

# A614/A6097 Major Road Network Improvement Environmental Statement – Non-Technical Summary

Via East Midlands Ltd



Project number: 60643622

February 2022

## Quality information

Prepared by	Checked by	Verified by	Approved by
S Dickerson Graduate Environmental Consultant	J Wright Senior Environmental Consultant	C. Bush Associate Director	S. Banks Project Manager
K Stevenson Environmental Consultant	A Morrissy Associate Director		

## Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	December 2021	First Draft	SB	S Banks	Project Manager
2	February 2022	Final	SB	S Banks	Project Manager

## Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

VIA East Midlands Ltd



Prepared by:

AECOM Infrastructure & Environment UK Limited  
Royal Court, Basil Close  
Chesterfield  
Derbyshire S41 7SL  
United Kingdom

T: +44 (1246) 209221  
aecom.com

© 2022 AECOM Infrastructure & Environment UK Limited. All Rights Reserved.

This document has been prepared by AECOM Infrastructure & Environment UK Limited ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>6</b>
1.1	Overview .....	6
1.2	What is an Environmental Impact Assessment? .....	6
1.3	ES Structure.....	7
<b>2</b>	<b>Existing Site and Environmental Constraints .....</b>	<b>9</b>
2.1	Ollerton Roundabout .....	9
2.2	Mickledale Lane Junction .....	10
2.3	White Post Roundabout.....	10
2.4	Warren Hill Junction.....	11
2.5	Lowdham Roundabout .....	11
2.6	Kirk Hill Junction.....	12
<b>3</b>	<b>The Project.....</b>	<b>13</b>
3.2	Construction, Operation and Long-Term Management .....	14
<b>4</b>	<b>Assessment of Alternatives.....</b>	<b>16</b>
<b>5</b>	<b>Environmental Assessment Methodology .....</b>	<b>18</b>
5.1	Scope of the EIA .....	18
5.2	EIA Methodology .....	18
<b>6</b>	<b>Air Quality .....</b>	<b>20</b>
6.1	Introduction.....	20
6.2	Construction Phase Effects .....	20
6.3	Operational Phase Effects.....	20
6.4	Project-Wide Effects.....	21
6.5	Mitigation and Monitoring.....	21
6.6	Residual Effects.....	21
<b>7</b>	<b>Cultural Heritage.....</b>	<b>22</b>
7.1	Introduction.....	22
7.2	Construction Phase Effects .....	22
7.3	Operational Phase Effects .....	24
7.4	Project-Wide Effects (Construction and Operation).....	24
7.5	Mitigation and Monitoring.....	24
7.6	Residual Significant Effects .....	25
<b>8</b>	<b>Landscape and Visual .....</b>	<b>26</b>
8.1	Introduction.....	26
8.2	Baseline .....	26
8.3	Assessment of Effects on Landscape.....	27
8.4	Assessment of Visual Effects.....	27
8.5	Project-Wide Effects (Construction and Operation).....	28
8.6	Mitigation and Monitoring.....	28
8.7	Residual Effects.....	28
<b>9</b>	<b>Biodiversity .....</b>	<b>29</b>
9.1	Introduction.....	29
9.2	Habitats and Biodiversity Net Gain .....	29
9.3	Construction Phase Effects .....	29
9.4	Operational Phase Effects.....	31
9.5	Project-Wide Effects (Construction and Operation).....	33
9.6	Mitigation and Monitoring.....	34
9.7	Residual Effects.....	35

<b>10</b>	<b>Geology and Soils</b> .....	<b>36</b>
10.1	Introduction.....	36
10.2	Construction Phase Effects .....	36
10.3	Project-Wide Effects (Construction).....	37
10.4	Operational Phase Effects .....	37
10.5	Mitigation and Monitoring.....	37
10.6	Residual Effects.....	37
<b>11</b>	<b>Noise and Vibration</b> .....	<b>38</b>
11.1	Introduction.....	38
11.2	Construction Phase Effects .....	38
11.3	Operational Phase Effects .....	39
11.4	Project-Wide Effects (Construction and Operation).....	39
11.5	Mitigation and Monitoring.....	39
11.6	Residual Effects.....	40
<b>12</b>	<b>Road Drainage and the Water Environment</b> .....	<b>41</b>
12.1	Introduction.....	41
12.2	Construction Phase Effects .....	41
12.3	Operational Phase Effects .....	43
12.4	Project-Wide Effects (Construction and Operation).....	46
12.5	Mitigation and Monitoring.....	46
12.6	Residual Effects.....	46
<b>13</b>	<b>Climate</b> .....	<b>47</b>
13.1	Introduction.....	47
13.2	Construction Phase Effects .....	47
13.3	Operational Phase Effects .....	51
13.4	Mitigation and Monitoring.....	52
13.5	Residual Effects.....	52
<b>14</b>	<b>Combined and Cumulative Effects Assessment</b> .....	<b>53</b>
14.1	Introduction.....	53
14.2	Combined Effects Assessment .....	53
14.3	Cumulative Effects Assessment.....	54
14.4	Mitigation and Monitoring.....	54
<b>15</b>	<b>Summary</b> .....	<b>55</b>
<b>16</b>	<b>References</b> .....	<b>58</b>
<b>17</b>	<b>Abbreviations List</b> .....	<b>59</b>
	<b>Appendix A Figures</b> .....	<b>60</b>
	<b>Appendix B General Arrangement Drawings</b> .....	<b>61</b>

# 1 INTRODUCTION

## 1.1 Overview

- 1.1.1 This document is the Non-Technical Summary (NTS) of the Environmental Statement (ES) produced for the A614/A6097 Major Road Network Improvement Project (the 'Project'). The 'Applicant' for the Project is Nottinghamshire County Council (NCC). Figures to support this NTS can be found in Appendix A attached to this document.
- 1.1.2 The A614 is an important road linking Nottingham in the south towards Worksop and Retford and beyond in the north. The A6097 provides a connection from the A614 to the A46 (the trunk road linking Leicester with Newark and Lincoln). Within the area identified for improvement, the A614 is a two-way single carriageway. The A6097 is a two-way single carriageway which has a short length of dual carriageway through Lowdham (known as the Epperstone Bypass).
- 1.1.3 The A614 serves two economic functions: accommodating regular commuter trips and local movements, and also being an important corridor for the tourist economy which will grow in future. A number of junctions along the corridor are heavily congested causing journey delays, whilst others pose difficulties for drivers trying to access the A614 from nearby villages. Existing concerns for safety and journey delays are expected to get worse over time with future traffic growth.
- 1.1.4 The Project consists of proposed junction improvements at six locations (referred to as the 'Schemes') from north to south along the route as listed below and shown on Figure 1 (Appendix A):
- Ollerton Roundabout – the intersection of the A614/ A616/ A6075 roundabout;
  - Mickledale Lane Junction – the A614/ Mickledale Lane crossroads;
  - White Post Roundabout – the A614/ Mansfield Road roundabout;
  - Warren Hill Junction – the A614/ A6097 priority junction;
  - Lowdham Roundabout – the A6097/ A612 Nottingham Road/ Southwell Road roundabout; and
  - Kirk Hill Junction – the A6097/ East Bridgford Road/ Kirk Hill crossroads.
- 1.1.5 The Schemes general arrangement drawings and planning (red line) boundaries can be found in Appendix B. The red line planning boundary encompasses the full extent of all highway improvement works, including areas of changes to existing signage, new signage and new lighting, plus all temporary working areas required for the construction of each Scheme.
- 1.1.6 The Project seeks to relieve congestion and address safety concerns, whilst facilitating economic growth. The Schemes fall within the local authority areas of Newark and Sherwood District Council (NSDC) and Rushcliffe Borough Council (RBC).

## 1.2 What is an Environmental Impact Assessment?

- 1.2.1 Environmental Impact Assessment (EIA) is a process undertaken to identify the likely significant environmental effects of a project to ensure that decisions made by the Local Planning Authority are made with full knowledge of these effects. The outcome of the EIA process is reported within an ES.
- 1.2.2 EIA is an iterative process such that where likely significant effects are predicted, measures to prevent, reduce or offset any adverse effects are identified. During the

EIA process for the Project, mitigation measures have been identified and incorporated within the design, or noted as actions to be taken during construction.

- 1.2.3 An EIA Scoping Report was submitted to NCC in June 2021 detailing the proposed contents and methods to be used in the EIA and reported in the ES. NCC reviewed and consulted on the Scoping Report. Scoping Opinions were received alongside consultee comments and these comments have been taken into account within the preparation of the ES. As proposed within the Scoping Report, no specific assessment has been undertaken for the White Post Roundabout and Warren Hill Junction Schemes due to the limited extent of works required which would be unlikely to result in significant environmental effects.

## 1.3 ES Structure

- 1.3.1 The ES has been structured to provide a stand-alone assessment of each Scheme to accompany individual planning applications, whilst also providing an assessment of Project-wide cumulative effects for each environmental topic, assessment of combined effects and assessment of cumulative effects of the Project in conjunction with other forthcoming developments.
- 1.3.2 **Volume 1** of the ES provides an overview of the Project description, the assessment of Project alternatives, an assessment of the Project-wide cumulative effects for each environmental topic, the assessment of combined effects and the assessment of cumulative effects in conjunction with other developments. Supporting figures and technical appendices to this document can be found within **Volume 2 and Volume 3** respectively.
- 1.3.3 The environmental assessment of each individual Scheme has been presented within **Volumes 1A (Ollerton Roundabout), 1B (Mickledale Lane Junction), 1C (Lowdham Roundabout) and 1D (Kirk Hill Junction)** for ease of understanding of the impacts of the Schemes individually.
- 1.3.4 The full ES structure is outlined in Table 1-1.

Table 1-1: Environmental Statement Structure

Contents	Assessment Reports	Figures	Technical Appendices
Project Overview and Cumulative Effects Assessment	Volume 1	Volume 2	Volume 3
Ollerton Roundabout	Volume 1A	Volume 2A	Volume 3A
Mickledale Lane Junction	Volume 1B	Volume 2B	Volume 3B
Lowdham Roundabout	Volume 1C	Volume 2C	Volume 3C
Kirk Hill Junction	Volume 1D	Volume 2D	Volume 3D

- 1.3.5 The ES complies with the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') (as amended 2018) (HM Government, 2018) and forms part of a suite of documents submitted as part of the planning application for the Project.

## 1.4 Environmental Statement Availability

- 1.4.1 This document is a Non-Technical Summary of the Environmental Statement. The full Environmental Statement is available for viewing by the public via the NCC public

access portal: <https://www.nottinghamshire.gov.uk/planning-and-environment/planning-applications/commenting-on-planning-applications>.

- 1.4.2 A electronic (CD-ROM) copy of the ES can be obtained by contacting VIA East Midlands:

VIA East Midlands  
Bilsthorpe Highways Depot,  
Bilsthorpe Business Park,  
Eakring Road  
Bilsthorpe  
Newark  
NG22 8ST

0115 804 2100

- 1.4.3 A payment of £40 (including VAT and postage and packaging) will be payable in advance for each CD-ROM.
- 1.4.4 NCC should be contacted by telephone (0300 500 8080) or by email ([development.management@nottscc.gov.uk](mailto:development.management@nottscc.gov.uk)) to make arrangements to view the ES in hard copy. A paper copy of the full ES can be obtained at a cost of £850 (excluding VAT).
- 1.4.5 Comments on the planning application should be made via the NCC public access portal: <https://www.nottinghamshire.gov.uk/planning-and-environment/planning-applications/commenting-on-planning-applications>.



## 2 EXISTING SITE AND ENVIRONMENTAL CONSTRAINTS

### 2.1 Ollerton Roundabout

- 2.1.1 Ollerton Roundabout is located in Ollerton village in Nottinghamshire, approximately 12 km north-east of Mansfield and 26 km north of Nottingham. It is a six-arm roundabout with one arm being bus only. The junction facilitates local movements from Ollerton and local tourist attractions as well as strategic trips (A1(T) via the A614).
- 2.1.2 Several businesses are situated near the junction including a McDonald's restaurant, a drive-through Costa Coffee, a Public House and two petrol stations. A small number of houses are located to the north-east of the roundabout and one on Mansfield Road.
- 2.1.3 The wider area around the junction is largely rural. Within 200 m of Ollerton Roundabout there are several ecologically sensitive sites including Birklands West and Ollerton Corner Site of Special Scientific Interest (SSSI), Birklands and Bilhaugh Special Area of Conservation (SAC) and Sherwood Heath Local Nature Reserve (LNR) and Local Wildlife Site (LWS). There are also habitats included within the Sherwood Area Possible Potential Special Protection Area (ppSPA) within 200 m. Some of these habitats are adjacent to the existing junction.
- 2.1.4 There are footways along the roads leading into Ollerton Roundabout, with a Public Right of Way (PRoW) bridleway 26 (Ollerton and Boughton Bridleway No. 26 changing name at the Parish boundary to Edwinstowe Bridleway No. 24 leading north-west through Sherwood Heath LNR).
- 2.1.5 Three Noise Important Areas (NIAs) were identified within 600 m of the Scheme which are the responsibility of NCC. NIAs are those areas which are most exposed to noise from various sources, including road traffic.
- 2.1.6 Alluvium (clay, silt, sand and gravel) underlies the existing roundabout and surrounding area to the north-east, east and south-west. Sherwood Sandstone Group, Chester Formation directly underlies the western part of the study area. The Chester Formation is classified as a Principal Aquifer.
- 2.1.7 The Scheme is located within a Source Protection Zone 3 which relates to the sensitivity of the area to contamination of groundwater supplies of drinking water.
- 2.1.8 The River Maun and tributaries are located to the south and east of the site, flowing to the east and north-east. This is within the Water Framework Directive (WFD) water body catchment; 'Maun from Rainworth Water to Poulter'.
- 2.1.9 The roundabout lies within Flood Zone 2 and Flood Zone 3 for flood risk from rivers.
- 2.1.10 The Agricultural Land Classification (ALC) for the study area is Grade 2, which is considered to be best and most versatile<sup>1</sup> (BMV) agricultural land.
- 2.1.11 In terms of buried archaeology, there is evidence of archaeological assets within the 500 m study area dating from 1540AD to the modern era. In terms of built heritage, within the 500 m study area of the site, there are 10 Grade II listed buildings and one

---

<sup>1</sup> The best and most versatile land is defined as Grades 1, 2 and 3a by policy guidance in the National Planning Policy Framework (2021). This is the land which is most flexible, productive and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals.

