1.5	
9	Delete	4.1 White Post	20/03/2019	4 arm roundabout widening	Unlock ec	1. Small impact		4		4			1. Little		2. Red/amber		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		5. Poor <1	
10	Delete	4.2 White Post - signals	20/03/2019	4 arm roundabout - signals	Unlock ec	1. Small impact		4		4			1. Little		2. Red/amber		2. Red/amber		3. Amber		2. Red/amber		4. Amber/green		5. Poor <1	
11	Delete	4.3 White Post - Access only	20/03/2019	3 arm roundabout - Access only on side road arm	Unlock ec	1. Small impact		4		4			1. Little		1. Red		1. Red		3. Amber		2. Red/amber		4. Amber/green		5. Poor <1	
12	Delete	4.4 White Post - Road Safety	20/03/2019	Anti skid and maintenence	Unlock ec	2		4		4			1. Little		6. No Impa		6. No Impa		3. Amber		6. No Impa		4. Amber/g		4. Low 1-1	
13	Delete	5.1 Warren Hill Signals	20/03/2019	Signalised junction	Unlock ec	2		4		4			2		2. Red/amber		1. Red		3. Amber		2. Red/amber		3. Amber		5. Poor <1	
14	Delete	5.2 Warren Hill roundabout	20/03/2019	enlarged conventional roundabout	Unlock ec	3		4		4			3		4. Amber/green		3. Amber		3. Amber		2. Red/amber		3. Amber		3. Medium 1.5-2	
15	Delete	6.1 Lowdham - Signals	20/03/2019	Traffic Signalised junction	Unlock ec	3		4		4			3		3. Amber		2. Red/amber		3. Amber		2. Red/amber		3. Amber		5. Poor <1	
16	Delete	6.2 Lowdham - Conventional	20/03/2019	Enlarged 4 arm roundabout	Unlock ec	4		5. High		5. High			3		5. Green		4. Amber/green		3. Amber		2. Red/amber		3. Amber		2. High 2-4	

		Overall			Managerial																						
Unique Ref. No.	Delete option?	Name / No.	Date	Description	Implementation timetable	Implementation timetable - Comments	Public acceptability	Public acceptability - Comments	Practical feasibility	Practical feasibility - Comments	What is the quality of the supporting evidence?	What is the quality of the supporting evidence? - Comments	Key risks	Affordability	Affordability - Comments	Capital Cost (£m)?	Capital Cost (£m)? - Comments	Revenue Costs (£m)?	Revenue Costs (£m)? - Details	Cost Profile	Overall cost risk	Other costs	Flexibility of option	Flexibility of option - Comments	Where is funding coming from?	Any income generated? (Y/N)	If yes, how much income generated (£m)?
1	Delete	1.1 Ollerton Roundabout	20/03/2019	Enlarged conventional roundabout	5. 2-5 years		5. High		5. High		4			5. Affordable		03. 5-10		02. 0-5			3		1. Static		DfT	No	
2	Delete	1.2 Ollerton Signals	20/03/2019	Traffic Signals - enlarged	5. 2-5 years		3		4		4			5. Affordable		03. 5-10		02. 0-5			3		1. Static		DfT	No	
3	Delete	2.1 Deerdale Lane 2+1 Signals	20/03/2019	Traffic Signals 2 lanes + 1 lane	5. 2-5 yea		3		4		4			5. Affordat		02. 0-5		02. 0-5			3		1. Static		DfT	No	
4	Delete	2.2 Deerdale Lane 2+2 Signals	20/03/2019	Traffic Signals 2 lanes + 2 lane	5. 2-5 yea		3		4		4			5. Affordat		02. 0-5		02. 0-5			3		1. Static		DfT	No	
5	Delete	2.3 Deerdale Lane Roundabout	20/03/2019	4 arm roundabout	5. 2-5 years		2		4		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
6	Delete	3.1 Mickledale Lane 2+1 signals	20/03/2019	2 lane + 1 lane signals	5. 2-5 years		2		4		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
7	Delete	3.2 Mickledale Lane 2+2 signals	20/03/2019	2 lane + 2 lane signals	5. 2-5 years		2		4		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
8	Delete	3.3 Mickledale Lane Roundabout	20/03/2019	4 arm roundabout	5. 2-5 years		1. Low		3		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
9	Delete	4.1 White Post	20/03/2019	4 arm roundabout widening	5. 2-5 years		1. Low		2		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
10	Delete	4.2 White Post - signals	20/03/2019	4 arm roundabout - signals	5. 2-5 years		1. Low		2		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
11	Delete	4.3 White Post - Access only	20/03/2019	3 arm roundabout - Access only on side road arm	5. 2-5 years		1. Low		1. Low		4			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
12	Delete	4.4 White Post - Road Safety	20/03/2019	Anti skid and maintenence	4. 1-2 yea		Don't know		5. High		4			5. Affordat		02. 0-5		02. 0-5			5. Low risk		1. Static		DfT	No	
13	Delete	5.1 Warren Hill Signals	20/03/2019	Signalised junction	5. 2-5 years		Don't know		3		3			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
14	Delete	5.2 Warren Hill roundabout	20/03/2019	enlarged conventional roundabout	5. 2-5 years		Don't know		4		3			5. Affordable		02. 0-5		02. 0-5			3		1. Static		DfT	No	
15	Delete	6.1 Lowdham - Signals	20/03/2019	Traffic Signalised junction	5. 2-5 years		Don't know		4		4			5. Affordable		02. 0-5		02. 0-5			4		1. Static		DfT	No	
16	Delete	6.2 Lowdham - Conventional	20/03/2019	Enlarged 4 arm roundabout	5. 2-5 years		4		4		4			5. Affordable		03. 5-10		02. 0-5			4		1. Static		DfT	No	

