# A46 Newark Bypass

# TR010065/APP/6.1

# 6.1 Environmental Statement
# Chapter 2 The Scheme

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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**The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009**

# A46 Newark Bypass

# Development Consent Order 202[x]

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## ENVIRONMENTAL STATEMENT

## CHAPTER 2 THE SCHEME

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|---|---|
| **Regulation Number:** | Regulation 5(2)(a) |
| **Planning Inspectorate Scheme Reference** | TR010065 |
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| **Author:** | A46 Newark Bypass Project Team, National Highways |

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| Rev 1 | April 2024 | DCO Application |

## Contents

# 2 The Scheme

## 2.1 Need for the Scheme

2.1.0 The stretch of A46 between the Farndon Junction, to the west of Newark-on-Trent and the A1 to the east of Newark-on-Trent, is the last remaining stretch of single carriageway between the M1 and A1 and consequently queuing traffic is a regular occurrence, often impacting journey time reliability. The Midlands Connect's study[1] highlights that speed is frequently below 20 mph around Newark resulting in unreliable journey planning, rising export transport costs and business unproductivity.

2.1.1 On a local scale, the Newark & Sherwood Infrastructure Delivery Plan (IDP)[2] has been developed, highlighting the key role of Newark in fostering future local growth. To meet the area's targets, the Scheme is a key condition to unlocking growth in Newark-on-Trent, thus reaching the district's objectives.

2.1.2 The Scheme would address the identified need by:

- Improving the performance of the A46 around Newark and addressing the delays and congestion.
- Improving journey time reliability.
- Improving safety through compliance with layout and design standards.
- Supporting and helping to unlock local economic aspirations. Developments within and around Newark will be aided by the progression of the Scheme.
- Boosting strategic connectivity by reinforcing wider strategic connectivity and access to and from the Humber Ports to the Midlands, providing an alternative to the M1.
- Achieving better environmental outcomes to improve the local environment in and around Newark-on-Trent.

2.1.3 Further detail on the need for the Scheme is set out within the Case for the Scheme **(TR010065/APP/7.1)**.

[1] Midlands Connect [online] available at: Midlands Connect | (last accessed December 2023).

[2] Official Census and Labour Market Statistics (2023). Labour Market Profile - Nomis [Online]. Available at: nomisweb.co.uk. (last accessed December 2023).

## 2.2 Scheme objectives

### Department for Transport objective

2.2.1 The Department for Transport's (DfT's) RIS2 sets out the following Strategic Outcomes:

- Improving safety for all
- Providing fast and reliable journeys
- A well maintained and resilient network
- Being environmentally responsible
- Meeting the needs of all users
- Achieving efficient delivery

### National Highways' Scheme objectives

2.2.2 The current National Highways' Scheme objectives are detailed in Table 2-1.

**Table 2-1: National Highways' Scheme objectives**

| | |
|---|---|
| **Safety** | **Improving safety through Scheme design to reduce collisions for all users of the Scheme.** |
| Congestion | Improve journey time and journey time reliability along the A46 and its junctions between Farndon and Winthorpe, including all approaches and A1 slip roads. |
| Connectivity | Accommodate economic growth in Newark-on-Trent and the wider area by improving its strategic and local connectivity. |
| Environment | Deliver better environmental outcomes by achieving a net gain in biodiversity, and improve noise levels at Noise Important Areas along the A46 between Farndon and Winthorpe junctions. |
| Customer | Build an inclusive Scheme which improves facilities for cyclists, walkers and other vulnerable users where existing routes are affected. |

2.2.3 Details of how the Scheme meets the DfT Strategic Outcomes and National Highways' Scheme objectives is set out within the Case for the Scheme **(TR010065/APP/7.1)**.

## 2.3 Scheme location

2.3.1 The Scheme would provide a dual carriageway on the A46 between Farndon and Winthorpe. The section of the A46 that would be upgraded is approximately 6.5 kilometres (approximately 4 miles) in length. The Farndon Roundabout is located at the western extent of the Scheme where the B6166 Farndon Road joins the A46. The existing Winthorpe Roundabout is located at the eastern extent where the A1133 joins the A46. Along its route, it crosses the A617 and B6326, at the existing Cattle Market Junction, and the A1 between the

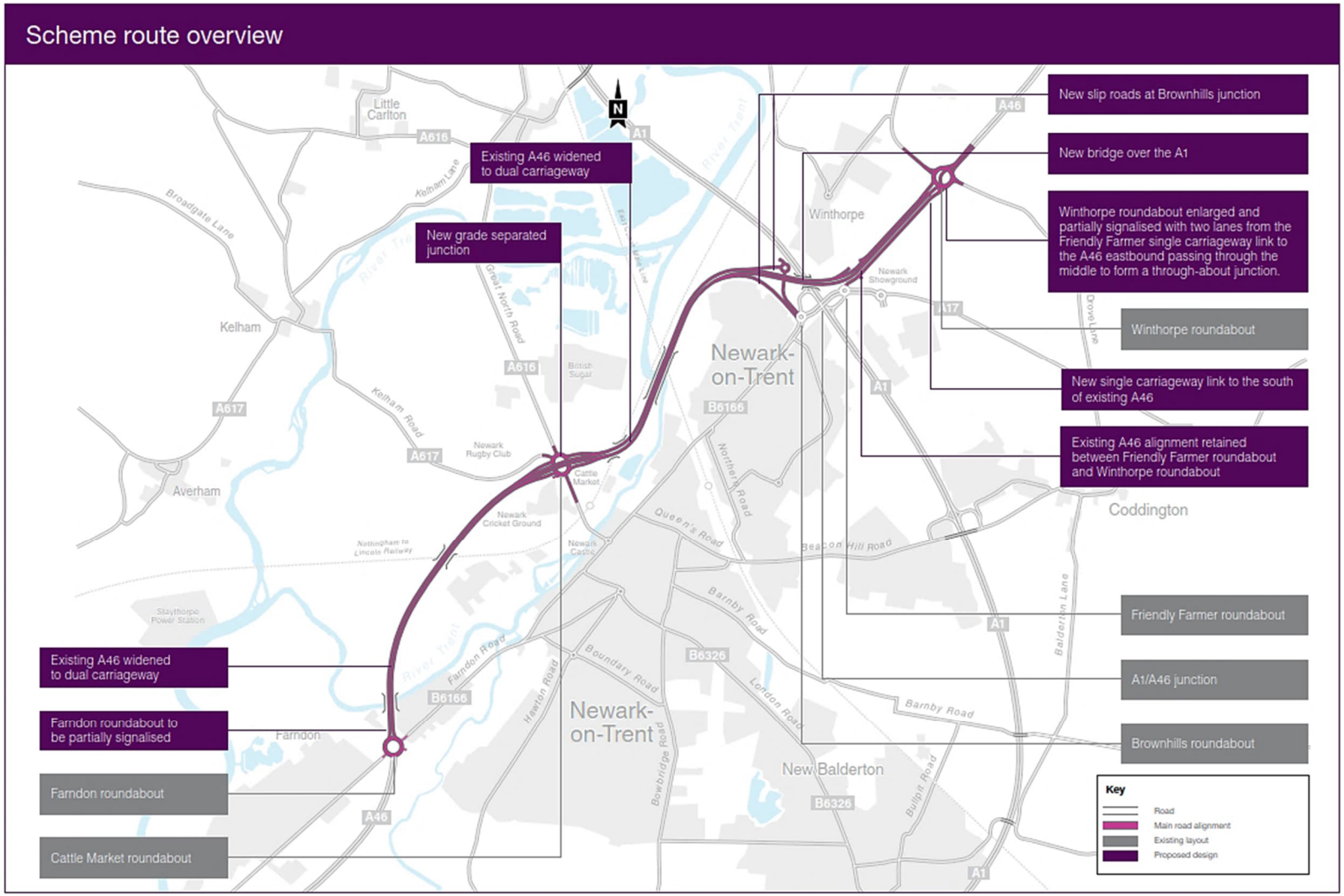
Friendly Farmer and Brownhills Roundabouts. Figure 2-1 below shows the location of the Scheme and the location of the principal elements. Figure 2.1 (Scheme Location Plan) of the Environmental Statement (ES) Figures **(TR010065/APP/6.2)** also presents the location of the Scheme. A Location Plan **(TR010065/APP/2.1)** is also provided with the application, which shows the location of the Scheme in its wider geographical context.

2.3.2 The Scheme is situated within the county boundary of Nottinghamshire County Council and within the administrative boundary of Newark & Sherwood District Council.

2.3.3 The Scheme crosses the River Trent twice, the Nottingham to Lincoln railway line twice, and the East Coast Main Line (ECML) once.

2.3.4 The existing A46, currently single carriageway, is generally elevated on embankment due to the low-lying floodplain of the River Trent. This floodplain is located to the west of the A46 for much of the affected length, along with a section at the southern end on the eastern side of the A46. Several roundabouts form key junctions along the route, linking with several local A roads. Road infrastructure is softened by roadside vegetation in places and the River Trent is a strong natural influence within an otherwise manmade landscape. To the north of the A46, farmland dominates, interspersed with small-scale settlements. To the south of the road, the town of Newark-on-Trent forms a notable urban settlement.

**Figure 2-1: Scheme location and location of the principal elements**




**Source: National Highways, 2023**

## 2.4 Baseline scenario

2.4.1 Regulation 14(2) of the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (the EIA Regulations)[3] requires *"a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed within reasonable effort on the basis of the availability of environmental information and scientific knowledge"*.

2.4.2 The potential changes to the existing baseline due to natural changes have been outlined below. This future baseline, known as the 'Do-Minimum', assumes that the Scheme is not constructed, and instead, the existing A46 is maintained in its current state. The future baseline scenario takes into consideration changes in 15 years' time and changes in 60 years' time. Years 15 and 60 have been used as they are the years which are forecast using the traffic model as defined in Transport Analysis Guidance (TAG)[4] for the purposes of the cost benefit analysis for the Scheme. The costs and benefits are appraised for the Scheme opening year, the design year (15 years later), and 60 years later after opening, aligning with the requirements of TAG Unit A1.13, and as such, it is considered appropriate to review (where possible) the potential changes to the existing baseline due to natural changes over this period for consistency.

2.4.3 Future changes to the baseline without the Scheme could result from both natural events and from other human activities. This could include development (residential and commercial), changes to greenhouse gas emissions (such as from changes in traffic flows) and climate change (resulting in increased flood risk and severe weather). Refer to Table 2-2 for an outline of the future baseline scenario in relation to the Design Manual for Roads and Bridges (DMRB) environmental topics.

[3] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [online] available at: The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (legislation.gov.uk) (last accessed December 2023).

[4] Department for Transport (2018) TAG Unit A.1 Cost-Benefit Analysis [online] available at: TAG Unit A1.1 - Cost Benefit Analysis_Nov 2022_Accessible_v1.0 (publishing.service.gov.uk) (last accessed December 2023).

## Table 2-2: Outline of future baseline scenario

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| Population and human health | Air quality | There are not anticipated to be any baseline changes as a result of natural events that would impact air quality due to its geographical location. | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years within the air quality study area (as defined in Section 5.4, Chapter 5 (Air Quality) of this ES), although traffic movements are likely to increase, vehicle emissions are set to improve as a result of improving technology and the uptake of electric vehicles is also likely to increase[5], benefitting local air quality and increasing the value of the receptors.<br><br><u>Baseline changes within the next 60 years</u><br>• Air quality is expected to improve in the future, mainly due to reduced vehicle emissions, improved abatement technology and a shift towards cleaner energy, increasing the value of the receptors.<br>• Due to the variables such as policy changes and uptake of technology which could impact upon the baseline, a confident prediction on baseline changes in the next 60 years is not possible. |
| Biodiversity | Air Quality | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years. | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years within the air quality study area (as defined in Section 5.4, Chapter 5 (Air Quality) of this ES), although traffic movements are likely to increase, vehicle emissions are set to improve as a result of improving |

[5] Defra (2017) Air Quality in the UK: plan to reduce nitrogen dioxide emissions [online] available at: UK plan for tackling roadside nitrogen dioxide concentrations: Detailed plan (publishing.service.gov.uk) (last accessed December 2023).

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | <u>Baseline changes within the next 60 years</u><br>• Potential for changes in weather patterns due to climate change, resulting in more frequent lightning storms and associated wildfires increasing atmospheric nitrogen oxide (a greenhouse gas which will contribute to further warming of the planet). Exposure of ecological receptors to increases in nitrogen oxide could affect habitat composition, decreasing plant diversity and impacting animal species. | technology and the uptake of electric vehicles is also likely to increase[6], benefitting local air quality and increasing the value of the receptors.<br><br><u>Baseline changes within the next 60 years</u><br>• The continuing increase in the global population will require a greater yield of food with less land available, resulting in more fertilisers being used, and an increase in effluent produced from livestock and humans (therefore an increase in nitrogen oxide). A confident prediction on baseline changes in the next 60 years is not possible, as changes in human diets and buying habits would be speculation (reducing meat consumption, purchase organic and local food, therefore reducing transport emissions). Exposure of ecological receptors to increases in nitrogen oxide could affect habitat composition, decreasing plant diversity and impacting animal species.<br>• Increased development included in the local plans has the potential to bring emission sources closer to ecological receptors.<br>• Air quality is expected to improve in the future, mainly due to reduced vehicle emissions, improved abatement technology and a shift towards cleaner energy, increasing the value of the receptors.<br>• Due to the variables such as policy changes and uptake of technology which could impact upon the baseline, a confident prediction on baseline changes in the next 60 years is not possible. |

[6] Defra (2017) Air Quality in the UK: plan to reduce nitrogen dioxide emissions [online] available at: UK plan for tackling roadside nitrogen dioxide concentrations: Detailed plan (publishing.service.gov.uk) (last accessed December 2023).

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | | • Future potential changes as a result of the Environment Act 2021, including requirements for Biodiversity Net Gain (BNG), have the potential to offset the negative impact local plans may have on biodiversity. |
| Material assets, cultural heritage, and the landscape | Cultural heritage | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years.<br><br><u>Baseline changes within the next 60 years</u><br>• Natural growth of trees has the potential to alter setting of heritage assets and key views. | <u>Baseline changes within the next 15 years</u><br>• Potential negative changes to setting of heritage assets and key views as a result of increased development, reducing the value of receptors, such as the redevelopment of the Newark Lorry Park, embankment works to Tolney Lane and the Urban Growth Area in land south of Newark. In addition, the potential removal of archaeological remains. This is likely to impact on Farndon and Newark Conservation Areas.<br><br><u>Baseline changes within the next 60 years</u><br>• Increased development has the potential to alter setting and key views, reducing the value of these receptors, as well as the potential removal of archaeological remains, such as those contained within three future local plans. |
| Material assets, cultural heritage, and the landscape | Landscape | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years based on the time it takes for vegetation to develop.<br><br><u>Baseline changes within the next 60 years</u> | <u>Baseline changes within the next 15 years</u><br>• Potential adverse changes or alterations to local character areas and key views as a result of additional developments proposed within the study area such as those sites adjacent to Kelham and Averham Conservation Area.<br><br><u>Baseline changes within the next 60 years</u><br>• Potential adverse change to areas and key views as a result of additional developments proposed within the |

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | • Natural growth of trees has the potential to alter setting of character areas and key views. | area in the future, such as those contained within future iterations of the Strategic Housing and Employment Land Availability Assessment (SHELAA)[7] or future local plans. |
| Material assets, cultural heritage, and the landscape | Material assets and waste | There are not anticipated to be any baseline changes as a result of natural events that would impact material assets and waste due to its geographical location. | <u>Baseline changes within the next 15 years</u><br>• Potential for increased risk of depletion of primary materials due to increased local residential development as a result of increased resource use.<br><br><u>Baseline changes within the next 60 years</u><br>• Potential for increased risk of depletion of primary materials due to increased local residential and commercial development as a result of increased resource use.<br>• Provision of additional minerals development in Nottinghamshire to ensure a steady and adequate supply.<br>• Potential for further reduction in landfill capacity in Nottinghamshire.<br><br>Provision of additional waste management infrastructure to make further provision for managing waste in Nottinghamshire. |
| Biodiversity | Biodiversity | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years. | <u>Baseline changes within the next 15 years</u><br>• The Newark & Sherwood Local Development Framework outlines proposed new strategic housing and community facilities but does not indicate a time frame, therefore it is |

[7] Newark & Sherwood District Council (2021) Strategic Housing and Employment Land Availability [online] available here: Strategic Housing and Employment Land Availability | Newark & Sherwood District Council (newark-sherwooddc.gov.uk) (last accessed December 2023).

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | <u>Baseline changes within the next 60 years</u><br>• Potential for changes in weather patterns affecting protected species behaviour, such as warmer winters preventing species to fully hibernate. | considered some developments will go to construction within the next 15 years.<br><br><u>Baseline changes within the next 60 years</u><br>Increased development contained within the future iterations of the SHELAA or future local plans may lead to:<br>• Increased disturbance to protected species as a result of increases to baseline noise levels.<br>• Increased severance to habitats.<br>• Fragmented habitats and isolated populations of protected species.<br>• Decrease in genetic diversity resulting from isolation of populations leading to a reduced resilience of protected species to climate change.<br>• Potential for changes in weather patterns and extreme weather events associated with climate change affecting protected species behaviour such as warmer winters preventing species to fully hibernate.<br>• Future potential changes as a result of the Environment Act 2021, including requirements for BNG, have the potential to offset the negative impact local plans may have on biodiversity. |
| Land, soil, water, air and climate | Geology and soils | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years.<br><br><u>Baseline changes within the next 60 years</u> | <u>Baseline changes within the next 15 years</u><br>• Potential for additional development may result in the remediation of isolated contaminated areas, such as the development sites identified within the SHELAA[4]. However, potential for increased development (residential/industrial/commercial) may result in additional pollution incidents with the potential to affect near surface soils. |

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | • Possibility that extreme weather events could change the geomorphology of the areas due to erosion causing changes in near surface geology. | <u>Baseline changes within the next 60 years</u><br>• Potential for additional development may result in the remediation of isolated contaminated areas, such as development identified in future iterations of the SHELAA[4] or future local plans. However, potential for increased development (residential/industrial/commercial) may result in additional pollution incidents with the potential to affect near surface soils. For example, the expansion of the British Sugar site.<br>• Potential for additional mineral extraction industries to be present in the area given anticipated population growth and likely increase in demand for geological resources.<br>• Potential for development of flood defences including raising of levels or creating excavation areas for flood compensation. |
| Population and human health | Noise and vibration | There are not anticipated to be any baseline changes as a result of natural events that would impact noise and vibration due to its geographical location. | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years although traffic movements are likely to increase.<br><br><u>Baseline changes within the next 60 years</u><br>• Increased development may increase the baseline noise levels as a result of increased traffic.<br>• Due to the variables such as policy changes, population changes and uptake of technology which could impact upon the baseline, a confident prediction on baseline changes in the next 60 years is not possible. |
| Population and human health | Population and human health | <u>Baseline changes within the next 15 years</u> | <u>Baseline changes within the next 15 years</u> |

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | No significant baseline changes are anticipated within the next 15 years.<br><br><u>Baseline changes within the next 60 years</u><br>The likely ranges of change in climatic parameters including precipitation, temperature, wind speed, humidity and frequency of extreme weather are not considered to materially affect the future baseline described for population and human health or increase the sensitivity of receptors to impact. However, it is expected that some population groups, for example older people, will be particularly vulnerable to some of the consequences of a changing climate. | • Potential for increased residential developments such as those contained within the SHELAA[4] and Newark & Sherwood Local Development Plan[8] to create opportunities for local employment during construction phases.<br>• Potential for continued increase in traffic due to increased residential and employment development.<br><br><u>Baseline changes within the next 60 years</u><br>• Potential for changes in employment rates in the local area.<br>• Potential for changes to community facilities in the local area.<br>• Potential for changes to land use, for example changes in agricultural practice as well as land set aside for community facilities.<br>• Potential for changes in land ownership.<br>• Potential for loss of community facilities such as recreational playing fields as a result of increased flood events in the local area, associated with increased development and / or increased rainfall events. |
| Land, soil, water, air and climate | Road drainage and the water environment | <u>Baseline changes within the next 15 years</u><br>• No significant baseline changes are anticipated within the next 15 years (see Appendix 13.2 (Flood | <u>Baseline changes within the next 15 years</u><br>• Potential for additional development leading to increases in flood events and reduced water quality. It is assumed appropriate mitigation measures will be incorporated |

[8] Newark & Sherwood District Council (2019) Newark & Sherwood Local Development Plan [online] available here: Local development framework | Newark & Sherwood District Council (newark-sherwooddc.gov.uk) (last accessed December 2023).

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | Risk Assessment) and Appendix 13.3 (HEWRAT) of the ES Appendices (TR010065/APP/6.3)).<br>• There is a potential for increased flooding events as a result of climate change.<br><br><u>Baseline changes within the next 60 years</u><br>• No significant baseline changes are anticipated within the next 60 years. (see Appendix 13.2 (Flood Risk Assessment) and Appendix 13.3 (HEWRAT) of the ES Appendices **(TR010065/APP/6.3)**).<br>• There is a potential for increased flooding events as a result of climate change. | within development designs to reduce the risk of increased flooding as a planning requirement.<br><br><u>Baseline changes within the next 60 years</u><br>• Potential for increased flooding events due to increased development identified in future iterations of the SHELAA[4] and future local plans, it is assumed appropriate mitigation measures will be incorporated within development designs to reduce the risk of increased flooding as a planning requirement.<br>• Potential for improvements to water quality and aquatic ecology due to implementation of waterbody mitigation. |
| Land, soil, water, air and climate | Climate | <u>Baseline changes within the next 15 years</u><br>• Climate change forecasted in the region under the RCP 8.5 scenario will result in mean annual temperate increases of up to 1ºC, 5% increase in mean winter precipitation and an 8% reduction in summer precipitation.<br><br><u>Baseline changes within the next 60</u> | <u>Baseline changes within the next 15 years</u><br>• Greater action towards net zero is expected over the next 15 years working towards the net zero goal and reduction targets, this is likely to impact upon the emissions over the operational period for energy, maintenance and use of infrastructure.<br><br><u>Baseline changes within the next 60 years</u> |

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | **Natural events** | **Human activities** |
| | | years<br>• Climate change forecasted in the region under the RCP 8.5 scenario will result in mean annual temperate increases of up to 4.1°C, 20% increase in mean winter precipitation and a 35% reduction in summer precipitation. | • Net zero targets for 2050 are planned to be achieved within the UK[9] and by National Highways[10], therefore this is likely to heavily impact upon the emissions over the operational period for energy, maintenance and use of infrastructure. |
| Interaction between the factors | Combined and Cumulative Effects | No significant baseline changes are anticipated associated with both combined and cumulative effects as a result of natural events due to its geographical location. | Baseline changes within the next 15 years<br>• Potential for combined effects to all receptors identified above as a result of human activities, such as increased developments identified within the SHELAA[4] affecting both historic and landscape setting.<br>• Potential for cumulative effects associated with developments anticipated to come forward as part of the SHELAA[4].<br><br>Baseline changes within the next 60 years<br>• Potential for combined effects to all receptors identified above as a result of human activities, such as increased developments as part of future development affecting both historic and landscape setting. |

[9] UK Government (2021) Net Zero Strategy: Build Back Greener [online] available at: net-zero-strategy-beis.pdf (publishing.service.gov.uk) (last accessed December 2023).

[10] National Highways (2021) Net zero highways: our 2030/2040/2050 plan [online] available at https://nationalhighways.co.uk/media/eispcjem/net-zero-highways-our-2030-2040-2050-plan.pdf (last accessed December 2023).

| Environmental factor | DMRB environmental topic | Potential future changes to baseline | |
|---|---|---|---|
| | | Natural events | Human activities |
| | | | • Potential for cumulative effects associated with developments anticipated to come forward as part of future developments. |

## 2.5 Scheme description

### Introduction

2.5.1 The section of the A46 that would be upgraded is approximately 6.5 kilometres (approximately 4 miles) in length. The Scheme comprises on-line widening for the majority of its length between Farndon Roundabout and the A1. A new section of off-line dual carriageway would be provided between the western and eastern sides of the A1 before the new dual carriageway ties into the existing A46 to the west of Winthorpe Roundabout. The widening works include earthwork widening along the existing embankments, and new structures where the route crosses the Nottingham to Lincoln and ECML railway lines, River Trent, Brownhills link and the A1.

### Scheme design

2.5.2 The development of the Scheme design has been an iterative process, undertaken as part of an integrated design team bringing together civil infrastructure disciplines alongside broader design disciplines including landscape architects, and influenced by environmental specialists. The design has been developed to meet the Scheme objectives whilst also minimising environmental effects wherever practicable. Consequently, the Scheme design adheres to the principles of the design and mitigation hierarchy outlined in DMRB LA 104 Environmental Assessment and Monitoring[11] (further explanation for using the DMRB is detailed in Chapter 4 (Environmental Assessment Methodology) of the ES. The first principle being to avoid potential adverse effects where possible, before seeking to minimise or mitigate any unavoidable impacts. This has formed a well-developed embedded and essential mitigation strategy. Further details of the embedded mitigation for the Scheme are captured in paragraphs 2.5.124 to 2.5.139.

2.5.3 The Scheme would consist of the following permanent elements, all of which are described in more detail in the following sections of this chapter. Temporary elements are detailed within Section 2.6 of this chapter.

- The provision of a dual carriageway for a distance of 6.5 kilometres (approximately 4 miles) to provide two traffic lanes in both directions. This consists of the following key highways elements:

[11] Standards for Highways (August 2020) Design Manual for Roads and Bridges; LA 104 – Environmental assessment and monitoring [online] available at: 0f6e0b6a-d08e-4673-8691-cab564d4a60a (standardsforhighways.co.uk) (last accessed December 2023).

  - Partial signalisation of Farndon Roundabout at the southern extents of the Scheme
  - Widening of the existing A46 for a length of 4.5 kilometres
  - A new grade separated junction at Cattle Market Roundabout
  - A new off-line section to bypass the existing Brownhills and Friendly Farmer roundabouts for a length of 1.3 kilometres
  - A new grade separated link between Brownhills Roundabout and a new roundabout that is situated to the north of the new dual carriageway. These are linked to the new dual carriageway via a new northbound off-slip and southbound on-slip.
  - Retention of the existing dual carriageway between Winthorpe Roundabout and the A1 for a length of 0.8 kilometres
  - An upgraded roundabout with partial signal controls at Winthorpe Roundabout
  - A two-way parallel link road from Friendly Farmer to Winthorpe Roundabout situated to the south of the existing dual carriageway
  - Tie in with local roads at Farndon, Cattle Market and Winthorpe Junctions

- New bridge structures over the Nottingham to Lincoln and ECML railway lines, River Trent and the A1.
- New culverts and extensions of existing culverts.
- A parking lay-by near Brownhills Junction.
- Improvements/amendments to walking and cycling routes.
- Floodplain compensation at the following three floodplain compensation areas (FCAs):

  - Kelham and Averham FCA
  - Farndon West FCA
  - Farndon East FCA

- Three potential borrow pit areas to support the creation of embankments required for the Scheme:

  - Farndon West
  - Farndon East
  - Brownhills Junction

- The provision of drainage systems including attenuation ponds to drain carriageways and adjacent land.
- The provision of road lighting.
- The provision of road markings and new traffic signs.
- The provision of new road restraint systems.
- Earthworks in order to establish the road foundation (including cuttings and embankments) and also to provide visual screening and noise attenuation.
- Environmental mitigation including landscape planting, noise attenuation and areas identified for ecological mitigation.

- Boundary treatments such as boundary fencing, hedgerow planting and trees.
- Perimeter drainage ditches.
- Technology installations.
- Diversionary and protection works to public utilities including telephone, fibre-optics, electricity, gas, water supply and sewers.
- Associated accommodation works and maintenance access tracks.

2.5.4 A number of plans are provided as part of the application for development consent that illustrate the design for the Scheme. The General Arrangement Plans **(TR010065/APP/2.5)** provide an overview of the Scheme design. The Rights of Way and Access Plans **(TR010065/APP/2.4)** illustrate the Public Rights of Way (PRoW) together with the existing highway, private means of access and existing PRoW that are to be stopped up. Structures General Arrangements **(TR010065/APP/2.6)** are also provided with the application documents.

2.5.5 The Scheme layout has been designed in accordance with the DMRB and National Highways design principles. Further details are contained within the Scheme Design Report **(TR010065/APP/7.4)**.

### Dual carriageway

2.5.6 At its south-western limits, the dual carriageway ties in with the northern arm of the existing Farndon Roundabout which already has two lanes entering and exiting the roundabout. Travelling north-eastwards, the route follows the alignment of the existing A46 for a length of 2.5 kilometres. Over this length the existing A46 would remain in place as the new southbound carriageway and the road would be widened to the north-west, away from Newark-on-Trent, to form the new northbound carriageway. Retaining the existing A46 in place over this section would allow the existing vegetation on the eastern side of the road to be retained.

2.5.7 Immediately north of Farndon Roundabout the alignment of the new dual carriageway passes over the existing Farndon underpass which provides walking and cycling access beneath the existing A46. Widening of this underpass is not required to accommodate the design, however the kerbs on the west side of the existing pedestrian underpass would be amended to cater for the widened carriageway. Heading north-east from Farndon underpass the existing embankment would be widened to the western side of the existing A46 with a vertical retaining wall that extends approximately 100 metres north from the existing underpass. This would be provided to minimise the removal of existing vegetation to the rear of the adjacent property gardens. Once the route has passed the property extents, the retaining wall would finish, and the embankment would be widened to the west with 1:2 earthwork slopes until it reaches Windmill Viaduct.

2.5.8 On approach to Windmill Viaduct the new northbound A46 carriageway would begin to separate from the existing A46 to allow it to pass over a new structure that would be constructed next to the existing. After the new structure the new carriageway would move back in towards the existing carriageway whilst maintaining a slightly wider centre reserve to allow for improved visibility as the route bends around to the right and heads towards the Nottingham to Lincoln Railway Line.

2.5.9 Between Windmill Viaduct and the Nottingham to Lincoln Railway Line the existing embankment would be widened to the west utilising slopes ranging from 1:2 to 1:0.4. The embankment through this section would be founded on a free draining material to prevent erosion as flood waters recede and the cross section has been minimised as far as possible to reduce the floodplain compensation requirements. In this section an existing farm access underpass and two existing culverts would be extended to the west to match the footprint of the widened earthworks.

2.5.10 On either approach to the Nottingham to Lincoln Railway Line West Railway Crossing the northbound carriageway would begin to separate from the existing A46 to allow it to pass over a new structure over the railway line that would be constructed next to the existing. The A46 would then continue north-eastwards towards Cattle Market Roundabout. The existing embankment would be widened utilising slopes ranging from 1:2 to 1:0.4. The embankment through this section would again be founded on a free draining material to prevent erosion as flood waters retreat and the cross section would be minimised as far as possible to reduce the floodplain compensation requirements.

