MILESTONE INFRASTRUCTURE

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A16 Norwood, Peterborough

Outline Business Case

Delivering what we promise

Document Control

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4.0	Updated following Second ITE Review	HP	RPJ	RMJ	RMJ	26.8.2022

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Executive Summary

This Outline Business Case (OBC) makes a strong case for investment into the A16 Improvement Scheme, which will return High Value for Money with a BCR of 2.94 based on an economic assessment whilst having significant strategic value by support a significant local growth area identified within Peterborough's Local Plan.

Design and development work has been underway for several years to identify a package of highway improvements which will address future challenges along the A16 and A47 corridors, including congestion and road safety.

Critically, construction of the schemes will also support the delivery of 2,000 homes on the Norwood growth side, as identified within the Peterborough Local Plan 2016 to 2036 (Adopted on 24th July 2019). The developments at the Norwood site still need to mitigate their impacts and the schemes are only intended to support the sustainability of an area earmarked for growth.

More recent phases of the project have identified active travel and environmental improvements which will be incorporated into the next phase of design, and reduce severance for the new developments, providing healthier travel choices for users and the environment.

The OBC is set out in compliance with the DfT's Five Case Business Model.

Strategic Dimension

The Strategic Dimension has considered the policy context in which the scheme has been developed. As well as policy, the need for intervention is explained, which includes the requirement to overcome the following challenges which compromise local growth aspirations:

- Peak Hour Congestion and Delay (particularly on the A47 and A16)
- High levels of U-turning traffic from Newborough Road (limiting capacity)
- High accident rate.

The policy review as well as data on the existing and future issues has been used to identify scheme objectives, and a long list of potential improvement options have been assessed against these objectives using the DfT's Early Assessment Sifting Tool (EAST). The scheme objectives are set out beneath.

Primary objectives include:

- **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout
- **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised
- **Limit impact on the local environment and improve biodiversity**: Fully mitigate any adverse environmental impacts of a scheme, and ensure a biodiversity net gain within the study area
- **Improve active travel routes to provide a viable alternative to private car travel**: Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.
- **Improve road safety:** Reduce accidents and improve personal security for all travellers within the study area.

In addition to the above, secondary objectives were identified and are set out within the Strategic Dimension.

The Strategic Dimension concludes with details of the modelling and assessment work undertaken to identify the Preferred Option. Full details of this phase of work can be found in the A16 Norwood Option Assessment Report (October 2019) and are summarised within this OBC.

The package of schemes that make up the Preferred Option referred to as 'the scheme' from hereon includes:

Highway Components

- Closure of the Newborough Road Junction access onto the A47 (southbound only)
- Dualling of the A16 between the Norwood Development Roundabout and the A16 / A47 / Welland Road Roundabout
- Partial Signalisation of the A16 / A47 / Welland Road Roundabout (A16 approach)
- Creation of a flare to provide a third lane on the A47 westbound approach
- Creation of a Left Dedicated Left (LDL) from the A47 eastbound approach to the A16 northbound exit
- Realignment / reconstruction of the bridal way to the north of the A16 / A47 / Welland Road Roundabout, connecting the signalised crossing to Newborough Road

Active Travel Components

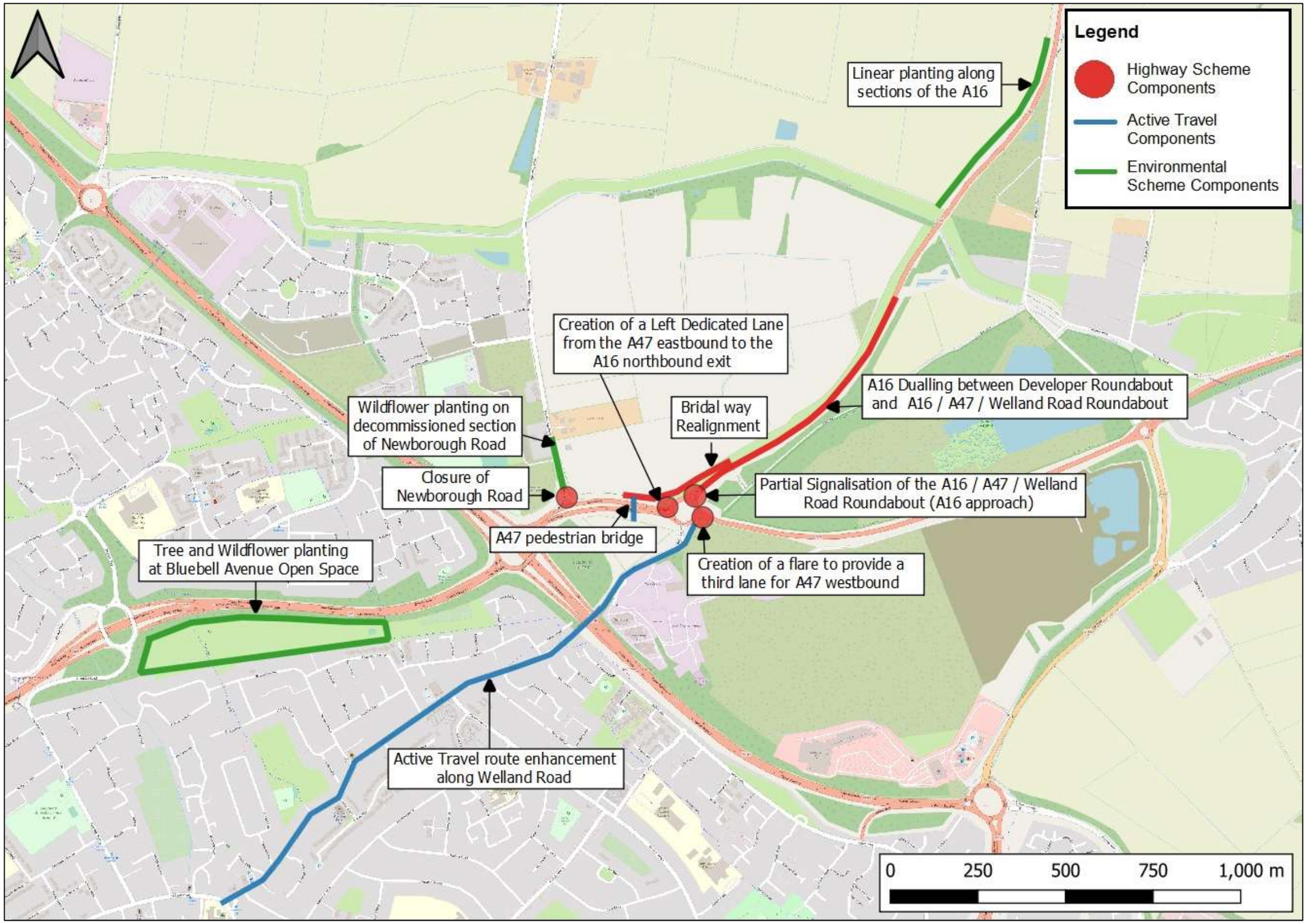
- Route enhancements from the Norwood site down Welland Road and towards the City Centre
- A pedestrian bridge over the A47 (feasibility to be explored during next design phase).

Environmental Components

- Wildflower planting is proposed in the immediate areas of the A16 development and on the decommissioned section of Newborough Road
- Linear planting of native trees and shrubs along sections of the A16 (north of the bridge) infilling gaps in the existing roadside hedgerows
- Tree and enhanced wildflower planting at Bluebell Avenue Open Space, located approximately 370m to the west of Junction 20.

It should be noted that the active travel and environmental scheme components are not yet as developed as the highway components. This will be addressed during the Detailed Design phase of the project.

The scheme outputs are shown in the Figure overleaf.


Legend
Highway Scheme Components
Active Travel Components
Environmental Scheme Components
Linear planting along sections of the A16
Creation of a Left Dedicated Lane from the A47 eastbound to the A16 northbound exit
A16 Dualling between Developer Roundabout and A16 / A47 / Welland Road Roundabout
Wildflower planting on decommissioned section of Newborough Road
Bridal way Realignment
Closure of Newborough Road
Partial Signalisation of the A16 / A47 / Welland Road Roundabout (A16 approach)
A47 pedestrian bridge
Tree and Wildflower planting at Bluebell Avenue Open Space
Creation of a flare to provide a third lane for A47 westbound
Active Travel route enhancement along Welland Road
0
250
500
750
1,000 m

Economic Dimension

The Economic Dimension demonstrates that the A16 Norwood scheme achieves a Benefit to Cost Ratio of 2.94 and offers **High Value for Money**. Further assessment as part of the Full Business Case will include a broader range of benefits, including active travel benefits.

The economic assessment is based upon a robust scheme cost estimate and has been calculated in line with TAG guidance over a 60-year appraisal period.

The transport user benefits of the scheme were assessed using the SATURN-based Peterborough Transportation Model (PTM3). The model has used the forecast years of 2026, 2031 and 2036 to appraise the impacts of the scheme. Results from this modelling were then assessed using the Transport User Benefits Appraisal (TUBA, 1.9.17) tool to calculate a scheme BCR.

Model outputs were also used in conjunction with specialist software to quantify additional benefits, including accident benefits and noise / air quality benefits. These assessments are described further in the Economic Dimension.

A breakdown of the scheme BCR is provided in the AMCB table beneath.

A16 Norwood AMCB	
Present Value of Benefits (PVB)	£21,320,000
Present Value of Costs (PVC)	£7,254,000
Net Present Value (NPV)	£14,066,000
Benefit to Cost Ratio (BCR)	2.94
Value for Money	**High**

The Present Value of Benefits for the A16 Norwood Improvement Scheme is £21,320,000. These are achieved against the Present Value of Cost of £7,254,000, generating a scheme BCR of 2.94 (High Value for Money). Please note that these figures are in 2010 prices and the Present Value of Cost is not the cost of constructing the scheme, but a figure used within the economic assessment. The Outturn Cost, which is the cost required by Peterborough City Council to deliver this scheme, is discussed in the Financial Dimension beneath.

A range of sensitivity tests have also been undertaken to determine the impact of different variables (such as cost, growth assumptions, funding source on the scheme BCR. These are set out within the Economic and Financial Dimensions and demonstrate that the scheme BCR is robust.

Qualitative and quantitative assessments have also been undertaken for the following areas:

- Accidents
- Landscape
- Historic Environment
- Biodiversity
- Noise and Air Quality
- Water Environments
- Accessibility Impacts.

These assessments did not identify any significant concerns and the assessment results are included within the Appraisal Summary Table (AST).

Financial Dimension

The Financial Dimension demonstrates that the scheme has been robustly costed. The costs include design and development costs as well as allowances for risk and inflation. The cost estimates for the scheme are summarised in the table beneath.

Description of Cost Type	Cost (£) Total
Base Investment Cost	8,530,488
Risk Adjusted Base Cost	10,290,443
Risk Adjusted Base Cost with Construction Industry Inflation (**Outturn Cost**)	**12,932,753**
Inflated Risk Adjusted Costs incorporating Whole Life Costs (60 year assessment period)	13,388,167

The scheme Outturn Cost is £12,932,753 which includes risk allowance and inflation costs through to the end of construction in 2025. This figure represents the funding needed by Peterborough City Council to deliver this scheme.

The Inflated Risk Adjusted Costs incorporating Whole Life Costs (£13,388,167) includes inflated maintenance costs over the sixty-year assessment period, but the additional cost beyond the Outturn Cost is not required as part of the scheme funding and is purely calculated to ensure that the scheme will continue to provide value for money with post construction costs considered.

The CPCA currently have an allocation of £12,000,000 in the mid-term financial strategy (MTFS) to support delivery of this scheme. The scheme outturn cost will be jointly funded through developer contributions and the CPCA MTFS allocation. The proportional split between these two sources will be confirmed at FBC.