Grade II\* listed building. Ollerton Conservation Area is also located directly to the east of the Scheme.

## 2.2 Mickledale Lane Junction

- 2.2.1 Mickledale Lane Junction is located approximately 500 m west of the village of Bilsthorpe in Nottinghamshire, approximately 9 km east of Mansfield and approximately 22 km to the north of Nottingham.
- 2.2.2 In close proximity to the junction are four houses to the south-east, and a transport café (Limes Café) and house to the north-west. Other than these buildings, the junction is surrounded by agricultural land. Inkersall Lane is a narrow road leading westward 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.
- 2.2.3 In terms of buried archaeology, there is evidence of archaeological assets within the 500m study area dating from 4,000BC to 1900AD. In terms of built heritage, there are no designated assets within the 500m study area. There are four non-designated assets recorded within 500 m of the Scheme, including a flint axe head, post-medieval buildings (Featherstone House Farm and Labour in Vain Cottage) and a bridge at Rufford.
- 2.2.4 A total of eight LWSs are located within the search area. The closest LWS is Alder Carr, located 25 m to the south-west of the Scheme.
- 2.2.5 There are footpaths on both the east and west sides of the existing junction. Inkersall Lane is a PRow and Rufford Bridleway No. 5. Route Number 645 of the National Cycle Network (NCN 645) lies 210 m to the north of the junction and is a traffic free route.
- 2.2.6 The bedrock geology (Chester Formation) underlying the site is classified as a Principal Aquifer. Groundwater is particularly sensitive in this area, as the Scheme and study area lies within parts of an SPZ Zone 1 (inner zone), Zone 2 (outer zone) and Zone 3 (total catchment area). The eastern margins of the site are located within a Drinking Water safeguarding zone.
- 2.2.7 The ALC for the study area is mainly Grade 3a, with areas of Grade 2 and 3b.
- 2.2.8 No surface water features have been identified on-site, apart from a drainage ditch running along the western side of the A614 / Old Rufford Road. The nearest off-site surface water feature is Rainworth Water, which is located approximately 100 m south of the site, flowing east.
- 2.2.9 The Environment Agency Flood Map for Planning shows the Scheme is within Flood Zone 1. Land and property in Flood Zone 1 is considered to have a low probability of flooding from rivers or the sea.

## 2.3 White Post Roundabout

- 2.3.1 White Post Roundabout is located just west of the village of Farnsfield in Nottinghamshire, approximately 9 km southeast of Mansfield and 16 km north of Nottingham. The current layout is a four-arm standard roundabout with the A614 running north-south.
- 2.3.2 Mansfield Road connects the junction to Rainworth and the town of Mansfield to the west and to the village of Farnsfield to the east.
- 2.3.3 There are a number of business and residential properties surrounding the junction. Businesses include a Public House (The White Post), a motor vehicle sales garage,

the Wheelgate Family Theme Park, a day nursery and White Post Farm (animal visitor park).

## 2.4 Warren Hill Junction

- 2.4.1 Warren Hill Junction is located just south of the village of Farnsfield in Nottinghamshire, approximately 10 km southeast of Mansfield and 14 km north of Nottingham.
- 2.4.2 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 (routing north) merges onto the A614 by entering the mainstream on the passenger side (rather than the normal driver's side). This unusual arrangement creates a perception that the junction is unsafe. The junction is predicted to be a capacity restraint in future years.
- 2.4.3 A caravan sales site is located to the immediate north of the junction, though the rest of the junction is surrounded by agricultural land.

## 2.5 Lowdham Roundabout

- 2.5.1 Lowdham Roundabout is located in Lowdham village in Nottinghamshire, approximately 2 km north of the village of Gunthorpe and 9 km north-east of Nottingham. It is a four-arm standard roundabout with the dual-carriageways of the A6097 entering the junction from both the north-west and south-east.
- 2.5.2 Residential dwellings have been constructed to the east and south of the junction along the A612 and a cricket pitch is located to the north of the junction. To the north-west, the junction is bordered by agricultural land.
- 2.5.3 Footpaths have been provided around the junction and splitter islands are available to assist pedestrians crossing. There is a PRow footpath (Lowdham FP2) which starts approximately 100 m to the south of the junction between property numbers 2 and 4 Nottingham Road.
- 2.5.4 A single veteran tree is located within 200 m of the Scheme.
- 2.5.5 In terms of buried archaeology, there is evidence of archaeological assets within the 500m study area dating from 1540AD to the modern era. In terms of built heritage, within the 500 m study area of the site, there are a total of seven Grade II listed buildings, and the Lowdham Conservation Area.
- 2.5.6 There are eight LWSs within 2 km of the Scheme, with the closest being Lowdham Pasture LWS and Caythorpe Grassland LWS, both approximately 750 m away to the north-east and east respectively.
- 2.5.7 The alluvium is classified as a Secondary A Aquifer. The initial findings of the ALC survey carried out at the site indicate that the areas of agricultural land on-site are largely Grade 2 and Grade 3a, which is considered to be BMV land, with small areas of Grade 3b.
- 2.5.8 Two NIAs were identified within 600 m of the Scheme, both of which are the responsibility of NCC.
- 2.5.9 A main river, the Cocker Beck, is located 160 m east of the existing junction. This is flowing to the south-east towards the River Trent approximately 2.5 km downstream. A short ditch follows the south-western edge of the A6097 / Epperstone Bypass, and a second which flows to the north-east along the south-eastern edge of the A612 / Nottingham Road before changing direction and flowing to the south-east.

2.5.10 The Lowdham Roundabout is located within Flood Zone 2 and Flood Zone 3 on the Flood Map for Planning. Land and property in Flood Zone 3 is considered to have a high probability of flooding from rivers or the sea and land or property in Flood Zone 2 is considered to have a medium probability of flooding from rivers or the sea. At Lowdham, the source of this flood risk is the Cocker Beck which flows north-south through the village with areas of flood risk on both sides of the watercourse. Lowdham has flooded significantly in 2007, 2012, 2013 and most recently in 2020 where up to 95 houses were flooded. However, updated flood modelling for the Scheme has shown that the existing roundabout is at low risk of fluvial flooding due to recent flood risk mitigation works completed by the Environment Agency.

## 2.6 Kirk Hill Junction

- 2.6.1 Kirk Hill Junction is located just south of East Bridgford, approximately 10 km east of Nottingham. It is a four-arm traffic signalled junction. The A6097 Bridgford Street runs north-west to south-east and Kirk Hill joins the A6097 from the north, providing access to East Bridgford village. East Bridgford Road provides access to Newton village to the south. Both A6097 approaches are characterised by two lanes, one of which is a dedicated right turn lane, with the other used for traffic travelling straight ahead or turning left. Both Kirk Hill and East Bridgford Road are single lane approaches.
- 2.6.2 The junction is in a rural location, predominantly bordered by agricultural land. Residential dwellings are located in an area of land between the A6097 and Kirk Hill.
- 2.6.3 In terms of buried archaeology, there is evidence of archaeological assets within the 500 m study area dating from 10,000BC to the modern era.
- 2.6.4 In terms of built heritage, there is a scheduled monument, one Grade I listed building (the Church of St Peter), seven Grade II listed buildings and East Bridgford Conservation Area within the heritage study area. All the listed buildings are located within East Bridgford to the north.
- 2.6.5 The scheduled monument is the remains of a motte and bailey castle adjacent to the River Trent approximately 500 m north-west of the Scheme.
- 2.6.6 There are 10 LWSs within 2 km of the Scheme, the closest being Trent Hills Wood located 500 m to the north-east.
- 2.6.7 Public bridleway East Bridgford Bridleway No. 28 runs parallel with the A6097, on the north-eastern side of the A6097.
- 2.6.8 Gunthorpe Weir Local Geological Site has been identified approximately 700 m north of the site.
- 2.6.9 Underlying the Scheme are Secondary Aquifers and Secondary B Aquifers, while the Edwalton Member (siltstone) and the Cotgrave Sandstone Member are Secondary A Aquifers.
- 2.6.10 A land drain is located adjacent to the site, to the north-west of the existing junction.
- 2.6.11 The site is within the Shelford Brook Catchment (tributary of Trent) Water Body, which was recorded to have bad ecological status in 2019.
- 2.6.12 The ALC for the soils study area is predominantly Grade 3b with soils of Grade 3a and Grade 2 in the east.

## 3 THE PROJECT

### Ollerton Roundabout

- 3.1.1 It is proposed to enlarge the existing Ollerton Roundabout. The junction currently has six approaches, and this would be reduced to five by removing the bus-only arm Newark Road, which would realign to join the A616 Ollerton Road arm.
- 3.1.2 Approaches from all directions would be widened to provide two entry lanes onto the roundabout. Changes to speed limits are proposed with the speed limit reduced from national speed limit to 40 mph at the roundabout and on all approaches.
- 3.1.3 Toucan crossing points (a crossing with signal controls) for both pedestrians and cyclists would be provided on the A6075 Mansfield Road and the A614 Old Rufford Road.

### Mickledale Lane Junction

- 3.1.4 It is proposed to construct a new three-arm roundabout on the A614 to the south of the existing junction. A new link road would connect the A614 and Mickledale Lane by passing through a field to the south-east of the existing junction. The new link road would tie into Mickledale Lane via a second three-arm mini-roundabout.
- 3.1.5 The existing Mickledale Lane crossroads would be amended to close off access for vehicles to/ from the A614 onto Mickledale Lane. Mickledale Lane would become a cul-de-sac accessed from the east, from the new link road. New access would be provided off the new link road into Strawsons Ltd premises to the east.
- 3.1.6 The A614 roundabout junction would be subject to a 50 mph speed limit, and the link road would be subject to a 30 mph speed limit.

### White Post Roundabout

- 3.1.7 It is proposed to carry out small-scale road safety and maintenance works at White Post Roundabout. This would involve localised carriageway repairs and the provision of high friction surfacing on the approaches to the junction. A review of the existing traffic signing will be undertaken and improvements made where required, as well as a review of existing street lighting provision which would guide any future additional lighting requirements or upgrades required.

### Warren Hill Junction

- 3.1.8 It is proposed to simplify this junction by providing an extended merge lane, thereby removing the requirement for north-bound drivers on the A6097 to give way to vehicles on the A614 to the left; an unnatural manoeuvre to give way to the left in a right-hand drive vehicle. This would require a small amount of carriageway realignment along with new white lining.
- 3.1.9 New removal bollards would be installed to the northern extent of the junction to remove the ability of traffic traveling northbound to return in a southbound direction. This movement was assessed during the traffic modelling which showed that the demand for the right turn from the A614 north to the A6097 south is extremely limited. In all of the modelled periods there were no vehicles making this turn.
- 3.1.10 Revised and upgraded signage would be provided to inform drivers of the new road layout.

## Lowdham Roundabout

- 3.1.11 It is proposed that an enlarged four-arm elliptical roundabout be constructed to replace the existing roundabout. This would have a two-lane circulatory carriageway and include a third left turn filter lane on the A612 Nottingham Road (eastbound) approach to the junction. A new access road would be provided from the A612 Nottingham Road to access the four properties on the south side of the road, closest to the roundabout.
- 3.1.12 Toucan crossing points for both pedestrians and cyclists would be provided on both carriageways of the A6097 Epperstone Bypass, north-west of the roundabout. These crossings would be linked by shared-use footway/cycleways.
- 3.1.13 It is proposed that the speed limit at the roundabout would be reduced from 40 mph to 30 mph. The 30 mph speed limit would also extend from the junction on the north western leg of the A6097 and approximately away from the junction on the south-western leg of the A612.