2.5.11 Around 500 metres to the north of the railway crossing the dual carriageway begins to elevate so that it passes over the top of the southern half of the existing Cattle Market Roundabout. Over this length the dual carriageway would be placed on a reinforced earth structure with near vertical sides at a height of around 7-8 metres above exiting ground. The reinforced earth sections over this length would be supported on top of a load transfer platform which is founded on a shallow ground improvement consisting of stone displacement or concrete columns. The dual carriageway would cross over the new enlarged Cattle Market Roundabout gyratory on two single span structures.

2.5.12 The route remains elevated beyond Cattle Market as it continues to follow the alignment of the A46 where it passes over the existing Nottingham to Lincoln East Railway Crossing, which would be widened to accommodate the new dual carriageway. Between Cattle Market and the railway, the existing embankment would be widened on both sides to accommodate the new north-east facing slip roads utilising slopes that vary from 1:2 to 1:0.4.

2.5.13 To the east of the structure the route remains elevated with the existing embankment widened to the west of the existing embankment utilising a short length of earthworks. These would incorporate 1:0.4 slopes transitioning to a hybrid earthworks and sheet pile solution where a combination of 1:2 and 1:0.4 slopes extend around 10 metres from the edge of the new dual carriageway. At this point it would be intersected by a sheet pile wall approximately 1.0 metre high. The route then remains elevated as it crosses the River Trent for a second time and the ECML. The southbound carriageway in this location would be situated on the existing Nether Lock Viaduct and the northbound carriageway on a new structure that is built to the north of the existing bridge.

2.5.14 From Nether Lock Viaduct the existing embankment would be widened to the west utilising slopes ranging from 1:2 to 1:0.4 and would be founded on a free draining material to prevent erosion as flood waters retreat. The cross section has been minimised as far as possible to reduce the floodplain compensation requirements. The existing underpass to the water treatment works would be extended.

2.5.15 Following this, the existing A46 bends to the right whilst the route of the Scheme diverts to the north via a new section of off-line dual carriageway that bypasses the existing Brownhills and Friendly Farmer Roundabouts. At this location a new southbound on-slip would be provided from the existing Brownhills Roundabout and a new northbound off-slip provided to a new roundabout located to the west of the A1. The new roundabout would then be linked to the existing Brownhills Roundabout via a new two-way link road, which the new dual carriageway passes over on a new single span structure situated around 60 metres west of the A1. The route then crosses at a skew over the A1 on a new structure located around 100 metres north of the existing bridge between Brownhills and Friendly Farmer Roundabouts. The dual carriageway is elevated on embankment throughout this offline section with 1:2 and 1:2.5 slopes.

2.5.16 To the east of the A1 the dual carriageway bends to the left where it would tie back into the existing A46 dual carriageway between the Esso interchange and Shell service station. The alignment of the route has been designed such that the two service stations can be retained, with slip roads to the Esso interchange provided to/from the northbound carriageway. Throughout the short off-line section to the east of the A1 the dual carriageway is elevated on low embankment with 1:2.5 slopes.

2.5.17 At the point where the new dual carriageway ties back into the existing A46, the existing dual carriageway would be retained up until Winthorpe Roundabout at the north-eastern extents of the Scheme. This includes retention of the existing central reserve and vegetation within it. Where the dual carriageway approaches Winthorpe Roundabout there would be localised widening to tie in with existing routes and the modified Winthorpe Roundabout.

## Junctions

2.5.18 There are four new junctions that would be provided as part of the Scheme. These are shown on the General Arrangement Plans **(TR010065/APP/2.5)** and described further below.

### Farndon Roundabout

2.5.19 The existing Farndon Roundabout is a large five-arm roundabout with two lanes around its circulatory. The existing A46 connects into the north and south of the roundabout with two lanes at the entries and exits on both the north and south sides. Fosse Road ties into the south-western side of the roundabout with two lanes on the entry and one lane on the exit that provides access to/from the village of Farndon. Farndon Road connects into the north-eastern side of the roundabout with two lanes on the entry and one lane on the exit that provides access to/from Newark-on-Trent. A large private road connects into the south-eastern side of the roundabout with two lanes on the entry and one lane on the exit that provides access to/from businesses in that area.

2.5.20 The only amendments that would be delivered by the Scheme to these five-arms would be to widen the entries from the A46 from two to three lanes. This would still largely be constructed within the footprint of the existing road as the existing entry is slightly wider than needed, but would require some small, localised widening to accommodate the extra lane.

2.5.21 A third lane would also be provided on the east and west sides of the circulatory of the roundabout, with traffic signals on the A46 arms of the roundabout which will improve flows for both A46 and local traffic. This would largely be constructed by modifying the road markings within the existing roundabout footprint as the existing circulatory is wider than required for two lanes. Some widening would however be required on the inside of the northern quadrant to facilitate the traffic signals that would be installed at this location and the spiralised road markings where the lanes reduce from three lanes to two in this location.

### Cattle Market Junction

2.5.22 The existing Cattle Market Roundabout is a large five-arm roundabout with two lanes around its circulatory. The existing A46 connects into the east and west of the roundabout with two lanes at the entries and exits on both the east and west sides. The A617 ties into the north-western side of the roundabout with two lanes on the entry and exit that provides access to/from the villages of Kelham and Averham. The A616 connects into the north side of the roundabout with two lanes on the entry and one lane on the exit that provides access to/from Ollerton. The Great North Road connects into the south side

of the roundabout with two lanes on the entry and one lane on the exit that provides access to/from Newark-on-Trent. There is also a small private access from the south-western side of the roundabout that provides maintenance access to the flood defence in the location.

2.5.23 As part of the Scheme the existing Cattle Market Roundabout would be enlarged in size to form a gyratory, with the mainline elevated over the top to separate local traffic and A46 mainline traffic. Northbound and southbound slip roads would be provided to allow traffic to pass between the roundabout and mainline. The northbound off-slip and southbound off-slip would be two lanes with taper diverges, widening to three lanes at the entry to the new gyratory. The northbound on-slip and southbound on-slip would be single lane slip roads with taper merges and two lanes at the exit from the roundabout.

2.5.24 The roundabout itself would be elongated to accommodate these slip roads and the gyratory widened to provide a third lane on the north and south sides of the gyratory, it would be partially signalised to improve traffic flows. The elongation would be mainly to the south, with slight widening also to the north and east. The mainline would then pass over the centre of the new gyratory. The existing culvert beneath the roundabout would be extended to accommodate the widened earthworks.

2.5.25 The new A617 and A616 arms would maintain the two-lane entry and single lane exit, however, the existing structure would need be widened to the west to accommodate the highway tie in to the enlarged roundabout. This would allow the existing eastern kerb line and footpath to remain in place and avoid the need to widen the Grade II listed Causeway Arches 500 metres north west of level crossing (known collectively as Smeaton's Arches) on the eastern side.

2.5.26 A third lane would be provided on the northbound entry from the Great North Road to the roundabout which would require widening of the existing road to the west. A second lane would also be added to the exit from the roundabout. This second lane would continue for around 200 metres down to the junction with Kelham Road to provide greater capacity for queuing traffic when the railway level crossing is closed and to prevent traffic from queuing back onto the A46 mainline. To accommodate the second lane the widening would largely be to the west of the Great North Road, allowing the existing kerb line and footpath on the eastern side to remain in place. There would however be some localised widening to the east of Great North Road on the immediate exit from the roundabout.

2.5.27 A walking and cycling route would be provided through the junction with signalised crossings on the eastern slip roads.

2.5.28 The existing private maintenance access on the south-western side of Cattle Market Roundabout would be closed for safety reasons, with alternative access provided from Kelham Road.

### Brownhills Junction

2.5.29 To the west of the A1 a new grade separated Brownhills Junction would be provided to maintain local access from the A46 and to provide a link from the A46 to the A1 and A17. This is required as the new dual carriageway will now bypass the existing Brownhills and Friendly Farmer Roundabouts which previously provided that access.

2.5.30 The Brownhills Junction would consist of a new southbound on-slip from the existing Brownhills Roundabout, and a new northbound off-slip linking to a new roundabout that is located to the west of the A1 and north of the new dual carriageway. The new roundabout would provide local access to the businesses/properties in that location and would be connected to the existing Brownhills Roundabout via a new two-way link road.

2.5.31 The southbound on-slip would be a single lane with a parallel merge and two lanes from the exit of Brownhills Roundabout. As far as possible this slip road would utilise the existing A46 and retain the vegetation along this corridor. A narrow widening would be required where the new on-slip joins the A46 within the grass verge, requiring a small retaining wall to retain the existing vegetation. The new eastbound off-slip would be a single lane with an auxiliary diverge and one lane on the entry to the new roundabout. This slip road would be formed on earthworks with 1:2 side slopes to minimise the impact on the flood zone. The new roundabout would be formed in earthworks with 1:2.5 side slopes. The level of the roundabout has been set such that it matches that of the existing A1 and to avoid it flooding. The roundabout needs to be lit for road safety reasons but these would be smaller than 10.0 metre-high lighting columns to reduce light pollution to adjacent properties.

2.5.32 The new link road between the new roundabout and the existing Brownhills Roundabout would be a single lane in each direction, widening to three lanes on the approach to Brownhills Roundabout as per the existing entry. A right turn would be provided from part way along the southbound on-slip which would provide the access from Brownhills Roundabout to the new roundabout.

### Winthorpe Roundabout

2.5.33 The existing Winthorpe Roundabout is a large four-arm roundabout with two lanes around its circulatory. The existing A46 connects into the north-east and south-west of the roundabout with two lanes at the entries and exits on both sides. The A1133 ties into the north-western side of the roundabout with two lanes on the entry and one on the exit that provides access to/from the villages of Winthorpe and Collingham. Drove Lane connects into the south-eastern side of the roundabout with a single lane on the entry and exit that provides access to/from the Newark Showground and onwards to Coddington.

2.5.34 As part of the Scheme, Winthorpe Roundabout would be enlarged and partially signalised, with the Friendly Farmer link traffic passing through the centre of the roundabout in a through-about layout. Eastbound and westbound slip roads would be provided to allow traffic to merge and diverge between the mainline and the roundabout.

2.5.35 To achieve this the A46 would be widened on the approach to the roundabout to accommodate the tie-in to the larger roundabout, the addition of traffic signals, and to provide three lanes on both approaches. Two lanes would be maintained on each of the exits to the A46. The A1133 would also be realigned to the south-west to provide compliant deflection as it approaches the roundabout, with two lanes maintained on the approach and a single lane on the exit. Drove Lane would also be locally widened to accommodate the tie-in to the larger roundabout and to provide two lanes on the entry. A single lane would be maintained on the exit from the roundabout. The enlargement of the roundabout would also require the existing access to Newark Showground off Drove Lane to be made into an exit only, the entrance is moved south by 200 metres from the Friendly Farmer link road.

2.5.36 A new single carriageway link named the Friendly Farmer Link Road would be constructed to the south of the dual carriageway that provides a link between Winthorpe Roundabout and Friendly Farmer Roundabout. There would be two lanes from the exit of Winthorpe Roundabout to this link and three lanes at the entry which would be controlled by traffic signals. The right-hand two lanes would pass through the centre of the roundabout to provide access to the A46 northbound only, whereas the left-hand lane would provide access to the circulatory of the roundabout to allow access to the A1133 and Drove Lane. This would be provided with additional signage to ensure users are in the correct lane on approach to the roundabout.

2.5.37 The circulatory of the roundabout would vary between two and five lanes. This would require clear signage and road markings so that the roundabout is clear to understand for users. This would include the addition of a new signage gantry over the south-eastern portion of the circulatory where the circulatory splits to four lanes. The height of this gantry would be around 8.0 metres high as it needs to provide 6.45 metre clearance for high loads.

## Local roads description

2.5.38 Connections to all local roads in the vicinity of Farndon, Cattle Market and Winthorpe Junctions would be retained, with the new junction layouts being designed to accommodate them as discussed in the section above. This includes Fosse Road, Farndon Road, the A617, the A616, the Great North Road, Drove Lane and the A1133.

2.5.39 In addition, a new single carriageway link named the Friendly Farmer Link Road would be provided between the Friendly Farmer Roundabout and the new enlarged roundabout at Winthorpe. This would be constructed on low level earthworks with 1:2.5 side slopes and would be separated from the dual carriageway by a road restraint system with anti-dazzle louvres on the top to prevent glare from the opposing carriageways.

2.5.40 The existing Brownhills Roundabout would be impacted slightly by the Scheme, with potential changes to traffic signs, road markings and highway lighting.

2.5.41 The existing Friendly Farmer Roundabout would also be impacted by the Scheme. Works to this roundabout would include a minor realignment to the eastbound approach from Brownhills and to the arm that would become the Friendly Farmer Link Road. In addition, there would be some potential changes to traffic signs, road markings and highway lighting.

## De-trunking roads

2.5.42 The Applicant considered whether to de-trunk Brownhills Roundabout, Friendly Farmer Roundabout and the Friendly Farmer Link Road but it was decided to maintain it as a trunk road as each component provides a key strategic link between the A46 and A1.

## Service areas

2.5.43 There are two existing service areas along the length of the A46 between Farndon and Winthorpe that would be affected by the Scheme. Both of the service areas are located to the east of the A1 near Friendly Farmer Roundabout, with one being located to the north and one to the south. The southern service area would require amendments to its existing access/egress on the A46. This would become an egress point only with the existing access from the A17 becoming the only access to the site. The northern service area would require new access and egress that would be provided by a new single lane slip road with taper merges/diverges to tie into the new alignment of the A46. The location of the new access would require the demolition of the Mint Leaf Restaurant.

## Parking lay-by

2.5.44 An assessment has been undertaken of the Scheme using DMRB CD 169 - The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms, to determine the required parking lay-by provision. This assessment identified that only one parking lay-by would be required to fully comply with these standards which should be located on the southbound carriageway between

Winthorpe and Cattle Market, on the western side of the new Brownhills Junction Bridge. The lay-by would be to the west of the A1 above the new Brownhills Link Road as shown on the General Arrangement Plans **(TR010065/APP/2.5)**.

## Structures

2.5.45 A range of structures including overbridges, underbridges, retaining walls, culverts, Closed Circuit Television (CCTV) masts, a variable message sign and a sign gantry would be installed as part of the Scheme. The primary structures along the new dual carriageway are detailed below and are shown within the Structures General Arrangement **(TR010065/APP/2.6)**. The foundations for the new structures would be spread footings where possible, where piles have been indicated this is due to the weak underlying ground that would continue to settle over many years causing damage to the bridge and uneven road surface travelling onto the bridge which is not safe for users. These piles would be in situ concrete to provide a seal in the ground and remove the potential harm of migrating contaminants into the aquifer. The finish to new bridges and culverts would generally be similar to the existing adjacent structures and where possible wing walls would be formed with split block facing in a stretcher bond layout. At Cattle Market the split block facing would have a red coloured lower section to link in with the adjacent Smeaton red brick parapet walls with the introduction of local artwork to the walkway/cycleway route abutment wall being considered during the detailed design stage. Where there is a risk of graffiti defacing the structural elements an anti-graffiti coating or anti-access measures would be provided.

2.5.46 **Windmill Viaduct** - A new three span structure would be built alongside the existing, this would be similar visually to the existing, there would be a gap between the structures to allow both the inspection and maintenance to take place safely in the future. The bridge would be supported on bored concrete piles.

2.5.47 **Nottingham to Lincoln Railway Line Western Crossing** - A new structure would be built alongside the existing which would be very similar visually to the existing. There would be a gap between the structures to allow both to be inspected and maintained safely in the future. The bridge would be supported on bored concrete piles.

2.5.48 **Cattle Market East** - The bridge would be a single span structure supported on bored concrete piles.

2.5.49 **Cattle Market West** - This bridge would be similar in structural form to Cattle Market Junction East.

2.5.50 **Nottingham to Lincoln Railway Line Eastern Crossing** - The existing bridge would be widened to the north to accommodate the additional width required for the dual carriageway. The form would

match the existing, with a new steel parapet installed to the northern side of the bridge on the widened section. The bridge would be supported on bored concrete piles.

2.5.51 **Nether Lock Viaduct** - A new structure would be built alongside the existing, this would be similar visually to the existing. There would be a gap between the structures to allow both to be inspected and maintained safely in the future. The bridge would be supported on bored concrete piles.

2.5.52 **Nether Lock Railway Crossing** - A new structure would be built alongside the existing, this would be a longer span than the existing to avoid the existing Lincoln line railway chord. There would be a gap between the structures to allow both to be inspected and maintained safely in the future. The bridge would be supported on bored concrete piles.

2.5.53 **Brownhills Junction Bridge** - This bridge would be identical in structural form to the Cattle Market Junction structures with a single span supported on bored concrete piles or a spread concrete foundation. This span would be longer than required to provide an open feel for walkers and cyclists using the walking/cycling route below.

2.5.54 **A1/A46 crossing** - A single span structure would be provided to pass over the existing A1 slip roads and the A1 mainline carriageway. The bridge would be supported on bored concrete piles or a spread concrete foundation.

2.5.55 To allow the new A1/A46 crossing to be constructed, there is a need for the existing Slough Dyke to be re-aligned and moved approximately 10 metres east to facilitate the installation of the new bridge west abutment. The channel profile (cross-sectional dimensions, and nature of riparian habitat) would be reinstated to match existing. Scour protection would be provided in the vicinity of the western abutment.

## Public rights of way and other routes

2.5.56 Along the route there would be one permanently stopped up PRoW for which an alternative route would be provided (FP14) with other walking and cycling routes impacted slightly due to the Scheme. Provisions have been included in the design to replace and, where feasible and appropriate, improve existing routes and facilities within the Order Limits that are used by pedestrians and cyclists, the objective being to ensure continued connectivity would be provided for walking and cycling route users between communities and routes within the wider PRoW network.

2.5.57 Together, the General Arrangements Plans **(TR010065/APP/2.5)** and the Streets, Rights of Way and Access Plans **(TR010065/APP/2.4)** illustrate the locations of:

- The existing PRoW network within and surrounding the Order Limits
- PRoW that would be permanently closed (referred to as being 'stopped up')
- New and improved walking and cycling routes that would be delivered as part of the Scheme

2.5.58 The routes impacted together with new routes that would be provided by the Scheme are detailed below:

2.5.59 **Footpath FP14** - This footpath crosses the exiting A46 from north to south via an uncontrolled crossing. The Scheme would stop up the footpath where it crosses the A46 for safety reasons and provide new and improved cycle track facilities (available for use by pedestrians) around the east side of Cattle Market Roundabout which would be available as an alternative route.

2.5.60 **Footway/Cycleway at Cattle Market** - The existing footway/cycleway around Cattle Market provides a link between the walking and cycling facilities present on the A617, A616 and Great North Road. A signalised crossing would be provided for users to cross the northern A616 arm of Cattle Market and two signalised crossings provided for them to cross the eastern A46 arms. This route forms part of the 'Trent Valley Way' long distance walking route. Signalised crossings would be provided as part of the Scheme around the enlarged Cattle Market gyratory to maintain/improve these links.

2.5.61 **Footway/Cycleway at Brownhills Junction** - The existing footway/cycleway crosses the existing A46 west of Brownhills Roundabout from north to south through an existing underpass. This route provides a link between Newark-on-Trent and the village of Winthorpe via a second underpass beneath the A1, as well as forming part of the National Cycle Network Route 64 and the Trent Valley Way long distance walking route. The existing A1 and A46 underpasses would be retained as part of the Scheme, however the existing route between them would be impacted by the Scheme, requiring it to be diverted alongside the new junction link road that passes beneath the new dual carriageway and over the Brownhills northbound off-slip via a new signalised crossing to ensure continued connectivity. The Brownhills Junction Bridge has been detailed to provide an open feel for walkers and cyclists.

2.5.62 **Footway east of the A1** - There is an existing footway that runs alongside the south side of the existing A46 between Winthorpe Roundabout and Friendly Farmer Roundabout. The route crosses the A46 in four locations via uncontrolled crossings across the existing dual carriageway which connect to provide a link between Newark-on-Trent and the Newark Showground. These crossings are considered unsafe, and they would not be retained as part of the Scheme. Instead, a new signalised crossing would be provided across the existing A46 between Friendly Farmer Roundabout and the A1 crossing to link with the existing route that crosses the A1 slip roads

and the A17. A new footway/cycleway link would be provided from the A17 crossing point through land to the south of the showground and alongside the south side of the new Friendly Farmer Link to Winthorpe Roundabout and the first showground entrance on Drove Lane.

2.5.63 **Footpaths FP2 and FP3** - Historically there was a PRoW that ran north to south between Winthorpe village and the Newark Showground. This has been severed by the existing A46 with FP2 ending at the northern boundary of the A46 and FP3 ending at the southern boundary. The Scheme would reconnect these two PRoWs via a new footway/cycleway that links with FP2 to the north and runs parallel to the new dual carriageway before crossing beneath it alongside the A1. On the south side of the new dual carriageway, it will cross the existing A46 via a new signalised crossing and join the existing PRoW network that provides a connection with FP3. The ends of FP2 and FP3 will be permanently stopped up where they would result in a 'dead end' next to the existing A46.

2.5.64 **Footpaths/Cycleway at Winthorpe Roundabout** - Currently there is no walking or cycling provision around Winthorpe Roundabout. The Scheme would address this by providing a new walking/cycling link between Hargon Lane and Drove Lane that passes around the north and east sides via new crossings over Winthorpe Roundabout. This would provide a link between Winthorpe and the Newark Showground.

2.5.65 Information regarding the need for temporary diversions and closures of PRoW during construction of the Scheme is presented within the construction strategy contained in Section 2.6 of this chapter.

## Accommodation works and private means of access

2.5.66 Accommodation works and Private Means of Access (PMA) have been incorporated into the design of the Scheme, in discussion with the relevant landowners, to allow continued access for landowners and businesses, where existing access arrangements would be severed or lost as a result of the Scheme. Any PMAs to be stopped up are shown on the Rights of Way and Access Plans **(TR010065/APP/2.4)**.

## Speed limits

2.5.67 A speed limit has been allocated to each section of road modified by, and included within, the Scheme. The new dual carriageway would operate under the national speed limit between Farndon and Cattle Market and be restricted to 50mph between Cattle Market and Winthorpe for safety reasons associated with the constrained highways geometry. Speed enforcement for this section of road is

currently under consideration to encourage compliance with the reduced speed limit which would include average speed cameras.

2.5.68 The Friendly Farmer Link Road between Winthorpe Roundabout and Friendly Farmer Roundabout would be 50mph, with the speed limit of Brownhills Roundabout and Friendly Farmer Roundabout and the link between them also being reduced from 60mph to 50mph to match.

2.5.69 All side roads have been designed to retain the speed limits currently in place on the existing road network with the exception of Cattle Market Roundabout and a short length on Great North Road south of Cattle Market which would be reduced from national speed limit to 30mph.

2.5.70 The speed limits are illustrated on the Permanent Speed Limit Plans **(TR010065/APP/2.8)**.

## Traffic flows

2.5.71 Construction and operation of the Scheme is predicted to alter the speed, flow and routing of vehicles using both the local and strategic road networks.

2.5.72 Traffic flows have been generated using computer modelling for scenarios both with and without the Scheme, to predict the changes in traffic flows as a result of the Scheme at different years in the future. and has accounted for changes on the networks that are likely to occur from planned developments and projects being implemented, population increases and employment growth.

2.5.73 Further details of these forecast traffic conditions are presented in the Transport Assessment **(TR010065/APP/7.4)**.

## Floodplain compensation area description

2.5.74 The widened embankment for the A46 carriageway passes through land that is within the floodplain for the River Trent. By using this land, the Scheme has the potential to increase flood risk elsewhere unless mitigation is provided. This mitigation would include three FCAs which will seek to provide an equivalent volume of floodplain storage in the local catchment by excavating land at similar elevations to that which would be displaced by the Scheme.

2.5.75 To demonstrate that the FCAs are effective, analytical flood modelling has been carried out to quantify impacts caused by the Scheme, identify flood mitigation measures and optimise the floodplain compensation areas. Three areas have been identified for floodplain compensation. These are being referred to as the Kelham and Averham FCA, Farndon West FCA and Farndon East FCA, the locations of which are shown on the General Arrangement Plans **(TR010065/APP/2.5)**. Further information on the FCAs are detailed

within Appendix 13.2 (Flood Risk Assessment) of the ES Appendices **(TR010065/APP/6.3)**.

2.5.76 At Kelham and Averham FCA two areas of land north of the A617 would be utilised, connected by a ditch. A culvert comprising 4No 600mm diameter pipes would be constructed under the A617 highway to connect the FCA to an existing ditch that runs down the field boundary adjacent to Kelham Hall and connects with the River Trent. The Kelham and Averham FCA utilises some land that has separate proposals for use as a solar farm. The Environment Agency has provided agreement in principle to the dual use of this land for the Scheme and the solar farm development. The area covered by the FCA is 125,000m$^2$. At Kelham and Averham, the infrequency of flooding means that the land can be returned to arable use.

2.5.77 Two FCAs adjacent to the A46 and the River Trent immediately north of Windmill Viaduct would be provided, referred to as Farndon West FCA and Farndon East FCA. These would provide a combination of direct and indirect compensation to floodplain. Connections to the Old Trent Dyke to enable flood water conveyance would be enabled through a connection to the bank of the watercourse. This approach was chosen to ensure that the maximum use of the land, would be provided whilst also not generating a River Trent bypass of the existing River Trent channel. The area of the eastern FCA is approximately 141,000m$^2$ and the western FCA is approximately 171,000m$^2$. Farndon East and Farndon West would also be used as borrow pits during construction.

2.5.78 Following construction works, Farndon East FCA would be a permanent lake with fish passages for connectivity. This lake is expected to be groundwater fed. The design of the lake may include a stepped profile with grass embankments to encourage wetland habitat to develop. Farndon West FCA would comprise of residual ponds formed in post-borrow pit excavations with floodplain grazing marsh created in the northern extent of the site. Both Farndon East and Farndon West FCA sites would incorporate fish escape passages to mitigate the risk of fish entrapment as flood water recedes. Following consultation with the Environment Agency, the specific number, location and design of fish escape passages would be finalised during detailed design and the proposals will be tested in the fluvial hydraulic model to assess the potential impact to receptors. These features are shown on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/6.2)**.

## Drainage

2.5.79 The drainage design has been developed in accordance with the Construction Industry Research and Information Association (CIRIA) SuDS (sustainable drainage systems) Manual (C753) and the design standards contained in the following sections of the DMRB:

- LA 113 Road drainage and the water environment
- CG 501 Design of highway drainage systems
- CD 522 Drainage of runoff from natural catchments
- CD 529 Design of outfall and culvert details
- CD 532 Vegetated drainage systems for highway runoff
- CD 521 Hydraulic design of road edge surface water channels and outlets

2.5.80 Consultation with the Environment Agency, Nottinghamshire County Council (the Lead Local Flood Authority), Newark & Sherwood District Council and the Trent Valley Internal Drainage Board has shaped and influenced the drainage design and the assessment of flood risk, with an allowance for the effects of climate change included in the design.

2.5.81 As road drainage for the Scheme would discharge into networks maintained separately by the Applicant and the local authorities, the drainage design has accordingly been split into two networks:

i. Local road drainage – which would be adopted by Nottingham County Council (other than Cattle Market Roundabout that will discharge into the Applicant's system).

ii. Road drainage for the strategic road network (SRN) – which would be operated and maintained by the Applicant.

2.5.82 The surface water would be collected from the carriageway and conveyed to existing outfalls or to newly formed attenuation areas prior to outfalling into water courses and rivers. Water would generally be conveyed to the attenuation areas and outfalls along a network of swales located at the bottom of the widened embankments. Where this is not feasible then this would be conveyed within an underground piped network.

2.5.83 The swales and attenuation areas would be designed to clean the highway runoff water prior to discharge, removing silt and debris and where required removing water borne chemicals such as zinc and copper. Some existing ditches would be modified or realigned to accommodate the Scheme.

2.5.84 New culverts would be provided across the A617 at Kelham to connect the floodplain compensation area to the River Trent flood zone. Several existing culverts located along the existing A46 would require extending as a result of the Scheme.

2.5.85 Full details of the drainage strategy are presented in Appendix 13.4 (Drainage Strategy Report) of the ES Appendices **(TR010065/APP/6.3)** and shown on the Drainage Engineering Plans **(TR010065/APP/2.6)**.

## Road restraint systems

2.5.86 The following types of road restraint systems are incorporated into the Scheme for road safety, in accordance with relevant safety standards:

- Steel barriers would be used on slip roads, junctions and sections of carriageway where restraint is required.
- Parapets would be used on new bridge decks as part of the bridge design.
- Concrete barriers would be installed in the new central reserve of the dual carriageway between Farndon and Friendly Farmer to separate traffic travelling in opposite directions.
- Where possible existing steel barriers would be retained alongside the southbound carriageway and within the central reserve between Friendly Farmer and Winthorpe.
- A new barrier would be provided between Friendly Farmer Link and the new dual carriageway to separate the traffic. This would have anti-dazzle louvres on the top to prevent glare from the opposing carriageways.
- Where required, a pedestrian guardrail would be installed around traffic islands and at controlled crossing points across the Scheme.

## Road lighting

2.5.87 Road lighting incorporated into the design of the Scheme reflects the level of safety required for road users.

2.5.88 Lighting would be installed or modified at the following locations across the Scheme

i. Farndon Roundabout.
ii. Cattle Market Junction.
iii. Brownhills and Friendly Farmer Junctions including the slip roads into the Esso interchange.
iv. Winthorpe Roundabout.
v. The single carriageway link between Friendly Farmer and Winthorpe.

2.5.89 The requirements for road lighting at these locations has been determined based on increasing safety for all road users, the design of which has sought to minimise adverse impacts and effects on the following:

- Nocturnal species (for example bats)
- The existing landscape and visibility from nearby properties and dwellings after dark
- The setting of features associated with the historic environment (for example listed buildings)

2.5.90 The approach to the existing lighting on the dual carriageway between Friendly Farmer and Winthorpe Roundabout would be considered

during detailed design using the DMRB TA501 (Road Lighting Appraisal). If the removal of existing lighting at these locations is safe and beneficial to environmental receptors, they would no longer be included in the design.

2.5.91 Requirement 18 of the draft Development Consent Order **(TR010065/APP/3.1)** requires that a written scheme for the proposed highway lighting is approved by the Secretary of State, following consultation with the relevant local authority on matters relating to its function prior any part of the authorised development coming into use. The written scheme must reflect the mitigation measures set out in the relevant chapters of the ES.

## Road pavement and surfacing

2.5.92 New sections of road would be constructed using different types and layers of bituminous materials.

2.5.93 All sections of road within the as part of the Scheme would be constructed of either fully flexible or flexible composite pavement construction. The depth of the pavement layers on each section of road varies based on the volumes of traffic that are forecast to use the road.

2.5.94 Where existing roads would be modified to connect with new sections of road, or where improvements to accommodate future traffic growth are required, a surface treatment of either thin surface course system, hot rolled asphalt or stone mastic asphalt would be applied. Low noise surfacing would be provided along the new dual carriageway. Where existing pavements are retained along the existing A46 then these would be re-surfaced with low noise surfacing as part of the Scheme where this has not been undertaken already.