Discussions with developers about contributions are progressing well, however exact amounts have yet to be agreed. In addition to developer contributions towards the CPCA scheme, developer funded commitments, including the Norwood internal access road and the new A16 Norwood Development Roundabout, will support the delivery of this package.

Commercial Dimension

The Commercial Dimension demonstrates that the A16 Norwood Improvement Scheme can be reliably procured and implemented through existing channels whilst ensuring value for money in delivery of the scheme.

All phases of the scheme to date, including Preliminary Design, and future phases of Detailed Design, construction and site supervision will be delivered by Peterborough Highway Services (PHS). All skills and competencies to deliver this scheme are available within the PHS contract and its supply chain.

The scheme construction will be procured using a Target Cost payment mechanism. This incentivises both parties to work together to reduce cost through a pain / gain mechanism. To ensure that the procurement remains commercially competitive and offers value for money, all subcontract packages will be subject to competitive tendering.

Management Dimension

The Management Dimension demonstrates that Peterborough City Council, through the PHS Framework, has the necessary experience and governance structure to successfully manage the delivery of the A16 Norwood Improvement Scheme.

The Council, through PHS, have successfully delivered the following highway improvement schemes in recent years. Both schemes are located on the Parkway Network at strategically sensitive locations and demonstrate PHS' ability to successfully manage and deliver highway schemes of this scale.

- Junction 20 Improvement Scheme (A47 Soke Parkway / A15 Paston Parkway) - £5.7m (2016 / 2017)
- Junction 17 – Junction 2 Improvement Scheme (A1139 Fletton Parkway) - £18m (2014 / 2015).

To date the delivery of the scheme has been managed by a Project Team, led by a PCC Project Manager. The Project Team consists of all the key project delivery partners. The Project Team has been responsible for the daily running of the project. The Project Team includes key stakeholders such as National Highways and the CPCA.

The existing PHS Project Board has overseen the continued development and delivery of the scheme to date by the Project Team and has made key decisions relating to the delivery of the project. The Project Board has been supported by technical specialists, with key stakeholders invited to attend as necessary.

Key project milestones for progressing to scheme delivery are outlined in the Table beneath:

Timescale	Activity
June 2022 – July 2022	Outline Business Case reviewed by CPCA, and approval sought from CPCA board for the release of funding to undertake Detailed Design and produce a Full Business Case.
September 2022	Work commences on the Detailed Design and Full Business Case.
September 2022 – November 2022	Site Surveys undertkaen to inform the Detailed Design
March 2024	Detailed Design and scheme costings complete. Full Business Case submitted.
April 2024 – May 2024	Full Business Case reviewed by CPCA and approval sought from CPCA board for the release of funding for scheme construction.
September 2024 – August 2025	Construction of the scheme undertaken, lasting approximately 12 months.
August 2026	1-year post-scheme monitoring undertaken
August 2030	5-years post-scheme monitoring undertaken

Stakeholders were consulted within this phase of work via email, letter or as part of the Walking, Cycling and Horse Riding (WCHR) Review, for comments on the Preferred Scheme at Preliminary Design stage.

Communication with developers and National Highways begun as part of the SOC and has continued through the development of Preliminary Design and this OBC. Communication has been quarterly via a working group which involves members of the CPCA and The Council's planning team, to discuss the project and wider updates on the Leeds Farm Planning Application (part of the Norwood Development).

Public perceptions of the Preferred Scheme were assessed as part of this phase of work, prior to the commencement of Detailed Design. The online consultation which featured on the PCC website and social media for a six-week period (1st November – 13th December 2021), highlighted elements of the scheme identified at OBC and Preliminary Design.

All comments received from stakeholders and members of the public will be incorporated into the Detailed Design where appropriate and reported within the FBC.

A Risk Register was produced during the projects initiation to identify potential risks and to evaluate factors that could have had a detrimental effect on the project. The Risk Register is a live document and has been reviewed regularly at progress meetings and updates are reported to the CPCA through the monthly Highlight Reports.

Details about how the scheme will be monitored and evaluated against the objectives are shown with the Management Dimension and include a range of quantitative and qualitative data collection methods that will be undertaken, including one year and five-year post scheme completion monitoring.

1. Introduction

1.1.1 This document sets out the Business Case for the A16 Norwood Improvement Scheme in Peterborough.

1.1.2 The scheme will help support growth aspirations of Peterborough City Council in relation to the planned Norwood and Paston Reserve urban extensions, as identified within the Peterborough Local Plan 2016 to 2036 (Adopted on 24th July 2019). The proposed highway improvements will add capacity and address future issues of congestion and delay along the A16 corridor, whilst active travel improvements will help reduce severance for users between the north-east of Peterborough and the City Centre.

1.1.3 This Outline Business Case is the second stage of the decision-making process using the format as set out in "The Transport Business Cases" document published by the Department for Transport (DfT) in February 2022.

1.1.4 The level of detail provided within the Business Case continually builds as the project progresses from Strategic Outline Case (SOC) to Outline Business Case (OBC), and then onto Full Business Case (FBC) ahead of construction. This progression reflects the greater level of detail that becomes available as the list of potential schemes is refined, and design of the preferred scheme matures.

1.1.5 A SOC and an Optional Appraisal Report (OAR) were submitted to the Cambridgeshire and Peterborough Combined Authority (CPCA) and approved in October 2019. This paved the way for Preliminary Design work to be undertaken on the preferred scheme, and for this OBC to be produced.

1.1.6 The primary purpose of the OBC is to:

- Confirm the need for change and the policy fit of a scheme at this location, as established in the SOBC
- Demonstrate that a range of options have been considered, and that a preferred option has been identified that meets the scheme objectives
- Evidence that the preferred option offers value for money, and has been robustly costed, and
- Explain how the scheme will be procured, and how delivery of the project will be managed.

1.2 Study Area

1.2.1 The study area encompasses the Norwood and Paston Reserve Urban Extension sites, which are bordered to the west by the A15 Paston Parkway, to the east by the A16 and to the south by the A47 and intersected by Newborough Road.

1.2.2 The Norwood and Paston Reserve urban extensions, shown below in Figure 1.1, are key areas of residential growth for Peterborough and have been allocated for development within the Peterborough Local Plan 2016 to 2036 (Adopted on 24th July 2019)[1], generating a combined total of 2,945 dwellings in the study area.

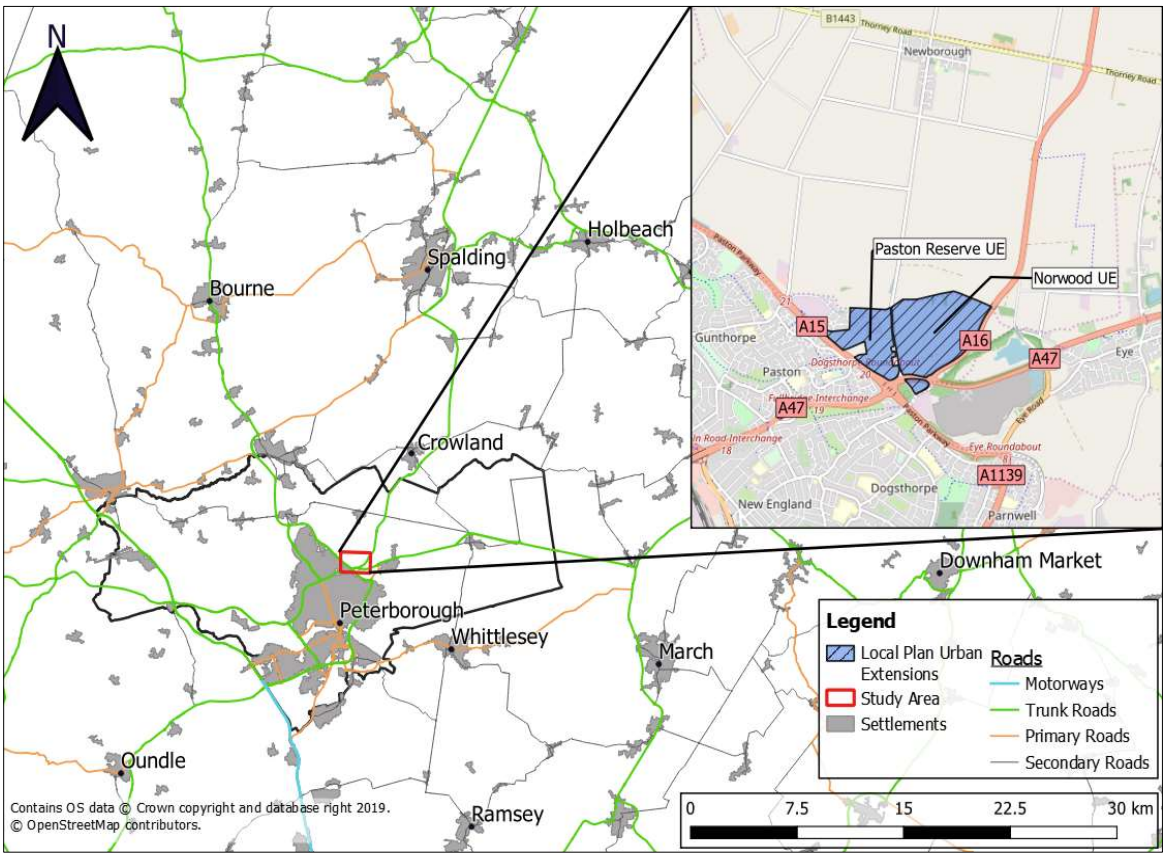


Figure 1.1: A16 Norwood Improvement Scheme Area

[1] Peterborough Local Plan (Adopted version).

1.2.3 The principal road network within the study area is shown in Figure 1.2 beneath.

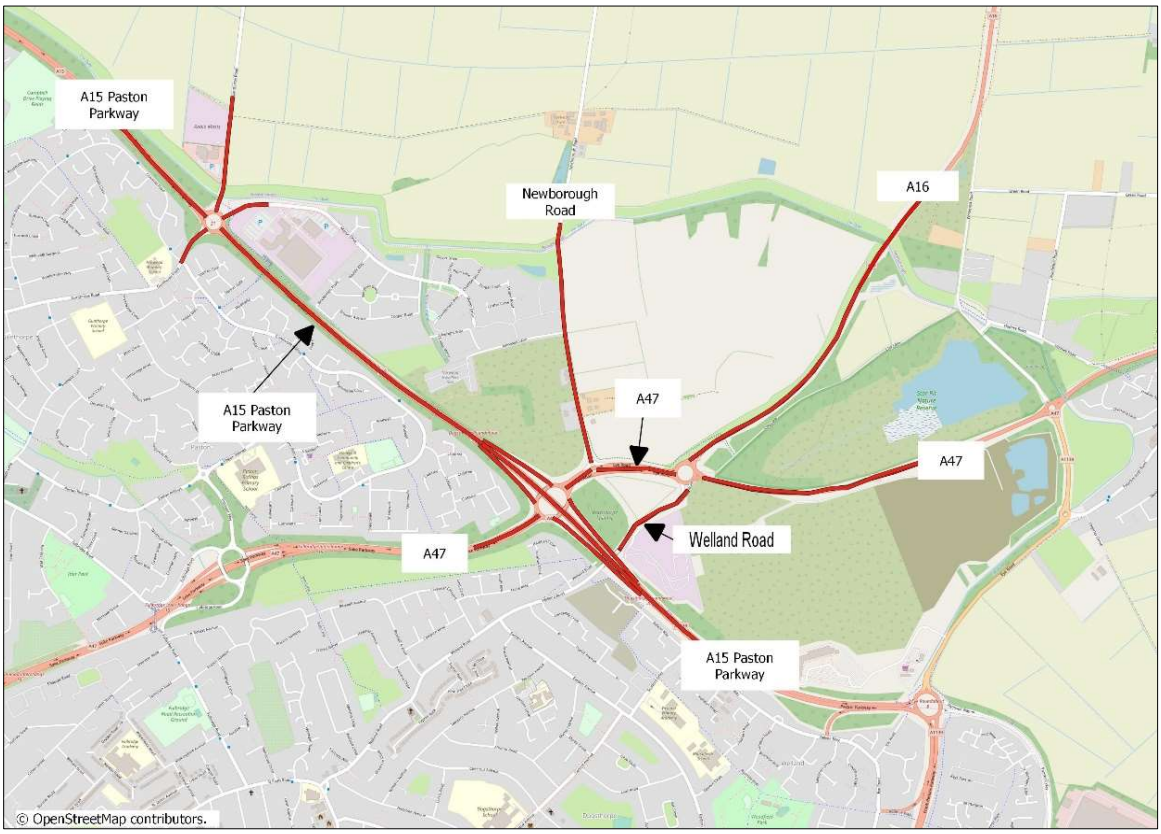


Figure 1.2: A16 Norwood Improvement Scheme Study Area Road Network

1.2.4 The A16 is a 125km principal road connecting Grimsby (Lincolnshire) and Peterborough, along with other primary destinations such as Boston and Spalding. The southern section of the A16 ends in Peterborough at the A16 / A47 / Welland Road Roundabout, which is operating over capacity with significant queueing and delays during the AM peak hour.