## Kirk Hill Junction

- 3.1.14 It is proposed to carry out carriageway widening works to provide two straight ahead lanes in each direction on the A6097 and separate right turn lanes into Kirk Hill and East Bridgford Road. It is further proposed to carry out localised widening on Kirk Hill to facilitate improved negotiation of left turns into the road by large vehicles. These changes would require upgrades and improvements to the traffic signals at the junctions.
- 3.1.15 East Bridgford Bridleway No. 28 would be diverted around the north side of Kirk Hill, crossing at the bend and linking through to the cut-through path which is currently used as an unofficial diversion route.
- 3.1.16 A new Pegasus crossing would be provided 100 m east of the junction to facilitate the safe movement of equestrians across the A6097. This crossing would link into the public bridleway on the northern side and a new path with fencing would be created on the southern verge of the A6097 to link the route to East Bridgford Road.
- 3.1.17 The Scheme would include a reduction in the speed limit from de-restricted to 50 mph beyond the existing 40 mph terminal point around 930 m north-west of the Kirk Hill to the junction with the A46 around 1.1 km south-east of the Kirk Hill Junction. This would make the speed limit consistent with the rest of the A6097 and A614 corridors.

## 3.2 Construction, Operation and Long-Term Management

- 3.2.1 The anticipated construction start dates and opening dates for each Scheme are outlined in Table 3-1 below.

Table 3-1: Scheme Anticipated Construction Start Dates and Opening Years

Scheme Name	Construction Start Date
Ollerton Roundabout	Autumn 2023 (for approximately 87 weeks)
Mickledale Lane Junction	Winter 2024/2025 (for approximately 54 weeks)
White Post Junction	Summer 2023 (for up to 4 weeks)
Warren Hill Junction	Summer 2023 (for approximately 4 weeks)
Kirk Hill Junction	Autumn 2023 (for approximately 38 weeks)
Lowdham Roundabout	Summer/Autumn 2024 (for approximately 36 weeks)

- 3.2.2 Operation and long-term management of the Project would remain the responsibility of NCC as the local highway authority. The maintenance of landscape planting would be the responsibility of NCC.



## 4 ASSESSMENT OF ALTERNATIVES

- 4.1.1 Information regarding the alternatives considered are provided below, with full details available in Volume 1 of the ES.

### Non-Car Options

- 4.1.2 Non-car options were considered early in the development of the Project alongside road improvements. This explored options to improve the existing bus network, local rail system (the Dukeries Line) and investment in cycling and walking infrastructure.
- 4.1.3 The review concluded that the provision of standalone non-car options would be unlikely to deliver any meaningful benefit to the A614/A6097 corridor. However, improvements to walking and cycling facilities at individual junctions on the corridor were worth further consideration once a junction package had been identified.

### Long List Highways Intervention Options

- 4.1.4 An early options development exercise was undertaken that produced a long list of twelve potential interventions, ranging from additional upgrades to the A6097 providing more dual carriageway, to a bypass at Ollerton and junction upgrades and capacity improvements. Consideration was also given to low-cost traffic management solutions such as speed limit changes to the A614/A6097 corridor.
- 4.1.5 The intervention options were initially combined into a number of different packages which were then assessed using the Department for Transport (DfT) Early Assessment and Sifting Tool (EAST) to help inform the original business case that was submitted to the DfT in May 2019. 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.
- 4.1.6 On completion of the EAST sifting, the package containing the interventions now presented as the Project was selected as it was found to meet the Project objectives, fit with local and regional transport strategies, have relatively more acceptable and mitigatable environmental impacts in comparison to other packages, was more acceptable to local stakeholders and provided good economic benefits.

### Scheme Design Development

- 4.1.7 After the completion of the long list sifting, the option designs at each junction were developed and a preferred option selected for each based on parameters such as cost, economic benefit, safety performance and environmental impact.
- 4.1.8 At Ollerton Roundabout, the option to retain a standard layout was chosen as it resulted in a small footprint, and reduced environmental impact in comparison to other options.
- 4.1.9 At Mickledale Lane Junction, a new roundabout and link road arrangement was chosen to reduce impacts on residential properties and avoid safety concerns with options to improve the existing crossroad junction.
- 4.1.10 At White Post Roundabout, it became clear that the availability of land was limited due to development on all four corners of the junction. It was decided to improve this junction in situ with small scale improvements to existing assets such as traffic signing and carriageway surfacing.
- 4.1.11 At Warren Hill Junction, a minor improvement was chosen to avoid land costs and environmental impacts associated with larger roundabout options.



- 4.1.12 At Lowdham Roundabout, an elliptical roundabout was chosen to deliver significant journey time benefits, whilst reducing the environmental impact associated with a more conventional roundabout layout.
- 4.1.13 At Kirk Hill, the improved capacity junction was chosen to deliver the greatest benefit to aid smoother flow of traffic on the A6097 and improve safety for left turning vehicles with the least environmental impact

## 5 ENVIRONMENTAL ASSESSMENT METHODOLOGY

### 5.1 Scope of the EIA

5.1.1 As part of the EIA scoping process, environmental topics were identified to be scoped into the EIA for each Scheme. Table 5-1 outlines which environmental topics have been scoped into (✓) or out of (X) the EIA.

Table 5-1: Topics scoped into the EIA for each scheme

Scheme Name	Air Quality	Noise	Water Environment	Cultural Heritage	Landscape	Biodiversity	Geology and Soils	Climate
Ollerton Roundabout	✓	✓	✓	✓	✓	✓	✓	✓
Mickledale Lane junction	✓	✓	✓	✓	✓	✓	✓	✓
White Post Roundabout	X	X	X	X	X	X	X	X
Warren Hill Junction	X	X	X	X	X	X	X	X
Lowdham Roundabout	✓	✓	✓	✓	✓	✓	✓	✓
Kirk Hill Junction	✓	✓	X	✓	✓	✓	✓	✓

### 5.2 EIA Methodology

5.2.1 The environmental effects of the Project were assessed both during construction and once the Project is complete and operational. The effects are described in terms of changes to the existing situation (the baseline). EIA assesses environmental effects on resources (such as archaeology) and receptors (such as human beings or protected species). The significance of the environmental effects was assessed by judging the sensitivity (that is, the importance) of a resource or receptor against the magnitude (that is, the scale or extent) of the predicted impact. The duration and geographic scale of the effects were also taken into account.

5.2.2 The EIA has assumed certain aspects of the design would be in place, such as landscaping proposals and drainage design that would help to limit the extent of potential environmental effects. It also assumes that a Construction Environmental Management Plan (CEMP) would be prepared to provide the mitigation measures required to minimise impacts during construction.

5.2.3 A development of this nature is certain to have some effects on the environment, both beneficial and adverse. What is important is that 'significant' adverse effects are identified and reduced through the design process, or through other mitigation measures. 'Significant' effects are considered to be those effects which represent key factors or material influences in the decision-making process.

5.2.4 Where significant adverse environmental effects are still likely to occur, additional measures are proposed to reduce effects where practicable. Any effects that remain, once these measures are taken into account, are reported as 'residual effects'.

- 5.2.5 The beneficial effects are also reported in the ES to ensure the benefits arising from the Project are realised and the balance of issues is understood. The remainder of this Non-Technical Summary sets out the findings of the ES, on a topic-by-topic basis.
- 5.2.6 An opening year of 2023 was used for the purposes of the traffic modelling and related assessments for air quality, noise and road drainage. The whole Project would not be open to traffic at this point, however this is considered to be a worst-case assumption for the purposes of the assessment within this ES. In terms of the operational noise assessment, a future year is included in the assessment (2027) to consider any worsening that background traffic growth would give rise to.

## 6 AIR QUALITY

### 6.1 Introduction

- 6.1.1 The air quality assessments within the ES (Chapter 5: Air Quality in ES Volumes 1A to 1D) present the findings of an assessment of the likely significant effects of the Project upon air quality. The assessment considers the potential for the Project to generate dust during the construction phase, as well as the potential air quality impacts of additional road traffic generated by the proposed development when complete and operational. The assessment focuses on the pollutants nitrogen dioxide (NO<sub>2</sub>) and particulate matter since these are the main pollutants from vehicle emissions. The assessment has been conducted in line with guidance in the Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality (Highways England, 2019).
- 6.1.2 NSDC undertakes monitoring at one location in the study area at Ollerton Roundabout near the Costa Coffee. As this is the only monitoring location in the Project study area, this has been used in the modelling for all Schemes.
- 6.1.3 There are no Air Quality Management Areas (AQMAs) within the study area for any of the Schemes.

### 6.2 Construction Phase Effects

- 6.2.1 The Project has the potential for adverse effects during the construction phase due to generation of dust and emissions from construction vehicles and equipment and from changes in vehicle activity (such as due to temporary traffic management).
- 6.2.2 Receptors (residential or designated habitats) within 50 m of the construction boundary are considered to have a 'high' sensitivity. Those within 50-200 m are considered to have a 'low' sensitivity.
- 6.2.3 The adverse effects from dust would be temporary (i.e. during the period of the construction works only) and could be minimised by the application of mitigation measures such as damping down of working areas. These measures and controls would be documented within the CEMP. No significant construction dust effects are predicted for any Scheme during construction.

### 6.3 Operational Phase Effects

- 6.3.1 All Schemes have the potential to affect air quality through changes to vehicle activity or through changes to road alignments which move the road closer to air quality sensitive receptors (residential or designated habitats).

#### Human Health

- 6.3.2 No receptors within the Schemes study areas are predicted to experience concentrations of NO<sub>2</sub> or particulate matter above the required air quality objectives (AQO) and therefore the air quality effects at public exposure receptors are considered to be not significant.
- 6.3.3 The Project would have no significant air quality effects for on human health.

#### Designated Habitats

- 6.3.4 No significant operational effects are predicted for designated sites near to Mickledale Lane Junction and Kirk Hill Junction. Most of the sites near these two Schemes are outside of the operational air quality study area.

### **Ollerton Roundabout**

- 6.3.5 Air quality modelling identified that land up to 60 m from the Ollerton Roundabout would be affected by changes in air quality due to the proposed re-location of the roundabout closer to the Birklands West and Ollerton Corner SSSI.
- 6.3.6 It is recognised that small increases in nitrogen deposition can have an adverse impact on dwarf shrub heath habitat. However, the impact is limited to a distance of 60 m from the nearest road, beyond which the change in nitrogen deposition is imperceptible. The habitat within 60 m of the road comprises a mix of unmanaged neutral grassland, amenity-managed grassland, plantation broadleaved woodland, continuous bracken, tall ruderal, bramble and gorse scrub. The nearest dwarf shrub heath habitat (for which the SSSI is protected) is at least 100 m from the road. Therefore, there would be neutral effect (not significant) on this receptor.
- 6.3.7 A Habitats Regulations Assessment (HRA) has also been prepared to accompany the ES, to consider the impacts on the Sherwood Area ppSPA and the Birklands and Bilhaugh SAC. This concludes no significant operational effects are anticipated on these designated sites.

### **Lowdham Roundabout**

- 6.3.8 With respect to the veteran tree identified within 200 m of the air quality study area; the change in nitrogen deposition is marginal and so the operational air quality effects are not expected to be significant.

## **6.4 Project-Wide Effects**

- 6.4.1 As all the Schemes and their associated affected roads (roads immediately surrounding the Schemes) are located more than 200 m apart, no receptors would be subject to the air quality effects from more than one Scheme.

## **6.5 Mitigation and Monitoring**

- 6.5.1 Nottinghamshire Wildlife Trust (NWT) has requested that the impacts of dust on the SSSI and LWS in close proximity to the junctions be monitored during construction, with a plan in place for how it could be rectified if a problem is shown to have arisen. This action would be included in the CEMP for the Ollerton Roundabout Scheme.
- 6.5.2 NWT has also requested, with respect to the Ollerton Scheme, that further monitoring is undertaken in key protected habitat sites such as heathland (within the SSSI) to ensure that the operational air quality modelling is correct. A programme of air quality monitoring (NO<sub>2</sub>) is therefore proposed adjacent to the roadside closest to the Birklands West and Ollerton Corner SSSI in the opening year.

## **6.6 Residual Effects**

- 6.6.1 The residual effect is considered to be 'not significant' for air quality for both the construction and operational phases of the Schemes in isolation and for the Project.

## 7 CULTURAL HERITAGE

### 7.1 Introduction

- 7.1.1 The cultural heritage assessments within the ES (Chapter 6: Cultural Heritage in ES Volumes 1A to 1D) present the findings of an assessment of the likely significant effects of the Project on buried archaeology and built heritage assets within the site and surrounding area. The assessment considers both the impacts during construction and operation of the Project and is conducted in line with guidance in DMRB LA 106 Cultural Heritage (Highways England, 2020a).
- 7.1.2 The baseline for cultural heritage was identified through completion of a desk-based assessment, which included a walkover survey to view assets in the vicinity of the Project from publicly accessible locations. The desk-based assessment was informed by data collected from various sources, including the Nottinghamshire Historic Environment Record (NCC, 2021) and Historic England's National Heritage List for England (2021).

### 7.2 Construction Phase Effects

#### Ollerton Roundabout

##### Buried Archaeology

- 7.2.1 A former toll booth is recorded on the historic mapping from the 18<sup>th</sup> century, located on the site of the north-eastern corner of the existing roundabout. Remains of the building would possess archaeological and historical interest as the site of one of very few remaining toll booths in Nottinghamshire. Construction of the Scheme would remove any buried building remains and result in a significant effect without mitigation.
- 7.2.2 Other than the toll booth, there is no known archaeology within the site. There is however potential for previously unrecorded archaeological remains to survive within the red line boundary, particularly in agricultural land at the south-east and north-east sides of the site. The possible remains of a medieval causeway which follows the line of A616 have also been identified. While the significance of any previously unrecorded remains that may survive within the site cannot be determined at the time of writing, any remains are likely to be of low heritage value and therefore disturbance caused by construction would not result in significant effects.