2.5.95 Where existing roads would be modified to accommodate traffic management arrangements, localised repairs would be undertaken to reinstate the existing carriageway to its original condition upon completion of the works.

## Kerbing

2.5.96 Kerbs would be provided at roundabouts and on side roads where a segregated cycleway or footway runs adjacent to the carriageway. Combined kerb and drainage systems would be installed on bridges where required.

2.5.97 Where required, combined kerb and drainage systems would be installed to convey surface water off the carriageway to nearby drainage systems.

## Road signs and marking

2.5.98 New road signage and markings would be installed across the Scheme to ensure route legibility for road users travelling on new and improved roads, and to support the Scheme objectives of reducing congestion and improving safety. Indicative road markings are shown on the General Arrangement Plans **(TR010065/APP/2.5)**.

2.5.99 As the Scheme would involve modifications to both the SRN and local road network, static road signage would be agreed with the applicable local authorities to ensure continuity is achieved along the adjoining routes.

2.5.100 Where existing signs within the Order Limits do not conform to new or modified road layouts within the Scheme, these would be removed and replaced with new signage containing updated information.

2.5.101 New and modified sections of road would be permanently marked using a combination of road markings and road studs to improve drivers understanding of the new road layout.

## Technology

2.5.102 The placement of new technology infrastructure has taken into account future maintenance requirements, allowing for off-site access wherever practicable.

2.5.103 CCTV coverage would be replaced where it is affected by the Scheme (Cattle Market, A1/A46 interface and the existing Message Sign to be relocated east of Winthorpe roundabout).

2.5.104 Emergency telephone may be installed within the parking lay-by to be located above Brownhills Junction.

2.5.105 The design of the Scheme includes one gantry for a variable message sign (VMS) which would be installed on the westbound approach to Winthorpe Roundabout on the existing dualled A46. The location of the VMS can be seen on the General Arrangement Plans **(TR010065/APP/2.5)**.

2.5.106 Installation of this technology would require improvements to be made to the existing communications network, for example, through the installation of new cabling and power connections that would be undertaken as part of the Scheme.

## Fencing and boundary treatments

2.5.107 Where formal boundaries are permanently required on new and improved sections of road, treatments would include wooden post and rail fencing or post and rail fencing with hedgerows.

2.5.108 Where fencing is installed along existing and new boundary lines to separate the new dual carriageway and its junctions from adjacent land it would incorporate a narrow strip of land between the fencing and the outer edge of cutting or embankment slopes for maintenance access.

2.5.109 Guide fencing, alongside the planting design, would be used to direct mammal species towards existing safe underpasses. The locations and extents of this fencing are illustrated on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/6.2)**.

## Land take

2.5.110 Although the Applicant is endeavouring to acquire the land required to construct, operate and maintain the Scheme by agreement, powers to compulsorily acquire land are being sought through the draft DCO **(TR010065/APP/3.1)**.

2.5.111 The Scheme's temporary and permanent land take requirements have been identified during the design-development and Environmental Impact Assessment (EIA) processes, and through consultation and engagement with affected landowners.

2.5.112 Land would be acquired permanently to accommodate the engineering, drainage and environmental components of the Scheme, and temporarily for works and operations including utilities diversions, construction compounds, vehicular access, haul routes, construction working areas, and materials storage.

2.5.113 The land required for the Scheme is illustrated on the Land Plans **(TR010065/APP/2.2)**, the extents of which are contained by the Order Limits.

2.5.114 In addition, permanent rights in land are being sought within the draft DCO **(TR010065/APP/3.1)** for future maintenance access by the Applicant, statutory undertakers and local authorities.

2.5.115 The Statement of Reasons **(TR010065/APP/4.1)**, which accompanies the Book of Reference **(TR010065/APP/4.3)** and Land Plans **(TR010065/APP/2.2)**, sets out the justification for why each land parcel is to be acquired either permanently or temporarily, or where permanent rights are sought.

## Order limits

2.5.116 The Order Limits define the maximum area of land required both temporarily and permanently to construct, operate and maintain the Scheme, the extents of which are illustrated on Figure 1.1 (Scheme Order Limits) of the ES Figures **(TR010065/APP/6.2)**.

## Limits of deviation

2.5.117 Lateral (horizontal) and vertical limits of deviation (LoD) have been incorporated around the main engineering components of the Scheme, around new gantries, and around areas where utility diversions would be required.

2.5.118 The purpose of the LoD is to allow minor modifications and refinements to be made to the preliminary design (the design that forms the application for development consent), where necessary, during the subsequent detailed design and construction stages.

2.5.119 The lateral LoD are illustrated on the Works Plans **(TR010065/APP/2.3)**. Any deviation from the lines, situations or locations shown on those plans would be contained within the extents of the LoD defined around the respective components or works.

2.5.120 The vertical LoD are referenced against the vertical profile levels indicated on the Engineering Plans and Sections **(TR010065/APP/2.6)**, and pursuant to Article 10 of the draft DCO **(TR010065/APP/3.1)** permit deviation of up to a maximum of 1 metre upwards or downwards for all works other than those outlined below which allow a greater limit of deviation downwards:

- Work No 33 – Mainline over Cattle Market roundabout – 1.0m up and 2.5m down.
- Work No 34 – Cattle Market Northbound offslip – 1.0m up and 2.0m down
- Work No 36 – Cattle Market Southbound onslip – 1.0m up and 2.0m down
- Work No 52 – Cattle Market Northbound onslip – 1.0m up and 2.0m down
- Work No 51 – Cattle Market Southbound offslip – 1.0m up and 2.0m down

2.5.121 In no case would the Scheme extend beyond the Order Limits.

2.5.122 The EIA of the Scheme has accounted for the potential of minor design flexibility and variation being required within the LoD.

2.5.123 Further details on the LoD can be found at Article 10 of the draft DCO **(TR010065/APP/3.1)**.

## Embedded mitigation measures

2.5.124 The Scheme design has been developed in line with the principles set out in DMRB GG 103 ‘Introduction and general requirements for sustainable development and design’. The Scheme design development has also been mindful of the objectives in the Environment Act 2021, to conserve and enhance where possible.

Embedded mitigation has been established in line with these principles, as appropriate, and was undertaken as part of an integrated design team to adhere to the principles of the design and mitigation hierarchy outlined in DMRB LA104 Environmental Assessment and Monitoring. The first principle of the mitigation hierarchy being to avoid potential effects, if at all possible, before seeking to minimise or mitigate for any unavoidable impacts through a well-developed mitigation strategy.

2.5.125 Embedded design features for the Scheme, grouped by National Highways' design principles in DMRB GG 103, are as follows:

### Design principle 1: Safe and useful, and understandable:

- Lighting columns limited to the junctions and approaches to these and to walking and cycling routes through the proposed Brownhills Junction and along the new Friendly Farmer Link Road.
- Traffic signals as required.
- Road restraint systems providing protection from features which may present a hazard, such as high embankments.
- Traffic signs at appropriate locations to provide route and destination information.
- Road markings as required.

### Design principle 2: Inclusive

- Access in and around the new junctions to accommodate walking, cycling and horse riding as required.
- Where the new alignment severs an existing public right of way, connectivity has been maintained wherever possible.

### Design principles 4, 5 and 6: Restraining, fitting into the context and environmentally sustainable are set out below

#### *Embedded mitigation measures for landscape and visual*

2.5.126 The following embedded mitigation measures have been incorporated into the Scheme design to avoid and reduce impacts on landscape character and visual receptors:

- An important part of the design philosophy is to asymmetrically widen the A46 to mitigate the potential impact on views from Newark-on-Trent and the setting of the Newark Conservation Area. This has been achieved by maintaining the position of the existing eastern edge of the carriageway in the southbound direction wherever possible and drainage solutions that aim to retain where practical the existing earthworks and screen planting and avoid vegetation clearance as far as practicable.
- Careful integration of earthworks into the landscape, shaping the new landform sympathetically to integrate the Scheme into the receiving landscape.

- The use of earth landscape bunds to the south of Winthorpe to further aid landscape integration and reduce the prominence of the Scheme as appropriate.
- The Scheme has been designed to retain existing carriageway and minimise earthworks thus allowing existing vegetation to be retained. Vegetation to be retained is shown on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/6.2)**.
- Slope profiles graded out and returned to agricultural use where possible to retain the open character of the area.
- Limit increase of vertical alignment of the newly constructed road, junctions, structures and associated infrastructure as far as practicable to minimise landscape and visual impacts.
- Lighting columns have been designed to the minimal height necessary and are directional to minimise impact on nearby properties and the wider night sky.
- New structures have been designed with consideration given to colour, form, and materials to minimise the visual prominence of these new features and aid their integration into the receiving landscape or architectural context, wherever practicable or appropriate. The design has been developed to reflect the aesthetics of neighbouring existing structures.
- The movement of Brownhills Junction off-slip so that it no longer crosses beneath the dualled A46 near to the A1, to substantially reduce the height of the new dual carriageway and its visual prominence within the area.
- Retention of the existing A46 for the new southbound on-slip from Brownhills Junction, allowing existing bunds and the majority of established vegetation to be retained.

### *Embedded mitigation measures for biodiversity*

2.5.127 The following habitat-focused embedded mitigation measures have been incorporated into the Scheme design:

- The Scheme has been designed to minimise habitat loss with a focus on avoiding high value and/or irreplaceable habitat present. All veteran trees within or in close proximity to the Order Limits have been retained. Habitats of principle importance and habitats of high distinctiveness (condition assessment for BNG) have been retained wherever possible. For example, attenuation ponds have been positioned to maximise retention of mature trees, hedgerows and habitat of principal importance.
- Habitat connectivity to the wider landscape has been maintained and enhanced wherever possible to maximise biodiversity opportunities within the Order Limits, particularly in respect to Local Wildlife Sites (LWSs) and priority habitats.
- The design of river crossings has considered the interaction of the Scheme with the River Trent and other watercourses, including bed and bank substrate, to minimise the impact on fluvial systems where safe and practical to do so.

- Runoff from the carriageway will filtrate through swales, discharge into forebays, followed by attenuation basins, before discharging into water courses, such as the River Trent and Old Trent Dyke, from controlled outfalls.
- Where possible, the design has incorporated drainage into existing infrastructure such as outfalls, swales/ditches and culverted pipes. This has helped to minimise the loss and damage to riparian and aquatic habitat, including disturbance of sediments and therefore reduce impacts to spawning fish.
- Maintenance activities have been considered during the design of the Scheme so that activities can be undertaken with minimal damage to the natural environment. This has included the provision of permanent access roads to attenuation ponds which can be used as temporary haul roads during construction.

2.5.128 The following species-focused embedded mitigation measures have been incorporated into the Scheme design:

- The incorporation of directional planting to direct badgers, otters and other mammals to use existing safe passages (including farmers tracks, under viaducts and culverts) to cross the A46 road network.
- The retention of trees supporting barn owl nest sites within 175 metres of works, where possible, including the temporary closure of the feature under ECoW supervision. The retention of features, where possible, that have potential to support roosting bats (for example mature trees and suitable built structures).
- The provision of a sensitive lighting design for construction and operation that takes bats, otters and other nocturnal wildlife into account. All lighting will be directional to minimise light spill onto retained habitat.
- Additional screening vegetation at height around areas of road will be implemented where practicable to minimise the chance of collisions between bats, barn owls and traffic and to maintain any existing commuting and foraging pathways.
- The features shown on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/6.2)** have been designed with consideration for climate resilient species which also contribute to protected species habitat creation.

### Embedded mitigation measures for archaeology and cultural heritage assets

2.5.129 The following embedded mitigation measures have been incorporated into the Scheme design to avoid and reduce impacts on archaeology and cultural heritage assets:

- The Scheme has been designed to avoid nationally designated buildings or monuments where possible. Where these impacts are inevitable, continuous engagement with the relevant stakeholders and considerate design have been undertaken to minimise the impact and integrate the design of the new grade-separated Cattle Market

Junction as much as possible into the context the Grade II listed Causeway Arches (also known as Smeaton's Arches).

- Archaeological surveys undertaken for the Scheme have revealed previously unknown archaeology sites; discussions with both the local authorities and Historic England have been undertaken to preserve such sites in situ where possible. This has included the reduction and movement of floodplain compensation areas, compounds and soil storage areas to preserve archaeological sites such as settlement sites south of Winthorpe (MM875) and at Kelham (MM514).
- Undertaking archaeological surveys and excavation to understand and record the heritage encountered along the route creating a greater knowledge of the area's heritage.
- Consultation with the hydrology teams to identify the potential for changes to the water table for sensitive sites and seek to minimise any change which could impact preservation levels and/or stability. As well as ensuring the locations of any ponds or flood compensation/storage areas do not unnecessarily impact heritage sites. These discussions have resulted in avoiding impacts north of Cattle Market Roundabout preserving vegetation south of the Civil War Redoubt (MM007), as well as reductions to floodplain compensation areas in Kelham and around Winthorpe to preserve archaeological sites.
- Geoarchaeological works have been undertaken to identify important deposits, further works will be undertaken as part of the archaeological mitigation, this will include sampling deposits for pollen sampling, Optically Stimulated Luminescence (OSL) and radiocarbon dating.
- Planting design has been used to further minimise any impacts on setting as well as reinforcing the existing landscape character and provision of noise fencing has been designed to manage noise and vibration in the vicinity of heritage assets. Increased planting west of Lowwood (MM053) and Winthorpe Conservation Area (MM432) is intended to reinforce the scrub and parkland character of planting in the area, and to screen the assets from the Scheme. Details are shown on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/2.7)**.
- The use of design to lessen the impact of new structures within the setting of heritage assets. Design of the new Cattle Market Junction is intended to indicate inspiration from, but not compete stylistically with, the Smeaton's Arches.
- Maintenance of access routes to heritage assets to maintain their viability. Design around Winthorpe is intended to maintain and improve access to the Conservation Area and associated listed buildings. Access to Langford Hall has been provided via a new access from the A1133, following the proposed closure of the existing southern access off the existing A46 due to safety reasons.
- Using land immediately adjacent to Winthorpe Conservation Area (MM432), which is included in the Order Limits, to lessen the visual impact of the road and mitigate against the impact of the Scheme on the character and appearance of the Conservation Area as well as

reduction of land take to avoid encroachment on the Conservation Area as much as possible.

- Limiting the increase of vertical alignments of new routes including junctions, structures and associated infrastructure as far as practicable to minimise landscape and visual impacts to the historic environment and its setting, including avoiding the location of fence lines at the top of any embankment slopes where they could dominate the skyline.
- Ensuring lighting columns are kept to a minimum height and are directional to minimise impact of light spill into the setting of heritage assets, whilst still meeting operational safety requirements.

### *Embedded mitigation measures for road drainage and water environment*

2.5.130 The following embedded mitigation measures have been incorporated into the Scheme design to avoid and reduce impacts on the water environment.

*Drainage*

- The drainage philosophy has been to maximise the use of sustainable drainage systems and integrating these with the landscaping provisions. Where possible water will be conveyed to attenuation areas via grass swales with trees and shrub planting integrated into the attenuation features. Appendix 13.4 (Drainage Strategy Report) of the ES Appendices **(TR010065/APP/6.3)** sets out the principles, design requirements and constraints for all drainage systems and features related to parts of the Scheme.
- Where technically feasible Sustainable Drainage Systems (SuDS) have been implemented to effectively manage pollution risk associated with road run-off.

*Watercourse crossings*

2.5.131 The Scheme crosses the River Trent three times (with an additional temporary access bridge crossing at Nether Lock) and has three culvert extensions for which the following measures have been incorporated into the Scheme design:

- Windmill Viaduct - The three span bridge has been designed with the new piers to be offset from the existing A46 piers, this would avoid works within the watercourse. The existing sheet piles will be extended along the northern river bank to provide scour protection at the pier to reduce the risk of bank erosion.
- Nether Lock Viaduct - The five span bridge has been designed to avoid works within the watercourse. On the northern bank of the River Trent, the proposed pier would be offset from the existing pier in order to maintain the access track, however there will be no encroachment into the watercourse.
- Culvert extensions - There are three existing culverts under the existing A46 that would be extended to the western side of the road to

allow the new northbound carriageways to be constructed over the top.

- Scour protection measures would be installed upstream of the culvert extensions and are anticipated to consist of rock blankets or gabion baskets made up in-situ and filled with imported stone.

*Watercourse realignment*

2.5.132 To allow for the culvert extensions under the Scheme at approximate chainage 1850 (shown on the General Arrangement Plans **(TR010065/APP/2.5))** there is a need for the Old Trent Dyke ordinary watercourse to be realigned. The realignment has been designed to be minor, with the upstream and downstream of the watercourse being realigned a total length of 20 metres and a width of 4 metres.

### *Embedded mitigation measures for geology and soils*

2.5.133 The following embedded mitigation measures have been incorporated into the Scheme design to avoid and reduce impacts on geology, soils and contaminated land:

- The avoidance of a contamination hotspot near Nether Lock that was identified as part of the Ground Investigation Report in Appendix 9.2 (Contaminated Land Risk Assessment) of the ES Appendices **(TR010065/APP/6.3)**. The design and construction strategy have been modified to ensure that the works would be between the existing ditch and toe of the embankment (and may also use the existing track) only, and there wouldn't be any works within the area of the contamination hotspot.
- The minimisation of the area of permanent and temporary land take of agricultural land within the Order Limits has been a fundamental consideration throughout the design of the Scheme.

### *Embedded mitigation measures for noise and vibration*

2.5.134 The following embedded mitigation measures have been incorporated into the Scheme design to avoid and reduce impacts from noise and vibration:

- Retention of the existing dual carriageway between Friendly Farmer and Winthorpe and building a new link to the south which will move the A46 away from Winthorpe (when compared with the Scheme design for the preferred route announcement).
- The use of a low noise surface course on new and existing carriageways to provide a reduction in road surface noise.
- The provision of noise bunds and barriers integrated as part of the landscape design to reduce adverse effects to noise receptors where required. The locations are shown on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/6.2)**.

### *Embedded mitigation measures for population and human health*

2.5.135 The following embedded mitigation measures have been incorporated into the Scheme design to avoid and reduce impacts on population and human health:

- Minimising the extent of direct, permanent land take affecting identified individual receptors.
- Providing appropriate signage for temporary WCH route diversions to direct users during construction and support access to community and recreational facilities using footpaths and cycleways.
- Integrating WCH infrastructure into the Scheme construction strategy, which includes the provision and locations for diversions of existing WCH routes, new crossings, new WCH routes, as well as ensuring access for key WCH routes is maintained.
- Mitigation to maintain access to all affected residential properties, businesses and areas of open space and recreation.
- The 50mph speed limit between Cattle Market Junction and Winthorpe Roundabout will reduce the noise impact and improve air quality.

### *Embedded mitigation measures for resource efficiency*

2.5.136 The following embedded mitigation measures have been incorporated into the Scheme design to ensure resource efficiency:

- Floodplain compensation is required to mitigate the loss of existing floodplain along the western side of the Scheme. This requires existing land to be lowered through the excavation of material which would ordinarily be sent to landfill. This has been mitigated by identifying some areas of land that can be used as a borrow pit to provide the structural fill to the widened embankments thus reducing the need to send material to landfill and import material from other locations.
- Retrofitting of existing structures, new rail and river crossings and an additional viaduct across the River Trent. Changes were made in the optioneering stages to try to preserve the fabric of the original structures (existing highways bridges including the Windmill viaduct and the Nether Lock viaduct) through the provision of a separate structure adjacent to the existing ones rather than removal of the historic structures and replacement with new.

2.5.137 A Design for Resource Efficiency (D4RE) online workshop was held on 01 April 2022 with the design team. The aim of the workshop was to identify opportunities to improve resource efficiency during the design stage, including the consideration of waste minimisation initiatives and identifying opportunities to reduce, reuse or recycle waste materials and improve resource efficiency.

2.5.138 A Resource Management Opportunities Matrix was used during the D4RE workshop to identify suitable opportunities. The matrix utilises the D4RE Tool which assists designers, through the workshop format which is based on a stepped approach of identify, evaluate, capture

and implement, to develop mitigation measures for resource use and waste management.

2.5.139 Opportunities were identified in the D4RE workshop, to enable resource efficiency and reduce waste. The following opportunities have been incorporated into the Scheme design:

- Repair and reuse of drainage along the existing carriageway.
- Sources of local fill material have been identified adjacent to the Scheme.
- Use of warm mix asphalt for the low noise surface course (causing less disruption to traffic during construction).
- Verge widths reduced across structures.
- Cross section of the embankments reduced and the central reserve has been narrowed to reduce the Order Limits.
- Low height modular gravity wall systems to reduce earthwork footprint along embankment widening.
- Low carbon concrete kerbs, drainage outfalls and drainage chambers.
- Retain as much soil as possible utilising soil restoration for carbon sequestration.
- Recycle of road pavement that is removed.

## 2.6 Construction, operation and long-term management

### Construction overview

2.6.1 At the preliminary design stage, the construction methodologies, programme and works information are indicative but are considered to be representative of the likely approach to how the Scheme would be implemented. The approach to construction would be further refined and finalised during the detailed design phase, post consent of the draft DCO **(TR010065/APP/3.1)**.

2.6.2 To minimise the disruption caused by construction of the Scheme, it is expected that certain works (referred to as advanced and pre-commencement works) would need to be undertaken ahead of the main construction works to allow these works to proceed, and to optimise the overall delivery programme for the Scheme.

2.6.3 Advanced works would be undertaken prior to consent for the draft DCO **(TR010065/APP/3.1)** being granted, and would be secured through separate permissions and landowner agreements outside the powers contained in the DCO. Advanced works will primarily comprise archaeological investigations, diversions of statutory undertaker's plant and demolition of buildings.

2.6.4 Pre-commencement works are defined within Article 2 of the draft DCO **(TR010065/APP/3.1)** and include preparation activities to make the area ready for the construction and would be undertaken after the Secretary of State has granted consent of the DCO. Pre-commencement works cover activities associated with site

preparation, the establishment of construction compounds (although some compound works may be undertaken as advanced works), construction of works accesses, security fencing and erection of signs. These works would also include preliminary site clearance works, haul roads, ecology works and works to PRoWs.

2.6.5 It is the intention of the Applicant that advanced works would be consented and delivered outside of the powers of the DCO. However, powers are included within the draft DCO **(TR010065/APP/3.1)** to deliver these advanced works, in the event that the Applicant is unsuccessful in securing the necessary consents and agreements outside of the DCO application and/or is unable to implement them in the periods assumed in the construction programme. These advanced works have been assessed within the ES.

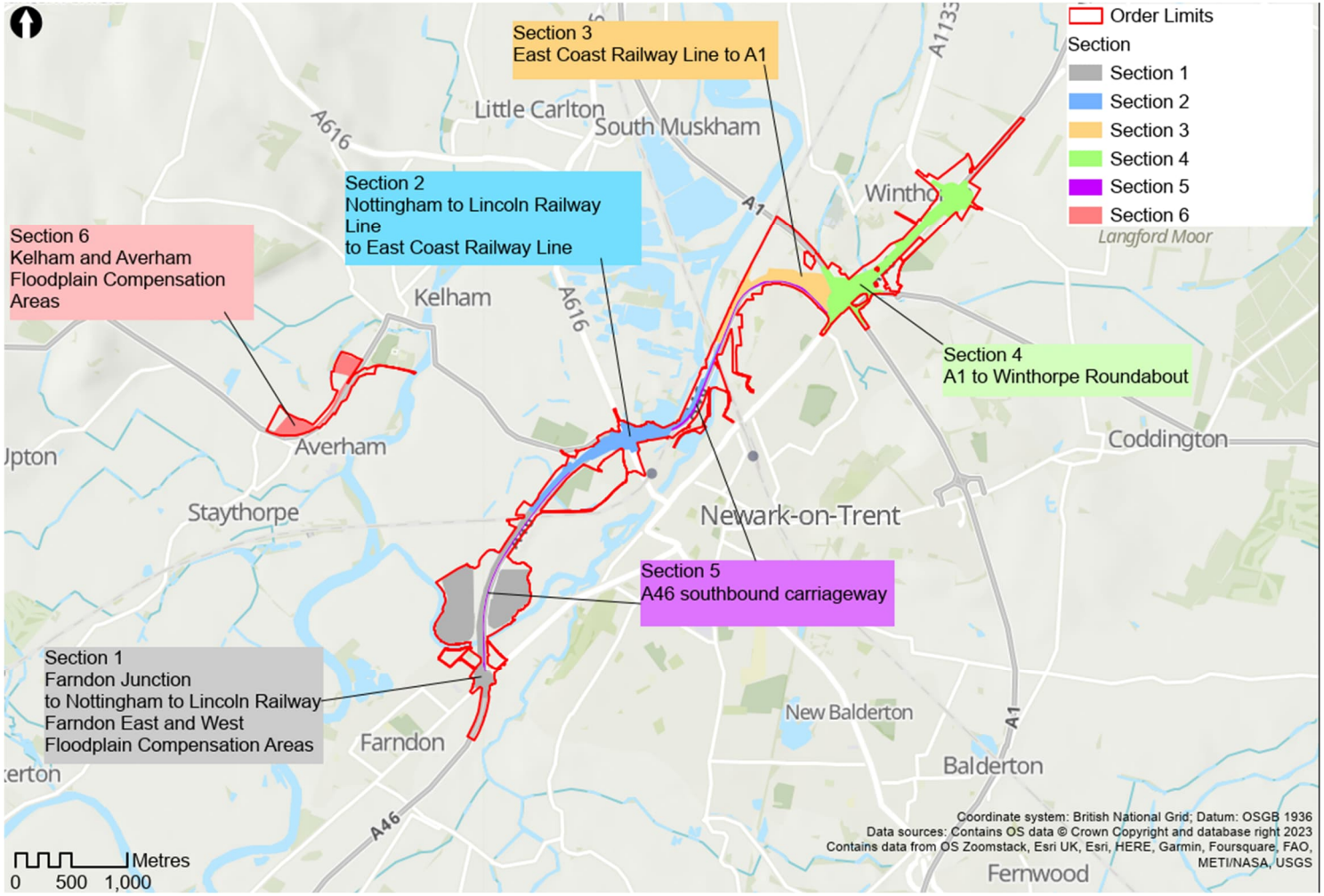
2.6.6 A Pre-Commencement Plan **(TR010065/APP/6.9)** has been prepared and submitted as part of this application. The Pre-Commencement Plan sets out the relevant controls and mitigation required for all Pre-Commencement Works and is secured by Requirement 17 of the draft DCO **(TR010065/APP/3.1)**.

2.6.7 Details of the advanced and pre-commencement works are shown in Table 2-4.

2.6.8 The main construction works would follow the advanced and pre-commencement works, with construction works split across the following sections of the Scheme, as presented in Figure 2-2 below:

- Section 1: Farndon Roundabout to Nottingham to Lincoln railway line
- Section 2: Nottingham to Lincoln railway line to East Coast Main Line
- Section 3: East Coast Main Line (ECML) to A1
- Section 4: A1 to Winthorpe Roundabout
- Section 5: Modifications to existing carriageway
- Section 6: Kelham and Averham FCA

**Figure 2-2: Main construction works sections**



2.6.9 Sections 1 to 4 would be delivered in parallel and would involve the widening of the existing A46 to form the two lanes for the new northbound carriageway and the central reserve. The new bridge structures and junctions would be constructed in this period. Section 5 involves the modifications required to convert the existing A46 carriageway into the two lanes for the new southbound carriageway. This would involve installation of new signage, road restraint systems and surfacing. This would take place following the completion of the new northbound carriageway, so that traffic can be diverted onto the new alignment, providing a traffic free working area.

2.6.10 Section 6 incorporates the works to form the floodplain compensation requirements in the land between the villages of Kelham and Averham. These works would be undertaken at the start of the programme to provide the required compensation ahead of the main embankment widening works commencing.

2.6.11 A phased approach to construction of some sections of the Scheme, particularly at the new and modified junctions at Farndon, Cattle Market, Brownhills and Winthorpe, would be adopted, with phasing determined by the requirements for Temporary Traffic Management (TTM) on existing routes and the need to minimise disruption to the travelling public, residents and businesses.

## Construction programme

2.6.12 National Highway's Delivery Plan 2020-25[12] explains how committed schemes included in the Road Investment Strategy 2 (RIS2)[13] will be delivered in the period up to 2025. The Scheme is included in the Delivery Plan 2020-25 as a development with a construction start date of 2024-25.

2.6.13 The Government has stated its commitment to delivering the Scheme in the RIS2 and has committed to funding the Scheme during the second Road Period (covering the financial years 2020-21 to 2024-25). Further details are contained within the Funding Statement **(TR010065/APP/4.2)**.

2.6.14 A delivery programme has been developed for the Scheme which assumes the main construction works would commence in August 2025, with works being completed and the Scheme being open for traffic in November 2028. These dates represent the key milestone dates for the Scheme. The main construction phase is therefore anticipated to last 3.5 years.

[12] National Highways (2020) Delivery Plan 2020-2025 [online] available at: 5-year-delivery-plan-2020-2025-final.pdf (nationalhighways.co.uk) (last accessed December 2023).

[13] Department for Transport (March 2020) Road Investment Strategy 2: 2020-2025 [online] available at: Road Investment Strategy 2: 2020-2025 (publishing.service.gov.uk) (last accessed December 2023).

2.6.15 Table 2-3 presents the indicative key dates and construction programme. These dates are based on an anticipated DCO decision in June 2025.

**Table 2-3: Indicative construction programme**

| Key construction programme element | Start date | Completion date |
|---|---|---|
| Anticipated DCO decision date | **June 2025** | |
| Advanced works | October 2023 | June 2025 |
| Pre-commencement works | June 2025 | August 2026 |
| Main construction works | August 2025 | November 2028 |
| Section 1 Farndon roundabout to Nottingham to Lincoln railway line | August 2025 | May 2028 |
| Section 2 Nottingham to Lincoln railway line to East Coast Main Line (ECML) | August 2025 | June 2028 |
| Section 3 ECML to A1 | August 2025 | May 2028 |
| Section 4 A1 to Winthorpe roundabout | August 2025 | June 2028 |
| Section 5 Modifications to existing carriageway | June 2028 | November 2028 |
| Section 6 Kelham floodplain compensation area | August 2025 | June 2026 |
| Scheme open for traffic | **November 2028** | |

## Advanced and pre-commencement works

2.6.16 Table 2-4 below summarises the types of works that are planned to be undertaken as advanced works and/or pre-commencement works. A summary of each aspect of the works are then provided. Further details on pre-commencement works are provided within the Pre-Commencement Plan **(TR010065/APP/6.9)**.