1.2.5 The A47 is a 309km east-west trunk road linking Birmingham to Lowestoft and passes through Peterborough. The significant queueing and delays along the A47 approach of the A16 / A47 / Welland Road Roundabout in Peterborough consequently encourages vehicles to rat-run via the A1139 Eye Road and increase queueing and delays at the A15 / A1139 / Parnwell Way signalised roundabout (Junction 8).

1.3 Growth Context

1.3.1 The population of Peterborough has grown considerably over recent years, increasing by 9.6% between 2011 and 2019, reaching a total population of 202,260 as of mid-2020 (based on Office for National Statistics estimates[2]). Peterborough's population growth is notably above the national average for England of 6.1%, making the area one of the country's fastest growing cities.

1.3.2 To date Peterborough's transport network, which was fundamentally redesigned in the 1970s to accommodate the then "Peterborough New Town", has served the city well. However, because of recent and planned housing and employment growth, capacity issues are now emerging on the road network, resulting in congestion and delay. As congestion increases on the strategic network, and queues form at key junctions, the potential for delivering new homes and jobs in the area will become increasingly constrained. Peterborough City Council are committed to addressing these highway constraints on its strategic road network to ensure that its full growth aspirations can be realised and avoid congestion from spilling onto the local road network which is being prioritised to accommodate active travel journeys.

1.3.3 The Peterborough Local Plan 2016 to 2036 (Adopted July 2019) sets out the overall vision, priorities and objectives for Peterborough for the period up to 2036. The strategy identifies the required delivery of approximately 19,440 dwellings and 17,600 jobs between 2016 and 2036. It is estimated that urban extensions would account for approximately 59% of all residential growth in Peterborough.

1.3.4 The Norwood and Paston Reserve urban extensions, shown previously in Figure 1.1, have been allocated for development within the Peterborough Local Plan 2016 to 2036 (Adopted July 2019). The 80-hectare Norwood site will provide 2,000 dwellings, a local centre and primary school. The delivery of the development has been split into two phases.

1.3.5 The first phase of development (2019 – 2031) is known as the Land off Newborough Road (Leeds Farm Development), which includes up to 870 dwellings and auxiliary uses, including a primary school and local centre, and would initially be accessed via Newborough Road. The second phase of development (2026 – 2031) will complete the build out of the Norwood site and will include the remaining dwellings.

1.3.6 In April 2021, Leeds Farm development received outline permission to develop up to 870 residential dwellings, a two-form entry primary school and a 0.25ha local centre. The outline permission is subject to a transport related 'monitor and manage' condition. The transport modelling to support the planning application established that 200 dwellings could be built without highway mitigation

[2] Office National Statistics, Mid-Year Population Estimates, UK, June 2020.

measures being required. However on-going monitoring will be required to ensure actual traffic levels reflect those in the modelling. The monitor and manage conditions were recommended to ensure highway mitigation measures are implemented at the right time.

1.3.7 The committee report for the application also identified that highway mitigation measured identified through the monitor and manage approach could be in the form of developer contributions towards the wider highway scheme that is identified within this OBC.

1.3.8 It is expected that the entire Norwood site will ultimately have a primary point of access onto the A16 via a developer funded / built roundabout, with the secondary point of access being via Newborough Road. It is currently understood that the two points of access will be connected by an internal road, providing all residents with direct access to the A16. These currently assumed access arrangements are shown in Figure 1.3 below.

Figure 1.3: Development Access Arrangements

1.3.9 The access arrangements have been agreed in principle following consultation with both developers, and written statements confirming these arrangements, along with support for the A16 Norwood Improvement Scheme, are currently being prepared and will be in place before the project proceeds to Detailed Design and Full Business Case. An exact alignment for the internal link road, and A16 roundabout location will be confirmed once internal site layouts have been further developed.

1.3.10 Adjacent to the Norwood site (to the west of Newborough Road) is the Paston Reserve Urban Extension, which will eventually include 945 dwellings, a local centre, a primary and secondary school. As of March 2021, its reported within the Housing Monitoring Report that 652 dwellings have been constructed. However, given the time that has elapsed since the March publication of the Housing Monitoring Report[3], the indication of dwellings complete to date is estimated to be between 700-750 dwellings. Both the primary and secondary schools are nearing completion, with the first cohort of pupils expected in September 2022.

1.3.11 Primary access to the Paston Reserve site is currently via Manor Drive and Junction 21 of the A15 Paston Parkway, with secondary access provided by Newborough Road and the A47.

1.3.12 The current access points for the Norwood site are the:

- A16 / A47 / Welland Road Roundabout
- A47 / Newborough Road priority junction.

1.3.13 Alternative access points are located to the north and are limited to:

- B1443 / Guntons Road / Willow Drove priority junction
- A16 / B1443 Roundabout.

1.3.14 The A16 / A47 / Welland Road Roundabout accommodates a large number of peak hour commuter trips between Peterborough, Newborough, Crowland, Spalding, Eye, Thorney, March and Wisbech, and as a result suffers from severe peak period congestion and delays. This is exacerbated by a high number of u-turning vehicles, coming from Newborough Road, which has an adverse impact on the capacity of the A16 / A47 / Welland Road Roundabout. The removal of u-turning trips from Newborough Road is therefore a success factor for this project.

1.3.15 The Norwood study area is identified as a key residential growth area in the Peterborough Local Plan. However, the local transport network is likely to constrain the amount of development that can take place at this location and limit its full potential.

1.3.16 Peterborough City Council is engaging with developers to develop a coherent plan for delivering the infrastructure required to support the Norwood area. Rather than develop site specific highway mitigations, developers are being encouraged to contribute towards the delivery of the A16 Norwood Improvement Scheme which will accommodate the growth at Leeds Farm and Norwood, as well as addressing wider network issues.

[3] https://cccandpcc.sharepoint.com/sites/PCCPlanningPolicyPublicData/Shared Documents/Forms/AllItems.aspx?id=%2Fsites%2FPCCPlanningPolicyPublicData%2FShared Documents%2FPlanning Policy%2FLocal Plan Monitoring%2FHousing Monitoring%2F2021 Housing Monitoring Report%2Epdf&parent=%2Fsites%2FPCCPlanningPolicyPublicData%2FShared Documents%2FPlanning Policy%2FLocal Plan Monitoring%2FHousing Monitoring&p=true

1.4 Proposed Scheme

1.4.1 The package of schemes included within this OBC consists of the following, as shown in Figure 1.3:

Highway Scheme Components

- Closure of the Newborough Road Junction access onto the A47 (southbound only)
- Dualling of the A16 between the Norwood Development Roundabout and the A16 / A47 / Welland Road Roundabout
- Partial Signalisation of the A16 / A47 / Welland Road Roundabout (A16 approach)
- Creation of a flare to provide a third lane on the A47 westbound approach to the A16 / A47 / Welland Road Roundabout
- Creation of a Left Dedicated Lane (LDL) from the A47 eastbound approach to the A16 northbound exit
- Realignment / reconstruction of the bridal way to the north of the A16 / A47 / Welland Road Roundabout, connecting the signalised crossing to Newborough Road

Active Travel Components

- Active Travel route enhancements from the Norwood site down Welland Road to the Dogsthorpe Road Junction, connecting into a proposed PCC LCWIP Improvement Route
- A pedestrian bridge over the A47 (feasibility to be determined in the next stage)

Environmental Components

- Wildflower planting is proposed in the immediate areas of the A16 development and on the decommissioned section of Newborough Road
- Linear planting of native trees and shrubs along sections of the A16 (north of the bridge) infilling gaps in the existing roadside hedgerows
- Tree and enhanced wildflower planting at Bluebell Avenue Open Space, located approximately 370m to the west of Junction 20.

1.4.2 It should be noted that the active travel and environmental scheme components have been identified during the current phase of the study, either through the Preliminary Design process or as a result of stakeholder consultation, and these will be assessed fully as part of the Detailed Design and FBC.