##### Built Heritage

- 7.2.3 The Scheme would alter a part of the Ollerton Conservation Area. However, it is not thought to change the character or the value of the conservation area which already includes part of the existing roundabout area. There may be a temporary increase of noise and traffic during construction, however this would not be considered a significant effect.
- 7.2.4 The following assets would be affected by the temporary increase in noise and traffic associated with the construction of the Scheme, but this would not result in significant effects:
- Ollerton water mill and adjoining mill house (Grade II listed building 150 m south-east of the Scheme);
  - Ollerton war memorial (Grade II listed building located approximately 140m south-east of the Scheme); and
  - a 20<sup>th</sup> century concrete bridge over the River Maun (located approximately 110m south-east of the Scheme).

## Mickledale Lane Junction

### Buried Archaeology

- 7.2.5 In terms of buried archaeology, there is no known archaeology within the site. There is however potential for previously unrecorded archaeological remains to survive within area, particularly in agricultural land to the east and west of the A614. These features may include buried remains associated an historic road from Bilsthorpe to Inkersall. While the significance of any previously unrecorded remains that may survive within the site cannot be determined at the time of writing, any remains are likely to be of low heritage value and therefore disturbance caused by construction would not result in significant effects.

### Built Heritage

- 7.2.6 Featherstone House Farm (a non-designated building approximately 110 m south-east of the Scheme) would experience temporarily increased noise and traffic closer to the building and remove part of the building's agricultural setting. The field affected is screened from the building and would not change the immediate surroundings of the house. Construction would not result in significant effects.
- 7.2.7 Labour in Vain Cottage (a non-designated building located approximately 250 m east of the Scheme) would experience a temporary increase in the noise and traffic that the building experiences, however, this would not result in significant effects.

## Lowdham Roundabout

### Buried Archaeology

- 7.2.8 Ridge and furrow has been recorded in fields located to the north and west of the Scheme. The Scheme only partially extends into the field to the north and is unlikely to significantly impact any surviving ridge and furrow.
- 7.2.9 There is potential for previously unrecorded archaeological remains to survive within the red line boundary, in the agricultural land to the north-west and south-west of the A6097. While the significance of any previously unrecorded remains that may survive within the site cannot be determined at the time of writing, any remains are likely to be of low heritage value and therefore disturbance caused by construction would not result in significant effects.

### Built Heritage

- 7.2.10 Lowdham War Memorial (a Grade II listed building located approximately 50 m north-east of the Scheme) would experience a temporary increase in noise and traffic. This would not result in significant effects.
- 7.2.11 Merevale (number 2 Southwell Road) and numbers 4-10 Southwell Road are all Grade II listed buildings, the closest of which (2 Southwell Road) is approximately 110 m north-east of the Scheme. The buildings are screened from the Scheme, however there would be a temporary increase in noise and traffic along Southwell Road during construction. This would not result in significant effects.

## Kirk Hill Junction

### Buried Archaeology

- 7.2.12 A pinfold (an animal enclosure) is located between the two current roads and may be physically impacted during construction. It is of negligible heritage value and so its removal during construction would not result in significant effects.
- 7.2.13 There is however potential for previously unrecorded archaeological remains to survive within the red line boundary, particularly in agricultural land at the north-eastern side of the site. This includes a possible Roman road beneath the A6097 that may be physically impacted during construction. While the significance of any previously unrecorded remains that may survive within the site cannot be determined

at the time of writing, any remains may be of medium heritage value. Widening of the road may physically impact upon archaeological remains of the potential Roman road and would result in a significant effect without mitigation.

### **Built Heritage**

- 7.2.14 The row of houses on Kirk Hill comprises two attached non-designated post medieval houses. Construction would have no physical impact on the houses but would cause a temporary increase in noise and traffic, as well as the presence of construction equipment. This would not result in significant effects.
- 7.2.15 There are several Grade II listed buildings located along Kirk Hill to the north-east of the Scheme, including the Old Rectory, The Hill and associated garden, house, stables and walls. There would be no physical impacts to the buildings as they would be screened by trees and walls along the road. There may be some increase in noise and traffic but this would not affect the setting.
- 7.2.16 The East Bridgford Conservation Area covers the core of the village. Changes to the conservation area by the Scheme would be limited to the southern edge and would only be temporary, not resulting in significant effects.

## **7.3 Operational Phase Effects**

### **Mickledale Lane Junction**

- 7.3.1 The presence of the Scheme would result in increased noise and traffic movement to the north-west of the Featherstone House Farm and Labour in Vain Cottage. This change would not result in significant effects.

### **Ollerton Roundabout, Kirk Hill Junction and Lowdham Roundabout**

- 7.3.2 As there are negligible changes to operational road traffic noise and in most cases a reduction in light spill as a result up of lighting upgrades; there are no expected operational effects to heritage assets arising from the Schemes at Ollerton Roundabout, Kirk Hill Junction or Lowdham Roundabout.

## **7.4 Project-Wide Effects (Construction and Operation)**

- 7.4.1 There is no overlap in terms of the study areas used to assess each of the Schemes in isolation and none of the receptors are affected by multiple Schemes. Therefore there are no additional Project-wide effects to consider.

## **7.5 Mitigation and Monitoring**

- 7.5.1 A watching brief would be in place at all Schemes during construction to identify potential surviving archaeological remains, including:
- possible remains of a medieval causeway which follows the line of A616 and a post-medieval toll booth within the red line boundary (Ollerton Roundabout);
  - remains possibly associated with the historic road from Bilsthorpe to Inkersall (Mickledale Lane Junction);
  - Roman remains relating to a Roman road beneath the existing A6097 (Kirk Hill Junction); and
  - Possible archaeological remains, notably within the agricultural field to the west of Lowdham Roundabout.
- 7.5.2 The Scheme would retain the green around the listed war memorial at Lowdham Roundabout to retain the setting of the monument.



- 7.5.3 Further design considerations such as the positioning of new or replacement signage and determining the finishes for the new bridleway section at Kirk Hill will be explored further at the detailed design stage.

## **7.6 Residual Significant Effects**

- 7.6.1 There are no significant residual effects upon archaeology or cultural heritage arising from any of the Schemes or the Project during construction or operation after consideration of the noted mitigation.

## 8 LANDSCAPE AND VISUAL

### 8.1 Introduction

- 8.1.1 The landscape and visual assessments within the ES (Chapter 7: Landscape and Visual in ES Volume 1A to 1D) presents the findings of an assessment of the likely significant effects of the Scheme on landscape and visual receptors. Full baseline information can be found within the ES Volumes 1A to 1D.
- 8.1.2 Landscape effects relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities, and landscape character. This relates to both rural landscapes and urban landscapes. Visual receptors relate to 'people' and their existing views. Visual effects relate to the potential for there to be changes to the composition of existing views, from the addition or loss of elements within the view.
- 8.1.3 The assessment considers both the impacts during construction and operation of the Scheme and is conducted in line with guidance in the Guidelines for Landscape and Visual Impact Assessment 3 (GLVIA3) (Landscape Institute, 2013) and DMRB LA 107 Landscape and Visual Effects (Highways England, 2020b).
- 8.1.4 A range of representative viewpoints have been identified for each Scheme which form the basis of the Landscape and Visual Impact Assessment (LVIA). Following production of a Zone of Theoretical Visibility for each Scheme, representative viewpoints were recorded within the study area.
- 8.1.5 The landscape design proposals for the Schemes are shown in Figure 2-2 in Volumes 2A to 2D of the ES which aim to mitigate loss of landscape elements by replication of key features of the landscape, mitigate effects on visual amenity and maximise biodiversity opportunities.

### 8.2 Baseline

#### Ollerton Roundabout

- 8.2.1 Eight representative viewpoints were identified for the LVIA at Ollerton Roundabout.
- 8.2.2 Overall, the junction is a busy intersection of key routes, dominated by traffic and post-war, functional buildings that reflect the importance of passing trade. It represents a landmark for drivers, particularly on the A614 as a punctuation point between Nottingham and the A1. However, the wider context is largely rural and the presence of mature trees and the influence of adjacent heathland and woodland provide an impression of a 'gateway' to Sherwood Forest.

#### Mickledale Lane Junction

- 8.2.3 Seven representative viewpoints were identified for the LVIA at Mickledale Lane Junction.
- 8.2.4 The junction has a functional character, influenced by fast-moving traffic, highways signage and the large adjacent café car park. Although the wider context is dominantly agricultural, adjacent fields are intensively farmed and largely featureless. Built form, particularly from the Strawson Ltd agricultural facilities, reinforces the modern, utilitarian influences.

#### Lowdham Roundabout

- 8.2.5 Six representative viewpoints were identified for the LVIA at Lowdham Roundabout.

- 8.2.6 To the north, there is a wide, grassed central reservation with occasional trees and a noticeable lack of barriers and highways infrastructure. To the south, the A6097 has a more functional, narrow, macadam central reserve. Belts of mixed deciduous trees and shrubs, form the highway boundary, partly screening adjacent houses and gardens.
- 8.2.7 Although the roundabout is busy, the character is more reflective a suburban or village-edge. There is an open aspect to the northeast, across the field, towards woodland and the Public House World's End.

### **Kirk Hill Junction**

- 8.2.8 Seven representative viewpoints were identified for the LVIA at Kirk Hill Junction.
- 8.2.9 The junction is well-screened from nearby East Bridgford by woodland and tree belts to the east. This reduces the wider influence of traffic and highways infrastructure that otherwise feels incongruous in what is superficially a rural context.

## **8.3 Assessment of Effects on Landscape**

### **Ollerton Roundabout**

- 8.3.1 Effects on the landscape character would be within the context of an existing junction dominated by commercial activity such that they would be neutral for the Sherwood Character Area at all stages (construction, Year 1 of operation and Year 15 of operation).
- 8.3.2 At a Policy Zone level, there would be a slight adverse effect (not significant) on the River Maun Meadowlands with Plantations or the Budby Estate Farmland Policy Zones during construction, Year 1 and Year 15.

### **Mickledale Lane Junction**

- 8.3.3 Effects on the landscape character would be within the context of the existing junction such that they would be neutral for the Sherwood Character Area at all stages (construction, Year 1 of operation and Year 15 of operation).
- 8.3.4 At a Policy Zone level, there would be a slight adverse effect (not significant) on the Old Clipstone Estate Farmlands Policy Zone during construction and Year 1, and a neutral effect by Year 15 once planting is established.

### **Lowdham Roundabout**

- 8.3.5 Effects on the landscape character would be within the context of the existing junction such that they would be neutral for the Mid-Nottinghamshire Farmlands and Trent Washlands character areas at all stages (construction, Year 1 of operation and Year 15 of operation).
- 8.3.6 At a Policy Zone level, there would be a slight adverse effect (not significant) on the Epperstone Village Farmlands with Ancient Woodlands Policy Zone during construction and Year 1, and a neutral effect by Year 15 once planting is established.
- 8.3.7 There would be a slight adverse effect (not significant) on the Gunthorpe and Hoveringham Village Farmlands with Ancient Woodlands Policy Zone during construction and a neutral effect in Year 1 and Year 15.

### **Kirk Hill Junction**

- 8.3.8 Effects on the landscape character would be within the context of the existing junction such that they would be neutral for the South Nottinghamshire Farmlands character area at all stages (construction, Year 1 of operation and Year 15 of operation).

- 8.3.9 At a Policy Zone level, there would be a slight adverse effect (not significant) on the East Bridgford Escarpment Farmlands Policy Zone during construction and Year 1, and a neutral effect by Year 15 once planting is established.

## 8.4 Assessment of Visual Effects

### Ollerton Roundabout

- 8.4.1 The majority of the visual effects are predicted to be slight adverse or neutral.
- 8.4.2 A significant adverse impact is predicted for residents at Forest Side as a result of increased visibility of the junction and construction activity. This is expected to reduce to be not significant in Year 1 and Year 15, due to the fact that the view would be very similar in nature (highway infrastructure and commercial buildings) as is currently present, the use of LED low light spill lighting and when considering the maturing landscape planting around the roundabout by Year 15.

### Mickledale Lane Junction, Kirk Hill Junction and Lowdham Roundabout

- 8.4.3 No significant residual effects are predicted for the Mickledale Lane Junction, Lowdham Roundabout or Kirk Hill Junction Schemes, as there would be very few changes visually to the current situation prior to construction and the maturing landscape planting by Year 15.

## 8.5 Project-Wide Effects (Construction and Operation)

- 8.5.1 Each of the junctions is geographically and visually separate with no identifiable inter-visibility between them due to distance and intervening landform and vegetation. The junctions occupy different landscape policy zones and none of the representative viewpoint locations would allow a viewer to see both junctions simultaneously.
- 8.5.2 There would be no significant cumulative Project-wide landscape or visual effects.

## 8.6 Mitigation and Monitoring

- 8.6.1 No additional mitigation is considered to be required.