**Table 2-4: Advanced and pre-commencement works**

| Works | Phase of implementation | | Summary of anticipated activities |
|---|---|---|---|
| | **Advanced works** | **Pre-commencement works** | |
| Archaeological works | ✓ | ✓ | Archaeological mitigation works comprising full and detailed excavation, sampling and recording of specific archaeological sites located within the Order Limits. Installation of protection measures (fencing) around archaeological sites, where required. |
| Utilities works | ✓ | ✓ | Undertaking surveys of existing utilities within the Order Limits and implementing diversions and protection measures where necessary on key apparatus.<br>Utility works undertaken as advanced works would be completed under utility company permitted development rights or specific planning permission if required. |
| Baseline monitoring | ✓ | ✓ | Install survey monitoring points to record seasonal variational movement |

| Works | Phase of implementation | | Summary of anticipated activities |
|---|---|---|---|
| | **Advanced works** | **Pre-commencement works** | |
| | | | on existing assets, such as railway tracks, that may require monitoring during construction. |
| Construction compound establishment | | ✓ | Works to facilitate the establishment of the main construction compounds and, where necessary, satellite construction compounds within the Order Limits. |
| Temporary bridge over the River Trent | | ✓ | Construction of abutments and installation of temporary bridge to provide access to the Nether Lock Viaduct works. |
| Site clearance works | | ✓ | The clearance of vegetation (trees and hedgerows) within the Order Limits, with works undertaken outside of the bird breeding season where possible to avoid adverse ecological effects. |
| Preparation works at the Floodplain Compensation Areas | | ✓ | Topsoil and earthworks removal to implement all FCA sites.<br>Construction of a culvert beneath the A617 between Kelham and Averham. |
| Haul roads and access works | | ✓ | Works to form construction haul roads and site accesses within the Order Limits. |
| Ecological works | | ✓ | Undertaking of ecological pre-construction surveys and, where applicable, preliminary ecological works (such as ecological fencing and bird/bat boxes). |
| PRoW works | | ✓ | Implementing measures on routes within the Order Limits that coincide with areas where advanced and pre-commencement works activities would be undertaken to:<br>i. Segregate users from the works with temporary fencing<br>ii. Divert users onto new temporary routes<br>iii. Temporarily close routes to users |
| Demolition | ✓ | ✓ | Demolition of properties within the Order Limits. |
| Temporary fencing | | ✓ | Erection of boundary and security fencing. |
| Vehicle recovery areas | | ✓ | Establishment of vehicle recovery bases prior to the main construction works. |
| Temporary CCTV and speed enforcement | | ✓ | Installation of temporary CCTV masts and cameras and speed enforcement cameras to monitor traffic conditions and enforce the temporary speed |

| Works | Phase of implementation | | Summary of anticipated activities |
|---|---|---|---|
| | Advanced works | Pre-commencement works | |
| | | | restrictions in place during the delivery of the main works. |
| Advanced vegetation planting | ✓ | ✓ | There are locations were planting could be undertaken in advance of the DCO being granted with agreement with the landowner. |

## Archaeological works

2.6.17 Archaeological works would be required ahead of the main construction phase to undertake the excavation, sampling and recording of buried archaeology. This is particularly relevant to the locations at the floodplain compensation areas, the new Brownhills Junction and the field systems between the A1 and Winthorpe roundabout which form part of the critical path programme works.

2.6.18 Details of the planned archaeological works and the locations of sites to be excavated and sampled would, in accordance with requirement 9 of the draft DCO **(TR010065/APP/3.1),** be detailed in the Archaeological Mitigation Strategy (i.e. Phase 3 update of the Archaeological Management Plan) **(TR010065/APP/6.8)**.

## Utilities works

2.6.19 Overhead and buried utilities would be impacted by the Scheme, and therefore diversion or protection works would be required to a number of existing infrastructure assets and services during the advanced and pre-commencement works phases and, where necessary, in the early stages of the main construction works. The full scope of these works would be developed and agreed with each affected asset operator.

2.6.20 The following classification of works would be undertaken on the existing utility assets within the Order Limits:

- Protection Works. The existing asset is retained in its current state but with either an exclusion zone or bridging slab installed to protect the asset during construction and from the loading from the elements of the new Scheme. Several of the existing service corridors pass under the existing A46 embankment and would have pre-existing protection measures in place. The Scheme's solution would be to carry out an assessment of the loading on the asset to determine, with approval of the asset owner, if a new protection slab is required to protect the asset from the temporary loadings associated with the construction traffic and the permanent loadings from the embankment widening.
- Single diversion. The asset is diverted onto a new permanent alignment prior to construction activities commencing.

- Multiple phased diversion. Where there are land or logistic constraints it may be necessary to divert the service into a temporary alignment, to allow construction to take place, and upon completion of the works the service is diverted into a new, permanent, alignment. This may be required where the proposed permanent alignment for the asset is within the construction area and that a single phased diversion would result in either excessively deep alignment or would create a hazard during the construction operation.

2.6.21 Works relating to the installation of protection slabs would involve the removal of topsoil and subsoil to a specified depth, followed by the formation of a reinforced concrete slab positioned on top of compacted fill material.

2.6.22 Works relating to the diversion of assets would likely involve different combinations of the following activities:

- Excavating trial holes to determine the exact alignment and depth of existing utilities and the desired connection points.
- Installation of new assets and connections to existing service.
- Installation of poles for overhead equipment.
- Survey of the completed asset for recording purposes.
- Testing and commissioning of the new assets.
- Decommissioning and removal of redundant equipment.

2.6.23 Trenchless techniques such as horizontal directional drilling and micro tunnelling would also likely be employed for installing certain buried utilities such as underneath the existing carriageway or areas where open trenching is not suitable. This usually constitutes excavating separate launch and reception pits, which vary in size depending on the method chosen, where the burrowing machinery would work from and to.

2.6.24 All service shut downs would be communicated to those affected via the statutory undertaker carrying out the works. If access to properties would be affected during diversionary works, this would be communicated to the relevant landowners with access maintained where possible.

2.6.25 The diversion and protection works identified in Table 2-5 need to be undertaken during the advanced and pre-commencement works phase to facilitate the delivery of the main construction works. It is assumed that where diversions are to occur as advanced works the diversions would be delivered under the statutory undertaker's permitted development rights. In any event, all advanced and pre-commencement works have been included in the draft DCO **(TR010065/APP/3.1)** and assessed in this ES.

## Table 2-5: Utility protection and diversion works

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| Section 1 Farndon Roundabout | 2 and 10 | National Grid | 132kv Overhead cables | Protect | The pylon and overhead cables at Farndon Roundabout would not be impacted by the Scheme. An exclusion zone would be established around the base of the pylon and appropriate height restriction barriers installed under the overhead lines in line with the Health and Safety Executive's guidance document, GS6, avoiding danger from overhead power lines. |
| Section 1 Farndon Roundabout | U1 | Local Authority (Nottinghamshire County Council) | Low voltage street lighting cables and feeder pillars | Single phase | Temporary diversion of the existing street lighting cable with protection measures to facilitate the construction of the haul road access to the south abutment of the Windmill Viaduct (Work No 7). |
| Section 1 Farndon Roundabout | 2 | Openreach | Buried ducted communications cable | Protect or single phase | On confirmation of the depth of the asset and the interface with the widening works to the Farndon Roundabout, the Scheme would be able to confirm if the asset can be protected with a cover slab or would require a local diversion, likely to involve the lowering of the asset, under the interface with the |
| Section 1 Farndon Roundabout | 2 | National Grid | Buried 11kv cable | Protect or single phase | |
| Section 1 Farndon Roundabout | 2 | Virgin Media | Buried ducted communications cable | Protect or single phase | |

[14] All Work Numbers referred to in this table are as set out in Schedule 1 of the draft DCO **(TR010065/APP/3.1)**.

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| | | | | | permanent works. |
| Section 1 Farndon Roundabout | 2 | Severn Trent | Buried clean water pipe | Protect | Protection slab over the asset to protect it from temporary construction traffic loading. |
| Section 1 A46 southbound | 16 | Virgin Media | Buried ducted communications cable | Protect | Protection slab over the asset to protect it from construction works in the construction of the new access road on the southbound A46 (Work No 16) |
| Section 1 Nottingham to Lincoln railway west crossing | U2 | National Grid | Buried and overhead 33kv cable. | Single phase and protect | Diversion of the existing 33kv overhead cables and construction of protection slab to allow the widening of the existing highway embankment to form the new A46 northbound carriageway (Work No 4). |
| Section 1 Nottingham to Lincoln railway west crossing | U3 | National Grid | Buried and overhead 11kv cable | Single phase and protect | Divert and lower the duct to avoid the excavations for the new bridge pier and abutment (Work No 26). Protection measures implemented to protect assets from the temporary construction traffic loading. |
| Section 1 Nottingham to Lincoln railway west crossing | U4 | Openreach | Buried ducted communications cable | Single phase and protect | |
| Section 2 Alignment of the old Kelham Road, now a private road. | U5 | Cadent Gas | Buried medium pressure gas main. | Single phase and protect | Diversion and protection of section of a medium pressure gas main to allow construction of the new northbound carriageway of the A46 (Work No 33) and the new slip road (Work No 34). |
| Section 2 Cattle Market | U6 | Severn Trent Water | Buried water main | Single phase and protect | Diversion and protection of section of a buried water main and values to allow construction of the new northbound |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| | | | | | carriageway of the A46 (Work No 33) new slip roads (Work No 34 and 36) and new retaining wall (Work No 35). |
| Section 2 Cattle Market junction | U9 | Openreach | Buried ducted communications cable | Single phase | Divert into new verge along the Great North Road (Work No 49) and around new roundabout (Work no 40). Divert short section into new verge along the Kelham Road (Work No 42) and Great North Road (Work No 45). |
| Section 2 Cattle Market junction | U10 | National Grid | Buried 11kv cable and transformer pole | Single phase and protect | Relocate Transformer pole on Great North Road to allow construction of new roundabout (Work No 40). Provide new ducted route under the A46 (Work No 33) and slip roads(Work Nos 51 and 52). |
| Section 2 Cattle Market junction | U7 | Virgin Media | Buried ducted communications cable | Single phase | Diverted into new ducted network to allow construction of the new slip road (Work No 36) and roundabout (Work No 40). Diverted along Great North Road and around new roundabout and in the verge of the new slip road. |
| Section 2 Nether Lock Viaduct | U12 | National Grid | Buried 11kv cable | Single phase and protect | Cable within tow path. Divert (if necessary) and protect where the access track for the satellite compound on the north side of the River Trent (Work No 65) crosses the cable route between factory building and |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| | | | | | the ECML. |
| Section 2 Nether Lock Viaduct | U13 | National Grid | Buried 11kv cable | Single phase and protect | Cable within land adjacent to old factory building. Divert (if necessary) and protect where the cables interface with the new bridge pier for the Nether Lock viaduct (Work No 64) on the north side of the River Trent. |
| Section 2 Nether Lock Viaduct | U11 | Openreach | Buried ducted communications cable and overhead cable | Single phase | Divert overhead cable alongside the tow path into duct to protect cable during construction of the new Nether Lock Viaduct (Work No 64). |
| Section 3 Quibell's Lane | U14 | Openreach | Buried ducted communications cable | Single phase and protect | Diversion required for the extension of the sewage treatment works underpass (Work No 70) and construction of the new northbound carriageway of the A46 (Work No 56). Divert into new alignment, parallel to the new embankment construction. Construct protection slabs at designated construction traffic crossing points and under new embankment. |
| Section 3 Crankley Point | 56 | Severn Trent Water | Buried foul sewer | Protect | Protection slab over the main at designated construction traffic crossing points and under the embankment for the new northbound carriageway of the A46 (Work No 56). |
| Section 3 Crankley | U15 | National Grid | Buried 11kv cables | Single phase | Diversion and protection slab over |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| Point | | | | and protect | cables at designated construction traffic crossing points and under the new embankment for the new northbound carriageway of the A46 (Work No 56). |
| Section 3 Crankley Point | 56 | Severn Trent Water | Buried water main | Protect | Protection slab over 3 inch water main at designated construction traffic crossing points and under the new embankment for the new northbound carriageway of the A46 (Work No 56). |
| Section 3 Brownhills borrow pit | U16 | Severn Trent Water | Buried foul water main | Single phase and Protect | Protection slab over 150mm dia water main at designated construction traffic crossing points for the borrow pit area to the north side of new Brownhills junction roundabout (Work No 83). Diversion of pipe around the attenuation basins (Work No 74). |
| Section 3 Winthorpe Road | U18 | Cadent Gas | Buried medium pressure gas main | Single phase | Divert gas main into new corridor in the verge of the new footway/cycleway (Work No 81) and the verge of the new link road (Work No 87) to allow construction of the new embankment for the A46 carriageway (Work No 76) and slip road (Work No 79). |
| Section 3 Winthorpe Road | U17 | Severn Trent Water | Buried water main | Single phase and protect | Divert water main into new corridor under the new embankment for the A46 carriageway (Work No 76) and slip road (Work No 79). |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| Section 3 Winthorpe Road | U19 | National Grid | Buried 11kv cable | Single phase | Divert electrical cables into the verge of the new footway/cycleway (Work No 81) and the verge of the new link road (Work No 87) to allow construction of the new embankment for the A46 carriageway (Work No 76) and slip road (Work No 79). |
| Section 3 Winthorpe Road | U20 | Openreach | Buried ducted communication cables | Single phase | Divert cables into the verge of the new footway/cycleway (Work No 81) and the verge of the new link road (Work No 87) to allow construction of the new embankment for the A46 carriageway (Work No 76) and slip road (Work No 79). |
| Section 4 A46 northbound | U23 | Openreach | Buried ducted communication cables | Single phase | Diversion between Friendly Farmer Roundabout and north of Winthorpe Roundabout into a new alignment along the north side of the northbound carriageway of the A46 (Work No 100). |
| Section 4 A46 northbound | U21 | Virgin Media | Buried ducted communication cables | Single phase | Diversion between Friendly Farmer Roundabout and north of Winthorpe Roundabout into a new alignment along the north side of the northbound carriageway of the A46 (Work No 100). Includes diversion of ducts and cables within the verge of the southbound carriageway at Friendly Farmer roundabout into the |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| | | | | | verge of the new Friendly Farmer Link road (Work No 104). |
| Section 4 Friendly Farmer roundabout | U22 | Severn Trent Water | Buried water main | Single phase and protect | Divert main, re-position values and install protection measures to allow construction of the new A46 dual carriageway to the east of the A1 (Work No 100) and the Friendly Farmer Link road (Work No 104). |
| Section 4 A46 southbound | U24 | National Grid | Overhead 11kv cable and substation | Single phase | Divert overhead cables into buried alignment within the verge of the new Friendly Farmer Link road (Work No 104). Relocation of existing substation to the east of the Shell service area access to allow for the construction of the new access provision (also included in Work No 104). |
| Section 4 Winthorpe roundabout | U27 | Virgin Media | Buried ducted communication cables | Single phase | Divert duct and cable into new alignment within the verge of the new A46 northbound carriageway (Work No 100) and under a new crossing to the north of side of the Winthorpe roundabout (Works No 108). |
| Section 4 A1133, Winthorpe roundabout and Drove Lane | U26 | TATA (EUNE Networks) | Buried ducted communication cables | Single phase | Divert duct and cable into new alignment within the verge of the new A1133 (Work No 109) under the A46 dual carriageway (Work No 100) and the Friendly Farmer Link (Work No 104) and then within the new verge of Drove |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| | | | | | Lane (Work No 115). |
| Section 4 Winthorpe roundabout and Drove Lane | U25 | Openreach | Buried ducted communication cables | Single phase | Divert duct and cable into new alignment around the new Winthorpe roundabout (Work No 108) with crossing under the A46 dual carriageway to the west of the roundabout (Work No 100) and east of the roundabout (Work No 119). Section of duct and cable diverted into new verge of Drove Lane (Work No 115). |
| Section 4 A1133, Winthorpe roundabout and Drove Lane | U28 | National Grid | Buried and overhead 11kv cables | Single phase | Divert the existing overhead and buried cables (including existing transformer poles) at Winthorpe roundabout, A1133 and Drove Lane into new buried alignments within the verge of the A1133 (Work No 109), the Friendly Farmer Link Road (Work No 104) and Drove Lane (Work No 115). |
| Section 6 A617 Main Road | U30 | National Grid | Buried and overhead power cable. | Single Phase | Remove and provide new connection to pump house located within the floodplain compensation area to the north side of the A617 (Work No. 125) |
| Section 6 A617 Main Road | U29 | National Grid | Overhead power cable. | Protect | Install protection measures to the overhead cables on the south side of the A617 during the construction of the new culvert crossing under the A617 (Work No 124). |
| Section 6 A617 Main Road | U31 | Open Reach | Buried ducts and cables | Divert and Protect | Diversion and protection measures to the buried ducted |

| Location | Work No[14] | Asset owner | Asset type | Protect or divert | Details |
|---|---|---|---|---|---|
| | | | | | cable in the north verge of the A617 during the construction of the new access road (Work No 122) and the new culvert crossing (Work No 124). |
| Section 6 A617 Main Road | U32 | Cadent Gas | Buried medium pressure gas main | Single phase | Diversion of the gas main required within the south verge of the A617 during the construction of the new culvert crossing (Work No 124). |
| Section 6 A617 Main Road | U33 | Severn Trent Water | Buried water main | Protect | Diversion and protection measures installed to protect the main during the construction of the new culvert crossing (Work No 124). |

## Construction compound establishment works

2.6.26 The Scheme requires a main construction compound and smaller, satellite compounds within the Order Limits to facilitate, the advanced, pre-commencement and main construction works. The locations of the compounds are shown on Figure 2.4 (Location of Temporary Works Areas Required During Construction) of the ES Figures **(TR010065/APP/6.2)**.

2.6.27 The main compound would be established at the site of the old Nottinghamshire County Council Highway Maintenance Depot site, as identified in Figure 2-3 below. The site has previously been used as a highway depot for Nottinghamshire County Council and has been unused for over a decade. It is identified within the Newark & Sherwood Local Development Framework[15] as being appropriate for B1, B2 and B8 development (industrial, storage or distribution).

[15] Newark & Sherwood District Council (July 2013) Local Development Framework [online] available at: Newark & Sherwood Allocations & Development Management DPD (cartogold.co.uk) (last accessed December 2023).

**Figure 2-3: Location of main construction compound**


2.6.28 The site has been selected as a suitable location due to its existing infrastructure and previous use as a maintenance depot.

2.6.29 The main construction compound would include office units, welfare facilities, materials handling and storage and production facilities.

2.6.30 In addition to the main construction compound several smaller satellite construction compounds would be established at key locations within the Order Limits. The satellite compounds are principally located at the sites of the new bridge structures. The satellite compounds are identified in Table 2-8 later in this chapter.

2.6.31 The construction compound establishment works would be undertaken prior to the main construction works and would involve the following activities:

i. Upgrade of the existing substation, undertaken during the advanced works stage.

ii. Widening the existing access from the Great North Road and creating a new access from the Cattle Market Roundabout.

iii. Clearing weeds and vegetation that are not being retained within the site.
iv. Installation of new drainage and sewerage system, where required, and connecting to the existing infrastructure.
v. Installation of new ducts and cables to provide power, telecoms and data networks services to the office units.
vi. Installation of new road surfacing for internal roads and car parking in areas where the existing is not in a suitable condition.
vii. Installation of lighting to the site.
viii. Erection of office cabins and welfare facilities.
ix. Installation of vehicle recovery base.

2.6.32 Details of the individual functions of the main and satellite construction compounds are presented in the Construction compounds section (paragraphs 2.6.233 to 2.6.248) of this chapter.

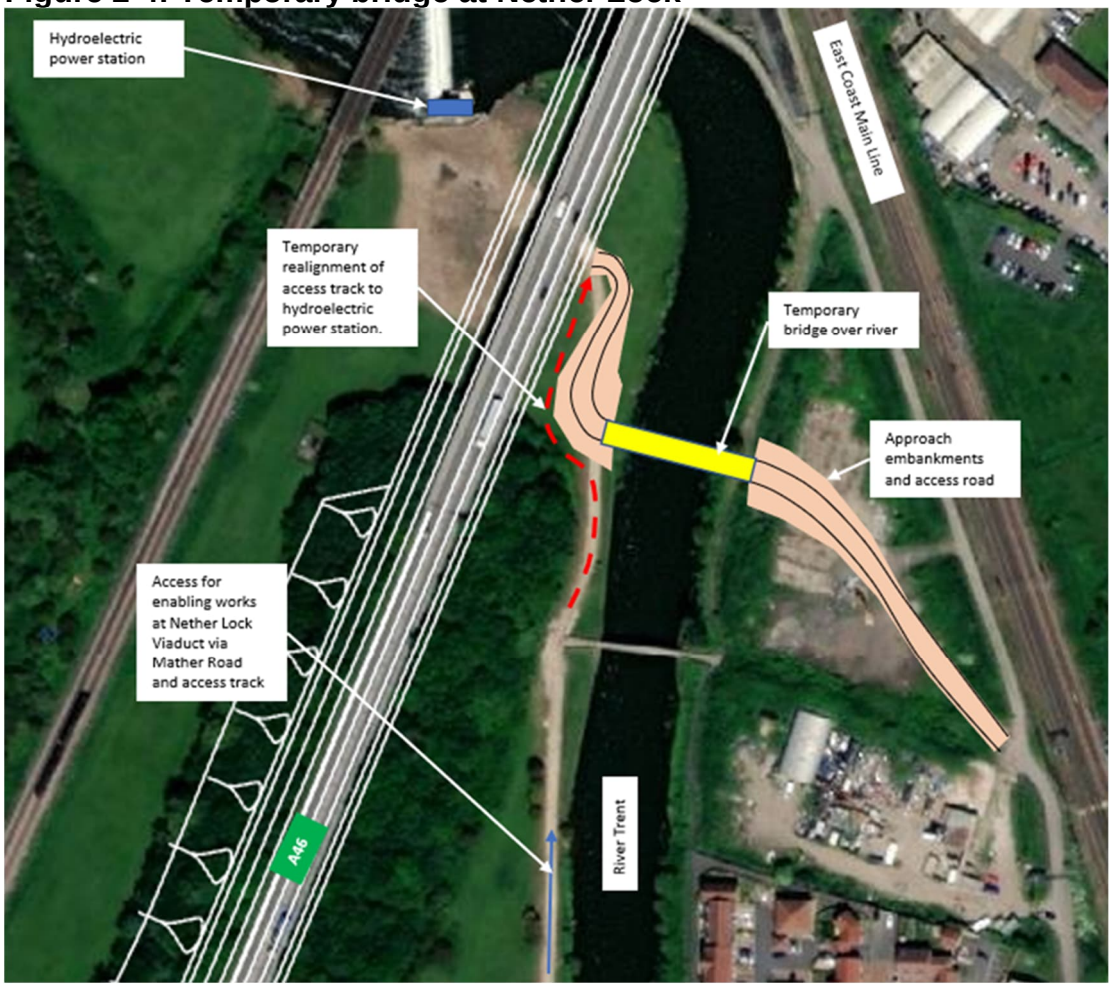
### Temporary bridge

2.6.33 Access to the land parcels to the southern side of the River Trent at Nether Lock is currently limited and restricted. Currently access to the land between the Nottingham to Lincoln railway line and the A46 carriageway is via a narrow stone track between the Kings Marina and the hydroelectric power station at Nether Lock Weir.

2.6.34 This track is unsuitable for large construction plant as there are several constraints including low bridges and access through an operating marina. Therefore, a temporary bridge would be constructed (Work No 63) over the River Trent to provide a suitable construction access route. Access to the temporary bridge crossing would be via Trent Lane, Maltkins Lane and through the temporary compound area to the southern side of the River Trent (Work No 62). These are shown in Figure 2-4 below.

2.6.35 The existing access track between the Kings Marina and the hydroelectric power station would need to be utilised in the advanced and pre-commencement works phases to facilitate the construction of the west abutment of the temporary bridge.

**Figure 2-4: Temporary bridge at Nether Lock**




## Site clearance works

2.6.36 Site clearance activities would need to be undertaken prior to the main construction works commencing, and would involve the removal of existing trees, hedgerows and vegetation from areas where construction works are planned to be undertaken.

2.6.37 To avoid disturbance to nesting birds, site clearance works (including the demolition of buildings and the removal of any woody vegetation and ground flora) would be undertaken outside the bird nesting season (March to August inclusive). In the event site clearance works would have to take place during the bird nesting season, such works would be preceded by a nesting bird survey conducted by a suitably qualified Ecologist.

2.6.38 Site clearance works would be undertaken under the supervision of the Ecological Clerk of Works, in accordance with the measures presented in the Pre-Commencement Plan **(TR010065/APP/6.9)**.

2.6.39 Sections of the existing vegetation adjacent to the railway lines and the highway would be required to be cleared utilising night-time lane

closures, or within rail possessions, to protect the workforce and the traveling public.

### Kelham and Averham FCA

2.6.40 Advanced and pre-commencement works would be undertaken along the A617 to divert the existing gas main so that it avoids the new piped culvert.

2.6.41 Works accesses would be constructed on the east and west side of the A617 to access the works area for the new culvert and the floodplain compensation areas.

2.6.42 The new culvert would be constructed in two phases, utilising temporary traffic lights and lane closures on the A617. Access to the east side of the culvert would be via a works access off the southbound carriageway. The land on the east side of the A617 is an active airfield. A secure fence will be erected around the works area.

2.6.43 The existing ditch between the culvert and the River Trent would be inspected and cleared where required.

2.6.44 The following paragraphs (2.6.45 to 2.6.52) detail the works that would be included in the main works phases at the Kelham and Averham FCA.

2.6.45 The southern section of the Kelham and Averham FCA would be accessed via a works access off the northbound carriageway of the A617. The existing pond would be drained utilising pumps and settlement tanks, discharging the water into the adjacent ditch.

2.6.46 The power supply to the pump house would be disconnected and the equipment removed.

2.6.47 The topsoil would be stripped and stored in the field to the west of the excavation.

2.6.48 The floodplain compensation area would be excavated using excavators and dozers. The excavated material would be stockpiled adjacent to the temporary site haul road where it would be loaded onto wagons for transportation to the embankment and stockpile areas in Sections 2, 3 and 4.

2.6.49 An area of the southern excavation would be locally lowered to create a new storage pond.

2.6.50 The lowered areas would be re-soiled using the topsoil from the adjacent stockpiles.

2.6.51 The northern section of the Kelham to Averham FCA would be created in two halves, with the stripped topsoil being stored on one side of the existing field.

2.6.52 The swale and bund between the two compensation areas would then be constructed.

### Farndon FCAs and Borrow Pits

2.6.53 Details of the works at the Farndon FCAs and borrow pits are included in the description of the works in paragraph 2.5.76 and Borrow Pits (paragraphs 2.6.202-2.6.211).

2.6.54 Site clearance works, archaeological investigation and construction of haul routes (including modifications to the existing access from the A46 southbound) would be undertaken in the advanced and pre commencement phase.

### Ecological works

2.6.55 Ahead of any construction works (including pre-commencement and main works), pre-construction including ecological and invasive species surveys (the findings of which would be used to inform the implementation of measures to prevent the spread of invasive species) would be undertaken, as detailed in the Pre-Commencement Plan **(TR010065/APP/6.9)** and the First Iteration EMP **(TR010065/APP/6.5)**.

2.6.56 The surveys would ensure mitigation requirements during construction of the Scheme are based on the latest information, particularly in relation to obtaining protected species licenses from the relevant authorities. Any subsequent changes to mitigation requirements would be documented within the Second Iteration EMP, which is to be developed in advance of the main construction works and must be substantially in accordance with the First Iteration EMP **(TR010065/APP/6.5)**. Ecological mitigation works for protected species would commence after obtaining the relevant licence (if required), and within the appropriate ecological mitigation calendar periods.

### Haul roads and access works

2.6.57 Haul roads and site access roads would be constructed ahead of the main construction works during the pre-commencement works phase to provide suitable access to the bridge structures, earthworks and FCA areas.

2.6.58 These routes would be used throughout the main construction works phase to facilitate:

i. The movement of plant and materials along sections of the alignment of the new dual carriageway.
ii. The movement of materials to and from the borrow pits.
iii. Connectivity between construction working areas and construction compounds.

2.6.59 The haul roads and access points are identified in Table 2-6 and are also shown in Figure 2.4 (Locations of Temporary Works Areas Required During Construction) of the ES Figures **(TR010065/APP/6.2)**. Access to these areas will be from the existing

highway network, HGV movements will be banned through the centre of Farndon and Newark, and they will also be prohibited from using the railway level crossing at Newark Castle.