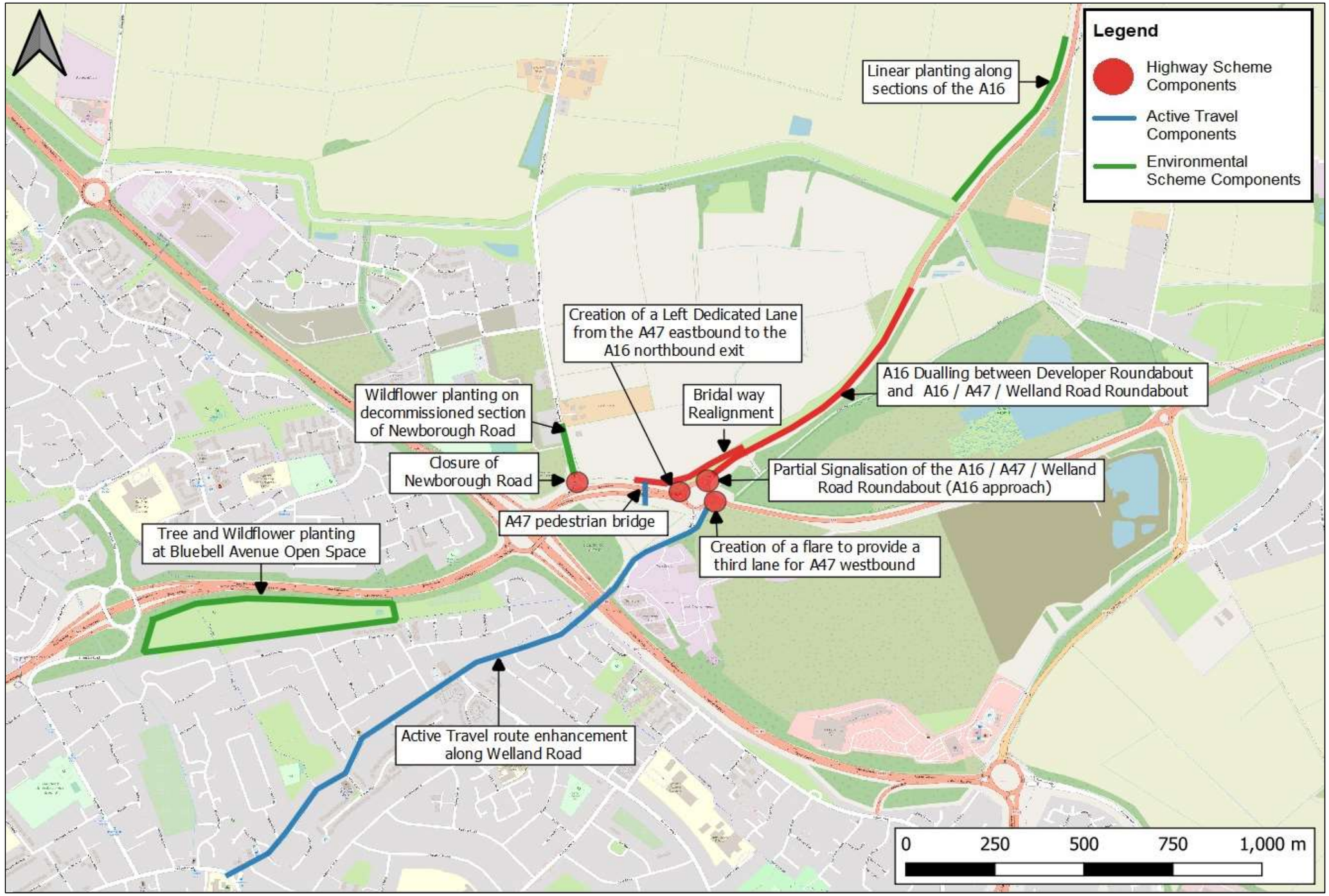


Figure 1.4: A16 Norwood Scheme Improvements

1.4.3 This Business Case demonstrates the need for, and value of, investing in schemes that together will provide the necessary increase in highway capacity to unlock congestion and significantly reduce delay along the A16 corridor. This will help to support the growth in the Norwood and Paston Reserve area, as well as providing wider network benefits.

1.5 Document Structure

1.5.1 Based on the context outlined above, the remainder of this report will consist of the following sections, with the aim of providing a thorough picture of baseline transport and development conditions across the study area, and the need for, and value in, investment to enable growth:

- **Chapter 2:** The Strategic Dimension identifies the need for an improvement at this location, considers an initial long list of options, and how these perform against CPCA, Peterborough City Council and the scheme objectives.
- **Chapter 3:** The Economic Dimension demonstrates that the preferred option offers value for money and details the quantitative and qualitative Economic Assessment undertaken to date on the scheme.
- **Chapter 4:** The Financial Dimension shows how the scheme has been costed, and the expected funding arrangement for delivering the scheme.
- **Chapter 5:** The Commercial Dimension sets out how Peterborough City Council will procure in a way that delivers value for money.
- **Chapter 6:** The Management Dimension explains how successful delivery of the scheme will be managed.

2. Strategic Dimension

2.1 Introduction

2.1.1 This chapter sets out the Strategic Dimension for the A16 Norwood package of scheme improvements. It demonstrates why improvements are needed at this location and considers how the package of schemes fit with local, regional and national policy, assisting Peterborough to deliver its planned growth.

2.2 Business Strategy

2.2.1 The Government's strategy for facilitating further economic growth requires continued investment in transport infrastructure to enable businesses to invest in job creation and the provision of new residential developments. Achieving economic growth, increasing living standards and the provision of new housing are key Government objectives at national, regional and local level. This section details how highway improvements within the Norwood area will contribute to achieving these strategic aims and polices.

Department for Transport Single Departmental Plan

2.2.2 The Single Departmental Plan published in June 2019[4] sets out the DfT's objectives and the plans for achieving them.

2.2.3 The objectives are:

- Support the creation of a stronger, cleaner, more productive economy
- Help to connect people and places, balancing investment across the country
- Make journeys easier, modern and reliable
- Make sure transport is safe, secure and sustainable
- Prepare the transport system for technological progress and a prosperous future outside the EU
- Promote a culture of efficiency and productivity in everything they do.

2.2.4 An improvement scheme along the A16 corridor, and within the general study area, has the potential to reduce congestion and improve journey time reliability. The delivery of these benefits will support housing and economic growth, aligning the main objectives of the DfT's Single Departmental Plan.

[4] https://www.gov.uk/government/publications/department-for-transport-single-departmental-plan

Cambridgeshire and Peterborough Combined Authority

2.2.5 The CPCA was formed as a Mayoral Combined Authority in 2017. It is made of seven local authorities (Cambridgeshire County Council, Peterborough City Council, Huntingdonshire District Council, East Cambridgeshire District Council, Fenland District Council, Cambridge City Council and South Cambridgeshire District Council) and the Business Board (Local Enterprise Partnership).

2.2.6 The focus of the CPCA is on strategic issues (such as housing, transport and infrastructure demand) which cross council borders and span the entire Cambridgeshire and Peterborough area. The Devolution Deal for Cambridgeshire and Peterborough runs for 30 years and sets out key ambitions for the CPCA as well as including a list of specific projects, which the CPCA and its member councils will support over that time.

2.2.7 To help achieve these ambitions and provide the requisite support, the CPCA Policy Framework (shown overleaf) has been developed to provide a clear pathway to delivering on the ambitious and transformational agenda for Cambridgeshire and Peterborough. The alignment of the A16 Norwood Improvement scheme to each of these components is discussed beyond the figure.

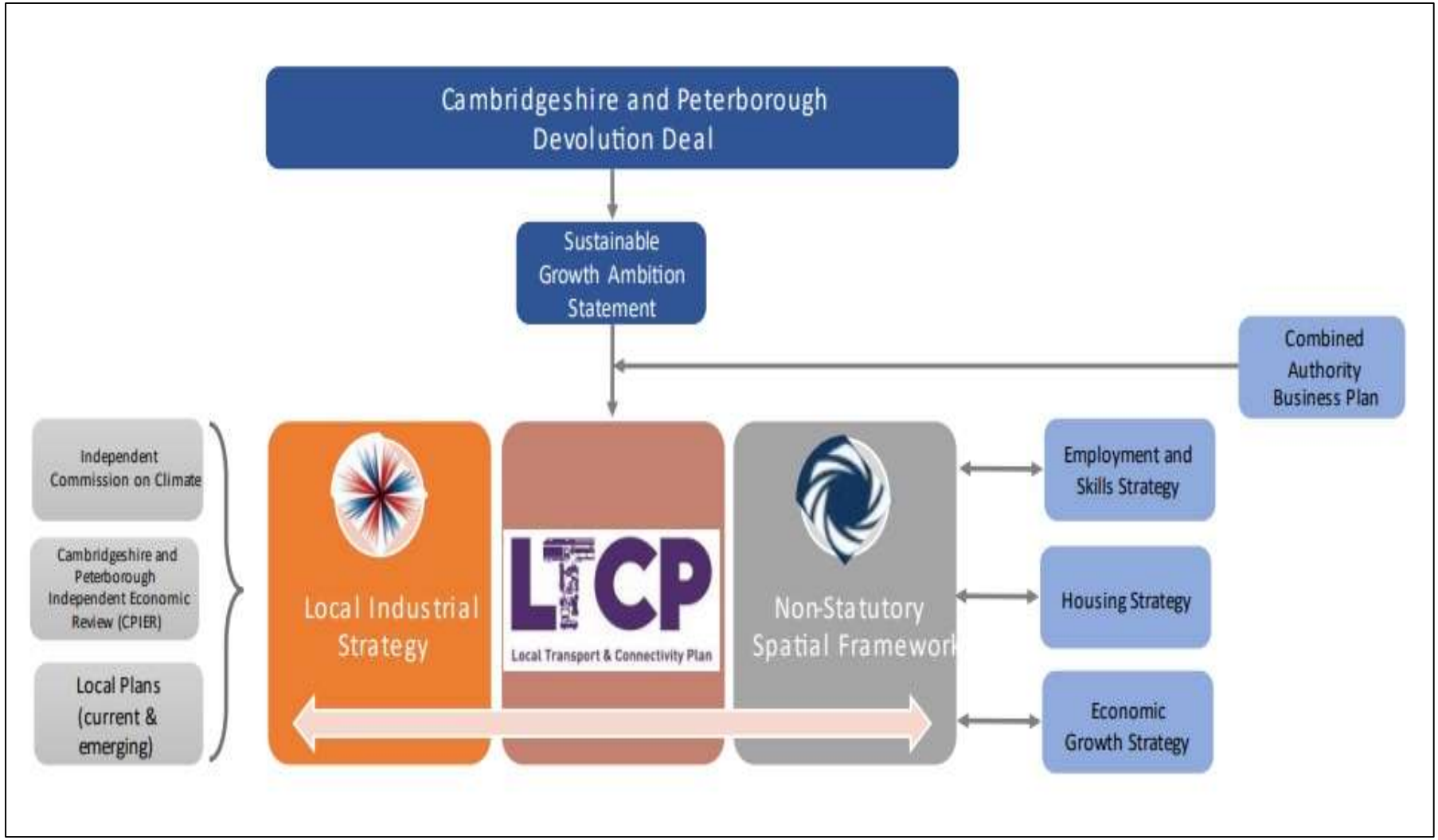


Figure 2.1: CPCA Policy Framework

Cambridgeshire and Peterborough Sustainable Growth Ambition Statement

2.2.8 The CPCA Mayor's Growth Ambition Statement sets out the regions priorities for achieving ambitious levels of inclusive growth and meeting the commitments of the Devolution Deal. The Statement's six themes[5] for achieving regional growth focus on:

- People
- Climate and Nature
- Infrastructure
- Innovation
- Reducing inequalities
- Financial and systems.

2.2.9 The statement is underpinned by work undertaken by the Cambridgeshire and Peterborough Independent Economic Review (CPIER)[6]. The assessment makes a number of recommendations for the CPCA to take forward over the short, medium and long-term.

2.2.10 The success of Cambridgeshire and Peterborough as a project of national importance is highlighted in the CPIER. This is because the area contains some of the most important companies and institutions in the country, much of the country's high value agricultural land, and the cities and towns that continue to support both.

2.2.11 The CPIER identifies Peterborough as a City with a dynamic business environment, built on its history of industry including brickmaking and manufacturing. It is an attractive place for business due to its position on the A1 and East Coast Main Line, as well as for aspirational workers who want easy access to London, the Midlands and the North.

2.2.12 The A16 Norwood Scheme will help to achieve the ambition set out within the CPIER for 'Peterborough to become a leading place to live, learn and work' by 2030. The Improvement Scheme will address increase highway capacity to unlock congestion and significantly reduce delay along the A16 corridor, making Peterborough more accessible for commuters from Lincolnshire and from Fenland via the A47. The Scheme will help support local growth, as well as provide wider network benefits. By addressing future highway issues, increasing accessibility, and enhancing the local area, the attractiveness of the City will increase helping to increase the population and support existing and future businesses.

[5] https://cambridgeshirepeterboroughcagov.cmis.uk.com.
[6] https://www.cpier.org.uk.

Cambridgeshire and Peterborough Independent Commission on Climate

2.2.13 The Cambridgeshire and Peterborough Independent Commission on Climate was created in 2020 by the CPCA board, with the purpose of providing authoritative recommendations to help the region mitigate and adapt to the impacts of climate change, which will enable the commitment of becoming 'net zero carbon by 2050' to be achieved.

2.2.14 Sectors in which the Commission focuses are transport, buildings, business and industry, nature and water and finally energy and waste.

2.2.15 Recommendations featured within the October 2021 report[7] specifically relating to transport and most relevant to major schemes funded by the CPCA include:

- Recommendation 3: Reduction in car miles driven by 15% to 2030 relative to baseline
- Major new developments (>1,000 homes) should be connected to neighbouring towns and transport hubs through shared, public transport and/or safe cycling routes
- CPCA, with its local authorities should explore options to improve cycling infrastructure
- Alternatives to road investment should be prioritised for appraisal and investment; including active travel and public transport options, to opportunities for light rail and bus rapid transit or options to enhance rail connections.