## 8.7 Residual Effects

- 8.7.1 No significant residual effects are expected, during construction or operation, from any of the proposed Schemes.

## 9 BIODIVERSITY

### 9.1 Introduction

9.1.1 The biodiversity assessments within the ES (Chapter 8: Biodiversity in ES Volumes 1A to 1D) consider the biodiversity impacts as a consequence of the construction and operation of the Scheme by using the assessment methodology described in the DMRB LA 108 Biodiversity Revision 1 (Highways England, 2020c).

9.1.2 Baseline information associated with the Scheme has been gathered between 2018 and 2021 and has informed the Scheme design and assessment process. This has included some desk study work and ecological surveys.

### 9.2 Habitats and Biodiversity Net Gain

9.2.1 The construction of the Project would result in both losses and gains of habitat across all Schemes. The Project has sought to deliver biodiversity improvements through the provision of landscape planting alongside each Scheme, and a biodiversity metric calculation has been prepared.

9.2.2 The Project provides a baseline biodiversity value equal to:

- 39.88 Habitat Units;
- 19.77 Hedgerow Units; and
- 2.51 River Units.

9.2.3 Post development, across the Project the following biodiversity values are realised:

- 47.09 Habitat Units;
- 33.96 Hedgerow Units; and
- 4.20 River Units.

9.2.4 This results in a 18.07% net gain for habitat units, a 71.75% net gain in hedgerow units, and a 67.14% net gain in river units.

9.2.5 The net gain is provided through the provision of new grassland, scrub, hedgerows, ditch and woodland habitat or through the enhancement of retained habitats. The replacement of lost habitat is 'like-for-like; or better across the extent of the Project.

### 9.3 Construction Phase Effects

#### Ollerton Roundabout

##### Designated Sites

9.3.1 Construction of the Ollerton Roundabout Scheme would have a direct impact, through habitat loss from the following designated sites (see Figure 2-A):

- Birklands West and Ollerton Corner SSSI;
- Sherwood Forest Area ppSPA;
- Birklands and Bilhaugh LWS; and
- Sherwood Heath LWS/LNR.

9.3.2 The habitat losses would be mitigated for by a mix of informal hedgerow with trees, a band of acid grassland planting up to the revised highway boundary. There would also be planting of new trees and creation of species-rich grassland within the existing Birklands and Bilhaugh LWS boundary.

- 9.3.3 The impacts on the designated sites from direct loss of habitats would not result in significant effects.
- 9.3.4 An HRA has also been prepared to accompany the ES, to consider the impacts on the Sherwood Area ppSPA and the Birklands and Bilhaugh SAC. This concludes no significant construction effects are anticipated on these designated sites.

#### Habitats

- 9.3.5 There would be loss of broadleaved woodland, grasslands and species poor hedgerows, however this loss is not considered significant due to the small areas of existing habitats being lost, and the low quality and value of these. Once the replacement habitats have matured and established, beneficial impacts are predicted, however these are also not considered to be significant.

#### Species

- 9.3.6 There is potential for adverse effects to birds, hedgehog and common lizard during the construction phase. This would be as a result of habitat loss, or construction noise and lighting. With mitigation and best practice during construction (e.g. management of light spill and control of noise) the effects on these species are not likely to be significant.

### **Mickledale Lane Junction**

#### Designated Sites

- 9.3.7 A total of eight LWSs are located within the 2 km search area as shown on Figure 2-B. There would be no direct habitat loss to designated sites as a result of the Scheme.
- 9.3.8 Due to the close proximity of Alder Carr LWS located 25 m to the south-west of the Scheme, best practice mitigation measures (as set out in the CEMP) to reduce dust would be required to prevent any potential adverse effects during construction.

#### Habitats

- 9.3.9 The Scheme would result in the loss of plantation broadleaved woodland, unimproved neutral grassland, arable land and species poor hedgerow trees; however as these are of low quality and value, the effect is not considered significant. In the most part this is due to the small areas of habitat being lost, and the low quality and value of such habitats. Once the replacement habitats have matured and established, beneficial impacts are predicted, however these are also not considered to be significant.

#### Species

- 9.3.10 There is potential for adverse effects to bats, birds and common lizard during the construction phase. This would be as a result of habitat loss, or construction noise and lighting. With mitigation and best practice during construction (e.g. management of light spill and control of noise) the effects on these species are not likely to be significant.

### **Lowdham Roundabout**

#### Designated sites and veteran tree

- 9.3.11 A total of eight LWSs are located within the 2 km search area as shown on Figure 2-C. There would be no direct habitat loss to designated sites as a result of the Scheme. No adverse effects are predicted on any of these sites during construction as they are sufficiently distant from the Scheme.
- 9.3.12 A veteran tree is located within approximately 140 m of the Scheme assessment boundary. There is the potential for adverse dust and pollution effects to the veteran tree during the construction of the Scheme. These effects would be temporary (i.e.

during the period of the construction works only) and would be reduced through standard mitigation measures to be set out in the CEMP. No significant effects are predicted.

#### Habitats

- 9.3.13 The loss of unimproved neutral grassland, species poor hedgerow, arable land, seasonally wet ditch, and scattered trees is considered to be significant due to the low quality and value of these habitats. Once the replacement habitats have matured and established, beneficial impacts are predicted, however these are also not considered to be significant.

#### Species

- 9.3.14 There is potential for adverse effects to bats, birds and hedgehog during the construction phase. This would be as a result of habitat loss, or construction noise and lighting. With mitigation and best practice during construction (e.g. management of light spill and control of noise) the effects on these species are not likely to be significant.

### **Kirk Hill Junction**

#### Designated Sites

- 9.3.15 A total of ten LWSs are located within the 2 km search area as shown on Figure 2-D. There would be no direct habitat loss to designated sites as a result of the Scheme. No adverse effects are predicted on any of these sites during construction as they are sufficiently distant from the Scheme.

#### Habitats

- 9.3.16 The loss of hedgerows (species poor hedgerow and species poor hedgerow with trees) and broadleaved woodland are considered not significant in the short and longer term. Once the replacement habitats have matured and established, beneficial impacts are predicted, however these are also not considered to be significant.
- 9.3.17 There would be a permanent loss of improved neutral grassland and arable grassland. This is not considered to be notable as they are of low ecological interest and lack the presence of any notable species.

#### Species

- 9.3.18 There is potential for adverse effects to badger, bats, birds, hedgehog and brown hare during the construction phase. This would be as a result of habitat loss, or construction noise and lighting. With mitigation and best practice during construction (e.g. management of light spill and control of noise) the effects on these species are not likely to be significant.

## **9.4 Operational Phase Effects**

### **Ollerton Roundabout**

#### Designated Sites

#### *Operational Lighting and Noise*

- 9.4.1 Birklands West and Ollerton Corner SSSI, Sherwood Heath LNR and Birklands and Bilhaugh LWS are known for their invertebrates, open-birch woodland and lowland acid grassland and heath. The operational lighting Scheme has been designed to reduced light spill, where possible, to incorporate aspects of road safety but also minimise ecological impacts. The proposed lighting Scheme would increase levels of illumination beyond what is already present up to 20 m from the road. This small increase in lighting levels is not expected to affect the features these sites are designated for, and therefore no significant effect is predicted.



- 9.4.2 The noted features of the SSSI, LNR and LWS are not sensitive to the impacts of noise, therefore the operational noise would not affect these sites.
- 9.4.3 The Sherwood Area ppSPA is noted for its breeding bird (nightjar and woodlark) interest. An increase in illumination and noise has the potential to cause disruption to these species. However, the presence of these species in close proximity to the road is not anticipated as suitable habitat is located further into the ppSPA, and so the effects are not considered to be significant.

*Air quality effects (nitrogen deposition)*

- 9.4.4 As noted in Chapter 6 of this NTS, air quality modelling identified that land up to 60 m from the Ollerton Roundabout would be affected by changes in air quality due to the proposed re-location of the roundabout closer to the Birklands West and Ollerton Corner SSSI (including the overlapping area of Birkland and Bilhaugh LWS).
- 9.4.5 It is recognised that small increases in nitrogen deposition can have an adverse impact on dwarf shrub heath habitat. However, the impact is limited to a distance of 60 m from the nearest road, beyond which the change in nitrogen deposition is imperceptible. The habitat within 60 m of the road comprises a mix of unmanaged neutral grassland, amenity-managed grassland, plantation broadleaved woodland, continuous bracken, tall ruderal, bramble and gorse scrub. The nearest dwarf shrub heath habitat (for which the SSSI is protected) is at least 100 m from the road. Therefore, there would be neutral effect (not significant) on this receptor.
- 9.4.6 The HRA has also been prepared to accompany the ES, to consider the impacts on the Sherwood Area ppSPA and the Birklands and Bilhaugh SAC. This concludes no significant operational effects are anticipated on these designated sites.
- 9.4.7 No changes in the air quality effects from vehicles emissions are predicted for the Sherwood Heath LNR. Due to their distance from the Scheme, all other statutory designated and non-statutory designated sites would not be affected by changes to air quality.

Species

- 9.4.8 There is potential for adverse effects to birds, hedgehog and common lizard during the operational phase as a result of road traffic noise, direct mortality and lighting. The operational lighting Scheme has been designed to reduce light spill, where possible, to incorporate aspects of road safety but also minimise ecological impacts. This has been specifically tailored at Forest Side where there is a suspect bat roost within a property.
- 9.4.9 Effects on these species are not likely to be significant due to the changes proposed being to an existing junction which is already lit. Noise assessment work has been undertaken for species of concern, which has indicated that there were not likely to be any significant effects.
- 9.4.10 Effects on these species from direct mortality, lighting and noise are not likely to be significant.

**Mickledale Lane Junction**

Designated Sites

- 9.4.11 The identified designated sites are suitably distant from the Scheme such that no operational effects are predicted. None of these sites are within the air quality study area.

Species

- 9.4.12 There is potential for adverse effects to bats, birds and common lizard during the operational phase as a result road traffic noise, direct mortality and lighting. The



operational lighting Scheme has been designed to reduce light spill, where possible, to incorporate aspects of road safety, but also minimise ecological impacts. Noise contour modelling work has been undertaken and reviewed for species of concern indicating that there were not likely to be any significant effects.

- 9.4.13 Effects on these species from direct mortality, lighting and noise are not likely to be significant due to the changes being negligible to minor.

### **Lowdham Roundabout**

#### Designated Sites and Veteran Tree

##### *Operational Lighting and Noise*

- 9.4.14 The identified designated sites and the veteran tree are suitably distant from the Scheme such that no operational effects are predicted. None of these sites are within the air quality study area.

##### *Air quality effects (nitrogen deposition)*

- 9.4.15 The assessment has considered the effects of vehicle emissions on the veteran tree during operation. A very small change in nitrogen deposition has been predicted for this tree. This change would not be considered significant.

#### Species

- 9.4.16 There is potential for adverse effects to bats, birds and hedgehog during the operational phase as a result of road traffic noise, direct mortality and lighting. The operational lighting Scheme has been designed to reduce light spill, where possible, to incorporate aspects of road safety but also minimise ecological impacts. Noise assessment work has been undertaken for species of concern, which has indicated that that there were not likely to be any significant effects.
- 9.4.17 Effects on these species from direct mortality, lighting and noise are not likely to be significant.
- 9.4.18 due to the changes being negligible. A small benefit is predicted for hedgehog, however this is not considered significant.

### **Kirk Hill Junction**

#### Designated Sites

- 9.4.19 The identified designated sites are suitably distant from the Scheme such that no operational effects are predicted. None of these sites are within the air quality study area.

#### Species

- 9.4.20 There is potential for adverse effects to badger, bats, birds, hedgehog and brown hare during the operational phase as a result road traffic noise, direct mortality and lighting. The operational lighting Scheme has been designed to reduce light spill, where possible, to incorporate aspects of road safety, but also minimise ecological impacts. Noise assessment work has been undertaken for species of concern, which has indicated that that there were not likely to be any significant effects.
- 9.4.21 Effects on these species from direct mortality, lighting and noise are not likely to be significant.
- 9.4.22 due to the changes being negligible. A small benefit is predicted for hedgehog, however this is not considered significant.

## 9.5 Project-Wide Effects (Construction and Operation)

- 9.5.1 The type of impacts identified for the Schemes are restricted to the immediate area of the work or the area within close proximity of the assessment boundary. There are not likely to be additional Project-wide effects when considering the Schemes together due to the intervening distances between each Scheme.

## 9.6 Mitigation and Monitoring

- 9.6.1 The following mitigation measures have been incorporated into the Scheme designs.

### Construction Management

- Construction would be subject to measures and procedures as defined within the CEMP to ensure the works accord with legal compliance and good practice guidance. The CEMP would include measures to minimise dust deposition, air pollution, pollution incidents, light spillage and noise and vibration which would all assist in minimising impacts upon biodiversity receptors.
- Ecological supervision would be required where works would take place during the breeding bird season (although this would be avoided where possible), for the clearance of suitable common lizard habitat and clearance of suitable hedgehog habitat. Specific method statements would be needed for some species, e.g. common lizard and bats.