**Table 2-6: Haul roads and access points**

| Section | From | To | Access point | Details |
|---|---|---|---|---|
| 1 | A46 | Farndon Roundabout satellite compound | Existing bellmouth access into roundabout. | Utilise the existing gated access on the western side of the roundabout. |
| 1 | Crees Lane | Windmill Viaduct south abutment | Crees Lane | New works access formed off Crees Lane with temporary holding area created in field system to the west of Crees Lane. |
| 1 | A46 southbound works access | The south abutment of the Nottingham to Lincoln railway line – west crossing. | Works access off the A46 southbound carriageway at location of existing field access. | Widening works undertaken to existing field access to provide a construction access and route to the north abutment of the windmill viaduct, the farm access underpass, the floodplain compensation areas and the south abutment of the Nottingham to Lincoln Railway Lane west crossing. |
| 1 | A46 northbound works access | The south abutment of the Nottingham to Lincoln railway line – west crossing. North abutment of Winthorpe viaduct | A46 northbound works access from the existing A46 carriageway | Access to the north abutment of the windmill viaduct and the south abutment of the Nottingham to Lincoln railway west crossing. |
| 2 | Kelham Road | The north abutment of the Nottingham to Lincoln railway line – west crossing. | Kelham Road | Use existing field access during advanced and pre-commencement works for installation of boundary fencing and securing site. |
| 2 | A617 | The north abutment of the Nottingham to | A617 westbound carriageway (Old Kelham Road to | Widen existing field access to construct bridge |

| Section | From | To | Access point | Details |
|---|---|---|---|---|
| | | Lincoln railway line – west crossing. | north of existing A46) | and embankment widening. This access will be shared with the land owner that has land to the west of the north abutment as their existing access beneath the railway bridge will be closed for safety reasons. |
| 2 | A617 | West side of Grade II Causeway Arches 500m north west of level crossing | A617 eastbound carriageway | Widen existing field access to provide construction access for the widening of the west side of the existing Grade II Causeway Arches 500m north west of level crossing |
| 2 | A616 | North-west side of the eastern crossing of the Nottingham to Lincoln railway line. | A616 | Widen existing field access to create construction access for the embankment widening, pond construction and the construction of the railway bridge. |
| 2 | Great North Road | South-west side of the eastern crossing of the Nottingham to Lincoln railway line. | Great North Road, Newark Lorry Park access. | Access to construct new embankment widening. |
| 2 | A46 Cattle Market Roundabout | Old alignment of Kelham Road, south of the A46. | A46 | Widen existing access to provide access route for the construction of the embankment widening. |
| 2 | Trent Lane (Maltkin Lane) | North-east side of the eastern crossing of the Nottingham to Lincoln railway line. | End of Maltkiln Lane. | Via temporary bridge over the River Trent to provide access to for the embankment widening and Nether Lock Viaduct |

| Section | From | To | Access point | Details |
|---|---|---|---|---|
| | | | | construction. |
| 2 | Trent Lane (Maltkiln Lane) | South abutment of the Nether Lock Rail bridge. | End of Maltkiln Lane. | Use of existing access track alongside the ECML and old factory building. |
| 2 | Mather Road | South side of the Nether Lock Viaduct. | Through Kings Marina access road. | Use of existing access road and track during advanced and pre-commencement works to facilitate construction of the temporary bridge over the River Trent. |
| 3 | Quibell's Lane | Crankley Point underpass | Quibell's Lane | Construction access track running parallel with Quibell's Lane due to narrowness of existing road. |
| 3 | A46 Southbound | North abutment of the Nether Lock Rail bridge | Access from A46 to construction access road parallel to the Winthorpe Road. | Construction access road separate to Winthope Road. Plant crossing at Winthorpe road to permit east to west construction traffic movement. |
| 3 | Winthorpe Road | North abutment of the Nether Lock Rail bridge | Existing field access from Winthorpe Road | For use in advanced and pre-commencement phase only. Separate construction access roads build in pre-commencement phase. |
| 3 | Winthope Road | West side of the A1 bridge crossing | Existing field access from Winthorpe Road | For use in advanced and pre-commencement |

| Section | From | To | Access point | Details |
|---|---|---|---|---|
| | | | | phase only. Separate construction access roads build in pre-commencement phase. |
| 3 | A46 southbound | West side of A1 bridge crossing | Works access from A46 southbound, north of Brownhills Roundabout. | Construction access track within fields adjacent to the existing Winthorpe Road. |
| 3 | A1 | A1 bridge fabrication area | Works access from the A1 northbound. Used for beam delivery and bridge deck transportation. | Hardening of existing northbound verge and installation of temporary barrier systems to provide a works access for large material deliveries and for tracking new bridge deck into position. |
| 4 | A46 northbound carriageway | East side of A1 bridge crossing | Works access to the west of Friendly Framer Roundabout. | Access for the construction of the new bridge abutment and earthworks. |
| 4 | A46 northbound carriageway | East side of A1 bridge crossing | Existing access road to the Mint Leaf restaurant. | Used for the demolition of the building and for drainage and earthwork operations. |
| 4 | A1133, northbound | East side of A1 bridge crossing | Field access off A1133 | Widen existing access. Access to stockpile locations. |
| 4 | A1133 southbound | Winthorpe Roundabout | Field access off A1133 | Widen existing access. Access for roundabout widening, accommodation works and stockpiles. |
| 4 | A46 southbound | Drove Lane | Works access off A46 southbound. | Provides a works access for the construction of the embankment widening, gantry construction and construction of the new Winthorpe roundabout. |

| Section | From | To | Access point | Details |
|---|---|---|---|---|
| 4 | Drove Lane | Friendly Framer roundabout | Works access off Drove Lane. | Provides a construction access for the construction of the Friendly Farmer Link road. |
| 6 | A617 | Kelham and Averham FCA | Works access off A617. | Three new works access points required from the A617 to access the floodplain compensation areas and construction of new culvert. |

2.6.60 Haul roads would be constructed from imported granular material placed on a geotextile membrane.

2.6.61 The majority of internal site haul roads would be constructed along the length of the alignment of the widened dual carriageway, adjacent to the toe of embankment slopes. These would be typically 10 meters wide with a small bund alongside them, formed using the excavated material from the haul road.

2.6.62 Haul route crossings for construction traffic would be provided at the following locations:

i. Quibell's Lane, south of the Nottingham to Lincoln railway line.
ii. Winthorpe Road, south of Bridge House Farm. Site traffic will enter the area next to Bridge House Farm utilising an existing field access to the west of Winthorpe Road and not use Winthorpe Road.

2.6.63 The majority of haul roads would be within the footprint of the permanent maintenance access tracks and drainage swales. For those that are outside of the footprint, measures are in place which are further detailed in the First Iteration EMP **(TR010065/APP/6.5)**.

2.6.64 In these locations, traffic signals would be installed to control the movement of vehicles across the carriageway. Wheel washing facilities would also be installed to reduce the risk of construction material being taken onto the road network.

### WCH User works

2.6.65 There are several WCH User routes which cross land within the Order Limits with footpaths, cycleways and bridgeways impacted by the Scheme (see the Streets, Rights of Way and Access Plans **(TR010065/APP/2.4)**).

2.6.66 During the pre-commencement works phase, the following measures would be implemented on the WCH routes that would be affected by the construction activities.

i. Segregation of WCH users from the construction works areas: In locations where construction works are close to WCH routes, works areas would be fenced off using temporary 'Heras' type panels (or similar) to segregate the site works from users.

ii. Diversion of users onto new temporary routes: Temporary diversion routes would be provided where practical and feasible, with users diverted around construction works via an adjacent WCH route or locally around the perimeter of the fenced works site, with appropriate signage erected.

iii. Use of temporary marshals: Where construction activities do not prohibit use of the routes but the safety of WCH users needs to be maintained.

2.6.67 Table 2-7 below outlines the intended diversions and control measures on the WCH routes during construction.

**Table 2-7: Intended diversions and control measures on WCH routes during construction**

| WCH route reference | Impact | Diversion | Duration |
|---|---|---|---|
| Newark BW2 | Temporary closure and diversion during construction of Windmill Viaduct (Work No 7) | Walkers and cyclists<br>Divert west along Farndon FP4 then south along Farndon FP2 onto Marsh Lane and Farndon FP5, south through field adjacent to Crees Lane, across temporary crossing at Crees Lane, under A46 underpass, along footway/cycleway and north on Newark FP3 to rejoin BW2.<br>Equestrians<br>Divert west along access track from Marsh Lane, head north along Newark FP5, head south through field adjacent to Crees Lane, across temporary crossing at Crees Lane, under A46 underpass, along footway/cycleway and north on Newark FP3 to rejoin BW2.<br><br>The segregation between BW2 and the working area for the Windmill Viaduct (Work No 7) will be designed and installed such as to permit access to the driveway to Windmill cottage. | 24 months |
| Newark FP14 | Permanent closure | Crossing is not currently used due to safety hazards associated with crossing the A46.<br>Foot traffic will be diverted along Kelham Road and Great North Road and will utilise the route of the existing Trent Valley Way. | Closed in pre-commencement works |
| Footpath/Cycleway along Great North Road | Temporary closure and diversions during construction.<br>Permanent re- | The construction of the new Cattle Market grade separated junction (Work Nos 33, 39A to 39F 40, 41 and 48) requires multiple construction phases to | 30 months |

| WCH route reference | Impact | Diversion | Duration |
|---|---|---|---|
| | alignment. | manage the traffic movements around the existing junction. Temporary signalised crossings would be installed during construction to segregate active travel users from the construction operations. | |
| Newark BW6 | Temporary closures with marshal control | The bridleway would need to be temporarily closed during the construction and demobilisation of the temporary bridge crossing at Nether Lock. A diversion of BW6, would be installed around the works area during this period. Access along the Bridleway would be controlled by marshals during the installation of the new bridge deck elements to the Nether Lock Viaduct (Work No 64).<br>The temporary bridge abutment working area on the south side of the riverbank (Work No 62) would be segregated from the WCH route during the works. | 1 week of closure.<br>4 weeks of marshal control in pre-commence ment works and 6 weeks of marshal control in main works. |
| Newark FP48#1 | Temporary closure and diversion | The footpath would be impacted during the construction of the Sewage Treatment Works underpass (Work No 70) and the earthworks operations associated with the embankment widening.<br>The footpath would be diverted south on Quibell's Lane to Newark BW10, cross the Lincoln Road railway bridge and join the Trent Valley Way to join Newark BW5. | 24 months |
| National Cycle Network 64 and Trent Valley Way along Winthorpe Road | Temporary closure and diversion during construction and diversion onto new permanent alignment. | National Cycle Network 64 and the Trent Valley Way along the Winthorpe Road would be impacted by the construction of the new A46 dual carriageway (Work No 76) and slip road (Work No 79) at the Brownhills junction. The existing footway on the southbound side of the road would be cleared and segregated to provide a segregated route along Winthorpe Road. The construction of the new junction wouldl be phased, such that the new footway/cycleway would be constructed and put into operation before the earthwork operations commence over the Winthorpe Road. | Phased diversions over 24 months |
| Winthorpe FP2 | Permanent re-alignment | There is currently no link between Winthorpe FP2 and FP3 across the A46. During construction FP2 would be permanently stopped up for approximately 100 metres before the A46.<br><br>A new WCH alignment would be | Section stopped up in pre-commence ment works |

| WCH route reference | Impact | Diversion | Duration |
|---|---|---|---|
| | | constructed along the alignment of the private means of access creating a circular WCH route between Winthorpe roundabout and the Friendly Farmer roundabout. | |
| Winthorpe FP3 | Permanent re-alignment | There is currently no link between Winthorpe FP2 and FP3 across the A46. FP3 currently joins the footway/cycleway along the southbound carriageway of the A46. FP3 would rejoin the new footpath/cycleway that would be constructed in the verge of the new Friendly Farmer link road (works No 104). | Section stopped up in pre-commencement works |
| Footway along the A46 between Drove Lane and Friendly Farmer Roundabout | Temporary closure and diversion during construction and diversion onto new permanent alignment. | The footpath would be temporarily diverted to the south of its existing alignment prior to the start of the construction of the new Friendly Farmer Link. | 18 months |

2.6.68 The Principal Contractor would consult with the relevant local authorities to identify, agree, implement and manage appropriate measures within the Order Limits for PRoW affected by construction works.

### Fencing and security

2.6.69 In the pre-commencement works phase the site boundary would be defined with either temporary fencing or the permanent post and four rail highway boundary fencing. In certain locations, where there is an increased interface with the public (such as PRoW or at the ends of existing access roads), 3 to 4 metre high timber hoarding would be erected to provide increased security to deter unauthorised personnel from accessing the work sites. These areas include:

i. Windmill Viaduct at the interface with Newark BW2. Here the hoarding would be designed and installed to maintain access to the river mooring and driveway associated with Mill House.
ii. Tolney Lane at interface with the south abutment of the railway bridge.
iii. Kelham Road at the interface with the haul road on the north side of the A46.
iv. Southside of Nether Lock Viaduct, adjacent to Newark BW6.

2.6.70 Areas in which plant and materials will be stored will have 24/7 security in place either with security guards on mobile patrol or with the use of remote Close Circuit Television Cameras (CCTV) monitoring systems.

2.6.71 Gate marshals will be positioned at key work access, such as Crees Lane and Winthorpe Road to control vehicle movements into and out of the works sites.

### Vehicle recovery areas

2.6.72 Vehicle recovery areas would be established as part of the Scheme which would be used during the construction phase for the recovery of broken down vehicles. These facilities would be operational 24 hours a day, 7 days a week during the main works.

2.6.73 The locations for these recovery areas are:

i. Satellite compound at Farndon Roundabout, off the Fosse Road with access from existing lay-by.
ii. Main construction compound.
iii. Satellite compound at Newark Showground.

### CCTV and speed enforcement cameras

2.6.74 CCTV and speed enforcement cameras would be installed in advance of the temporary traffic management to monitor incidents on the road network within the works area and to provide enforcement of the temporary speed restrictions.

2.6.75 The camera masts and bases would be installed adjacent to the existing carriageway and would be installed during night-time lane closures of the A46.

## Main construction works

2.6.76 Details of the construction activities required to deliver the Scheme are presented in the following sections, along with details of the anticipated construction methods to be used. The descriptions of the main construction works relate to the sections of the Scheme defined in paragraph 2.6.8.

### Section 1: Farndon Roundabout

2.6.77 The widening works to Farndon Roundabout would be undertaken in temporary traffic management conditions, with works access and exits provided into the centre roundabout area, via the existing maintenance access. Night-time lane closures and full road closures would be required for the installation of new traffic signal ducts, lighting columns and road surfacing and markings.

### Section 1: Farndon Roundabout to River Trent

2.6.78 The widening to the existing A46 embankment will involve the following construction sequence:

i. Construction of haul road and access points in pre-commencement works stage.

ii. Installation of temporary traffic management on the existing A46, including narrow lanes, temporary barriers and speed restrictions (refer to Table 2-9 for details).
iii. Installation of embankment toe drainage.
iv. Placement of embankment starter layer.
v. Installation of ground improvement solutions, where required.
vi. Installation of vertical retaining wall solutions, where required.
vii. Placement and compaction of embankment fill material to underside of road construction. This will involve benching, or cutting into, the existing highway embankment.

2.6.79 To retain sections of the existing vegetation between the residencies on Crees Lane and the A46, a retaining wall structure (works No 5) has been introduced for the first 100 metres of embankment widening. This would be installed from a working platform constructed alongside the existing A46 embankment.

2.6.80 The construction access to the southern abutment to the Windmill Viaduct would be via a haul road off Crees Lane. To reduce the impact on the existing vegetation, the haul road would be positioned between the retaining wall and the edge of the existing embankment. To control traffic movements along this construction access road, a holding area (work No 10) would be constructed in the field to the south-west of Crees Lane. Construction traffic would park in this holding area whilst it awaits authorisation to enter the works site by the on-duty traffic marshal.

### Section 1: Windmill viaduct

2.6.81 The Windmill Viaduct comprises a 92 metre long, three span, composite deck structure which would carry the new northbound dual carriageway over the River Trent.

2.6.82 The new bridge would be offset approximately 2 metres from the existing bridge.

2.6.83 The permanent and temporary works design will not require structures to be constructed within the river.

2.6.84 Protection works would be undertaken to the private power and fibre cable which runs along Bridleway 2.

2.6.85 Bridleway 2 would be diverted as detailed in Table 2-7 and the ends of the site secured from unauthorised access. Access would be maintained to the driveway of Mill House during construction.

2.6.86 Localised welfare facilities would be established near to the existing bridge abutments.

2.6.87 Temporary handrails would be erected between the work site and the edge of the river. These would be lined to prevent materials from falling into the river. A bund and interception ditch would be formed on the site side of the handrail to control surface water runoff.

2.6.88 Working platforms would be constructed at the east and west abutments and pier locations to support the piling and lifting plant. These would be formed from crushed, compacted stone. These temporary works platforms would be offset from the river bank and designed to prevent damage to the existing river banks.

2.6.89 The north and south piers would be constructed, followed by the new bridge abutments. The beams would be installed from the south span, heading north. The southern span would be installed via a crane located at the south abutment with the central and northern spans installed from a crane located at the north abutment working platform.

2.6.90 The lifting of the bridge beams, and subsequent deck works, would require works to take place over the River Trent. The Scheme would seek to temporarily prevent navigation along the River Trent through the implementation of river traffic controls in accordance with Article 58 of the draft Development Consent Ordre **(TR010065/APP/3.1)**. This would likely incorporate traffic lights and signage on the river bank which would be used to hold river traffic during the bridge beam installation. Subsequent operations, such as installation of participating formwork between the steel beams could be undertaken using a similar process, but with works stopped to allow river traffic to pass underneath.

2.6.91 A safety boat and crew would be deployed in the river during works over the river. The boat would be moored adjacent to the works area to the north-west of the south abutment.

2.6.92 The bridge beams would be delivered to the lifting area via the A46 and lifted from the road into the final position. Full road closures of the A46 would be required to undertake these works meaning that these operations would be undertaken at night during periods of lower traffic flow.

### Section 1 River Trent to Nottingham to Lincoln railway line

2.6.93 This section of embankment widening would be constructed using steepened slopes, minimising the footprint of the permanent works and reducing the floodplain compensation requirements.

2.6.94 The fill material for this embankment widening would be generated from the Farndon East borrow pit located in the field to the south side of the A46 (refer to paragraphs 2.6.202-2.6.211 for borrow pit locations). This material would be excavated from the borrow pit using tracked 360 degree excavators, loaded onto dump trucks and taken to an adjacent stockpile for drying and grading. The material would then be loaded onto dump trucks for transportation on the internal haul roads, under the A46 via the existing underpass and haul road under the Windmill Viaduct, to the deposition points along the embankment.

2.6.95 The existing underpass provides a link for the landowner between the east and west sides of the A46. This underpass would be extended to carry the new A46 northbound carriageway over the accommodation

works track. The works would be to construct piling platforms behind the existing wingwalls and drive steel columns, behind the wingwall foundation slabs. The deck abutments would be constructed on top of these steel piles and a reinforced concrete deck constructed. The existing parapet would be removed using hydro demolition to expose the existing bridge deck to create a key between the new and existing bridge decks.

2.6.96 A temporary works access route would be constructed off the northbound A46 lane to provide access for construction vehicles into the Windmill Viaduct north abutment and Nottingham to Lincoln railway (west crossing) work sites.

### Section 1 Nottingham to Lincoln railway (west) crossing

2.6.97 The Nottingham to Lincoln railway line (west) crossing is a three-span structure with reinforced concrete piled abutments, two reinforced concrete piled piers with pre-cast concrete bridge beams and reinforced concrete bridge deck.

2.6.98 The bridge foundations, pier and abutments would be constructed in-situ from reinforced concrete, with the bridge deck constructed from preformed beams and a reinforced cast in-situ deck.

2.6.99 Temporary works piling platforms would be constructed at the east and west pier and abutment locations. These platforms would accommodate the piling rigs and attendant cranes, excavators and associated equipment.

2.6.100 The existing drainage channel which runs under the eastern span of the bridge would require infilling to provide a temporary working platform for the construction of the eastern pier. Concrete pipes would be placed along the existing channel to maintain the movement of water during the works. The temporary works would be removed upon completion of the bridge.

2.6.101 A sheet piled retaining wall would be installed along the embankment of the existing railway line to retain the railway embankment structure during the excavation and construction of the pier foundations. This wall would also act as a barrier between the work site and the operational railway.

2.6.102 A temporary works crane platform designed to carry a large mobile crane would be constructed on both the east and west sides of the railway to enable placement of the bridge beams.

2.6.103 The bridge beams would be delivered to the site and offloaded at the crane platforms. Bracing and permanent deck soffit formwork would be installed to form braced pairs of beams that can be lifted into position on the bridge as one unit. A series of overnight weekend railway possessions with full isolation of the overhead power lines would be required in order to lift the bridge beams into position.

2.6.104 Once the bridge beams have been installed and the permanent formwork has been infilled and sealed, and all required temporary protection over the railway line has been fitted to the satisfaction of Network Rail, construction of the bridge deck would be progressed.

2.6.105 Following completion of all deck and associated drainage works, the protection screen would be dismantled from either side of the East Coast mainline railway and a temporary timber hoarding used to define the boundary between the construction works and the Network Rail land would be removed and replaced with a permanent palisade fence.

2.6.106 Construction access to the south abutment would be via the works access/exit of the A46 northbound carriageway and via the internal site haul road, adjacent to the embankment widening area.

2.6.107 The Openreach fibre cable and power cable along the access track at the south pier and abutment would be diverted out of the working area in the advanced/ pre-commencement stages of the Scheme.

2.6.108 All works carried out adjacent to, and over the ECML railway would be undertaken in accordance with procedures and method statements, agreed in advance with Network Rail and under Network Rail's supervision as required.

### Section 2 Cattle Market Roundabout

2.6.109 Figures 2.6 to 2.10 present an example of how the construction phasing could be implemented to maintain traffic movements around the junction during construction. The phasing plans would be further developed in detailed design and detailed in the Traffic Management Plan, which in accordance with Requirement 11 of the draft DCO **(TR010065/APP/3.1)** will be substantially in accordance with the Outline Traffic Management Plan **(TR010065/APP/7.7)** and must be approved by the Secretary of State following consultation with the local highway authority.

2.6.110 During phase 1 (Figure 2-5), traffic using the existing roundabout would remain on its current alignment but with temporary traffic management arrangements including narrow lanes, temporary barriers and a speed restriction. Night-time lane closures on the roundabout would be used to clear the vegetation and remove existing infrastructure such as CCTV mass and lighting columns.

2.6.111 The works undertaken in phase 1 include:

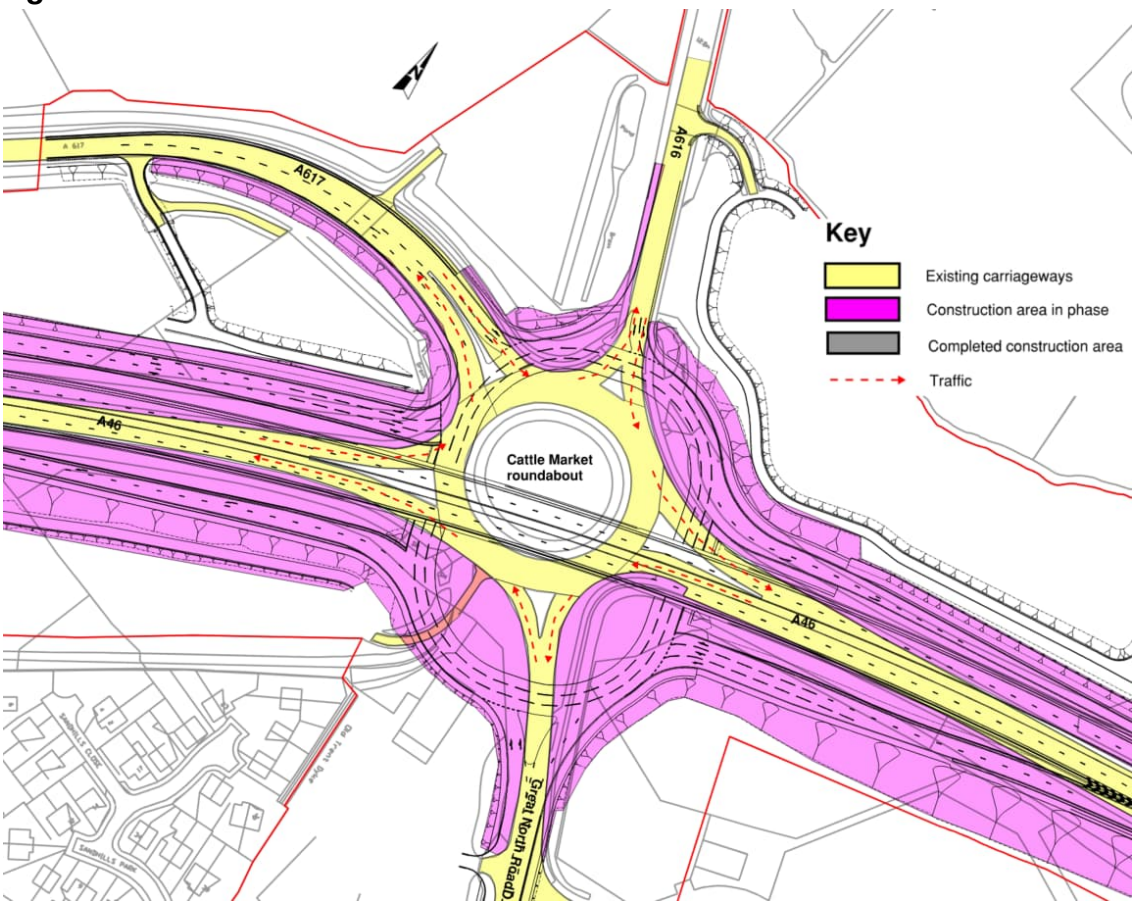
- Extension of the Cattle Market flood relief culvert.
- Installation of ground improvement solutions, either stone columns or ridged inclusions.
- Construction of the new southbound off slip and southbound on slip roads. The new embankments for the slip roads would be constructed. The carriageways for the southbound on slip and southbound off slip

would be temporarily widened to provide the necessary width for the next traffic management phases.

- Extension of the Grade II Causeway Arches 500m north west of level crossing
- Construction of the northbound widening and northbound slip roads.

2.6.112 Construction of temporary cross over points on the existing carriageway to form the temporary junction arrangement for phase 3.

**Figure 2-5: Cattle Market Junction Phase 1**

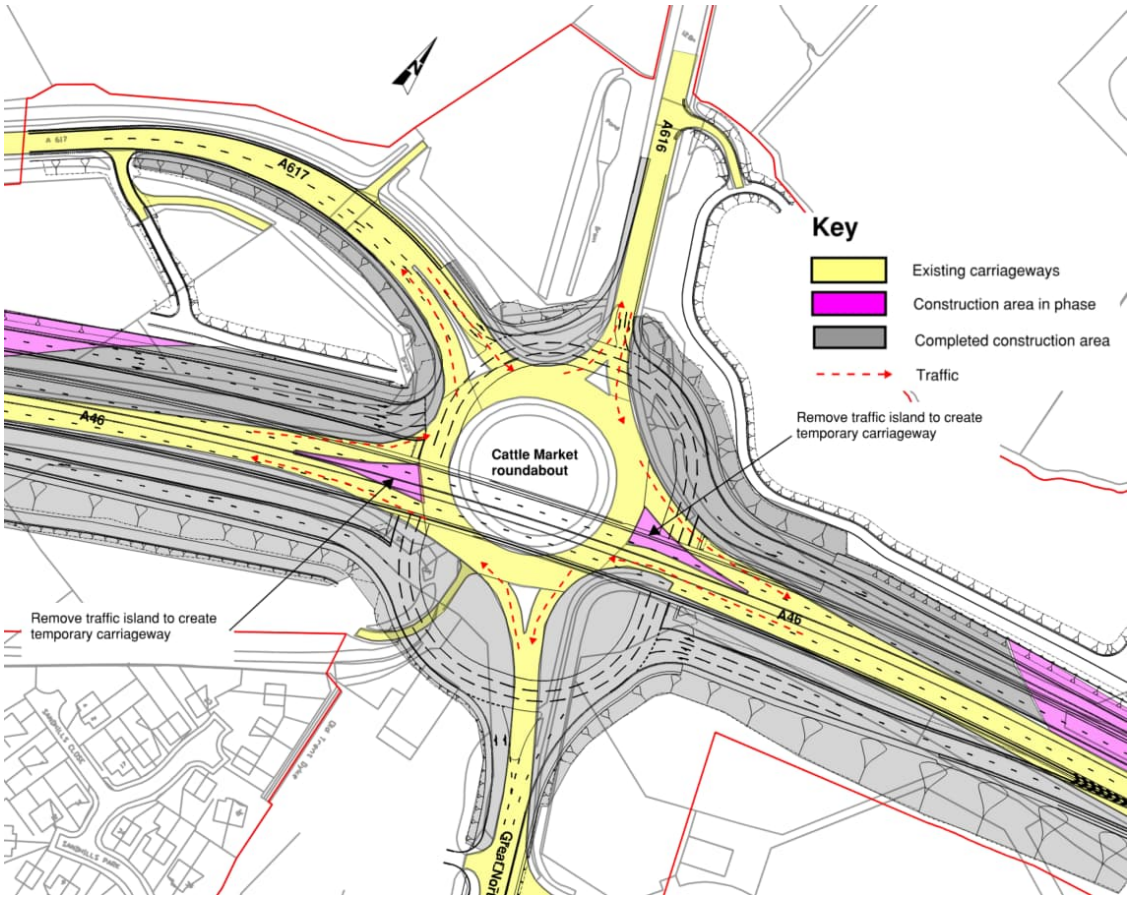



2.6.113 During phase 2 (Figure 2-6) works would be undertaken on the existing traffic islands on the A46. This would be undertaken within temporary traffic management arrangements.

2.6.114 The works undertaken in phase 2 include:

- Removal of traffic islands to create a level area for a temporary carriageway alignment in phase 3.
- Install road markings for temporary alignment in phase 3.

**Figure 2-6: Cattle Market Junction Phase 2**

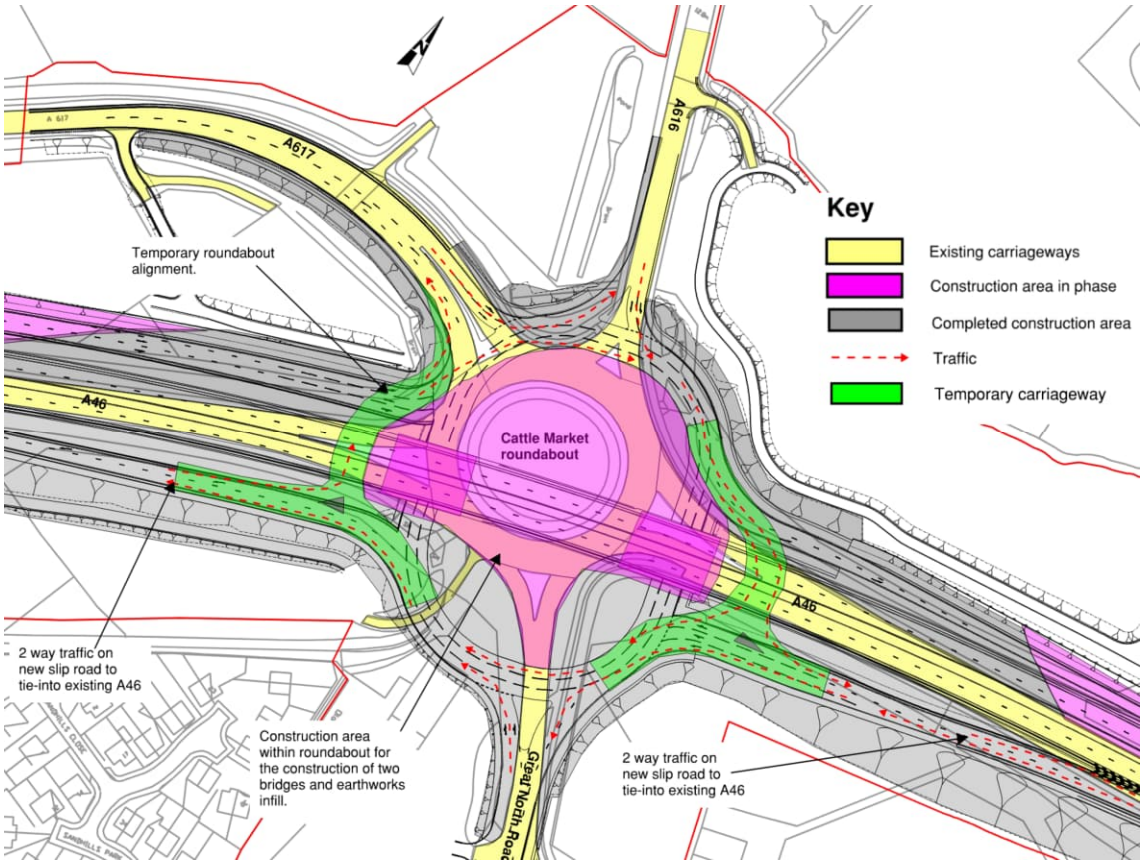



2.6.115 During phase 3 (Figure 2-7) traffic would be running on a temporary alignment around the Cattle Market Roundabout. This creates the working room required. Temporary traffic signals would be provided to maintain the WCH crossing of the A46.

2.6.116 The works undertaken in phase 3 include:

- Protection works to the flood relief culvert.
- Ground improvement works for the dual carriageway.
- Construction of the two new single span bridges.
- Construction of reinforced soil wall between the bridges.
- Installation of drainage and construction of new roundabout carriageway.