2.2.16 Wider benefits of the above recommendations include improved air quality, improved health and increased connectivity by linking people up to jobs, opportunities, and services. This reiterates the six themes identified within the overarching growth ambition statement of the CPCA policy framework.

2.2.17 The A16 Norwood scheme will help support the growth aspirations of Peterborough City Council. The highway elements will add capacity and address existing and future issues of congestion and delay along the A16 corridor, better connecting residents and commuters to the wider network, whilst the active travel improvements will help to reduce the severance for users between the north-east of Peterborough and the City Centre and encourage trips from Norwood to be made sustainably.

[7] FINAL CLIMATE REPORT LOW (002).pdf (hubspotusercontent40.net)

Local Industrial Strategy

2.2.18 The Local Industrial Strategy[8] sets out the economic strategy for Cambridgeshire and Peterborough, taking a lead role in implementing the business growth, productivity and skills, elements of the Growth Ambitions Statement.

2.2.19 In response to the findings of the CPIER, the Local Industrial Strategy focuses on the three sub-economies of:

- Greater Cambridge
- Greater Peterborough
- The Fens

2.2.20 The CPCA Assurance Framework[9] states that investments will only be made if they can demonstrate that they will support the delivery of the Growth Ambitions Statement and the Local Industrial Strategies, as well as the more detailed place and sector strategies.

2.2.21 This has a direct implication for the A16 Norwood Scheme, with a need to ensure it supports CPCA growth ambitions and align with the Local Industrial Strategy. As stated above Peterborough is identified as one of the three sub-economies and providing an efficient and reliable local transport network within the City is crucial to ensuring the continued success of the local economy in line with the CPCA Growth Ambition Statement. The A16 Norwood Scheme will provide improvements to future journey times and delay along a key corridor to the west of the City.

Local Transport Plan

2.2.22 In January 2020, the CPCA adopted a Local Transport Plan for Cambridgeshire and Peterborough[10] and it replaces the interim Local Transport Plan published in 2017. The plan describes how transport interventions can be used to address current and future challenges and opportunities for Cambridgeshire and Peterborough and sets out the policies and strategies needed to secure growth and ensure that planned large-scale development can take place in the county in a sustainable way.

2.2.23 The Local Transport Plan is split in to two main parts: The 'Local Transport Plan' which sets out the vision, goals and objectives and the policies designed to deliver the objectives, and the 'Transport Delivery Plan' (2019 to 2035) which explains how the Local Transport Plan strategy will be delivered. It details programmes for delivery of improvements to the transport network and for its day-to-day management and maintenance.

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8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/818886/Cambridge_SINGLE_PAGE.pdf

9 https://cambridgeshirepeterborough-ca.gov.uk/wp-content/uploads/documents/combined-authority-board/committee-papers-and-minutes/Cambridgeshire-and-Peterborough-Combined-Authority-Assurance-Frameworkv3final-002.pdf.

10 https://cambridgeshirepeterborough-ca.gov.uk/assets/Transport/Draft-LTP.pdf

2.2.24 The development of the Local Transport Plan was undertaken concurrently with the CPIER and the Growth Ambition Statement which enabled the challenges and opportunities detailed in these documents to be reflected within the Local Transport Plan. The Local Transport Plan completes the suite of documents which articulates the Combined Authority's response to the CPIER.

2.2.25 The vision for the Local Transport Plan is:

'To deliver a world-class transport network for Cambridgeshire and Peterborough that supports sustainable growth and opportunity for all'.

2.2.26 The goals of the Local Transport Plan outline the wider outcomes the transport network in Cambridgeshire and Peterborough will aim to achieve. They are:

- **Economy** – Deliver economic growth and opportunity for all communities
- **Society** – Provide accessible transport system so everyone can thrive and be healthy
- **Environment** – Protect and enhance our environment and tackle climate change.

2.2.27 The objectives of the Local Transport Plan underpin the delivery of the goals for an improvement within the Norwood study area, and form the basis against which scheme, initiatives and policies will be assessed. The initial scheme objectives for an A16 Norwood Improvement Scheme were devised at the beginning of the study and pre-date the objectives of the Local Transport Plan.

2.2.28 Since the introduction of the CPCA's Local Transport Plan, these initial scheme objectives have been refined to ensure they meet those objectives both locally (for Peterborough) and regionally (for the CPCA). The scheme objectives for an A16 Norwood Improvement Scheme are set out later in this chapter.

2.2.29 The objectives of the CPCA Local Transport Plan are:

- **Housing** – support new housing and development to accommodate a growing population and workforce
- **Employment** – connect all new and existing communities so all residents can easily access jobs within 30 minutes by public transport
- **Business and Tourism** – Ensure all of our region's businesses and tourist attractions are connected sustainably to our main transport hubs, ports and airports
- **Resilience** – build a transport network that is resilient and adaptive to human and environmental disruption, improving journey time reliability
- **Safety** – embed a safe systems approach in to all planning and transport operations to achieve Vision Zero (zero fatalities or serious injuries)
- **Accessibility** – promote social inclusion through the provision of a sustainable transport network that is affordable and accessible for all
- **Health and Well-being** – provide 'healthy streets' and high quality public realm that puts people first and promotes active lifestyles
- **Air Quality** – ensure transport initiatives improve air quality across the region to exceed good practice standards
- **Environment** – deliver a transport network that protects and enhances our natural, historic and built environments
- **Climate Change** – reduce emissions to as close to zero as possible to minimise the impact of transport and travel on climate change.

2.2.30 The A16 is identified within the Local Transport Plan as a corridor in need of improvement to relieve congestion and support growth in the Norwood area[11].

Emerging CPCA Local Transport and Connectivity Plan (LTCP)

2.2.31 The CPCA has drafted a new LTCP which sets out the transport strategy to meet the new challenges and opportunities faced within the region. The LTCP is expected to be finalised in late 2022 and will supersede the current Local Transport Plan (described above) which was adopted in January 2020.

[11] Peterborough Long Term Transport Strategy, 2010.

2.2.32 The new LTCP for the region follows the election of a new Mayor (May 2021), and reflects updated priorities for the combined authority, acknowledging the shifting demands on transport (at a national and local scale) following the COVID-19 pandemic, better aligning with recent national strategies for decarbonising transport set forward by government, and reflecting climate change aspirations put forward by the Cambridgeshire and Peterborough Independent Panel of Climate Change.

2.2.33 The vision, aims and objectives set forward within the draft LTCP focus on areas of; improved public health, accelerated carbon reduction, protection of the environment, reduced inequalities, and making growth in housing, employment, and the economy more sustainable by investing in better transport infrastructure. Future transport projects for Cambridgeshire and Peterborough region will be guided by the LTCP.

2.2.34 The draft LTCP is currently in a consultation phase, which is live from the 12th May to 4th August via multiple platforms. Feedback from the consultation will be incorporated into the final version of the LTCP, which will be subject to approval of the CPCA Board later in the year.

Mayoral Ambition

2.2.35 The CPCA Mayoral Election on the 6th May 2021 resulted in a new Labour Mayor (Dr Nik Johnson) being elected, replacing the incumbent Conservative Mayor who had held office since 2017.

2.2.36 The new Mayor vision is that future policies and actions will be driven by inclusivity and the '3 C's' of Compassion, Co-operation and Community, and have a stronger 'greenprint' running through strategy aiding the acceleration in carbon reduction by 2050[12].

2.2.37 In July 2021, the Combined Authority Board agreed to produce an updated Local Transport Plan. In September 2021, it was announced that the Local Transport Plan would become the Local Transport and Connectivity Plan (LCTP), to reflect the growing dependence on digital infrastructure. The LCTP will be finalised in Spring 2022.

[12] https://cambridgeshirepeterborough-ca.gov.uk/news/putting-compassion-co-operation-and-community-at-the-heart-of-reinvented-transport-masterplan/.

2.2.38 Despite the A16 Norwood Improvement Scheme being developed before the new Mayors visions and publication of the LCTP, the scheme does provide strong connections to the 3'Cs:

- **Compassion:** The scheme will address existing issues and increase highway capacity along the A16 corridor, improving operational efficiency and providing wider network benefits for the Norwood development area and its future residents. In addition to highway improvements, upgrades to the bridal way alongside the A16 will increase accessibility for all users, connecting the residential development to wider network with the City.
- **Co-Operation:** Strong engagement with key stakeholders including developers and National Highways has been maintained through the progression of the scheme and Business Case process, helping to create a scheme which recognises the interests of all partners
- **Community:** The incorporation of the bridal way into the scheme and upgrades to meet the recent highway code changes for prioritising active travel users, will increase accessibility to the development area, drawing upon health and wellbeing. Environmental and biodiversity elements included within the scheme also show the dedication of the Project Team to minimise impact and safeguard the environment.

Gear Change / Local Transport Note (LTN) 1/20 Policy

2.2.39 In October 2020, The Council adopted the Local Transport Note 1/20: Cycle Infrastructure Design (LTN 1/20) guidance. The guidance sets out five core principles[13] for which new cycle infrastructure implemented by local authorities should comply to secure funding from government. Core principles set out within the guidance include routes that are:

- Coherent
- Direct
- Safe
- Comfortable
- Attractive.

2.2.40 The above LTN 1/20 core principles are embedded within the wider DfT Gear Change Policy, adopted in 2020[14], which sets out the vision to transform our future transport systems to a point where active travel becomes the 'natural first choice' for journeys by 2030, and is prioritised within policy and local transport schemes.

[13] Cycle Infrastructure Design (publishing.service.gov.uk)
[14] Gear change: a bold vision for cycling and walking (publishing.service.gov.uk)

2.2.41 The themes of the Gear Change policy outlines how the vision can be achieved under the secured £2bn funding dedicated to active travel over the period of 2020 - 2025. The four themes are summarised below:

- **Theme 1 – Better streets for cycling and people:** Create higher standards for infrastructure including safe, continuous and direct routes for cycling, which are physically separated from pedestrians and high volumes of traffic
- **Theme 2 – Putting cycling and walking at the heart of transport, place and policy:** For local governments to receive funding for local highway investment, the presumption is that all new schemes will deliver or improve cycle infrastructure to the standards outlined in guidance
- **Theme 3 – Empowering and encouraging local authorities:** A new commissioning body 'Active Travel England', led by a walking and cycling commissioner will be established, awarding funding to schemes which adhere to standards and that can be delivered within the tighter delivery timescale controls
- **Theme 4 – Enabling and protecting those who choose cycling and walking:** Use established funding to roll out cycle training, to combat bike theft, introduce legal changes and support all users to cycle safely.

2.2.42 The A16 Norwood scheme will adhere to Gear Change and LTN 1/20 policy guidance through the inclusion of active travel aspirations, including cycle route enhancements along Welland Road, as well as a pedestrian bridge over the A47 (subject to feasibility). These aspirations will enable improved connectivity between the Norwood site and the wider cycle network toward the City Centre, as well as limit severance for active users to the north-east of the City.

2.2.43 Consultation with stakeholders and members of the public have been undertaken during this phase of work, which has identified the need to include additional active travel measures beyond the realignment / reconstruction of the bridal way to the north of the A16 / A47 / Welland Road roundabout that connects the signalised crossing to Newborough Road. Proposals received during the consultation period (mentioned above) will be explored further during the next phase of work and incorporated into the Detailed Design where appropriate.

2.3 Fit With the Wider Policy Context

2.3.1 The wider policy context is set out in Table 2.1 overleaf. Each policy document is set out alongside its objectives and how the proposed scheme will support and facilitate the objectives of each policy document.