### Design Features

- Temporary land would be restored to its original state, with new planting provided.
- Where habitats are lost permanently, these would be replaced with improved quality habitats (e.g. loss of species poor hedgerows with species rich hedgerows with trees etc.).
- Habitats suitable to provide foraging and nesting opportunities for birds, and roosting, foraging and commuting opportunities for bats would be planted (trees and hedgerows).
- The lighting designs have been designed to minimise impacts to bats (with the use of light emitting diodes (LEDs) and rear shields to ensure more directional and controlled light source where required).

Scheme specific features include:

- **Ollerton Roundabout** – Permanent habitat loss from Birklands West and Ollerton Corner SSSI habitat would be mitigated for by informal hedgerow with trees and band of acid grass planting.
- **Ollerton Roundabout** - Natural refugia (shelter) within retained and newly created habitat area. The provision of refugia would be provided in advance of commencement of construction works to allow reptiles to be displaced into suitable existing habitat.
- **Mickledale Lane Junction** - An open stone structure of gabion wall would be created along the length of the new link road, providing continuous linear habitat for common lizard, leading to the mineral line embankment to the north of the Scheme.

### Monitoring at Ollerton Roundabout

- 9.6.2 During the construction phase, dust monitoring adjacent to the Birklands West and Ollerton Corner SSSI would be undertaken to ensure that management measures implemented through the CEMP are successful in reducing dust impacts.

- 9.6.3 Natural England have raised concerns regarding the accuracy for forecasts in vehicle emissions trends and have requested a programme of monitoring be provided for the Birklands West and Ollerton Corner SSSI. This programme of monitoring would be undertaken adjacent to the roadside closest to the Birklands West and Ollerton Corner SSSI in the first year that the Scheme is open to traffic.

## 9.7 Residual Effects

- 9.7.1 The residual effect is considered to be 'not significant' for biodiversity for both the construction and operational phases of the Schemes in isolation and for the Project.

## 10 GEOLOGY AND SOILS

### 10.1 Introduction

- 10.1.1 The geology and soils assessments within the ES (Chapter 9: Geology and Soils in ES Volumes 1A to 1D) present the findings of an assessment of the likely significant effects each of the Scheme on geology and soils, which includes the potential for the Scheme to mobilise land contamination and affect human health, surface water and groundwater, as well as the effects on soil resources and agricultural land. The assessment considers both the impacts during construction and operation of the Scheme and is conducted in line with guidance in DMRB LA 109 Geology and Soils (Highways England, 2020d).
- 10.1.2 To determine the baseline conditions, Phase 1 geo-environmental desk studies were prepared for the Schemes. The desk studies gathered information from historical mapping and environmental data searches. A site walkover survey was also carried out to identify any potential sources of contamination and potential receptors.

### 10.2 Construction Phase Effects

#### All Schemes

- 10.2.1 No significant effect is anticipated with regard to geology with any of the Schemes.
- 10.2.2 The use of agricultural land for temporary compounds, storage and access during construction of the Scheme could cause permanent damage to agricultural land during construction resulting in a significant effect. However, with appropriate soil stripping, handling and storage, this impact would not likely be significant.
- 10.2.3 There would likely be no significant effects relating to contaminated dust or gases (dermal contact, inhalation) during construction with good practice measures in place.

#### Ollerton Roundabout

- 10.2.4 Use of SSSI / LNR land during construction of the Scheme has the potential for permanent damage to soil resources in these areas; this would result in a moderate adverse effect.
- 10.2.5 Surface water contamination would be unlikely to affect the Ollerton Brook or the River Maun from surface water run-off and/or migration of contaminated groundwater.
- 10.2.6 It is predicted that without mitigation, groundwater contamination could result in significant adverse effects upon the Principal Aquifer and Secondary A Aquifers which underlay the site. Additional supplementary ground investigation is proposed for this Scheme, with risk assessments and mitigation (such as aquifer protection measures) put in place, such that the residual effect is not significant.

#### Mickledale Lane Junction

- 10.2.7 It is predicted that without mitigation, groundwater contamination could result in significant adverse effects upon the Principal Aquifer/SPZ 1 which underlay the site. Additional supplementary ground investigation is proposed for this Scheme, with risk assessments and mitigation (such as aquifer protection measures) put in place, such that the residual effect is not significant.

#### Kirk Hill Junction and Lowdham Roundabout

- 10.2.8 No significant effects are predicted in relation to surface or groundwater from contamination with these Schemes.

### **10.3 Project-Wide Effects (Construction)**

10.3.1 The Project would result in the loss of agricultural land. A total area of approximately 3.49 ha would be temporarily lost (and restored after construction) and 3.47 ha would be permanently lost (including BMV agricultural land). This effect is considered significant and there is no accepted way to mitigate this loss.

### **10.4 Operational Phase Effects**

10.4.1 The operation of the Project is not anticipated to have significant effects on geology and soils aspects.

### **10.5 Mitigation and Monitoring**

10.5.1 General mitigation measures for the protection of soil resources, human health and controlled waters are proposed, including the production of a Soil Resources Plan, Site Waste Management Plan (SWMP), Materials Management Plan and a CEMP.

### **10.6 Residual Effects**

10.6.1 The assessment concludes that, with the exception of the loss of agricultural soils, all geology and soils effects for all Schemes would be reduced to slight adverse or neutral following implementation of the mitigation measures and there would not be any residual significant effects.

# 11 NOISE AND VIBRATION

## 11.1 Introduction

11.1.1 The noise and vibration assessments within the ES (Chapter 10: Noise and Vibration in ES Volumes 1A to 1D) considers the construction noise and vibration impacts and operational noise changes as a consequence of each Scheme. The assessment considers both the impacts during construction and operation of the Project and is conducted in line with guidance in the DMRB LA 111 Noise and Vibration Version 2 (Highways England, 2020e).

## 11.2 Construction Phase Effects

### Construction Noise

11.2.1 At this stage there is insufficient information on the construction activities and programme to be able to rule out significant noise effects during construction.

11.2.2 Therefore the assessment of the likely effects from construction noise have been based on typical construction noise levels for various road construction activities, with noise predictions made at various distances from these activities. A worst-case scenario has been used, assuming that construction activities would be undertaken at the nearest works boundary (e.g. the nearest possible point to identified Noise Sensitive Receptors (NSRs)).

11.2.3 The following predictions have been made, subject to refinement of the construction programme and sequencing:

### Ollerton Roundabout

- Four properties on Blyth Road and Mansfield Road are predicted to experience significant temporary adverse effects as a result of daytime, evening and if required - night-time activities.
- All other receptors are located more than 200 m from the assessment boundary, where it would likely unlikely that significant effects would occur for daytime and evening activities, but there is potential for significant adverse effects where night-time working takes place.

### Mickledale Lane Junction

- There is potential for significant effects from construction noise at Labour in Vain Cottages (Numbers 1 -4), The Limes and Fairfield Bungalow. However, as the majority of works would be focused on the new roundabout away from these receptors, the impacts from construction noise would be negligible for the majority of the time.
- All other receptors are unlikely to experience significant effects during construction.

### Lowdham Roundabout

- Significant effects are predicted for up to 35 NSRs within 50 m of the nearest works boundary.
- All other receptors are unlikely to experience significant effects during construction.

### Kirk Hill Junction

- Five properties on Kirk Hill are predicted to experience significant temporary adverse effects as a result of daytime, evening and if required – night-time activities.

- All other receptors are unlikely to experience significant effects during construction.

### Construction Vibration

- 11.2.4 Temporary construction vibration impacts could arise as a result of construction activities which give rise to a large source of vibration, such as earthworks and road construction (pavement) works using vibratory rollers.
- 11.2.5 For all Schemes, receptors located within 50 m of the works where there would be use of a large vibratory roller or medium sized towed roller could experience significant vibration levels in terms of annoyance.
- 11.2.6 For receptors located at distances greater than 50 m from the works, the effects of vibration would not be significant.
- 11.2.7 Vibratory impacts would be well below the threshold that would result in any cosmetic or structural damage.

## 11.3 Operational Phase Effects

### Short Term – Opening Year 2023

- 11.3.1 The Schemes are not expected to result in significant adverse operational noise effects during the daytime or night-time. Changes are largely negligible. This is likely due to:
- Ollerton Roundabout - the larger roundabout, a reduction in speed limits on approaches to it, and due to the north bound exit on the A614 Blyth Road moving slightly further west;
  - Mickledale Lane Junction - the location of the new junction further south from the NSRs on the A614 Old Rufford Road and lower speed limit on Mickledale Lane; and
  - Lowdham Roundabout - increased distance of the carriageway from the nearest receptors and lower speeds.

### Long Term – Future Year 2037

- 11.3.2 For all Schemes no significant adverse effects are predicted for receptors during the daytime or night-time, with an overall negligible adverse impact. This is mainly attributable to long-term traffic growth.

## 11.4 Project-Wide Effects (Construction and Operation)

- 11.4.1 There is no overlap in terms of the study areas used to assess each of the Schemes in isolation and no receptors are affected by multiple Schemes.

## 11.5 Mitigation and Monitoring

- 11.5.1 Full details of the proposed construction plant, timescales and hours of operation were not available at the time of the assessment – however it is anticipated that the contractor would employ standard Best Practicable Means (BPM) controls to manage noise and vibration levels during the construction phase and such measures would be detailed in the CEMP.
- 11.5.2 There is also potential for noise from construction activities to be reduced through the use of localised temporary noise screening. This has not been included in the assessment of construction noise in order to represent a worst-case scenario. Proposals for the use of localised temporary noise screening would be developed at the detailed design stage.

## 11.6 Residual Effects

- 11.6.1 At this stage any noise/vibration reduction benefits introduced as a result of the mitigation measures cannot be accurately quantified and so significant residual effects during construction cannot be ruled out. These are expected to be as noted in Section 11.3.



## 12 ROAD DRAINAGE AND THE WATER ENVIRONMENT

### 12.1 Introduction

- 12.1.1 The assessments within the ES Chapter 11: Road Drainage and the Water Environment (in ES Volumes 1A, 1B and 1C) consider potential to affect the water environment. The assessments are conducted in line with guidance in DMRB LA 113 Road Drainage and the Water Environment (Highways England, 2020f)
- 12.1.2 The Project has the potential to affect water resources during both the construction and operational phases. During the construction phase, potential effects may arise from contamination of surface water and groundwater from leakage and spills of fuels, oils, chemicals and concrete. Construction works within floodplains or on drainage to watercourses have the potential to increase the rate and volume of runoff and increase the risk of blockages in watercourses.
- 12.1.3 During operation there could be effects on surface and groundwater quality from routine highway runoff or as a result of accidental spillages. There may be changes on the natural form of the landscape which may affect drainage patterns and flood potential. Flooding potential can be altered within a catchment as a result of an increase in impermeable area or road levels.
- 12.1.4 A flood risk assessment has also been prepared for each of the Schemes. A detailed assessment of the impacts at Kirk Hill was scoped out of the EIA.

### 12.2 Construction Phase Effects

#### Ollerton Roundabout

##### Surface water quality

- 12.2.1 There is no requirement for works close to or directly within any watercourses for the Scheme, aside from highway ditches, which are intrinsically linked to road drainage.
- 12.2.2 There would be the potential for chemical spills (from fuels or oils) and fine sediment to reach the drainage system, and then the River Maun, during construction. All works would be carried out in accordance with mitigation measures to be set out in the CEMP and any discharges to surface water would need an appropriate permit from the Environment Agency. Therefore, significant effects on surface water quality during construction are unlikely to arise.

##### Groundwater flow and quality

- 12.2.3 Excavations and other construction activities have the potential to find groundwater and could create pathways for contamination to reach groundwater bodies. The construction of the drainage attenuation tank for this Scheme requires excavation, however this is unlikely to reach the groundwater table. No significant effects on groundwater level, flow and quality are predicted.

##### Flooding

- 12.2.4 The construction phase of the Scheme would involve works in Flood Zones 2 and 3. However, there would be no works to highway ditches close to the existing watercourse drainage network. Should a fluvial flood event occur during construction this could create a significant risk to construction workers in the vicinity of these drainage assets.
- 12.2.5 However, with the implementation of standard construction methods and mitigation as described in the CEMP this risk can be effectively managed (for example by monitoring weather forecasts and Environment Agency flood warnings, by

undertaking works to the drainage network during periods of dry weather, by ensuring an adequate temporary drainage system was in place and maintained throughout the construction phase, and avoiding stockpiling material on floodplains).

- 12.2.6 The Scheme is in general at a low risk from surface water, flooding from sewers and artificial sources and groundwater. With the implementation of the measures outlined in the CEMP, a negligible magnitude of impact is predicted to construction workers resulting in no change and no significant effect.

### Mickledale Lane Junction

#### Surface Water Quality

- 12.2.7 There is no requirement for works close to or directly within any watercourses for the Scheme, aside from highways ditches, which are intrinsically linked to road drainage.

- 12.2.8 There would be the potential for chemical spills (from fuels or oils) and fine sediment to reach the drainage system and then the Rainworth Water during construction. All works would be carried out in accordance with mitigation measures to be set out in the CEMP and any discharges to surface water would need an appropriate permit from the Environment Agency. Therefore, significant effects on surface water quality during construction are unlikely to arise.