**Figure 2-7: Cattle Market Junction Phase 3**

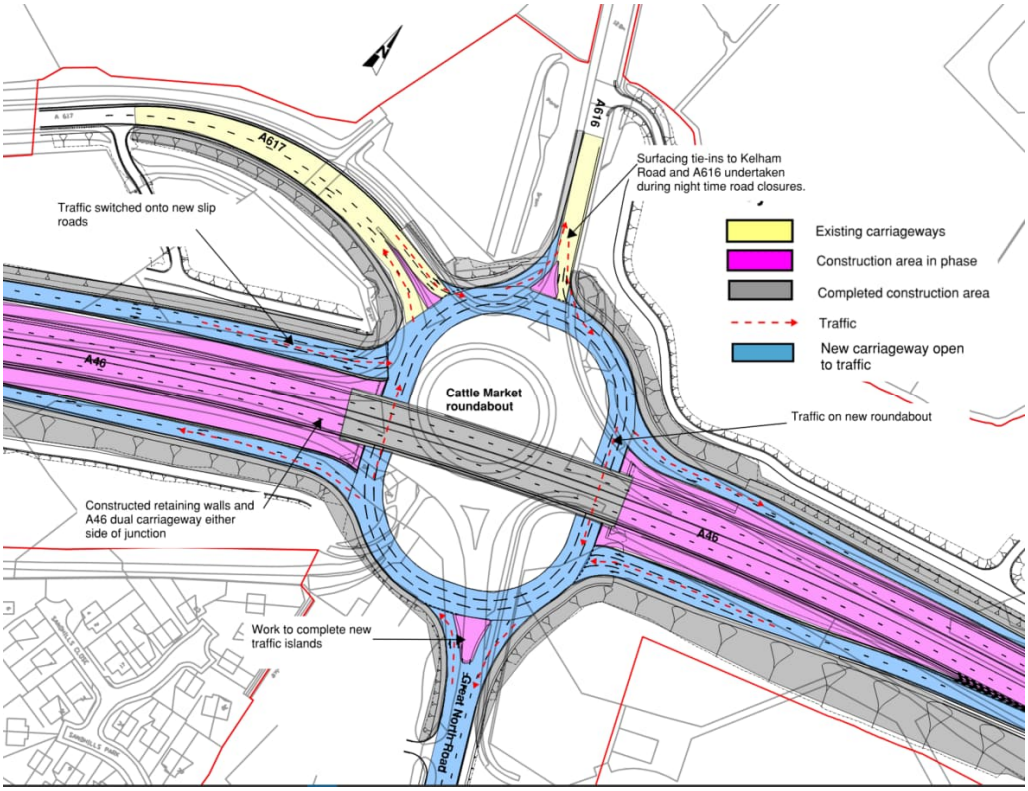



2.6.117 During phase 4 (Figure 2-8) traffic would be diverted onto the new slip roads and the roundabout gyratory, under the new bridges.

2.6.118 The works in phase 4 would include;

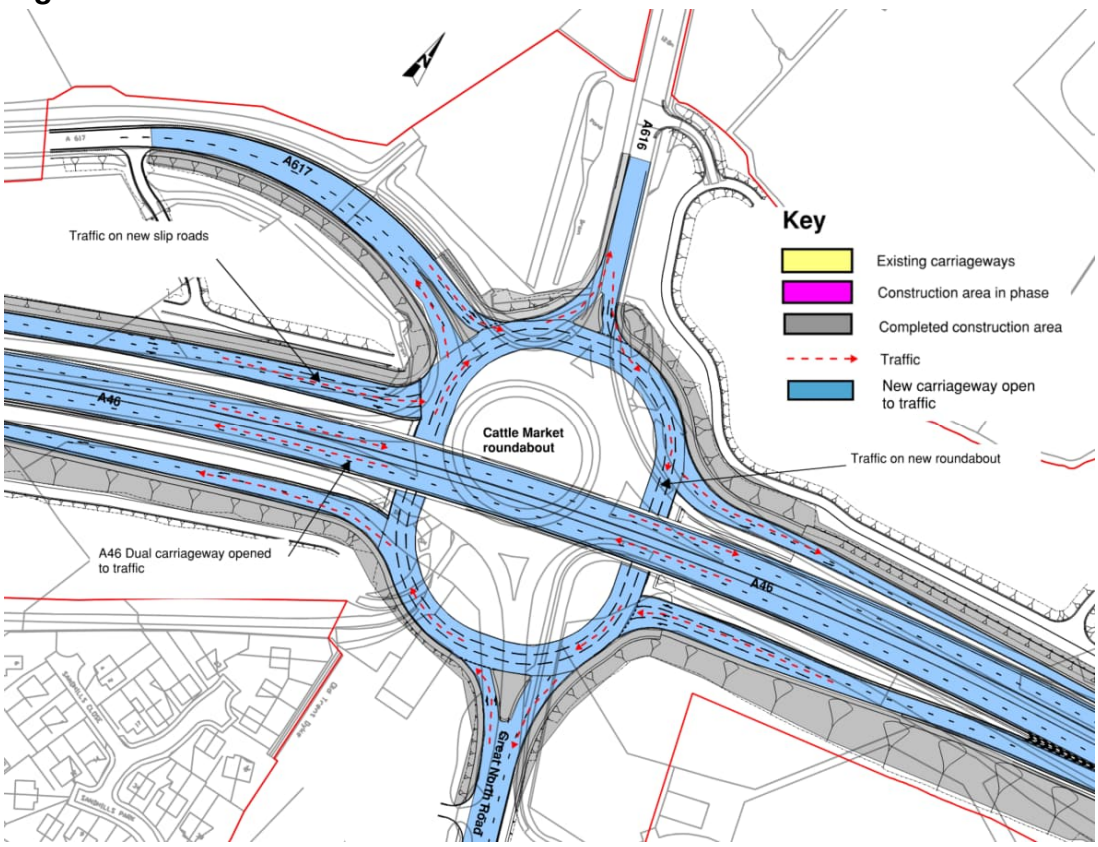
- Construction of reinforced soil walls and the A46 dual carriageway on the approaches to the new bridges.

**Figure 2-8: Cattle Market Junction Phase 4**




2.6.119 During phase 5 (Figure 2-9) the new grade separated junction would be fully open to traffic.

**Figure 2-9: Cattle Market Junction Phase 5**




## Section 2 Nottingham to Lincoln railway – east crossing

2.6.120 The existing structure comprises of reinforced concrete abutments and wingwalls with precast concrete bridge beams, reinforced concrete deck and concrete parapet edge beams. The bridge is wider than the A46 carriageway to incorporate a large visibility splay along the northbound carriageway.

2.6.121 There is limited land availability around this section, due to the proximity of the British Sugar Lake and railway line. The existing bridge would be widened to accommodate the new northbound carriageway.

2.6.122 The widening works would include:

i. Construction of access roads to the north and south abutments.
ii. A scaffold or similar modular protection screen would be constructed off this slab to form a robust barrier between the pier construction works and the adjacent operational railway.
iii. Installing a silt fence along boundary of worksite and the waterway.
iv. Constructing a piling platform in front of the north-west wingwall. Installing new rotary board piles for the west abutment and east wingwall foundation extensions.
v. Excavating behind existing north-east wingwall to expose existing wingwall pile cap. Creating a temporary slope for the A46

embankment. It is possible that soil nails may need to be used to strengthen the retaining slope.

vi. Constructing a piling platform for the extension of the north-west wingwall. Installing rotary board piles and constructed pile caps.

vii. Installing narrow lanes and temporary traffic management over the existing bridge to create a working area for the extension of the existing bridge deck. Installing a temporary traffic barrier between works area and live carriageway.

viii. Constructing the extended abutment walls.

ix. Installing a cantilever access platform to encapsulate the existing parapet edge beams and for use as an access platform to undertake the demolition operation to remove the concrete edge beams and deck.

x. Lifting out the northern two precast beams.

xi. Installing new precast concrete beams during night closures of the A46 using a crane located on the existing carriageway.

xii. Casting concrete deck and installing new parget string course.

xiii. Works interfacing with the railway network such as the demolition and bridge beam installation would be undertaken during night-time possessions.

### Section 2 Nether Lock viaduct and Nether Lock Rail crossing

2.6.123 The Nether Lock Viaduct is a multi-span, composite deck structure which carries the A46 northbound carriageway over the River Trent, access track to the hydroelectric power station, bridleway and hardstanding area adjacent to the factory building. The viaduct then continues over the ECML and Nottingham to Lincoln railway line.

2.6.124 Access to the southern side of the River Trent during the pre-commencement works would be via the existing access track from Mather Road and a temporary river crossing off Trent Lane (Table 2-5).

2.6.125 Access to the north section of the River Trent would be via the existing access road which continues from Trent Lane and runs behind the factory building.

2.6.126 Access to the north abutment would be via the haul road from the Winthorpe Road.

2.6.127 Construction of the north pier foundation and north abutment would be progressed behind a protection screen with minimal impact to the operation of the ECML railway. All works carried out adjacent to, and over, the ECML railway would be undertaken in accordance with procedures and method statements, agreed in advance with Network Rail and under Network Rail's supervision as required.

2.6.128 The power cable feed to the hydroelectric power station would be diverted into a temporary alignment to avoid the construction areas for the new bridge piers.

2.6.129 A temporary access route would be provided to maintain access to the hydroelectric power station.

2.6.130 A silt fence would be installed, off set from the edge of the riverbank.

2.6.131 Temporary works piling platforms would be constructed at the east abutment and pier locations. These platforms would accommodate the piling rigs and attendant cranes, excavators and associated equipment. Prefabricated pile reinforcement cages required for the foundations to be constructed would be delivered to the works areas via the site access routes. The platforms would be used to construct the pile caps and piers for the new structure.

2.6.132 The temporary works platform would be extended along the side of the approach embankment to facilitate the installation of the sheet pile retaining wall which would form the toe of the embankment widening.

2.6.133 A temporary works crane platform would be constructed to facilitate the fabrication and lifting of the steelwork for the new bridge spans. Larger sections would be lifted from the existing A46 during night-time carriageway closures.

2.6.134 The temporary works platforms along the edge of the River Trent would be offset and designed such that no damage occurs to the existing river bank. Handrails and silt fencing would be installed along the edge of the temporary works platforms.

2.6.135 A series of overnight weekend railway possessions with full isolation of the overhead power lines would be required in order to install a temporary gantry to support the overhead contact systems (OCS). The existing gantry to the north of the existing rail bridge would be removed.

2.6.136 A series of overnight weekend railway possessions with full isolation of the overhead power lines would be required in order to lift the bridge beams for the northern span into position. Spans over the ECML would be lifted in during night-time possessions of the railway. The OCS would be connected to the new bridge structure and the temporary gantry removed.

2.6.137 Once the bridge beams have been installed and the permanent formwork has been infilled and sealed, and all required temporary protection over the railway line has been fitted to the satisfaction of Network Rail, construction of the bridge deck would be progressed.

2.6.138 The lifting of the bridge beams, and subsequent deck works, would require works to take place over the River Trent. The Scheme would seek to temporarily prevent navigation along the River Trent through the implementation of river traffic controls in accordance with Article 58 of the draft Development Consent Order **(TR010065/APP/3.1)**.

This would likely incorporate traffic lights and signage on the river bank which would be used to hold river traffic during the bridge beam installation. Subsequent operations, such as installation of participating formwork between the steel beams could be undertaken using a similar process, but with works stopped to allow river traffic to pass underneath.

2.6.139 Following completion of all deck and associated drainage works, the protection screen would be dismantled from either side of the ECML railway and a temporary timber hoarding used to define the boundary between the construction works and the Network Rail land would be removed and replaced with a permanent palisade fence.

### Section 3 Sewage Treatment Works underpass

2.6.140 The extension of the existing underpass (Work No 70) would be undertaken following the installation of an alternative access route to the sewage treatment works. This route would utilise the site access road between Winthorpe Road and Quibell's Lane. The access road would be designed to provide the required turning circle for the sewage treatment works wagons and tankers to turn on to the existing level crossing.

2.6.141 Sections of the existing wingwalls would be demolished to allow the structure to be extended.

2.6.142 The existing road would be excavated to reach a suitable formation layer. A hardstanding area would then be installed to allow the new base slab to be constructed. The new underpass walls and deck slab would then be constructed.

2.6.143 The Quibell's Lane road would then be reinstated and opened to traffic.

### Section 3 Brownhills Junction

2.6.144 The new Brownhills Junction would be constructed in three phases to maintain access to Bridge House Farm, dog kennels, the caravan site and maintain use of the footpath and cycleway.

2.6.145 Figures 2.11 to 2.14 below present an example of how the construction phasing that would be implemented at Brownhills Junction. The phasing plans would be further developed in detailed design.

2.6.146 The phase 1 works (Figure 2-10) would include:

2.6.147 Traffic management installed along Winthorpe Road to segregate the footway and cycleway from the existing road and construction works.

2.6.148 Installation of works access and egress off the A46.

2.6.149 Installation of plant crossing across the Winthorpe Road.

2.6.150 Constructing the A1 bridge fabrication area in the location of the proposed Brownhills Junction roundabout.

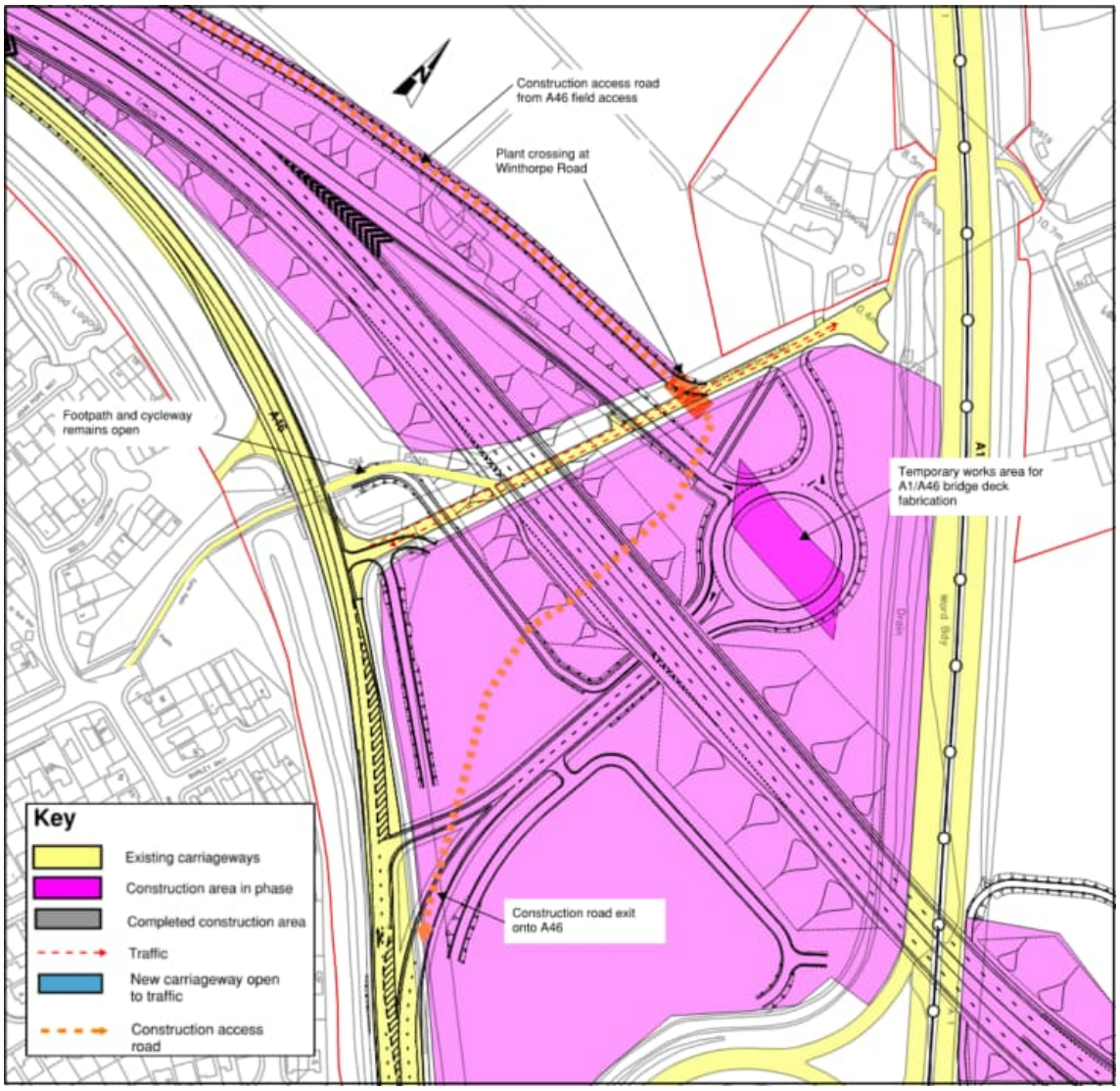
2.6.151 Constructing internal site access roads and hard standing area for the construction of the A46/link road bridge.

2.6.152 Constructing the A1/A46 bridge deck and A46 link road bridge.

2.6.153 Constructing an earthworks embankment to the westside of the Winthorpe Road.

2.6.154 Installing the A1 bridge deck

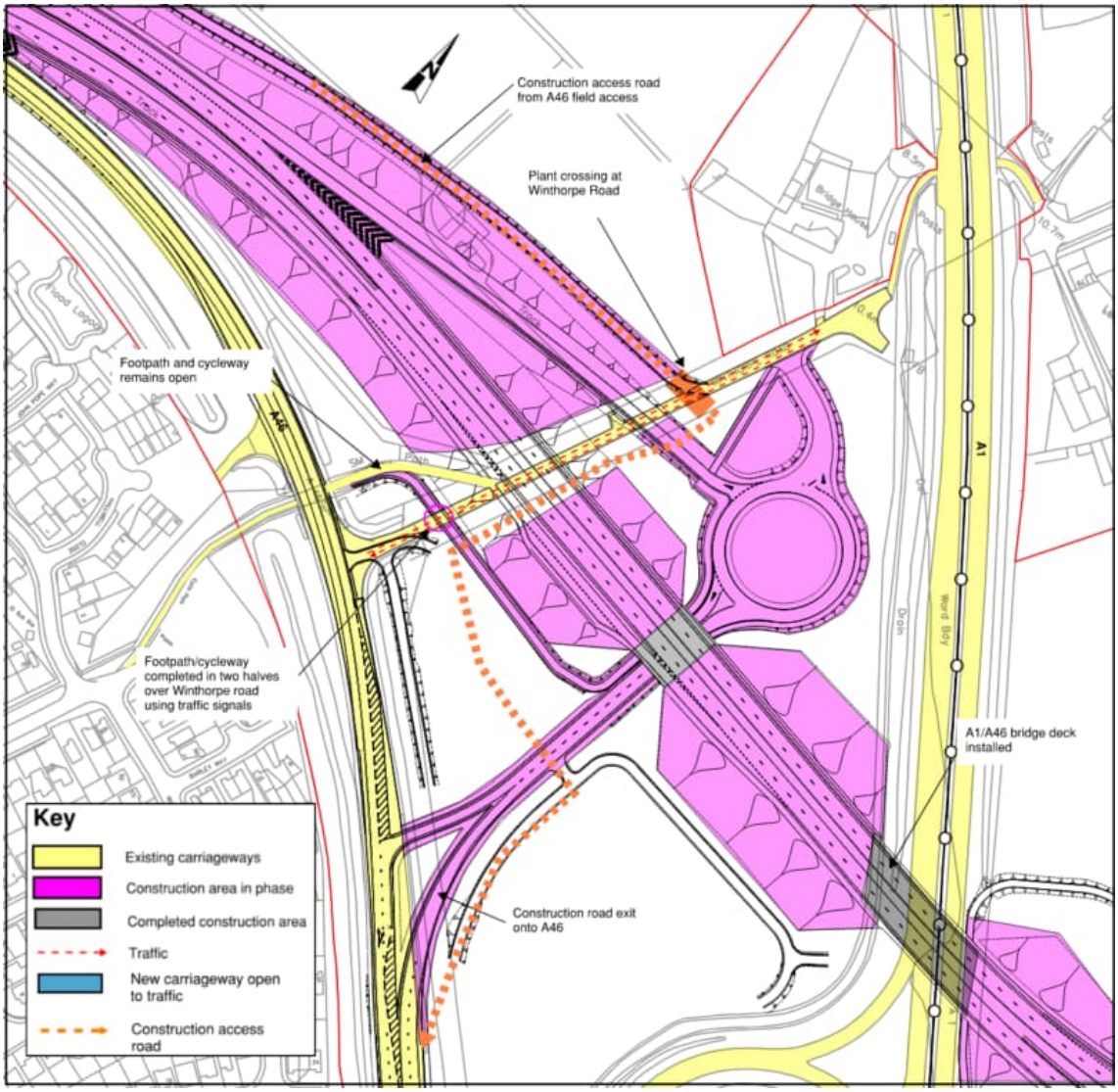
**Figure 2-10: Brownhills Junction Phase 1**



2.6.156 The phase 2 works (Figure 2-11) would include:

- Construction of the new roundabout, Bridge House Farm link and link road.
- Construction of an earthworks embankment between the A1 bridge and A46/link road bridge.
- Construction of the pedestrian footpath and cycleway.

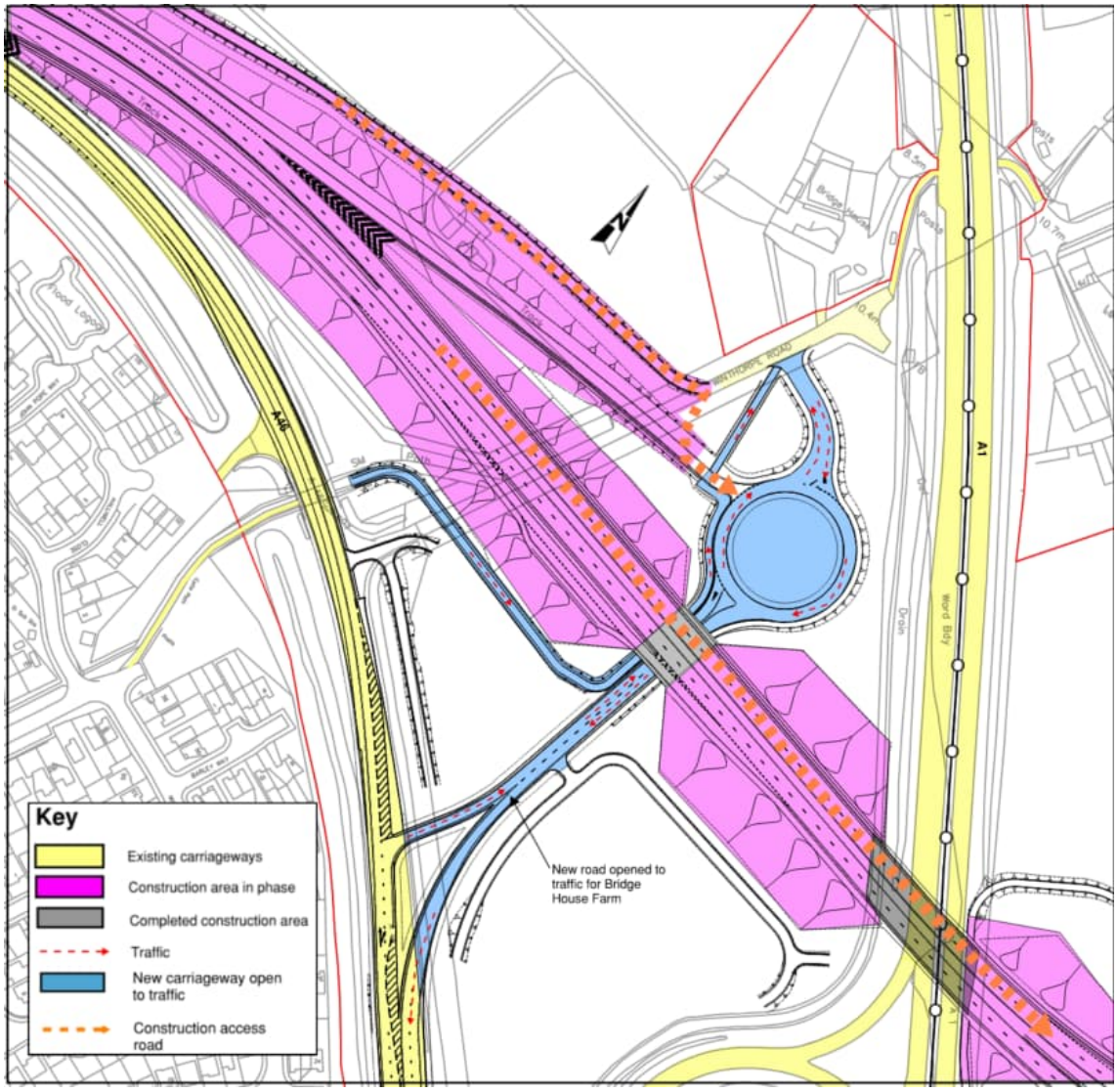
**Figure 2-11: Brownhills Junction phase 2**



2.6.158 The phase 3 works (Figure 2-12) would include:

- Moving the traffic and the footway and cycleway onto the new alignment.
- Completing the earthworks embankment over the Winthorpe Road.

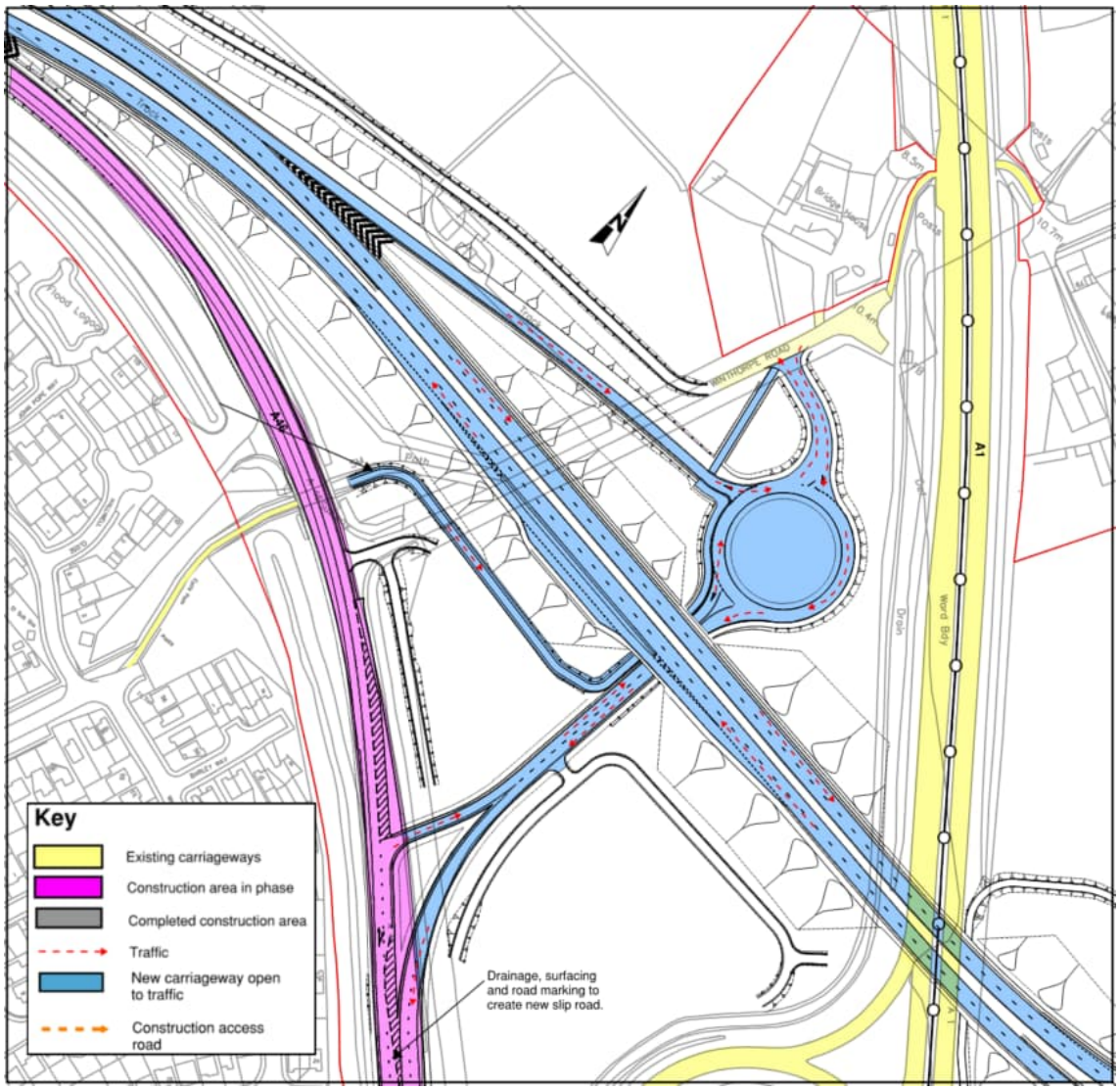
**Figure 2-12: Brownhills Junction phase 3**



2.6.160 The phase 4 works (Figure 2-13) would include:

- Drainage, resurfacing and road marking to the existing A46 to create the new southbound on slip from Brownhills Roundabout.

**Figure 2-13: Brownhills Junction phase 4**




## Section 4: A1/A46 bridge

2.6.161 The new A1/A46 bridge comprises a 62 metre long, single span, composite deck structure which would carry the new A46 dual carriageway over the A1.

2.6.162 The abutments would be constructed behind the existing road restraint system of the A1 with the new bridge deck being constructed off line in a temporary works and compound area (Work No 85).

2.6.163 The west abutment of the new bridge and the temporary works area are located on the alignment of the Slough Dyke river. The river would need to be permanently re-aligned prior to the abutment construction

commencing and temporary culverting required where the temporary works areas passes over the river.

2.6.164 The following construction phasing for the A1/A46 bridge would be utilised:

i) Temporary haul road constructed to the work area.
ii) Temporary piped culverts (6 meters in length) installed within the Slough Dyke to provide access to the works area.
iii) An excavator working within the verge of the A1, behind the working width of the existing road restraint system, would excavate the profile of the diverted Slough Dyke. The temporary culvert, under the working platform, would be installed within the field to the west of the existing dyke.
iv) A bung would be installed into the southern temporary culvert with an over pumping system installed to maintain the flow from the dyke into the temporary culvert. An excavator would then form the connections between the existing and new dyke alignments.
v) The working platform and abutment piling platforms would then be constructed.
vi) The abutments would be constructed at the same time as the bridge deck is fabricated on the working platform. The bridge deck would be transported to its permanent position during a full closure of the A1 over a weekend.
vii) The working platform would be regraded to form the new Brownhills Junction Roundabout.

2.6.165 The Slough Dyke would be reformed along its original alignment and connected back into the existing alignment at the northern end and into the realigned section at the southern end. The temporary culvert would then be removed.