2.3.2 Appendix A details other local policies that are relevant to improvements in the A16 Norwood Improvement Scheme study area.

Table 2.1: Wider Policy Context and Delivery Impacts

Policy Framework	Policy Function	Objectives	Study Impact
Department for Transport Single Departmental Plan	Sets out the DfT's objectives and the plans for achieving them	• Support the creation of stronger, cleaner, more productive economy • Help to connect people and places, balancing investment across the country • Make journeys easier, modern and reliable • Make sure transport is safe secure and sustainable • Prepare the transport system for technological progress and a prosperous future outside the EU • Promote a culture of efficiency and productivity in everything we do.	Improvements within the A16 study area will: • Support the housing and economic growth ambitions of the city • Improve reliability for drivers on this section of the city's road network
Cambridgeshire and Peterborough Combined Authority Local Transport Plan	Describes how transport interventions can be used to address current and future challenges and opportunities. Sets out policies and strategies needed to secure growth and ensure planned largescale development can take place in the county in a sustainable way. The Local Transport Plan completes the suite of documents which articulates the Combined Authority's response to the CPIER	• Housing – support new housing and development to accommodate a growing population and workforce • Employment – connect all new and existing communities so all residents can easily access jobs within 30 minutes by public transport • Business and Tourism – Ensure all of our region's businesses and tourist attractions are connected sustainably to our main transport hubs, ports and airports • Resilience – build a transport network that is resilient and adaptive to human and environmental disruption, improving journey time reliability • Safety – embed a safe systems approach in to all planning and transport operations to achieve Vision Zero (zero fatalities or serious injuries) • Accessibility – promote social inclusion through the provision of a sustainable transport network that is affordable and accessible for all • Health and Well-being – provide 'healthy streets' and high quality public realm that puts people first and promotes active lifestyles • Air quality – ensure transport initiatives improve air quality across the region to exceed good practice standards • Environment – deliver a transport network that protects and enhances our natural, historic and built environments • Climate Change – reduce emissions to as close to zero as possible to minimise the impact of transport and travel on climate change.	Improvements within the A16 study area will: • Support the housing and economic growth ambitions of the city • Improve journey time reliability for drivers on this section of the city's road network • Reduce the number of accidents • Help to connect new residents of Norwood to the wider city network, and improve accessibility for all users, including active travel users and equestrians • Undergo carbon assessments to ensure carbon cost savings are incorporated into design and construction • Protect and enhance the environment of the study area, aiming to achieve Biodiversity Net Gain.
Peterborough City Council Strategic Priorities	The Council's priorities to help meet its vision to: 'create and bigger and better Peterborough that grows the right way, and through truly sustainable growth	• Drive growth, regeneration and economic development • Improve educational attainment and skills • Safeguard vulnerable children and adults • Implement the Environment Capital Agenda • Support Peterborough's culture and leisure trust Vivacity • Keep all our communities safe, cohesive, and healthy • Achieve the best health and wellbeing for the city	Improvements within the A16 study area will: • Support the housing and economic growth ambitions of the city • Improve journey time reliability for drivers on this section of the city's road network • Reduce the number of accidents.
Peterborough City Council Local Plan	Updates the 2011 Core Strategy and looks to deliver 21,315 homes and 17,600 jobs by 2036		
DfT Gear Change / LTN 1/20 Guidnace	Introduces higher design standards for cycle infrastructure in which local authoritites must comply. Sets the vision to transform future transport systems, so that active travel becomes the 'natural first choice' for journeys by 2030.	• Theme 1 - Better streets for cycling and people • Theme 2 - Putting cycling and walking at the heart of transport, place and policy • Theme 3 – Empowering and encouraging local authorities • Theme 4 - Enabling and protecting those who choose cycling and walking	Improvements within the A16 study area will: • Enhance cycle and walking infrastructure within the study area • Ensure improvements to active travel are of the latest design standards

Fit Within Wider Environmental Policy

2.3.3 Alongside the overarching policies outlined in Table 2.1, local policy has strong emphasis on the environment, particularly integrating environmental improvements into the development of new infrastructure at an early stage to minimise disruption on the environment during scheme design, construction, and ongoing operation.

2.3.4 By factoring in the environment into scheme development from the offset, it better ensures the protection and enhancement of biodiversity at a minimum of 10% and meets aspirations set out within the various policies.

2.3.5 Table 2.2 below outlines the policy context in relation to the environment, documenting policy objectives and how the proposed scheme will support and facilitate each objective. Environmental considerations relevant to the scheme will be explored further within the latter stages of this chapter.

Table 2.2: Environmental Policy Context and Impact of the Scheme

Policy Framework	Policy Description / Function	Objectives	Study Supports and Facilitates the Policy Objectives
Cambridgeshire and Peterborough Combined Authority Local Transport Plan	Objective 9: Deliver a transport network that protects and enhances our natural, historic and built environment. Ensuring scheme improve rather than damage the environment based on DEFRA, Environment Agency and Natural England guidance.	• Protection and enhancement of the natural environment • Improving sustainable access to the natural environment • Delivering green infrastructure	Improvements at Norwood will: • Enhance the transport network by incorporating environmental enhancements into the final scheme • Will achieve Biodiversity Net Gain • Undergo extensive surveys, ensuring the protection of species • Engage with environmental stakeholders throughout the project, ensuring protection and licences for construction
Peterborough City Council Local Plan	Policy LP29: Any development should be prepared based on the overriding principle that; the existing tree and woodland cover is maintained, improved and expanded; and opportunities for expanding woodland are actively considered, and implemented where practical and appropriate to do so.	• Where the proposal will result in the loss of tree or woodland the Council will expect the retainment of trees that make a significant contribution to the landscape or biodiversity value of the area, provided this can be done without compromising the achievement of good design for the site. • Where it is appropriate for higher value tree(s) (category A or B trees) and/or woodland to be lost, then appropriate mitigation via compensatory tree planting will be required. Such planting should meet the five Tree Planting Principles • Where appropriate and practical, opportunities for new tree planting should be explored as part of all development (in addition to any necessary compensatory tree provision).	Improvements at Norwood will: • Undergo extensive surveys, gaining understanding of the species and value of trees/ habitats located within the study area • Actively explore / implement additional planting areas within the study area following guidance on replanting principles
Peterborough City Council – Trees and Woodland Strategy (2018)	The strategy sets out the benfits provided by trees and woodlands, how the Council aim to maintain, improve and expand tree cover, as well as the wider management of the City's tree stock in regards to development.	• To maintain and enhance the tree population of the city • To increase the tree canopy cover across the city with particular reference to areas with low canopy cover. • To maintain and maximise the ecosystem services provided by the Council's trees. • To promote biodiversity and conserve tree and woodland ecosystems. • To conserve and protect ancient woodland and ancient trees with significant ecological, historical and amenity value. • To work with partners to expand the woodland cover through sustainable external funding.	Improvements at Norwood will: • Include environmental elements within the final scheme design, enhancing the local environment and biodiversity within the study area • Actively explore / implement additional planting areas within the study area following guidance on replanting principles whilst working with partners Aragon • Undergo extensive surveys, gaining understanding of the species / habitats, and possible impact to these within the study area and identify mitigations • Engage with environmental stakeholdders to protect the identfied species and historic environment on site within design and construction
DfT proposed Environment Bill (Nature and Conservation Covenants) 2020	The Environment Bill will use a localised action approach to help contribute to the recovery of our natural environment, improving biodiversity and protecting urban street trees.	• 10% biodiversity net gain requirement on new development / schemes • A strengthened biodiversity duty on public authorities • Local Nature Recovery Strategies (LNRSs) • Species Conservation Strategies and Protected Sites Strategies • Targeted measures to protect existing trees	Improvements at Norwood will: • Achieve Biodiversity Net Gain at a minimum of 10% • Provide substantial evidence during option development with regard to tree loss, accounting for species type, maturity and ecological value. • Provide mitigations for species / historic environment protection during construction
CPCA / PCC endorsed Natural Cambridgeshire Doubling Nature Vision	By doubling the area of rich wildlife habitats and natural green-space, Cambridgeshire and Peterborough will become a world-class environment where nature and people thrive, and businesses prosper.	• Access to green space for communities • Air Quality, quality of life and public health • Long term financial gains • Ownership of the vision and growth agenda by local communities through an enhanced 'sense of place' • Increasing tree cover and the network of woodlands, hedgerows, within and around our towns and cities • Expanding the flower-rich grasslands on the limestone plateau west of Peterborough • Ensuring that at least 90% of our richest wildlife areas are in good ecological condition	Improvements at Norwood will: • Include environmental elements within the final scheme design, enhancing the local environment and biodiversity within the study area • Implement compensation tree planting where necessary and achieve Biodiversity Net Gain at a minimum of 20% Explore low maintenance environmental options for long -term gain for the Council

2.4 The Need for Change

2.4.1 This section discusses the need for change which set the requirement for the A16 Norwood Improvement Scheme.

2.4.2 It should be noted that the following section outlining the problems identified for the A16 Norwood study area, and the justification of why improvements are needed at this location are based on pre-COVID-19 traffic levels and conditions. The impact of COVID-19 on highway usage is discussed in section 2.12 'Key Risks'.

Problems Identified

2.4.3 There is a very clear and compelling case for change within the A16 Norwood corridor. The Local Plan has allocated Norwood as a residential urban extension along with further residential development on the neighbouring site at Paston Reserve, totalling over 2,945 new homes.

2.4.4 Evidence of existing conditions of the highway network within the study area, demonstrates that there are already congestion issues during the morning peak hour. If transport infrastructure is not improved and increased transport capacity provided, it will impact the growth aspirations for the Norwood area.

2.4.5 These challenges identified within the study area are set out beneath in the following themes:

- Peak hour congestion and delay (particularly on the A47 and A16 approaches to the roundabout)
- U-turning traffic from Newborough Road (degrading the capacity of the roundabout)
- High accident rate.

2.4.6 Proposed growth at the Norwood site is forecast to exacerbate these existing issues. If not resolved, these factors will compromise the city's growth aspirations as well as the Council's objectives to keep Peterborough a pleasant place to live and work.

Peak Hour Congestion and Delay

2.4.7 Figure 2.2 and 2.3 overleaf show the typical speeds (representing delay) at 08:30 and 17:30 on a neutral weekday (May 2022) to the east of Peterborough. Junctions with significant delay during the AM and PM peak periods include:

- A16 / A47 / Welland Road roundabout
- A47 / A1139 roundabout (Junction 20)
- A1139 / Peterborough Road Roundabout
- A15 / A1139 / Parnwell Way signalised roundabout (Junction 8).