#### Groundwater flow and quality

- 12.2.9 Excavations and other construction activities have the potential to find groundwater and could create pathways for contamination to reach groundwater bodies. The construction of the drainage attenuation tanks for this Scheme requires excavation, however this is unlikely to reach the groundwater table. No significant effects on groundwater level, flow and quality are predicted.

#### Potential risk of flooding from fluvial sources during construction

- 12.2.10 The construction of the Scheme would involve work in Flood Zone 1, however there would be no works within highway ditches close to Rainworth Water. As such there would not likely be any significant effects during construction.

- 12.2.11 The Scheme is in general at a low risk from surface water, flooding from sewers and artificial sources and groundwater. With the implementation of the measures outlined in the CEMP, significant effects for construction workers are not expected.

### Lowdham Roundabout

#### Surface Water Quality

- 12.2.12 There is no requirement for works close to or directly within any watercourses for the Scheme. There is work required within highways ditches which are intrinsically linked to road drainage and are not water receptors requiring assessment in their own right.

- 12.2.13 There would be the potential for chemical spills (from fuels or oils) and fine sediment to reach the drainage system and then the Cocker Beck during construction. All works would be carried out in accordance with mitigation measures to be set out in the CEMP and any discharges to surface water would need an appropriate permit from the Environment Agency. Therefore, significant effects on surface water quality during construction are unlikely to arise.

#### Morphology<sup>2</sup>

- 12.2.14 The modifications proposed to the roadside ditch to the west of the A6097, an agricultural ditch to the west of the roadside ditch and a ditch south of the A612 would have a negligible impact on any receiving watercourses as discharge rates

---

<sup>2</sup> 'Morphology' is the term used to describe the shape of the channel and how it changes in shape and direction over time.

and sources of flow would not change. There would be a small increase in the length of wet habitat available. However, the impacts are not considered to be significant to the morphology of the Cocker Beck catchment area.

#### **Groundwater flow and quality**

12.2.15 Excavations and other construction activities have the potential to find groundwater and could create pathways for contamination to reach groundwater bodies. The construction of the attenuation pond and realignment of ditches for this Scheme require excavation. This has the potential to find a local groundwater table which may need water to be pumped out of the excavation during construction.

12.2.16 With the implementation of mitigation measures contained within the CEMP, it is considered that the magnitude of impact on groundwater quality during construction for the Scheme would be negligible and would not result in significant effects.

#### **Potential risk of flooding from fluvial sources during construction**

12.2.17 Updated baseline flood modelling has demonstrated that the Lowdham Roundabout is not within Flood Zone 3 and is in an area of low risk from fluvial flooding. There would be no works within highway ditches close to the Cocker Beck. As such there would not likely be any significant effects during construction.

12.2.18 The Scheme is in general at a low risk from surface water, flooding from sewers and artificial sources and at medium risk for flooding from groundwater. Excavations have the potential to encounter and liberate groundwater in some areas, potentially leading to groundwater flooding. With the implementation of the measures outlined in the CEMP, significant effects are not expected.

## **12.3 Operational Phase Effects**

### **Ollerton Roundabout**

#### **Surface water and groundwater quality: routine road runoff**

12.3.1 The Scheme would result in an overall increase in impermeable (waterproof) area of approximately 1650 m<sup>2</sup> in the area of the roundabout where pollutants could be washed into watercourses.

12.3.2 The drainage design would connect to the existing drainage system which currently drains to the River Maun. Existing outfalls would be used and so there would be no direct works to watercourses. A new ditch would be provided which is a Sustainable Urban Drainage (SuDs) feature providing water treatment for soluble metals and sediments in road drainage before this discharges to the River Maun.

12.3.3 A water quality risk assessment has been undertaken to determine the effectiveness of the new drainage system in providing treatment for pollutants in road runoff. This considers the copper and zinc content of the runoff (as proxies for other dissolved metal pollutants typically found in highway runoff) and the impact on the receiving watercourse. The proposed drainage system 'passes' this risk assessment, with the exception of ambient copper which is already at a high level in the River Maun. This increases by a very small amount over existing levels.

12.3.4 There are not expected to be any significant effects on water quality during operation.

#### **Groundwater quality: routine road runoff**

12.3.5 Results of the groundwater assessment for the ditch tributary of the River Maun indicates a medium risk to groundwater. However, as the new drainage design includes treatment, this provides a degree of treatment prior to the outfall to the River Maun. The change to the drainage regime in relation to the potential effects on groundwater quality is negligible and not likely to result in any significant effects during operation.

### Accidental spillages

12.3.6 The assessment has shown that the risk of an accidental spillage resulting in a pollution incident is calculated at 0.0005% or 1 in a 2078-year event for the do minimum scenario in 2037, in comparison to 0.0007% or 1 in a 1501 year with the Scheme.

12.3.7 Both scenarios are less than 1%. The risk is therefore considered acceptable for the outfall to the River Maun without mitigation. This is unlikely to result in significant effects as a result of the Scheme.

### Surface water quality: surface de-icing

12.3.8 During cold periods, which typically occur between October and April each year when temperatures are around 4°C or less, rock salt or road grit would be applied to the road surface to maintain a safe driving surface. During this time, highway runoff (that may also include snow melt) may contain increased salt levels. These salts can mobilise heavy metals or nutrient into sediments.

12.3.9 The River Maun provides a high level of dilution and the additional impermeable area is considered small in the context of the local catchment area and so significant effects are not likely.

### Groundwater flow

12.3.10 Once the Scheme is operational and the ground re-profiled, the change to groundwater flows would be negligible and not likely to result in significant effects.

### Flood Risk Effects

12.3.11 The drainage strategy would be implemented to control runoff rates to receiving watercourses downstream of the Scheme, and to ensure sufficient runoff storage capacity is provided. No significant effects on flood risk are predicted.

### Mickledale Lane Junction

#### Surface Water and Groundwater Quality: Routine Road Runoff

12.3.12 The Scheme would result in an overall increase in impermeable (waterproof) area of approximately 5,900 m<sup>2</sup> in the area of the roundabout where pollutants could be washed into watercourses.

12.3.13 The drainage design would connect to the existing ditch on the western side of the A614 and into Rainworth Water to the south. This would occur through two existing outfalls and so there would be no direct works to watercourses. No new SuDs features are proposed.

12.3.14 A water quality risk assessment has been undertaken to determine the effectiveness of the new drainage system in providing treatment for pollutants in road runoff. This considers the copper and zinc content of the runoff (as proxies for other dissolved metal pollutants typically found in highway runoff) and the impact on the receiving watercourse. The proposed drainage system 'passes' this risk assessment, with the exception of ambient copper which is already at a high level in Rainworth Water. This increases by a very small amount over existing levels.

12.3.15 There are not expected to be any significant effects on water quality during operation.

#### Groundwater quality: routine road runoff

12.3.16 Results of the groundwater assessment for the ditch tributary of the Rainworth Water indicates a medium risk to groundwater. However, as the new drainage design includes treatment, this provides a degree of treatment prior to the outfall to the Rainworth Water. The change to the drainage regime in relation to the potential effects on groundwater quality is negligible and not likely to result in any significant effects during operation.

### Accidental Spillages

- 12.3.17 The assessment has shown that the risk of an accidental spillage resulting in a pollution incident is calculated at 0.0004% or 1 in a 2315-year event for the Do Something (with Scheme) scenario in 2037.
- 12.3.18 This is less than 1%. The risk is therefore considered acceptable for the outfall to the Rainworth Water without mitigation. This is unlikely to result in significant effects as a result of the Scheme.

### Surface Water Quality: Surface De-icing

- 12.3.19 During cold periods, which typically occur between October and April each year when temperatures are around 4°C or less, rock salt or road grit would be applied to the road surface to maintain a safe driving surface. During this time, highway runoff (that may also include snow melt) may contain increased salt levels. These salts can mobilise heavy metals or nutrient into sediments.
- 12.3.20 The flow from the A614 catchment area would be directed through the roadside ditch, and the flow from the new link road would be directed through two attenuation tanks to be constructed close to Mickledale Lane. Due to this amount of treatment and that the additional impermeable area is considered small in the context of the local catchment area, significant effects are considered not likely.

### Groundwater flow

- 12.3.21 Once the Scheme is operational and the ground re-profiled, the change to groundwater flows would be negligible and not likely to result in significant effects.

### Flood Risk Effects

- 12.3.22 The Scheme is located within Flood Zone 1. The importance for fluvial flood risk is considered to be low. The drainage of the scheme would be to ensure there is no increase in runoff from the site, therefore, no change in the flooding potential for Rainworth Water. As a result, the impact of the scheme is considered to be negligible, resulting in a neutral effect (not significant).

### Lowdham Roundabout

#### Surface Water and Groundwater Quality: Routine Road Runoff

- 12.3.23 The Scheme would result in an overall increase in impermeable (waterproof) area of approximately 1,100m<sup>2</sup> in the area of the roundabout where pollutants could be washed into watercourses.
- 12.3.24 The drainage design would connect to the existing road drainage system which drains to roadside ditches and on to the Cocker Beck. This would occur through three existing outfalls and so there would be no direct works to Cocker Beck.
- 12.3.25 A water quality risk assessment has been undertaken to determine the effectiveness of the new drainage system in providing treatment for pollutants in road runoff. This considers the copper and zinc content of the runoff (as proxies for other dissolved metal pollutants typically found in highway runoff) and the impact on the receiving watercourse. The proposed drainage system 'passes' this risk assessment, with the exception of ambient copper which is already at a high level in the Cocker Beck. This increases by a very small amount over existing levels.
- 12.3.26 There are not expected to be any significant effects on water quality during operation.

#### Groundwater quality: routine road runoff

- 12.3.27 Results of the groundwater assessment for the ditches leading into the Cocker Beck indicate a low risk to groundwater. However, as the new drainage design includes treatment, this provides a degree of treatment prior to the outfall to the River Maun. The change to the drainage regime in relation to the potential effects



on groundwater quality is not likely to result in any significant effects during operation.

### **Accidental Spillages**

12.3.28 The assessment has shown that the risk of an accidental spillage resulting in a pollution incident is calculated at 0.0003% or 1 in a 3266year event for the Do Something (with Scheme) scenario in 2037.

12.3.29 This is less than 1%. The risk is therefore considered acceptable for the outfall to the Cocker Beck without mitigation. This is unlikely to result in significant effects as a result of the Scheme.

### **Surface Water Quality: Surface De-icing**

12.3.30 During cold periods, which typically occur between October and April each year when temperatures are around 4°C or less, rock salt or road grit would be applied to the road surface to maintain a safe driving surface. During this time, highway runoff (that may also include snow melt) may contain increased salt levels. These salts can mobilise heavy metals or nutrient into sediments.

12.3.31 The Cocker Beck provides a high level of dilution and the additional impermeable area is considered small in the context of the local catchment area and so significant effects are not likely.

### **Groundwater flow**

12.3.32 Once the Scheme is operational and the ground re-profiled, the change to groundwater flows would be negligible and not likely to result in significant effects.

### **Flood Risk Effects**

12.3.33 The Scheme is located within an area at a low risk of flooding from all sources (except groundwater which is a medium risk). The drainage of the scheme would be to ensure there is no increase in runoff from the site, therefore, no change in the flooding potential for the Cocker Beck or from other sources. As a result, the impact of the scheme is considered to be 'no change', resulting in a neutral effect (not significant).

## **12.4 Project-Wide Effects (Construction and Operation)**

12.4.1 There are considered to be no Project-wide significant effects during construction or operation as the Schemes are distant from each other, would be constructed at different times, or, in the case of Lowdham Roundabout, would not affect the same receptors as the Ollerton Roundabout and Mickledale Lane Junction Schemes.

## **12.5 Mitigation and Monitoring**

12.5.1 No additional mitigation is considered to be required.

## **12.6 Residual Effects**

12.6.1 No significant residual effects are expected, during construction or operation, from any of the proposed Schemes.

## 13 CLIMATE

### 13.1 Introduction

13.1.1 ES Chapter 12: Climate (ES Volume 1A-D) reports the findings of an assessment of the likely significant effects on climate as a result of the proposed Schemes. It also considers the impacts of climate change on the Schemes. The assessment considers both the impacts during construction and operation of the Project and is conducted in line with guidance in DMRB LA 114 Climate (Highways England, 2021).

13.1.2 This assessment includes consideration for two elements:

- **Lifecycle greenhouse gas (GHG) impact assessment** – the effects on the climate of GHG emissions arising from the construction of the Scheme; and
- **Vulnerability of Scheme to climate change assessment** – the resilience of the Scheme to climate change, including how the Scheme design would be adapted to take account for the projected impacts of climate change.

13.1.3 GHG emissions for the operational phase were scoped out of the assessment as signalling and maintenance (including resurfacing) will be similar to the baseline scenario and the traffic count and traffic speed are expected to remain comparable.

### 13.2 Construction Phase Effects

#### GHG Emissions

13.2.1 As detailed in Table 13-1 the total GHGs estimated to be emitted during construction have been calculated to be 4,828 tCO<sub>2</sub>e over the course of the construction period. The majority of emissions are associated with embodied carbon in raw materials and transport of materials to site, accounting for approximately 30% and 57% of all construction emissions respectively.