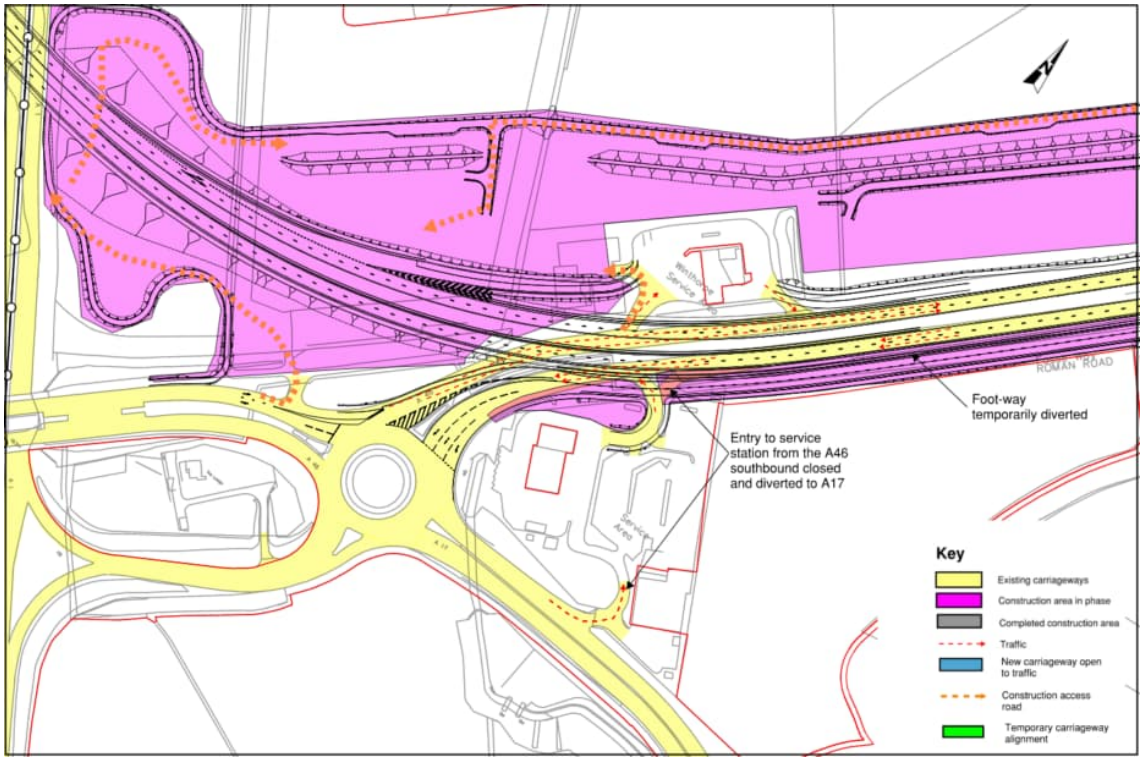
### Section 4 Friendly Farmer tie-in

2.6.166 The construction of the new link road and tie-in of the new dual carriageway to the existing A46 would be undertaken in five traffic management phases to enable access to be maintained to the existing service station facilities located adjacent to the Friendly Farmer Roundabout.

### *Phase 1*

2.6.167 Figure 2-14 illustrates phase 1 of the A46 dual carriageway and Friendly Farmer link road tie-in at the Friendly Farmer Roundabout.

**Figure 2-14: Friendly Farmer Roundabout tie-in phase 1 works**



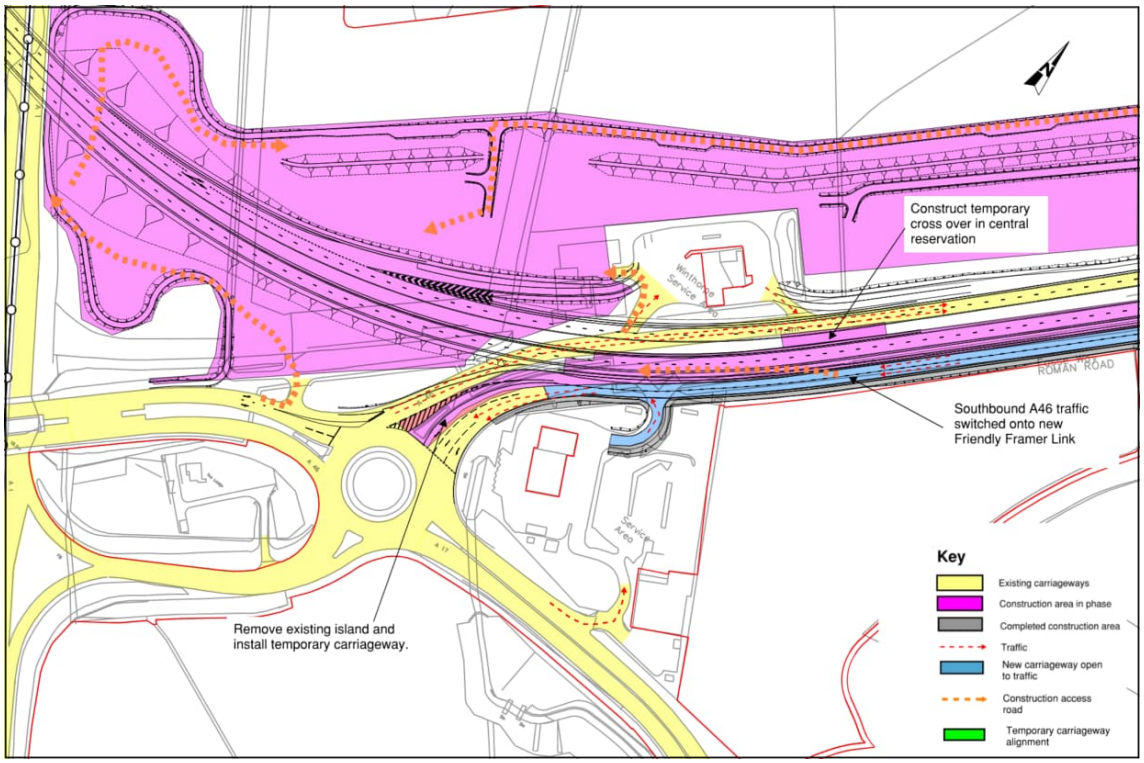

2.6.168 Works in phase 1 include:

i. Diversion of the 11kv overhead power cable that runs along the boundary of the Newark Showground and relocation of the substation adjacent to the access to the Shell service station.
ii. Installation of temporary traffic management along the southbound A46 with narrow lanes, temporary barrier and temporary speed restrictions.
iii. Construction of the new link road between Winthorpe roundabout and Friendly Farmer Roundabout, including sections of the cross carriageway drainage.
iv. Overnight closures of the A46 southbound would be used to undertake the pavement tie-in works across the Shell service station access and at the tie-in with the Friendly Farmer Roundabout.

### *Phase 2*

2.6.169 Figure 2-15 illustrates the phase 2 works.

**Figure 2-15: Friendly Farmer Roundabout tie-in phase 2 works**



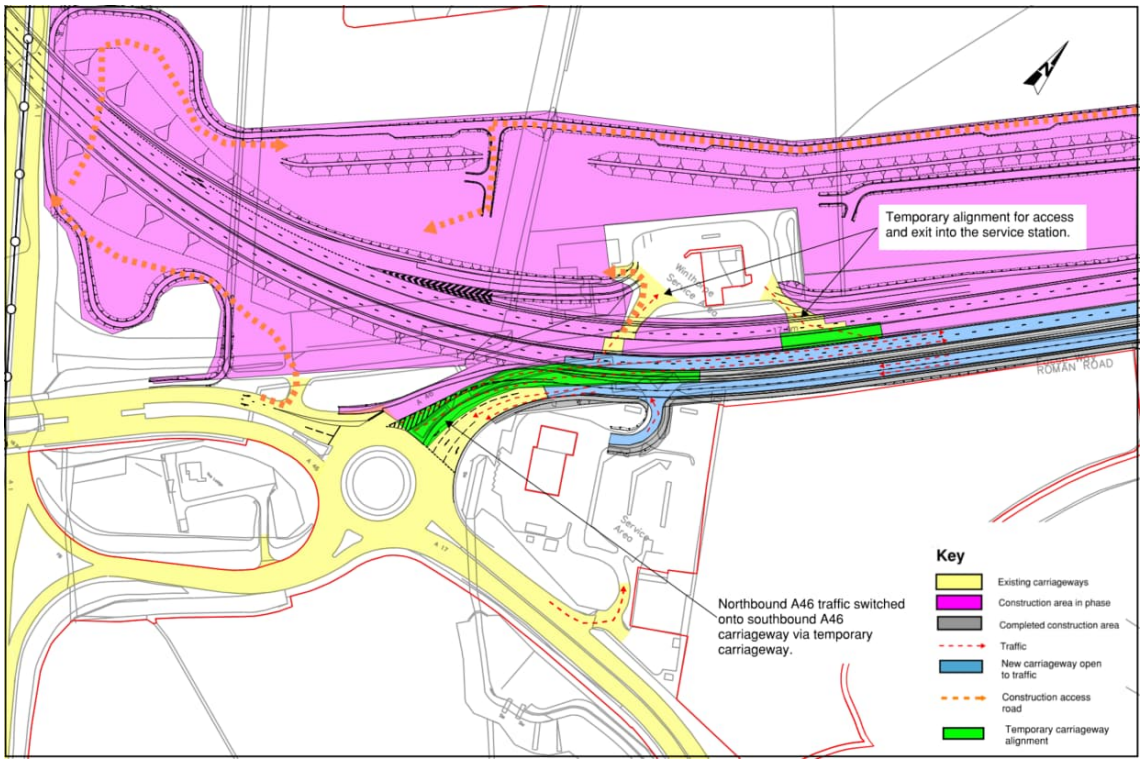

2.6.170 Works in phase 2 include:

i. The A46 southbound traffic will be switched onto the new link road.
ii. Temporary traffic management installed on the A46 northbound carriageway to move traffic away from the central reservation.
iii. Construction of the A46 southbound carriageway including the tie-in of the cross carriageway drainage.
iv. Construction of temporary crossovers within the central reservation for later traffic management phases.

### *Phase 3*

2.6.171 Figure 2-16 illustrates the phase 3 works.

**Figure 2-16: Friendly Farmer Roundabout tie-in phase 3 works**



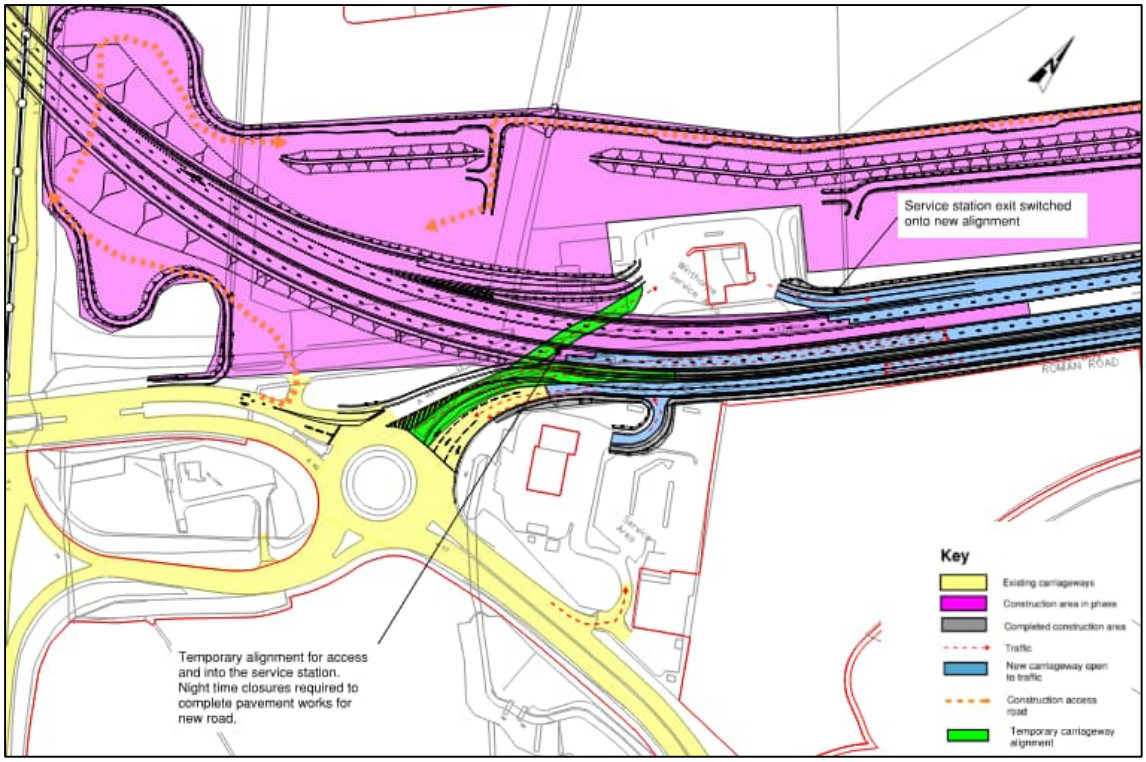

2.6.172 Works in phase 3 include:

i. The A46 northbound traffic will be switched to the A46 southbound carriageway via a temporary crossover.
ii. Construction of the new northbound slip road for the Esso interchange.
iii. Construction of a section of the dual carriageway to the west side of the Esso service station which will be used as a temporary access road into the service area during phase 4.

### *Phase 4*

2.6.173 Figure 2-17 illustrates the phase 4 works.

**Figure 2-17: Friendly Farmer Roundabout tie-in phase 4 works**



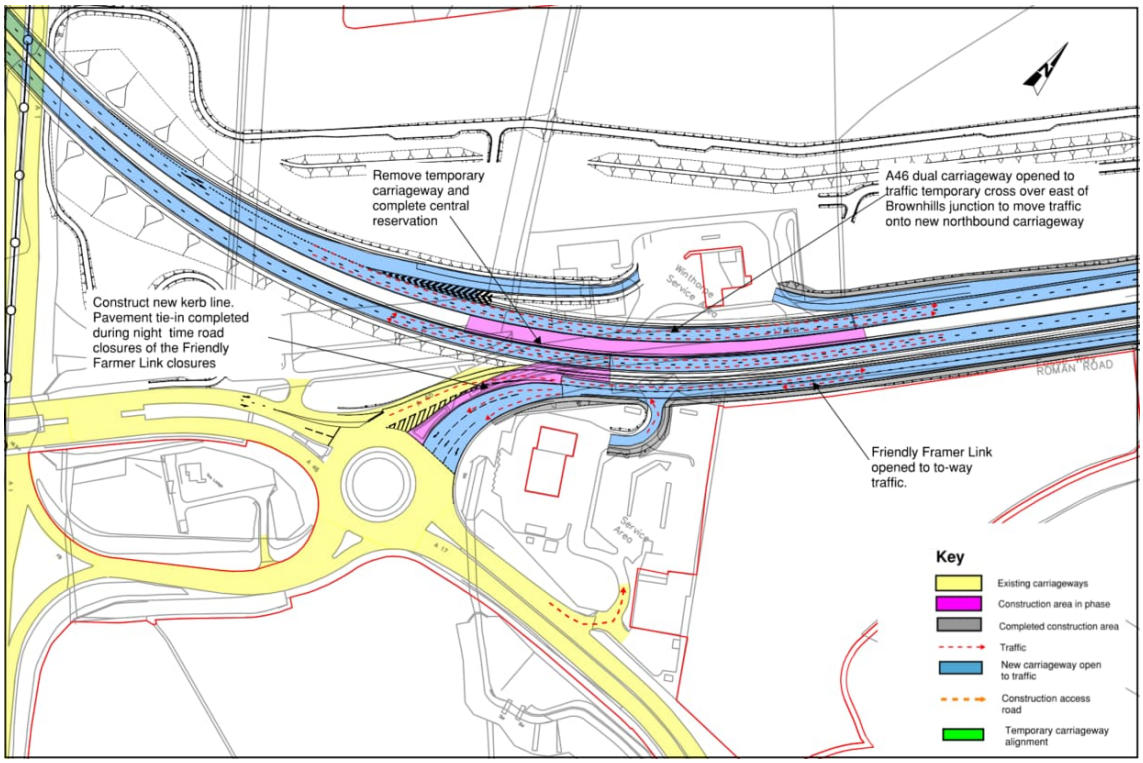

2.6.174 Works in phase 4 works would include:

i. Construction of the new northbound A46 carriageway across the existing access and exit roads to the Esso interchange.

### *Phase 5*

2.6.175 Figure 2-18 illustrates the phase 5 works.

**Figure 2-18: Friendly Farmer Roundabout tie-in phase 5 works**




2.6.176 Works in phase 5 include:

i. The A46 northbound traffic will be switched onto the new northbound carriageway.
ii. Removal of the temporary access roads to the interchange service area.
iii. Construction of the remaining section of the southbound carriageway.
iv. Construction of the central reservation barrier.

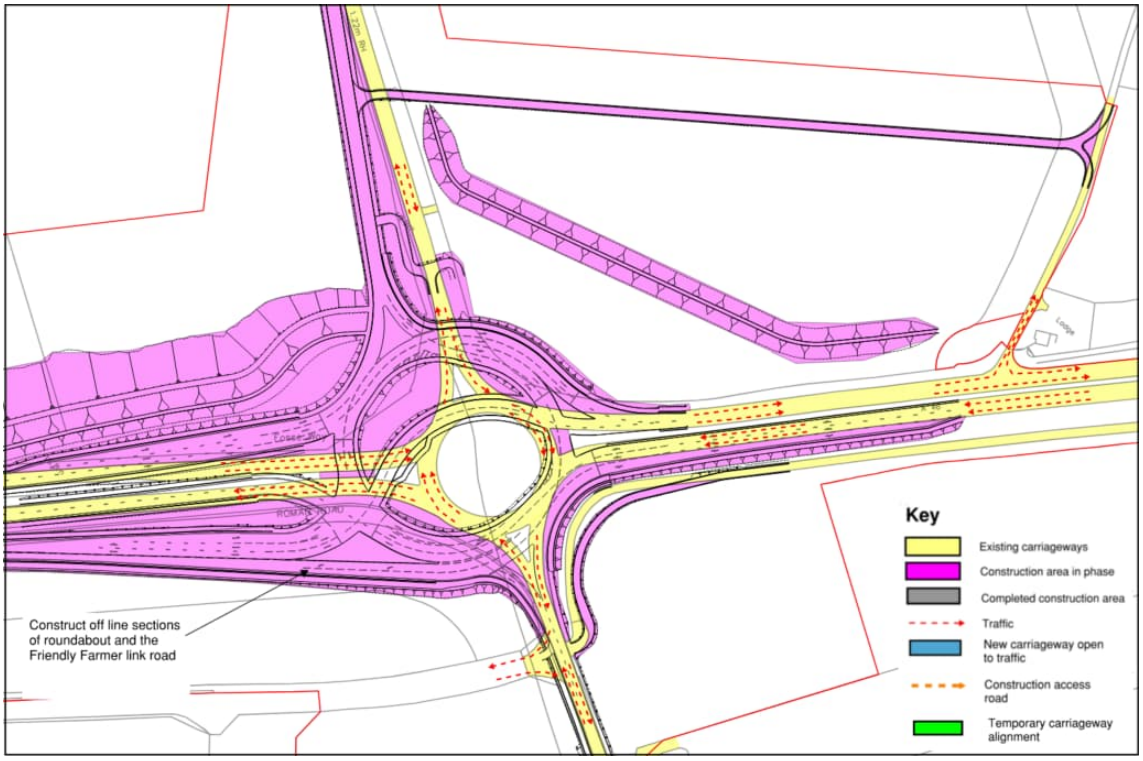
## Section 4 Winthorpe Roundabout

2.6.177 The construction of the new Winthorpe Roundabout would be undertaken in three traffic management phases.

### *Phase 1*

2.6.178 Figure 2-19 illustrates the phase 1 works.

**Figure 2-19: Winthorpe Roundabout phase 1 works**



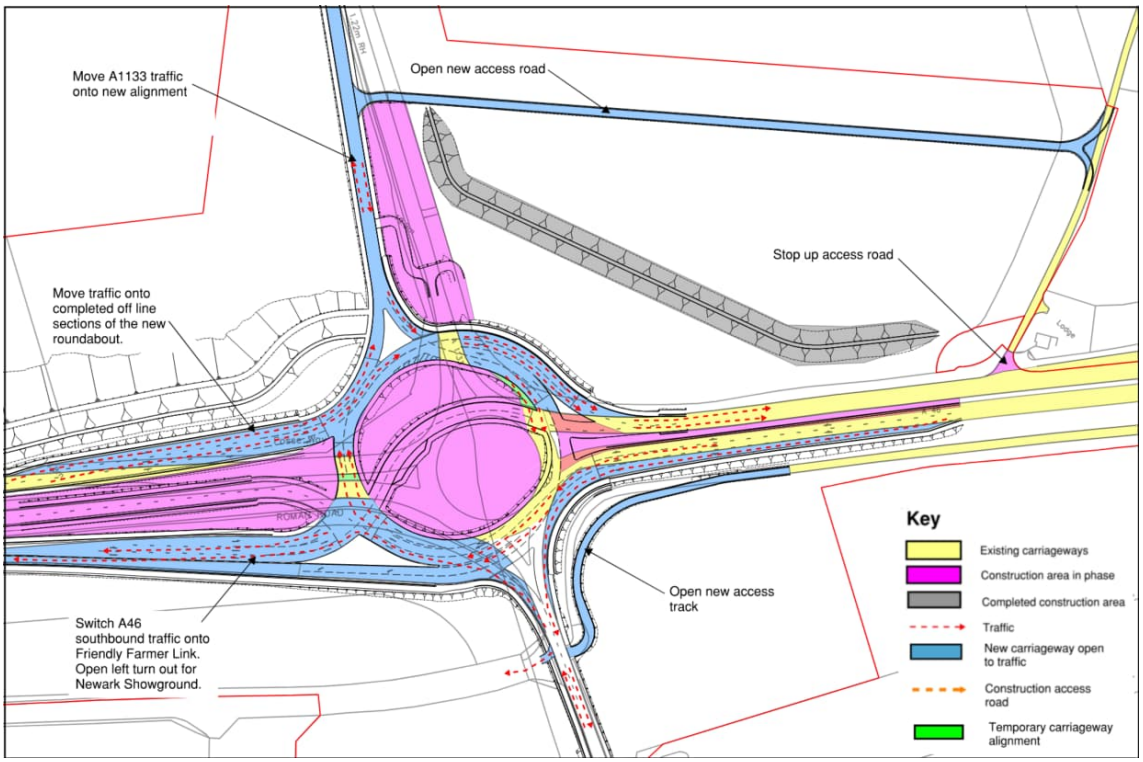

2.6.179 Works in phase 1 include:

i. Diversion of the 11kv overhead power lines.
ii. The A46 traffic would be in a temporary traffic management arrangement with reduced speed limits, narrow lanes and temporary vehicle restraint barriers to create a safe working area.
iii. Diversion of the footway/cycleway.
iv. Construction of the offline sections of the new roundabout and the new link road.
v. Night-time closures of Drove Lane and the A1133, required to complete the pavement and drainage works.

### *Phase 2*

2.6.180 Figure 2-20 illustrates the phase 2 works.

**Figure 2-20: Winthorpe Roundabout phase 2 works**



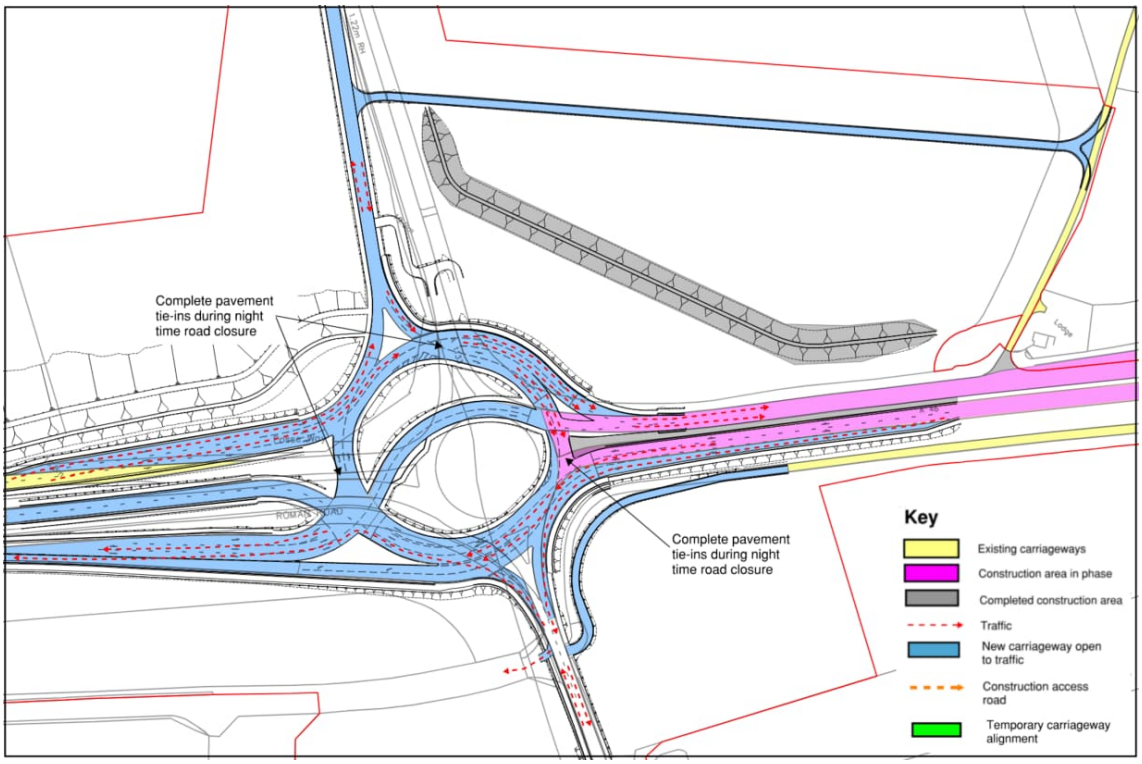

2.6.181 Works in phase 2 include:

i. The A46 southbound traffic being switched onto the new link road, creating a working area along the existing southbound carriageway.
ii. The A46 northbound traffic being moved onto its new alignment around the roundabout.
iii. Completion of tie-ins between the southbound carriageway and the new roundabout.
iv. Works in the centre of the new roundabout to create the through-about section of the link road.

### *Phase 3*

2.6.182 Figure 2-21 illustrates the phase 3 works.

**Figure 2-21: Winthorpe Roundabout phase 3 works**




2.6.183 Works in phase 3 include:

i. The Drove Lane traffic being moved onto the new road alignment.
ii. Completion of the through lane in the center of the roundabout and completion of the north-east quadrant of the roundabout.
iii. Night-time closures of the junction to complete the signing, gantry, pavement and white lining works.

## Section 5: Modifications to existing carriageway

2.6.184 The A46 northbound and southbound traffic would be moved from the existing carriageway onto the completed northbound carriageway. This would allow the modification works to be undertaken on the existing carriageway to create the new southbound carriageway.

2.6.185 The works would include:

i. Installing new drainage gullies and connecting into the existing drainage system.
ii. Planing out the existing surface course and resurfacing.
iii. Installing new road signage.
iv. Installing new road restraint systems where required.
v. Installing new road markings.

## Culvert extensions

2.6.186 There are several existing culverts that carry water courses under the A46 that would require extending to the northern side of the road to allow the new northbound carriageways to be constructed over the top.

2.6.187 The existing water flow would be diverted during the construction operation, to provide a dry working environment. This would be created by intercepting the existing flow prior to the working area by means of a temporary dam and sump. The water would be over pumped from the interception point into the existing culvert. Where possible this work would be undertaken during the dryer months.

2.6.188 The existing reinforced concrete headwalls would be demolished using a mechanical excavator with a breaker attachment.

2.6.189 A lifting platform would be constructed setback from the culvert and an excavator or crane would be mobilised to the platform. Precast culvert units or pipes would be delivered on a flatbed lorry and lifted in and placed into position. A system of chain-blocks or similar would be used to pull the units together, with the joints then sealed. The full extent of the buried elements of the culvert would be waterproofed prior to reinstatement, and the culvert backfilled with suitable compacted material.

2.6.190 Once the surround is complete, general fill would be placed and compacted as part of the general embankment widening construction. The backfill at each end of the culvert would be stepped back to allow for the construction of the headwalls.

2.6.191 Dependent upon the size and complexity of the headwall detail, either precast or in-situ head walls would be constructed. The headwall and wingwall locations would be excavated and blinded. Where precast wingwalls are used, the sections would be lifted into position and the stitch details between units cast. Where an in-situ detail is required, preformed formwork and prefabricated steel reinforcement would be utilised to form the new headwall arrangement.

2.6.192 Once the headwalls are complete the scour protection measure required upstream of the new culvert would be installed. These would be formed from rock blankets or gabion baskets which would be made up in-situ and filled with imported stone. When the new culvert structure is complete, the approach section of the new drainage route would be excavated and tied back into the watercourse and the water diverted to the new route. The original route would then be sealed off, any soft spots dug out before the original route is backfilled and reinstated. Where over-pumping has been used the upstream dam would be removed and the pumping system demobilised.

## Earthworks

2.6.193 There is approximately 700,000 $m^3$ of new embankment to create along the route of the new northbound carriageway. The embankments would be formed either with bulk earthwork fill or as engineered soil slopes using geotextile layers.

2.6.194 Topsoil and subsoil would be stripped by an excavator and moved to a storage area. Because the majority of the Scheme is within the flood plain, the majority of the excavated soils would be transported to the soil storage and landscape bunds in Section 4.

2.6.195 The existing stone drainage layer would be extended out using an imported class 6C to form the starter layer.

2.6.196 It is anticipated that some ground improvement measures would be required in sections 1 to 3, particularly within the area of Cattle Market Junction. These would be either sand drains or ridged inclusions and would be installed from the 6C starter layer.

2.6.197 An excavator and dozer would cut benches into the existing embankment in which the fill material would be placed and compacted to form the widened embankment.

2.6.198 The areas identified as having steepened slopes would have geosynthetic grids placed in between layers of compacted fill.

2.6.199 Suitable material excavated from the floodplain compensation areas would be transported to the new embankment fill locations.

2.6.200 The material excavated from the Kelham and Averham FCA would be transported by road wagon to fill locations in sections 2, 3 and 4.

2.6.201 The material excavated from the Farndon East FCA, Farndon West FCA and borrow pits would be graded on site to form a suitable fill material for the embankment widening between the River Trent and the Nottingham to Lincoln Railway Line. Surplus excavated material would be graded and transported by road wagon to the embankment construction in section 2.

2.6.202 The floodplain compensation excavation and fill quantities would be monitored during the construction programme to ensure that fill material is not placed in the flood zone until the corresponding floodplain compensation has been created.

## Material Stockpiles

2.6.203 The existing topsoil and subsoil would be stripped and stored in local storage areas, where practicable and, if storage areas are within the flood zones, only after the appropriate floodplain compensation has been created.

2.6.204 Where it is not practical to store soils in local storage areas these would l be transported to soil storage areas outside the flood zones in

Section 4. These include temporary storages areas are adjacent to the Winthorpe Roundabout (Work Nos 111 and 120), the Friendly Framer Link (Work No 106) and the location of the new landscape bunds (Work Nos 94A to 94C).

## Borrow pits

2.6.205 The design of the Scheme includes the formation and use of borrow pits, the purpose of which would be to extract suitable earthworks materials for use during construction of the Scheme.