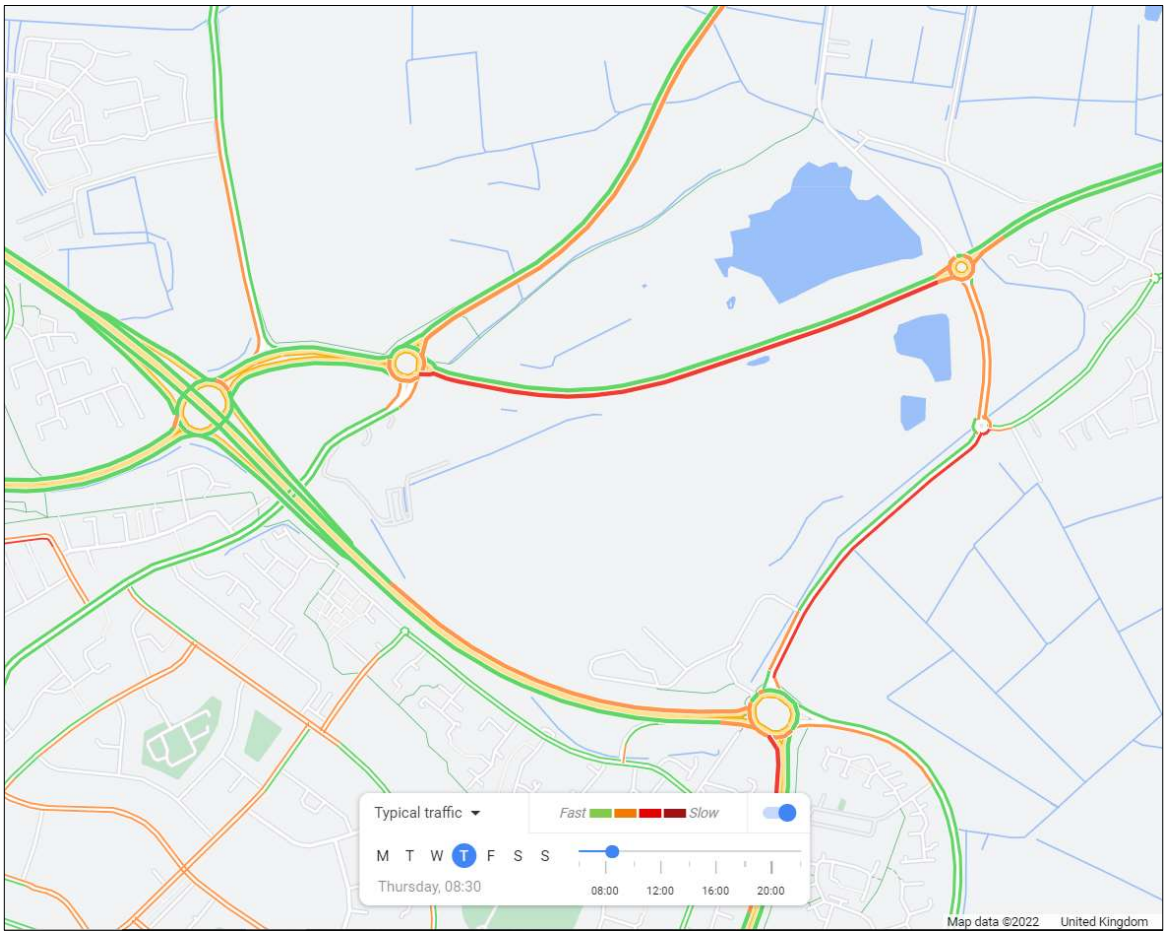


Figure 2.2: Google Traffic, Typical AM Peak Hour Delay to the East of Peterborough (May 2022)

2.4.8 Figure 2.2 shows delay along the A16 southbound and A47 westbound on the approach to the A16 / A47 / Welland Road Roundabout. This is due to the volume of traffic and tidal nature of trips into Peterborough during the AM peak hour. Two significant inbound traffic flows (A16 and A47) merge at the A16 / A47 / Welland Road Roundabout, and capacity at the junction is compromised by a high proportion of u-turning traffic from Newborough Road.

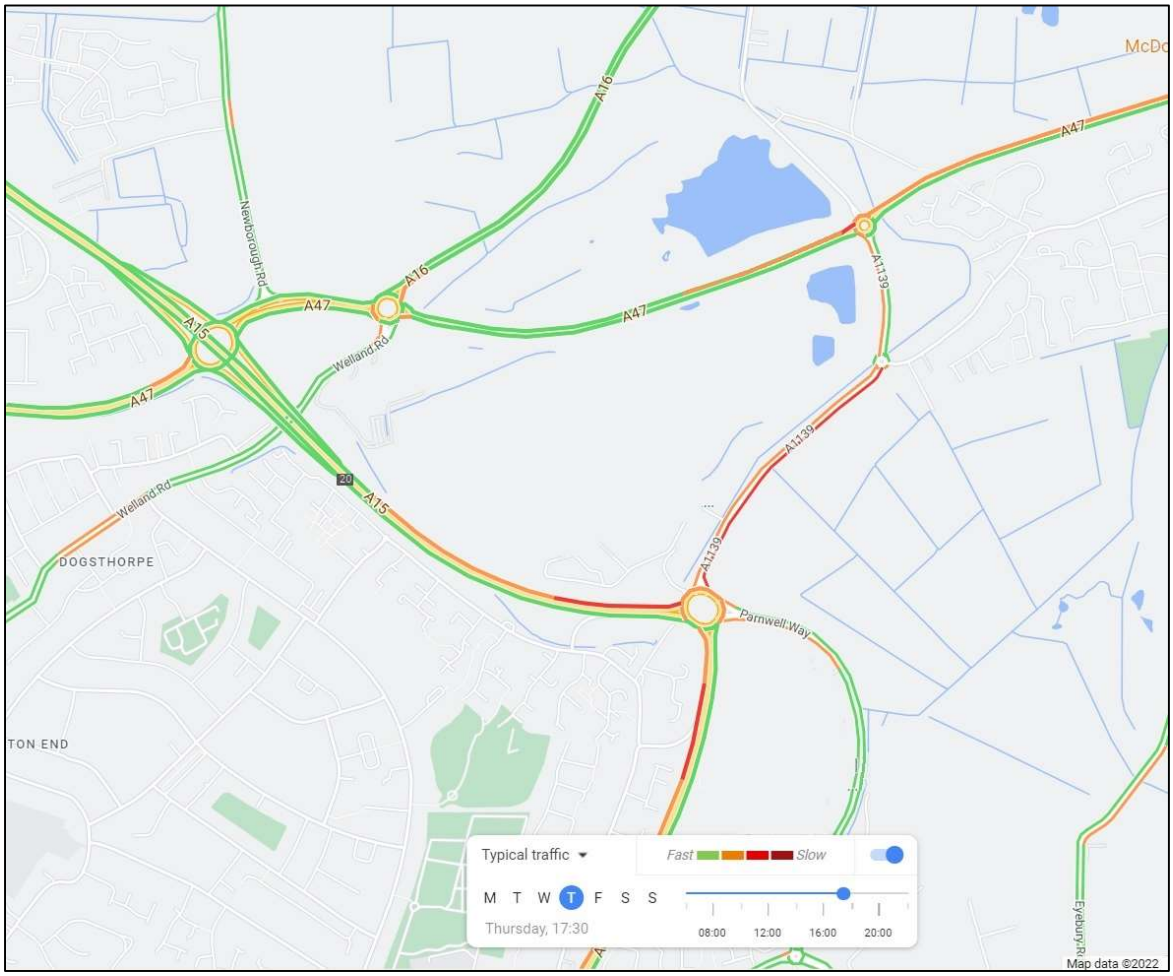


Figure 2.3: Google Traffic, Typical PM Peak Hour Delay to the East of Peterborough (May 2022)

2.4.9 The tidal nature of delay is evident again in the PM peak hour, as delay forms on the A47 eastbound approach to the A1139 / A47 Roundabout and beyond.

2.4.10 Satellite Navigation data (2018) has been used to better understand historic journey times and delay within the study area. Figure 2.4 overleaf shows the journey times for the Free Flow period (FF, 00:00 – 05:00), AM peak hour (08:00 – 09:00), Inter peak hour (14:00 – 15:00) and PM peak hour (17:00 – 18:00) within the study area for weekdays in October 2018.

2.4.11 Note that this data and analysis predate the Covid-19 pandemic, and that further analysis will be undertaken using post pandemic data and included within the Full Business Case.

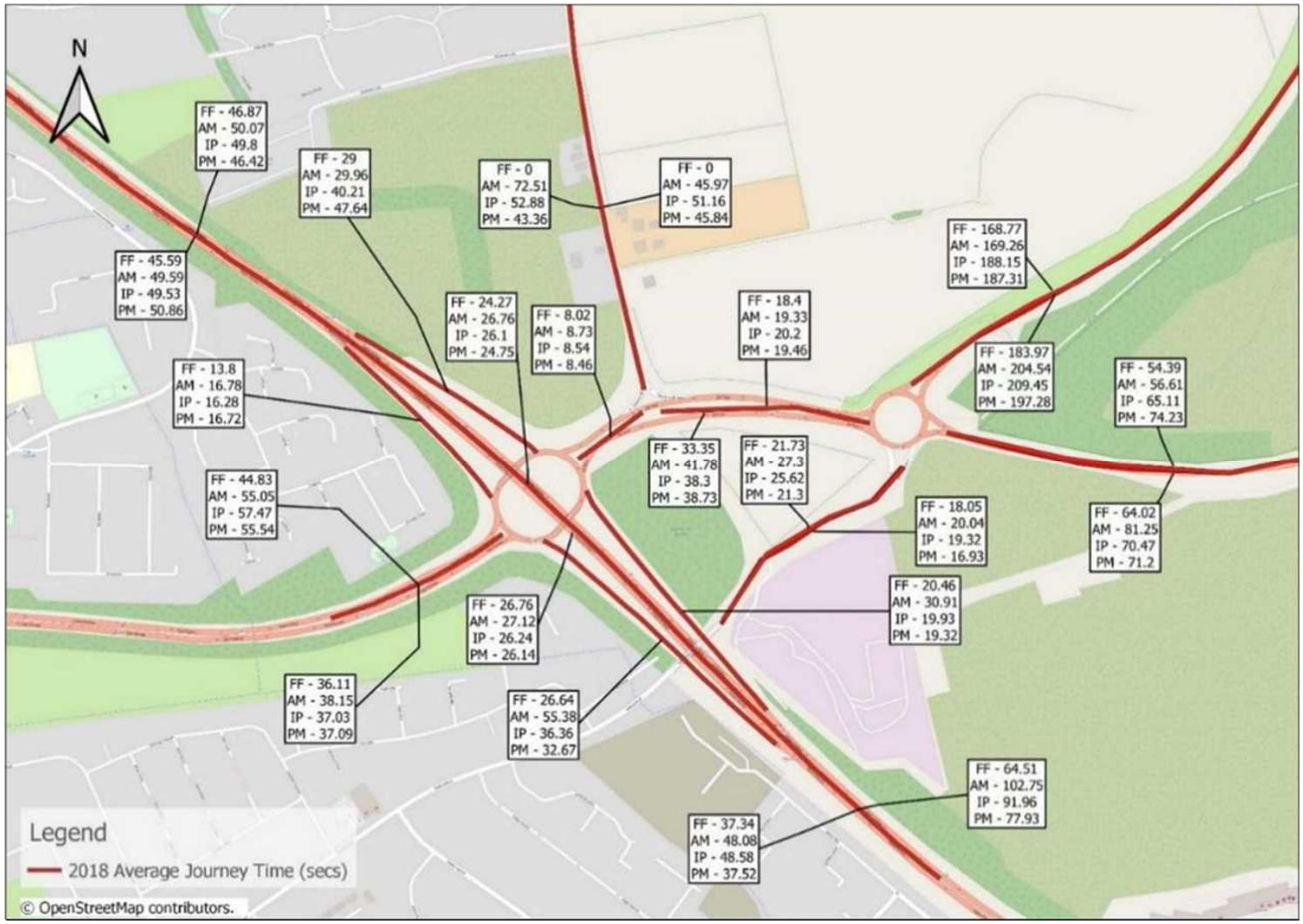


Figure 2.4: Average Traffic Master Journey Times (secs – Free-Flow, AM, Inter-peak and PM Peak Hour).

2.4.12 There are some significant increases in journey times in the AM peak hour when compared to the free flow period, including a 20 second increase per vehicle on the A16 southbound. There is also an increase in journey time on the A47 westbound towards the A16 / A47 / Welland Road Roundabout of 17 seconds per vehicle in the AM peak when compared to the free flow period.

2.4.13 It should be noted that not enough trips were recorded along Newborough Road in the free flow period for a journey time record to be ascertained.