Appendix B – Option Capacity Assessments

Modelled using 2037 design year flows (Including dependent development)

Junction			proposal type			model	modelled	outline perf (%PRC or RFC)			
		existing	primary	secondary 1	secondary 2			AM	PM	IP	OP
1	Ollerton	roundabout(sml)				Arcady	06/02/2019	1.48	1.74	1.02	0.07
			roundabout (1c)			Arcady	05/02/2019	0.85	0.9	0.61	0.05
				signalled rdbt (1d)		Linsig3	05/02/2019	8.2	2.2	44.6	1275.9
					n/a						
2	Deerdale	priority				Picady	06/02/2019	0.47	0.37	0.18	0.01
			signals (2a)			Linsig3	30/01/2019	-19.7	-8.1	33.2	1286.5
				expanded signals (2b)		Linsig3	30/01/2019	54.8	64.3	136.1	2300.0
					roundabout (2c)	Arcady	06/02/2019	0.86	0.85	0.50	0.05
3	Mickledale	priority				Picady	06/02/2019	0.55	0.45	0.20	0.01
			signals (3a)			Linsig3	28/01/2019	-22.9	-11.1	31.9	1235.1
				expanded signals (3b)		Linsig3	28/01/2019	44.0	45.3	117.9	2050.0
					roundabout (3c)	Arcady	28/01/2019	0.83	0.89	0.53	0.05
4	White Post	roundabout(sml)				Arcady	05/02/2019	1.06	1.12	0.61	0.06
				signals (4b)		Linsig3	06/02/2019	-0.4	-9.8	9.8	1477.7
					n/a						
5	Warren	gyratory				Picady	06/02/2019	0.87	0.97	0.5	0.04
			roundabout (5b)			Arcady	06/02/2019	0.83	0.55	0.38	0.04
				signals (5a)		Linsig3	05/02/2019	-25.8	-4.0	55.5	1492.9
					n/a						
6	Lowdham	roundabout(sml)				Arcady	06/02/2019	1.16	1.49	0.17	0.03
			roundabout (6a)			Arcady	28/01/2019	0.86	0.84	0.48	0.04
				signals (6b)		Linsig3	28/01/2019	-34.7	-34.9	4.5	980.0
					n/a						

NOTE:

Outline signal performance is %PRC. 0% = junction at practical capacity. -10% = junction at maximum capacity. > -10% = junction over maximum capacity

Outline roundabout performance is RFC for worst arm. >0.85 = junction over practical capacity

Outline priority performance is RFC for worst movement. >0.85 = junction over practical capacity

Mickledale and Deerdale Lane signals modelled with rarely called stages (Inkersall Lane and A614N RT) not included

aecom.com