2.6.206 Potentially three borrow pits would be formed:

a. Farndon West borrow pit, to the north of the River Trent.

b. Farndon East borrow pit, to the north of the River Trent.

c. Brownhills borrow pit.

2.6.207 These locations have been selected due to their proximity to where material would be needed during the construction phase, and to minimise the distance over which material would need to be transported.

2.6.208 The average depth of the borrow pits would be 1-4 meters.

2.6.209 The topsoil excavated from the borrow pit areas would be either stockpiled adjacent to the area or transported to the soil stockpile areas at the northern end of the Scheme. The topsoil would be used for re-soiling after completion of the works. Settlement and recharge lagoons would be constructed adjacent to the borrow pit areas to allow dewatering operations to take place.

2.6.210 The excavated material would be cleaned and graded to a specified material classification on site. This would be loaded onto wagons to be taken to the required fill locations.

2.6.211 Material excavated from the Farndon sites is likely to be sands and gravels and would be processed into a class 6i/j material for use in the reinforced earth soil embankment between the River Trent and the Nottingham to Lincoln railway line in Section 1.

2.6.212 Material excavated from the Brownhills site is likely to be a class 2 clay. This would be used to construct the new embankment at Brownhills Junction.

2.6.213 After completion of the extraction of the material, the excavations at Brownhills borrow pit would be backfilled and re-soiled. Farndon West borrow pit site would be profiled to suit the essential mitigation shown on Figure 2.3 (Environmental Masterplan) of the ES Figures **(TR010065/APP/6.2)**. It is likely that there would be no surplus material to backfill the borrow pit at Farndon East, and it is likely this would be left to naturally fill with water over time. For the purposes of the environmental assessment it has been assumed that there would be no surplus material to backfill Farndon East borrow pit.

2.6.214 The finished levels at the Farndon borrow pit locations will be lower than the levels required for the FCAs to function as required.

## Drainage and dewatering

### Construction surface water drainage

2.6.215 Temporary site drainage would be planned to manage the risks associated with heavy rainfall or flood events appropriate to the risk during construction, such as the topography, catchment size and duration of the works. A number of discharge locations would be in operation concurrently throughout the Scheme and volumes would vary depending on the progress of the works programme. Outfalls from temporary site drainage would be to local surface water bodies and would maintain existing catchment boundaries wherever feasible.

2.6.216 Temporary site drainage would utilise the permanent ponds in the temporary situation where feasible to provide attenuation during construction, with additional ditch connections to watercourses. During the construction phase, the ponds would be temporarily sized to deal with water from the localised catchment area.

2.6.217 In some locations, new temporary ponds may need to be constructed for surface water storage needs. All temporary drainage ponds would be within the Order Limits. Land for new temporary ponds would be returned to its original use after construction.

2.6.218 Temporary pumping arrangements may also be required for localised pumping operations.

2.6.219 Standard mitigation measures would be utilised to prevent pollution of watercourses from surface water runoff during the construction phase, such as use of silt fencing, cut-off drains, and baffles at discharge locations. Further information on these measures can be found in Chapter 13 (Road Drainage and the Water Environment) of this ES, as well as the First Iteration EMP **(TR010065/APP/6.5)**.

### De-Watering

2.6.220 De-watering is expected to be required at borrow pit locations. It is anticipated that de-watering would be managed by a 'sump pumping' type arrangement, which would involve excavating approximately 1-metre-deep sumps at natural low spots around the periphery of the borrow pit excavation area. Water would be directed to the borrow pit sumps via grip drains and ditches around the periphery of the excavated area.

2.6.221 Diesel-powered pumps would remove water from the borrow pit sumps to silt lagoons located within the borrow pit area for settlement and attenuation before discharge to local watercourses. If de-watering of a borrow pit is required and excavation layout and ground

conditions suit, a groundwater recharge arrangement would be implemented to manage groundwater levels.

2.6.222 Environmental permits for groundwater abstraction and water discharge would be sought from the Environment Agency before this work commenced.

2.6.223 In addition to de-watering at borrow pit locations, groundwater de-watering impacts could occur as a result of earthworks and excavations associated with features such as road box cuttings, drainage trenches, culvert extensions drainage attenuation ponds, and bridge substructure elements that penetrates below the water table.

## Working in flood zones

2.6.224 The A46 widening works are located within Flood Zone 2 and 3. The preliminary design includes floodplain compensation areas which would be excavated during the pre-commencement works stage.

2.6.225 The excavation of the floodplain compensation areas would be undertaken as part of the pre-commencement works, creating the availability to commence the earthwork widening works and construction of the temporary works areas in the first summer of the construction programme. The quantity of material excavated for the compensation works would be monitored by the main contractor such that the fill placement can be effectively managed. This process is detailed in the Pre-Commencement Plan **(TR010065/APP/6.9)**. If the works are undertaken as part of the main construction works then it would be in line with the Second Iteration EMP which will substantially accord with the First Iteration EMP **(TR010065/APP/6.5)** as required by Requirement 3 of the draft DCO **(TR010065/APP/3.1)**.

2.6.226 The Pre-Commencement Plan **(TR010065/APP/6.9)** and the First Iteration EMP **(TR010065/APP/6.5)** also requires for an Emergency Response Plan for Flood Events to be prepared which includes proposals for emergency flood response protocols that the Principal Contractor would implement when a flood warning is received.

## Construction materials and waste management

2.6.227 Details of the main types and estimated quantities of construction materials required for the delivery of the Scheme are provided in Chapter 10 (Material Assets and Waste) of this ES.

2.6.228 Notwithstanding the use of borrow pits to source construction material, it would be necessary to import some engineering earthworks materials, for example imported backfill material behind structures and, where required, imported materials in a starter layer or drainage layer under embankments.

2.6.229 Where possible, materials would be recycled and used in the works. This includes materials such road planings from resurfacing works or redundant sections of carriageway.

2.6.230 It is planned that unsuitable materials generated from earthworks operations would be used within the works and placed in earth bunds or landscaping areas, or used to backfill the excavated borrow pits.

2.6.231 Surplus material would be transported to a suitable deposition location via haul roads where possible. Where this is not possible, road wagons would be used to transport the material via defined site access points and defined routes on the road network.

## Environmental management

2.6.232 In accordance with Requirement 17, all pre-commencement works would be undertaken with appropriate environmental controls in place, in line with the Pre-Commencement Plan **(TR010065/APP/6.9)**.

2.6.233 All other construction works would be undertaken with appropriate environmental controls in place, in line with the Second Iteration EMP.

2.6.234 A First Iteration EMP **(TR010065/APP/6.5)** is included as part of the DCO application. The First Iteration EMP includes the Register of Environmental Actions and Commitments (REAC), which outlines the essential mitigation required to be implemented during construction.

2.6.235 In accordance with Requirement 3 of the draft DCO **(TR010065/APP/3.1)**, a Second Iteration of the EMP would be developed by the Principal Contractor prior to the start of the main construction works, it will substantially accord with the First Iteration EMP **(TR010065/APP/6.5)**.This would include the implementation of industry standard practice and control measures for environmental impacts arising during construction, such as, but not limited to, the control of dust, noise and other emissions, and the approach to waste and material management onsite.

## Construction compounds

2.6.236 The main construction compound would have security in place on a 24-hour basis. Although construction of the Scheme would primarily be undertaken during core working hours, a number of functions associated with the works would need to operate 24 hours per day. These functions include:

i. Site security
ii. Vehicle recovery
iii. Traffic management
iv. Water management
v. Deliveries of large components and/or plant which are moved during off-peak traffic hours, to minimise disruption to road users

vi. Activities identified in section 2.6.271 of this chapter in which the welfare and office facilities would be made available.

2.6.237 Lighting within the main construction compounds and on the boundary would be managed to reduce light spill as far as practicable, and where possible cabins and welfare facilities would be single story and positioned centrally within the compounds to minimise impacts on receptors in close proximity to the site boundaries.

### Main construction compound

2.6.238 The main construction compound is located at the site of the old Nottinghamshire County Council Highway Maintenance Depot and would function as the head office for the Scheme and would accommodate the site management and delivery teams responsible for works.

2.6.239 The total area of this compound is approximately 14,500m$^2$.

2.6.240 Vehicle access to the compound is via the Great North Road with the existing access amended as part of the compound establishment works.

2.6.241 The existing highway depot land is secured with a variety of fencing types. These would be assessed and replaced with 2.4 metre high chain link fencing or similar to prevent unauthorised access. Security barriers would be installed at the access to the compound. The barriers would be offset from the Great North Road access to prevent queuing of site vehicles entering the compound.

2.6.242 In summary, the compound would include the following features:

i. Modular office of approximately 2,000m$^2$ together with canteen and welfare facilities.
ii. Training building for site safety briefings and inductions.
iii. Site stores compound, including subcontractor material storage yards and plant yards and laydown areas.
iv. Materials testing laboratory facilities.
v. Cement bound material batching plant, installed during the pavement construction operations.
vi. CCTV traffic control facility.
vii. Vehicle free recovery unit and storage, with customer care centre.
viii. Waste management and segregation areas.

2.6.243 The compound would accommodate parking provision for:

i. Up to 166 vehicles for staff, subcontractors, labour and visitors traveling to the site daily.
ii. 20 vehicle spaces for site-based vehicles including pickups, vans, minibuses, crew cabs etc. and suitable parking for LGVs, HGVs and plant.

## Satellite construction compounds

2.6.244 In addition to the main construction compound, a number of satellite construction compounds and temporary works areas would be formed to facilitate the construction of the Scheme.

2.6.245 These smaller compounds would generally be located adjacent to bridge structures and be in operation for a limited duration whilst undertaking these works. Works within the compounds would normally only be undertaken during core hours; however, during periods of overnight works such as bridge beam installation, road tie-ins and other critical works, these compounds would need to operate outside of these hours.

2.6.246 The temporary works areas would consist of hardstanding areas adjacent to the working areas that are used for the fabrication of bridge elements and the positioning of construction plant, such as cranes and piling rigs.

2.6.247 The perimeter to the compounds would be fenced to prevent unauthorised access. The fence type and construction would be appropriate to the level of security required, but this is likely to be 'Heras' type fencing.

2.6.248 Lighting columns would be installed to reduce light spill and where possible cabins would be single storey to reduce any impact on receptors in close proximity to the perimeter.

2.6.249 The satellite construction compounds would typically include the following features:

i. Parking spaces for a small number of site vehicles such as pickups, vans and minibuses.
ii. An office of 72m$^2$ required for up to 10 staff, together with mess room and welfare facilities.
iii. A diesel generator to provide a source of power to the facilities (where practicable solar panels and batteries would be used in place of, or in combination with, a generator).
iv. Site storage areas including subcontractor material storage yards and plant parking.

2.6.250 The location of each satellite construction compound and temporary works area are illustrated on Figure 2.4 (Locations of Temporary Works Areas Required During Construction) of the ES Figures **(TR010065/APP/6.2)**, the details and access arrangements of which are described in Table 2-5.

## Table 2-8: Satellite construction compound and temporary works area details

| Satellite compound/temporary works area name | Location | Details |
|---|---|---|
| Farndon Roundabout | Within Farndon roundabout. | Access would be via the existing gated access on the western side of the roundabout.<br>Welfare units.<br>Vehicle recovery area (24/7) operation.<br>Material storage. |
| Crees Lane | Field to the west side of Crees Lane | Certation of a hardstanding area to act as a waiting area for vehicles wanting to access the southern abutment of the Windmill Viaduct and prevent queuing along Crees Lane. |
| Windmill Viaduct south | To the east and west side of the Windmill viaduct | Welfare units and hardstanding areas for material storage. |
| Windmill Viaduct north | To the west side of the Windmill Viaduct | Welfare units and hardstanding areas for material storage. |
| Farndon East FCA | Adjacent to the Farm Access underpass | Welfare units and hardstanding areas for material storage. |
| Nottingham to Lincoln railway west crossing west crossing south | West side of the A46 carriageway. | Welfare units and hardstanding areas for material storage. Hardstanding area for cranage. |
| Nottingham to Lincoln railway west crossing west crossing north | West side of the A46 carriageway. | Welfare units and hardstanding areas for material storage. Hardstanding area for cranage. |
| Smeaton's Arches | West side of the A616 adjacent to the Grade II Causeway Arches 500m and 650m north west of level crossing | Access via A617 and exit onto A616. Hardstanding area with small welfare unit. |
| Lorry Park | East end of the Lorry Park | Welfare units and material storage. |
| Nottingham to Lincoln railway west crossing east crossing, south | West side of railway | Welfare units and material storage. |
| Nottingham to Lincoln railway west crossing east crossing, north | East side of railway | Welfare units and material storage. |
| Kings Marina | South side of the redundant railway bridge at the southern end of the access track | Material stockpiles. |
| Trent Lane | The northern end of Trent Lane on the east side of the River Trent | Access Via Trent Lane and Maltklin Lane. Welfare, office units and material/plant storage. |
| Nether Lock south | Northern end of the access track | Security gate house with welfare. |

| Satellite compound/temporary works area name | Location | Details |
|---|---|---|
| Nether Lock north | North side of the new viaduct between the A46 and the Nottingham to Lincoln Railway Line | Accessed via the access track adjacent to the ECML and behind the old Quibell's glue factory building.<br>Hardstanding area for bridge fabrication.<br>Office and welfare units.<br>Material and plant storage. |
| ECML north | North side of the north abutment | Office and welfare units. |
| Quibell's Lane | South side of the Severn Trent Water underpass | Accessed via temporary access track from Quibell's Lane.<br>Office and welfare units.<br>Material and plant storage. |
| Brownhills junction | Between the A1 and Winthorpe Road | Hard standing area for the fabrication of the A1 bridge deck.<br>Office and welfare units.<br>Material and plant storage. |
| A1 bridge east | East side of the A1 | Access from the A46 northbound carriageway.<br>Office and welfare units.<br>Material and plant storage. |
| Mint Leaf | Site of the Mint Leaf restaurant | Welfare units. |
| Showground | South side of the A46 | Welfare units.<br>Vehicle recovery area (24/7) operation.<br>Material and plant storage.<br>Cement Bound Granular Material (CBGM) batching plant. |
| Friendly Farmer to Winthorpe | North side of the A46 | Soil storage along the location of the permanent landscape bunds. |
| Winthorpe roundabout south | East side of Drove Lane | Soil storage |
| Winthorpe roundabout north | East side of A1133 | Soil storage |

2.6.251 Compound areas located on temporary land will be restored to previous land use on either completion of the Scheme, or in some cases, when the works are completed in that specific area on completion of the Scheme.

### Construction traffic and traffic management

2.6.252 Estimates of the likely number and type of construction traffic have been generated based on the planned approach to, and phasing of, construction of the Scheme. Details of these estimated vehicle movements are presented in the Transport Assessment **(TR010065/APP/7.4)**.

2.6.253 During construction, a Traffic Management Plan, based on the Outline Traffic Management Plan **(TR010065/APP/7.7)** would be put in place

to ensure that traffic flows on both the strategic and local road networks are maintained, whilst allowing safe working at the interface between the existing road network and the Scheme (details are contained in Table 2-9 below).

2.6.254 The main objectives of the temporary traffic management are:

i. To protect the construction workforce against the risks to health and safety associated with working on or adjacent to live carriageways.
ii. To ensure the safety of road users (including WCH) as they approach, and travel through, routes affected by roadworks.
iii. To minimise the health and safety risks to the local community resulting from construction operations, including the impacts of (intended and unintended) traffic diversions onto the local road network.
iv. Minimise disruption to road users, local businesses and communities during construction works.

2.6.255 Temporary traffic management would include, but not be limited to, the following types of measures:

i. The application of temporary speed limits.
ii. Carriageway and slip road closures.
iii. The segregation of routes.
iv. The use of signage and clear road marking systems.
v. Formation of safe access and egress points.
vi. Communication of measures to stakeholders.

2.6.256 Further details of the temporary traffic management measures to be implemented during the construction of the Scheme are presented in the Outline Traffic Management Plan **(TR010065/APP/7.7)**. An overview of the temporary traffic management proposals are included in Table 2-9.

**Table 2-9: Anticipated traffic management**

| Construction Element/location | Section | Anticipated traffic management measures |
|---|---|---|
| A46 between Farndon and 750 metres north of Winthorpe roundabout | All | Speed restrictions would be in place from when the works requiring traffic management commence, until completion. Lane closures during weekdays would be between the hours of 20:00 and 06:00 (traffic count dependent) and full closures from 21:00 to 06:00 (traffic count dependent). During weekends, closures could be in effect for 24 hours.<br>Two-lane running would be maintained on the A46 between Friendly Farmer and Winthorpe Roundabouts and the A1 during weekday peak traffic hours (between 06:00 and 21:00) to minimise the disruption to traffic flows. The exception to this would be for the installation of the A1 bridge crossing and the tie-in of the new A46 alignment to the existing.<br>All diversion routes for full closures would be pre-signed, |

| Construction Element/location | Section | Anticipated traffic management measures |
|---|---|---|
| | | and advance warning signs would be installed prior to the closure dates. |
| Crees Lane | 1 | Temporary traffic lights and lane closures for the construction of the works access points. |
| Farndon Roundabout | 1 | Narrow lanes and temporary barrier with speed restrictions to construct new lane inside the existing roundabout.<br>Full and lane closures to complete pavement and road markings. |
| Construction of northbound carriageway | 1, 2 and 3 | Traffic management would predominantly take the form of narrow lanes and speed restrictions. |
| Cattle Market Junction | 2 | Multi-phased traffic management solution (refer to paragraphs 2.6.109 to 2.6.119) to maintain traffic movements and to create safe working areas to construct the new junction. This would require off peak lane and full closures of the A46, A616 and the Great North Road. |
| Great North Road | 2 | Narrow lanes and temporary barrier with speed restrictions to widen the Grade II Causeway Arches 500m north west of level crossing |
| Quibell's Lane | 3 | Temporary traffic lights to construct bellmouth for temporary access track.<br>Diversion required for the closure of Quibell's Lane during the construction of the Sewage Treatment Works underpass for traffic accessing the Sewage Treatment Works. |
| Winthorpe Road | 3 | Multi-phased traffic management solution (refer to paragraphs 2.6.140 to 2.6.154) to maintain traffic movements and create safe working areas to construct the new junction. |
| A1 | 3 | Night-time lane closures and full closure of the A1 northbound to construct the works access into the bridge fabrication area.<br>Full weekend closure of the A1 (Friday night to Sunday afternoon) to install the A1 bridge deck. |
| Friendly Farmer Roundabout to Winthorpe Roundabout | 4 | Multi-phased traffic management solution (refer to paragraphs 2.6.151 to 2.6.161) to maintain traffic movements and create safe working areas to construct the new junction. |
| Winthorpe Roundabout | 4 | Multi-phased traffic management solution (refer to paragraphs 2.6.162 to 2.6.168) to maintain traffic movements and create safe working areas to construct the new junction. |
| Southbound carriageway | 5 | Traffic would be moved onto the new northbound carriageway to allow the modifications to be undertaken to the existing carriageway. Temporary speed restrictions would be retained due to the anticipated tie-in works at the junctions. |
| Kelham and Averham FCA | 6 | Traffic lights, narrow lanes and speed restrictions on the A617 for the construction of the work access points. |

## Permitted and excluded routes

2.6.257 Where practicable, access into work areas has been planned to come off the A46 via temporary access points and junctions. However, there are areas of the Scheme where this form of access would not be feasible, and the use of side roads would be required to access these work areas (see Table 2-10).

2.6.258 To minimise the use of side roads, permitted, permitted with restrictions, and excluded routes would be specified to cause minimal disruption to local stakeholders and residential areas, where practicable.

**Table 2-10: Access restrictions**

| Side Road | Status | Details |
|---|---|---|
| Crees Lane | Permitted with restrictions | Construction vehicles not permitted along the private road section. |
| Fosse Way | Permitted with restrictions | Construction traffic would use Fosse Road to access Crees Lane. |
| Tolney Lane | Excluded | - |
| Kelham Road (South of the A46) | Permitted with restrictions | On street parking along this section of the road make it unsuitable for HGVs. Restricted to LGVs, vans and cars for accessing the main compound and for the use of 4x4s with trailers using the farm access track to the south side of Work No 26). |
| A616 | Permitted | - |
| A617 | Permitted | - |
| Mather Road | Permitted with restrictions | Used as access to Nether Lock Viaduct during advanced and pre-commencement works. |
| Lincoln Road, Lincoln Road Bridge and Northgate. Trent Lane and Maltkiln Lane | Permitted with restrictions | Construction vehicles to access Trent Lane via the Lincoln Road from the Brownhills Junction only. Construction traffic (other than personal cars and small vans) would not be permitted to access Trent Lane via the Bar Gate and North Gate. |
| Winthorpe Road and Quibell's Lane | Permitted with restrictions | Access along Winthorpe Road to the Quibell's Lane junction only. |
| Winthorpe Road between A46 and A1 | Permitted with restrictions | Used during advanced and enabling work. Separate construction access and egress routes to be provided from the A46. |
| Drove Lane | Permitted with restrictions | Used to access the works access at the western end of Drove Lane only. No construction vehicles permitted past the Order Limits on Drove Lane. |
| A1133 | Permitted with restrictions | Used to access the works access only. |
| Gainsborough Road | Permitted with restrictions | No HGVs or LGVs. Limited to cars/vans to undertaken inspection of the technology and electrical equipment on the east side of the A1. |

2.6.259 Information on routes would be provided to all relevant project staff and the supply chain prior to arrival. Signage would be installed

locally to advise construction traffic of the permitted, permitted with restrictions and excluded routes.

### Construction plant and equipment

2.6.260 Construction activities undertaken across the Scheme would involve the use of a range of plant, equipment and machinery depending on the location and nature of the works.

2.6.261 Tracked excavators, dozers, breakers, dumper trucks, planers, piling rigs, concrete pumps and rollers would be used to dig, move, lay and compact material as part of the earthworks and foundation operations.

2.6.262 Road wagons, tipper wagons, telehandlers, low loaders and cranes would be used to transport materials and equipment to and from construction working areas.

2.6.263 Hand tools including hammer drills, vibrators, saws, plate compactors and sprays would be used for specific activities and where access does not permit the use of larger equipment.

2.6.264 Petrol and diesel powered generators would be used in working areas to provide a power source for some plant and equipment. Solar powered equipment such as lighting towers would be utilised where applicable.

2.6.265 Ancillary equipment such as pumps would be installed during construction to dewater the excavations and working areas, and lighting towers would be erected to provide illumination for safe working outside of daylight hours.

2.6.266 Equipment comprising office and canteen cabin units, drying rooms, stores, changing rooms and showers a would be set up within the main construction compound and in some satellite construction compounds for staff welfare. A mobile welfare unit would be used during the works in areas more remote from these compounds.

2.6.267 Minibuses, pick up vehicles, road sweepers, recovery trucks and lorry mounted cranes would be used across all working areas to support other construction activities, and for the transportation of people and vehicles from the main construction compound.

2.6.268 Communications masts and signal boosters would be used to facilitate effective construction techniques through the adoption of digital technology. The masts would be of a form comparable to a lighting column and would be installed temporarily at locations with signal blackspots.

2.6.269 Construction activities would involve the use of heavy plant items with the potential to emit high levels of noise and vibration and contribute to pollution, such as excavators, dumper trucks, dozers and compaction equipment. Noisy activities also include, but are not limited to, demolition of existing features and piling for structures and retaining walls. Further information of noise impacts during

construction is included in Chapter 11 (Noise and Vibration) of this ES. A detailed list of the plant and equipment required for various construction activities, along with the assumed noise levels, is provided in Appendix 11.1 (Construction Activities and Plant for Noise Assessment) of the ES Appendices **(TR010065/APP/6.3)**.

2.6.270 To mitigate the impacts associated with construction plant and equipment, standard mitigation measures would be undertaken as necessary during the construction phase of the works, as detailed within the First Iteration EMP **(TR010065/APP/6.5)**.

### Workforce management

2.6.271 The construction workforce would vary throughout the advanced works, pre-commencement works and main construction works phases.

2.6.272 The approximate maximum size of the workforce is expected to peak at 450 staff on site per day. Approximately three quarters would be site based, and the remaining quarter would be site-officed based, working from home or in a hybrid capacity.

2.6.273 It is expected that the majority of site staff would commute from the local towns and cities that are within a one hour drive of the Scheme. Individuals working away from home would stay overnight in the local area, using settlements such as Newark, Grantham and Nottingham. The location of the Scheme to several towns with suitable accommodation options means that on site accommodation is not proposed.

2.6.274 The exception to this would be the road work recovery teams who would be working shift patterns on site. Welfare and accommodation facilities would be installed for these teams at the main construction compound.

2.6.275 Car sharing would be encouraged, and the main construction compound would also include bicycle storage, and bicycle and pedestrian access routes, to promote sustainable and active travel options.

### Construction working hours

2.6.276 Core construction working hours would be from 07:00 to 18:00 on weekdays and from 07:00 to 13:00 on Saturdays.

2.6.277 Other than in the case of the exceptions described below, and in the case of emergencies, the PC would adhere to these core working hours as far as is reasonable practicable.

2.6.278 Exceptions to the core hours include the following:

i. Online sections of the Scheme would require night-time working to facilitate traffic management installation and removal.
ii. The installation of bridge beams to the new bridge structures.

iii. Removal of the existing signal gantry on the A46 between the Friendly Framer and Winthorpe roundabouts and the installation of new gantry structures at the Winthorpe roundabout and north of the Winthorpe roundabout.

iv. Tie-in of new road surfacing into existing and installation of road markings.

v. Installation of signs and street lights where the works are adjacent to live traffic.

vi. Abnormal load deliveries, such as bridge beams or large items of plant, that cannot travel on the road network within core working hours.

vii. Construction of the Nether Lock Rail bridge over the ECML and the works over the Nottingham to Lincoln line would require working in proximity to the railway line. To ensure the safety of construction personnel and railway operations, certain activities would be required to be undertaken during closures (referred to as possessions) of the railway. The timings of the possessions would be dictated by Network Rail's 'Rules of the Route' requirements, these being the rules agreed with train operators under which speed restrictions or temporary line closures can be imposed. Where practicable, railway possessions would be used to install safety systems (for example protection decks and railway protection barriers) to enable a greater amount of the construction activities to be undertaken during core hours.

viii. Security.

ix. Maintenance of plant and equipment requiring 24/7 operation such as dewatering pumps.

x. Certain other specific construction activities would require extended working hours for reasons of engineering practicability. These activities include, but are not limited to, major concrete pours and piling works.

xi. Environmental and engineering surveys may need to be carried out outside of core working hours.

2.6.279 Outside the core hours and days specified above, the Applicant will consult with the local planning authority prior to carrying out certain operations such as earthworks which are season and weather dependant.

2.6.280 Any other work required to be undertaken outside of core hours (not including repairs or maintenance) would be agreed with the relevant local authority prior to undertaking the works. In addition any Section 61 of the Control of Pollution Act 1974 consents will be obtained where required.

2.6.281 In the case of work required in response to an emergency or which if not completed would be unsafe or harmful to the works, staff, public or local environment, the relevant local authority would be informed as

soon as reasonably practicable of the reasons for, and likely duration of, the works. Examples include where pouring concrete takes longer than planned due to equipment failure, or where unexpectedly poor ground conditions are encountered whilst excavating and they require immediate stabilisation.

2.6.282 The intention would be to avoid working on any online sections of roads during bank holidays to minimise potential disruption to road users.

### Landscape aftercare period

2.6.283 The Principal Contractor would be responsible for undertaking landscape management within the contract period, after which the long-term maintenance and management responsibilities would transfer to the Applicant.

2.6.284 The Principal Contractor would also be responsible for the preparation of a Third Iteration EMP during the contract period.

2.6.285 The purpose of the Third Iteration EMP is to provide information relating to existing and future environmental commitments and monitoring that would need to be delivered by those responsible for the future management and operation of the Scheme. The Third Iteration EMP would also include specific requirements concerning long-term maintenance and management of all landscaping incorporated into the Scheme.

### Long-term maintenance of the Scheme

2.6.286 The Scheme has been designed in a way that minimises the frequency of future interventions through the incorporation of low maintenance equipment and features that reduce the amount of repairs required. Examples include the use of cast-in road studs over other stick-on alternatives, and the co-location of equipment to facilitate access for routine inspections. Accordingly, no major maintenance activities are likely to be required within the first five years of the Scheme being operational.

2.6.287 The maintenance responsibilities for the new carriageway and associated slip roads as shown in the Classification of Roads Plans **(TR010065/APP/2.9)** and Schedule 3of the draft DCO **(TR010065/APP/3.1)** would rest with the Applicant.

2.6.288 The maintenance responsibility for the new local road network and any other unclassified roads as shown in the Classification of Roads Plans **(TR010065/APP/2.9)** and Schedule 3 of the draft DCO **(TR010065/APP/3.1)** would rest with the local highway authority.

2.6.289 Short-term maintenance and repair activities are likely to comprise inspections on the new works and installed assets, and any unplanned, emergency repair works due to damage following events such as road traffic incidents.

2.6.290 The highway assets within the Scheme would be subject to the routine maintenance operations, similar to those being undertaken elsewhere on the existing SRN and local road network. These maintenance activities would, wherever feasible, be programmed in a way that enables their combination with other planned operations to reduce disruption to road users associated with land closures and diversions.

2.6.291 Traffic Management deployed during such operations would comprise a combination of temporary speed restrictions, land closures and reduced running land widths to enable continued access for traffic.

## Decommissioning

2.6.292 The traffic and economic assessment (as detailed in the Transport Assessment **(TR010065/APP/7.4)**) demonstrates that the improvements would operate adequately for the 15 year design life of the Scheme. Typically, most assets in highways schemes are designed to have a material life-span of between 20 and 40 years before upgrading is required dependant on material properties, maintenance and usage. Assets including structural concrete and steelwork have extended design lives of up to 120 years.

2.6.293 It is highly unlikely that the Scheme would be decommissioned after its design life, as the improvements would have become an integral part of the strategic and local road networks. Decommissioning has been scoped out of the assessment within this ES, as set out within the Appendix 4.1 (Scoping Opinion Schedule of Comments and Responses) of the ES Appendices **(TR010065/APP/6.3)**.

2.6.294 In the unlikely event of the Scheme needing to be decommissioned, this would conform to the statutory process in place at that time, including any requirements for EIA as appropriate.

2.6.295 Demolition of the Scheme has therefore not been considered further in this ES; however, appropriate consideration has been given, where relevant, to its future maintenance in relation to activities such as periodic inspections and the renewal of components once they reach the end of their design life, where significant effects are likely to occur.

## 2.7 Demolition

2.7.0 Two existing structures have been identified as requiring demolition in either the advanced works or pre-commencement works stages. These are:

- The Mint Leaf Restaurant which is located under the alignment of the new entry slip road to the Esso interchange and would be demolished in advance of the main works.

- The old maintenance shed to the south-west quadrant of the existing Cattle Market Roundabout within the old highway maintenance depot.

2.7.1 The locations of the above are illustrated on the Works Plans **(TR010065/APP/2.3)**.

## 2.8 References

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