13.2.2 All these emissions are considered ‘additional’ as they would not occur if the Project did not go ahead.

Table 13-1 Project-Wide Estimated Construction GHG Emissions

**Emissions  
n(tCO<sub>2</sub>e)**

**i  
s  
s  
i  
o  
n  
S  
o  
u  
r  
c  
e**

	Ollerton	Mickledale	Lowdham	Kirk Hill	Total emissions
E420	546	254	251	<b>1,471</b>	
<b>m b o d i</b>					

**Emissions**  
**m(tCO<sub>2</sub>e)**

i  
s  
s  
i  
o  
n  
S  
o  
u  
r  
c  
e

**Ollerton      Mickledale      Lowdham      Kirk Hill      Total  
emissions**

e  
d  
c  
a  
r  
b  
o  
n  
i  
n  
r  
a  
w  
m  
a  
t  
e  
r  
i  
a  
l  
s

F37                      22                      20                      25                      **104**

u  
e  
l  
u  
s  
a  
g  
e  
o  
n  
s  
i  
t  
e

T686                      1,258                      403                      390                      **2,737**

r  
a  
n  
s  
p



**Emissions**  
**m(tCO<sub>2</sub>e)**

i  
s  
s  
i  
o  
n  
S  
o  
u  
r  
c  
e

**Ollerton**      **Mickledale**      **Lowdham**      **Kirk Hill**      **Total emissions**

o  
r  
t  
o  
f  
m  
a  
t  
e  
r  
i  
a  
l  
s  
t  
o  
s  
i  
t  
e

---

D44	160	11	31	<b>246</b>
-----	-----	----	----	------------

---

i  
s  
p  
o  
s  
a  
l  
o  
f  
c  
o  
n  
s  
t  
r  
u  
c  
t  
i  
o  
n  
w  
a

**Emissions**  
**m(tCO<sub>2</sub>e)**

i  
s  
s  
i  
o  
n  
S  
o  
u  
r  
c  
e

	Ollerton	Mickledale	Lowdham	Kirk Hill	Total emissions
<b>E101</b>	91	40		38	<b>270</b>
<b>Total</b>	<b>1,288</b>	<b>2,077</b>	<b>728</b>	<b>735</b>	<b>4,828</b>

13.2.3 To contextualise the change in GHG emissions, these emissions have been compared to the UK Carbon budgets. As highlighted in Table 13-2, detailing the construction emissions against that of the relevant UK Carbon Budgets, the Project contributes 0.0002% to the 4th Carbon Budget only. This is not considered to be significant.

**Table 13-2 Project-Wide Contribution of the Construction Emissions to the UK Carbon Budgets**

<b>UK Carbon Budget Period</b>	<b>UK Carbon Budget (MtCO<sub>2</sub>e)</b>	<b>Do Something Construction Phase Emissions (MtCO<sub>2</sub>e)</b>	<b>Do Something Percentage Contributions to UK Carbon Budget</b>
4 <sup>th</sup> (2023-2027)	1,950	0.004819	0.0002%

### Climate Change Vulnerability Assessment

13.2.4 During construction works, receptors such as the construction work force, construction plant, vehicles, materials and workplan may be vulnerable to a range of climate risks. These could include:

- lack of access to the construction site due to severe weather event (flooding, snow and ice, storms) restricting working hours and delaying the construction programme;
- health and safety risks to the workforce during severe weather events;
- unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities; and
- damage to construction materials, plant and equipment, including damage to temporary buildings/facilities within the site boundary, such as offices, compounds, material storage areas and worksites, for example as a result of stormy weather.

13.2.5 No significant vulnerability impacts have been identified for the construction phase of work for any of the Schemes.

## 13.3 Operational Phase Effects

### Climate Change Vulnerability Assessment

13.3.1 During operation, receptors such as the road users, physical assets, maintenance workers, maintenance plant and maintenance vehicles may be vulnerable to a range of climate risks. These could include:

- lack of access to the maintenance site due to severe weather event (flooding, snow and ice, storms) restricting working hours and delaying the construction programme;
- health and safety risks to the workforce and road users during severe weather events;
- unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities; and
- damage to assets, landscaping, materials, plant and equipment as a result of stormy weather, flooding and excessive heat.

13.3.2 No significant vulnerability impacts have been identified for the operational phase of work for any of the Schemes.

## 13.4 Mitigation and Monitoring

### GHG Emissions

- 13.4.1 During the construction phase, the CEMP would include a range of industry standard good practice measures to reduce energy consumption and associated carbon emissions, such as using materials with lower embodied GHG emissions and water consumption. The SWMP would adopt good practice measures to reduce waste, such as agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme.
- 13.4.2 During the design phase, opportunities to reduce waste include waste arisings would be prevented and designed out where possible and opportunities to re-use material resources would be sought where practicable, such as the re-use of existing on-site lighting if in a suitable condition.

### Climate Change Vulnerability

- 13.4.3 During the construction phase, the CEMP would include a range of industry standard good practice measures to prevent or reduce the likelihood of climatic hazards affecting construction staff and assets.
- 13.4.4 The landscape design is predicted to achieve a net gain in biodiversity through landscaping and enhancement/creation of habitats. Species would be chosen that are appropriately tolerant to a changing climate.

## 13.5 Residual Effects

- 13.5.1 The residual effect of the Scheme is considered to be 'not significant' for climate change for both the construction and operational phases of the Project.

## 14 COMBINED AND CUMULATIVE EFFECTS ASSESSMENT

### 14.1 Introduction

- 14.1.1 ES Chapter 13: Combined Effects Assessment (ES Volume 1) reports the assessment of the combined effects of the Project and ES Chapter 14: Cumulative Effects Assessment (ES Volume 1) reports the cumulative effects assessment.
- 14.1.2 Combined effects arise from the accumulation or interaction of different impacts due to the Project at a specific location or on a specific sensitive receptor. For example, construction noise and visual intrusion affecting a single receptor. Individually these may not be significant, but the accumulation of different impacts may give rise to an overall significant effect.
- 14.1.3 Cumulative effects arise as a result of the combination of activities associated with the Project together with the activities associated with other development. For example, impacts caused by the Project may be exacerbated by the activities from other development nearby or non-significant individual impacts at different sites collectively may give rise to an overall significant effect in the local area or wider region.
- 14.1.4 The combined and cumulative effects assessments were undertaken at a project-wide level, combining and assessing impacts from the individual Schemes that comprise the Project.
- 14.1.5 There is no standard methodology for combined effects assessment. The assessment for cumulative effects was undertaken in accordance with DMRB LA 104 Environmental Assessment and Monitoring (Highways England, 2020g), supplemented by the Planning Inspectorate Advice Note Seventeen (Planning Inspectorate, 2019).

### 14.2 Combined Effects Assessment

- 14.2.1 The potential for combined effects on the same receptor was identified by reviewing the effects identified within the environmental assessment topics covered in ES Volume 1 and Volumes 1A to 1D.
- 14.2.2 Where the combined effect on the receptor or resource is inherently covered within the technical assessments in the ES, this was not considered further. The assessment considered the combined effects on residential receptors only.
- 14.2.3 The types of effects that could be experienced by these receptors and which may interact are noise, air quality and visual effects during both construction and operation.

#### Construction

- 14.2.4 There is potential for combined effects during construction for all Schemes for properties within close proximity of the assessment boundaries – typically 0-50 m. This is due to combinations of construction noise, dust, vibration and visual effects. Significant combined effects are predicted at the closest properties for all four Schemes.
- 14.2.5 For all Schemes the prominent impacts are those expected from noise and vibration activities. As suggested within the noise and vibration chapters of the ES (Volumes 1A to 1D), at this stage there is insufficient information on the construction activities and programme to discount the possibility that the timescales outlined would be exceeded. Therefore, it is conceivable that a significant adverse effect due to

construction noise may occur at nearby residential properties, however through the use of BPM and planning for the construction programme, it may be possible to reduce the number of significant effects.

14.2.6 For properties typically over 50 m of the Scheme assessment boundaries there are no significant combined effects anticipated.

### Operation

14.2.7 During operation, no significant combined effects are anticipated. Effects would be at most negligible adverse.

## 14.3 Cumulative Effects Assessment

14.3.1 A 4 km search area was used to prepare the long list of 'other developments' which may interact with the Project, as reflected by the cumulative Zones of Influence (Zols) for biodiversity, landscape and visual, and road drainage and the water environment – the largest Zols. The long list includes:

- roads projects which have been confirmed for delivery over a similar timeframe;
- development projects where planning consent has been granted, and for which an EIA was undertaken; and
- proposals in adopted development plans with a clear identified programme for delivery.

14.3.2 A total of 31 developments were included in the initial long list. Three 'other developments' from the long list were shortlisted for inclusion in the assessment of cumulative effects. These developments are:

- ID 1: The Former Thoresby Colliery (NSDC planning permission ref. 16/02173/OUTM), located approximately 580 m west from Ollerton Roundabout;
- ID 12: Land East & West Of Chapel Lane, Bingham (RBC planning permission ref. 10/01962/OUT, located approximately 1443 m south-east from Kirk Hill Junction; and
- ID 20: Land At Royal Air Force Newton (RBC planning permission ref. 10/02105/OUT), located approximately 789 m south from Kirk Hill Junction.

14.3.3 Based on the review of environmental information available for the Project and these shortlisted developments, there are not likely to be any significant cumulative effects as a result of the Project in conjunction with other developments.

14.3.4 This is due to a combination of factors, including the low level of impact from the respective Schemes and the other developments on the same receptors following mitigation, as well as the distance between the Schemes and the other shortlisted developments.

## 14.4 Mitigation and Monitoring

14.4.1 The Project has not resulted in any likely significant adverse cumulative or combined effects, therefore no additional mitigation measures are required.

## 15 SUMMARY

15.1.1 The following assessments reported no likely significant residual environmental effects during the construction or operation phases of the Project or individual Schemes:

- Air quality;
- Biodiversity;
- Road drainage and the water environment;
- Climate; and
- Cumulative effects.

15.1.2 The assessments reported in the following chapters identified likely significant environmental effects during the construction phases of the Project or individual Schemes:

- Landscape and visual;
- Cultural heritage;
- Geology and soils;
- Noise and vibration; and
- Combined effects assessment.

15.1.3 Table 15-1 summarises the likely significant effects associated with the construction and operation of the Project as detailed in Volumes 1 and 1A to 1D of the ES.

Table 15-1 Summary of Likely Significant Residual Effects

Scheme / Project	Topic	Receptor	Phase	Mitigation and Monitoring	Residual effect
Project-wide	Geology and Soils	Approximately 3.47 ha of agricultural land, including BMV land.	Construction (permanent loss)	No additional mitigation proposed.	Moderate adverse
Ollerton Roundabout	Visual Effects	Residents at Forest Side (represented by photoviewpoint 2)	Construction	Standard mitigation measures, no additional mitigation.	Moderate adverse
Ollerton Roundabout	Construction Noise	4no. receptors (R1-R4) Blyth Road (A614)	Construction	BPM and temporary screening where feasible	Significant adverse
Ollerton Roundabout	Construction Vibration	4no. receptors (R1-R4) Blyth Road (A614)	Construction	BPM	Significant adverse
Ollerton Roundabout	Combined construction effects relating	Residential properties within close	Construction	None above the mitigation and BPM	Moderate adverse

Scheme / Project	Topic	Receptor	Phase	Mitigation and Monitoring	Residual effect
	to noise, vibration and visual effects.	proximity to the Scheme assessment boundary (properties adjacent to Blyth Road and one property off Mansfield Road)		described in the topic assessments.	
Mickledale Lane Junction	Construction Noise	7no. receptors	Construction	BPM and temporary screening where feasible	Significant adverse
Mickledale Lane Junction	Construction vibration	6no. receptors	Construction	BPM	Significant adverse
Mickledale Lane Junction	Combined construction effects relating to noise, vibration and visual effects.	Residential properties within close proximity to the Scheme assessment boundary (properties adjacent Mickledale Lane to and A614 Old Rufford Road)	Construction	None above the mitigation and BPM described in the topic assessments.	Moderate adverse
Lowdham Roundabout	Construction Noise	35no. receptors	Construction	BPM and temporary screening where feasible	Significant adverse
Lowdham Roundabout	Construction vibration	28no. receptors	Construction	BPM	Significant adverse
Lowdham Roundabout	Combined construction effects relating to noise, vibration and visual effects	Residential properties within close proximity to the Scheme assessment boundary (A612 Nottingham Road and Nottingham Road)	Construction	None above the mitigation and BPM described in the topic assessments.	Moderate adverse
Kirk Hill Junction	Construction Noise	5no. receptors (R1-R5) Kirk Hill, NG13 8PE	Construction	BPM and temporary screening where feasible	Significant adverse



Scheme / Project	Topic	Receptor	Phase	Mitigation and Monitoring	Residual effect
Kirk Hill Junction	Construction vibration	3no. receptors (R1-R3) Kirk Hill, NG13 8PE	Construction	BPM	Significant adverse
Kirk Hill Junction	Combined construction effects relating to noise, vibration and visual effects	Residential properties within close proximity to the Scheme assessment boundary (properties on Kirk Hill)	Construction	None above the mitigation and BPM described in the topic assessments.	Moderate adverse