2.4.14 As with the AM peak hour, the Inter peak hour experiences an increase in average journey time (25 seconds per vehicle) along the A16 southbound compared to the free flow period. The majority of other journey times are similar to those in the free flow period.

2.4.15 In the PM peak hour, there are increases in average journey time compared to the free flow period along the A16 southbound (13 seconds per vehicle), A16 northbound (19 seconds per vehicle) and the A47 eastbound exit from the A16 / A47 / Welland Road Roundabout (20 seconds per vehicle).

2.4.16 The Norwood development is likely to exacerbate existing delay in this area.

U-Turning Traffic

2.4.17 Part of the capacity constraint at the A16 / A47 / Welland Road Roundabout is caused by u-turning traffic from Newborough Road. The A47 / Newborough Road junction is currently a left in / left out only junction, and so any vehicle from Newborough Road destined for Peterborough must U-turn at the roundabout, as shown in Figure 2.5 below.

Figure 2.5: U-turning Traffic Route from Newborough Road

2.4.18 This movement has a significant impact on capacity at the roundabout, as vehicles on the busier A16 and A47 westbound movements (AM peak hour) must stop and give–way to every u-turning vehicle from Newborough Road. If not resolved, this issue will be exacerbated in future with the development of Paston Reserve and Norwood both having direct access to Newborough Road.

High Accident Rate

2.4.19 Figure 2.6**Error! Reference source not found.** shows the incident density weighted by severity along the A16 and at the A16 / A47 / Welland Road Roundabout compared to the wider area to the east of Peterborough (2016 – 2019).

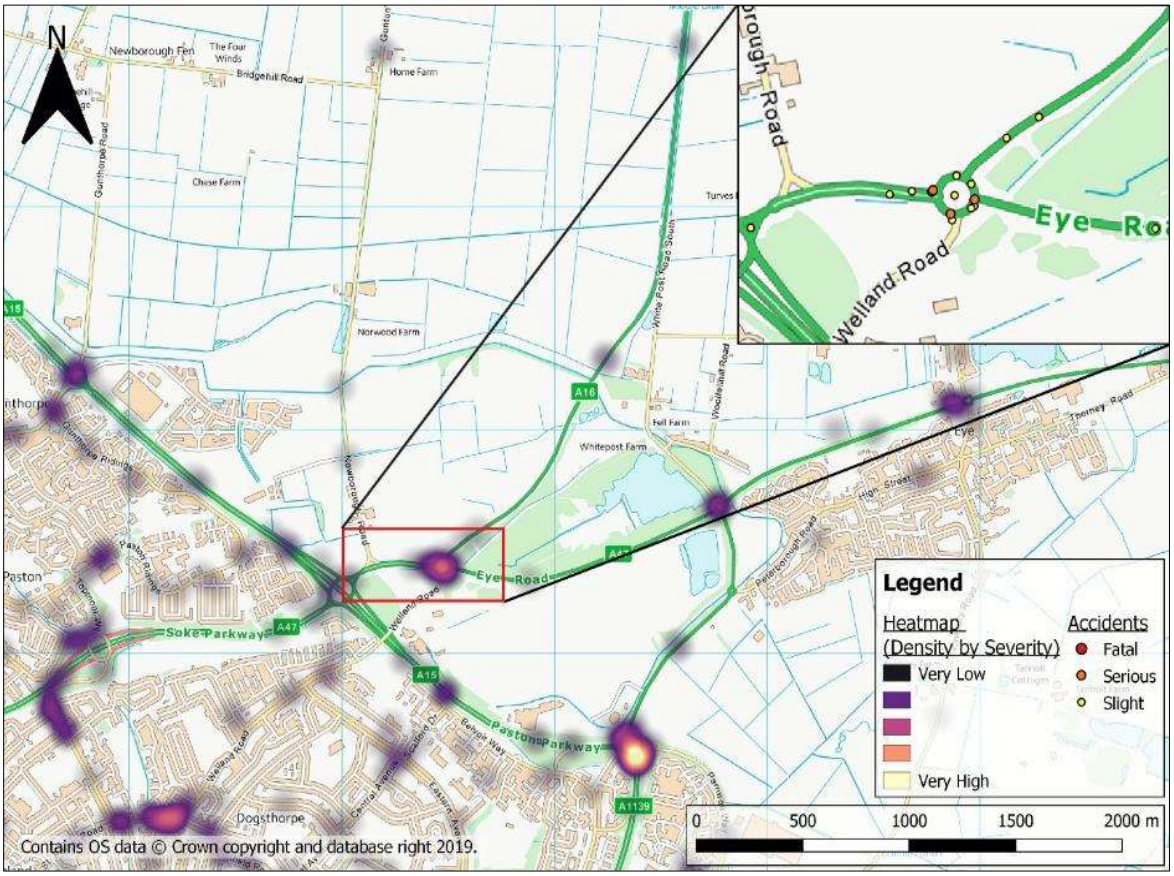


Figure 2.6: Accident Density Weighted by Severity (2016 – 2019 Dataset)

2.4.20 Figure 2.6 shows that the A16 / A47 / Welland Road Roundabout has a higher density of accidents than other junctions along the A47 to the east of Peterborough. Only Junction 8 (A15 Paston Parkway / A1139 Frank Perkins Parkway / Parnwell Way Roundabout) to the south-east of the study area has a higher density of accidents.

2.4.21 Nearly all of the accidents have happened on either the circulatory or the approaches close to the give way line of the roundabout, with most being a result of either failing to look properly or misjudging the speed of the other vehicle. All recorded serious accidents occur on the A47 (eastbound and westbound) and Welland Road approaches close to the give way line. It is expected that the proposed scheme, and specifically the partial signalisation of the A16 / A47 / Welland Road Roundabout, will improve safety at this junction, and this is evidenced within the Economic Dimension.

2.5 Impact of Not Changing

2.5.1 The impact of not progressing this scheme would be:

- Worsening of congestion, delay and journey times
- Likelihood of accidents will rise
- Local growth stalls
- Attractiveness of Norwood as a place to live and Peterborough as a place to work will decrease.

Congestion, Delay and Poor Journey Times

2.5.2 Norwood and Paston reserve are identified as an area of growth in the Peterborough Local Plan, with residential development expected to come forward before 2036. Combined these areas are expected to facilitate 2,945 dwellings, two local centres, two primary schools and a secondary school. Forecast trip rates from these sites once fully built out, as per the PTM3 Model forecasts, is approximately 2,085 trips during the AM peak hour and 2,198 trips in the PM peak hour.

2.5.3 Without intervention, the existing issues of peak hour delay and congestion along the A16 and A47 will deteriorate further. This will impact on the operational performance of the highway network across the study area and compromise the viability of local growth aspirations within the Norwood area.

2.5.4 The Peterborough Transportation Model (PTM3) model has been used to assess conditions within the Norwood study area in future years should the growth occur without any highway improvements (Do Minimum (DM) Scenario).

2.5.5 PTM3 was developed using SATURN (v11.4.07H), which is a suite of network analysis programs. SATURN allows the user to model baseline and future year traffic conditions, such as traffic volumes, capacities and delays, at a strategic level and analyse the impact of potential road-investment schemes.

2.5.6 PTM3 has been constructed to represent the morning (08:00 – 09:00), Inter (14:00 – 15:00) and evening (17:00 - 18:00) peak hours, to reflect the most congested time periods across Peterborough's network, and it models cars, LGVs, HGVs and buses. The base model was validated using traffic count and travel time data from 2019.

2.5.7 The PTM3 forecast models use the base model and applies traffic growth sourced from the Department for Transport's Trip End Model Presentation Program (TEMPro), National Road Traffic Forecasts (NRTF) and trip rates for local developments. Forecast growth has been calculated for 2026, 2031 and 2036 to align with the Local Plan.

2.5.8 Figure 2.7 shows delay (seconds per vehicle) in the AM peak hour across the study area in the 2036 DM scenario.

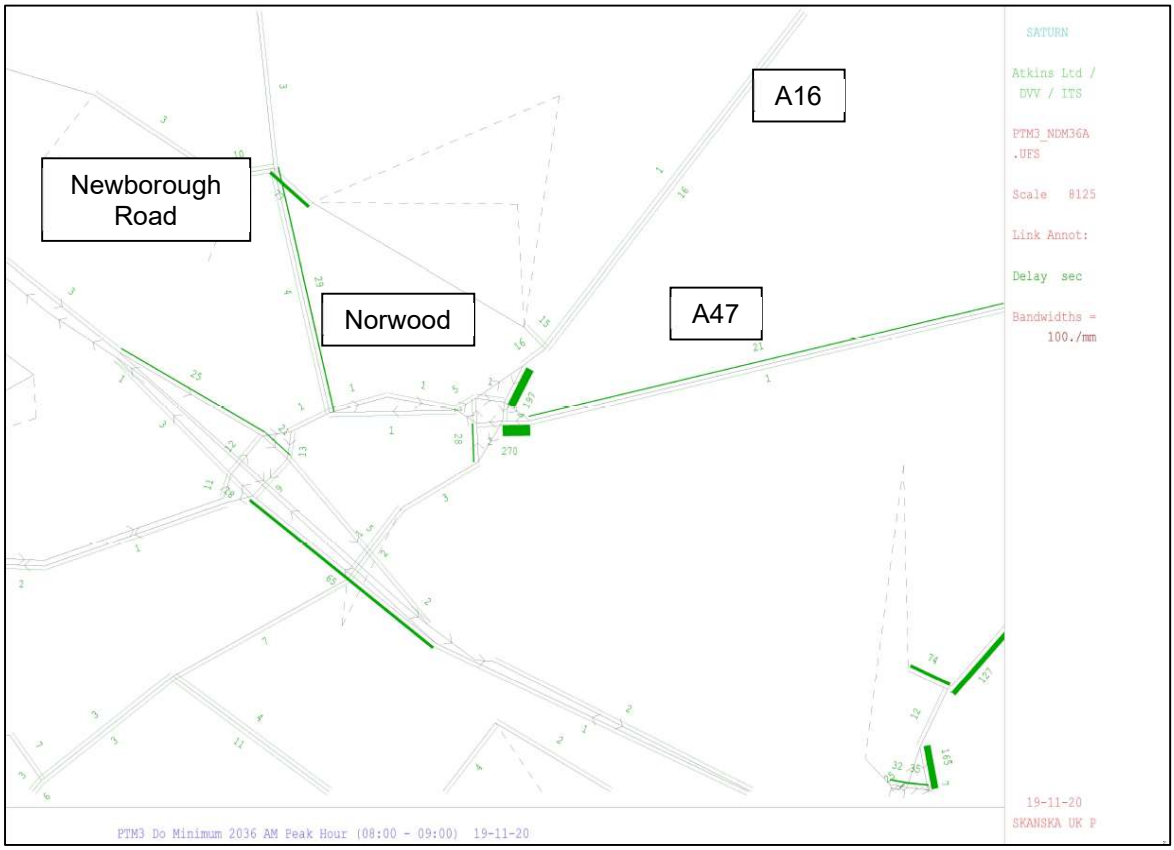


Figure 2.7: AM Peak Hour Delay (seconds per vehicle) 2036 Do-Minimum Scenario (PTM3)

2.5.9 Figure 2.7 shows that without intervention there is expected to be significant levels of delay on both the A16 southbound approach (197 seconds per vehicle) and the A47 westbound approach (270 seconds) at the A16 / A47 / Welland Road Roundabout.

2.5.10 There is also expected to be 85 seconds of delay (per vehicle) on the Development Access onto Newborough Road.

2.5.11 Figure 2.8 shows delay (seconds per vehicle) in the PM peak hour across the study area in the 2036 DM scenario.

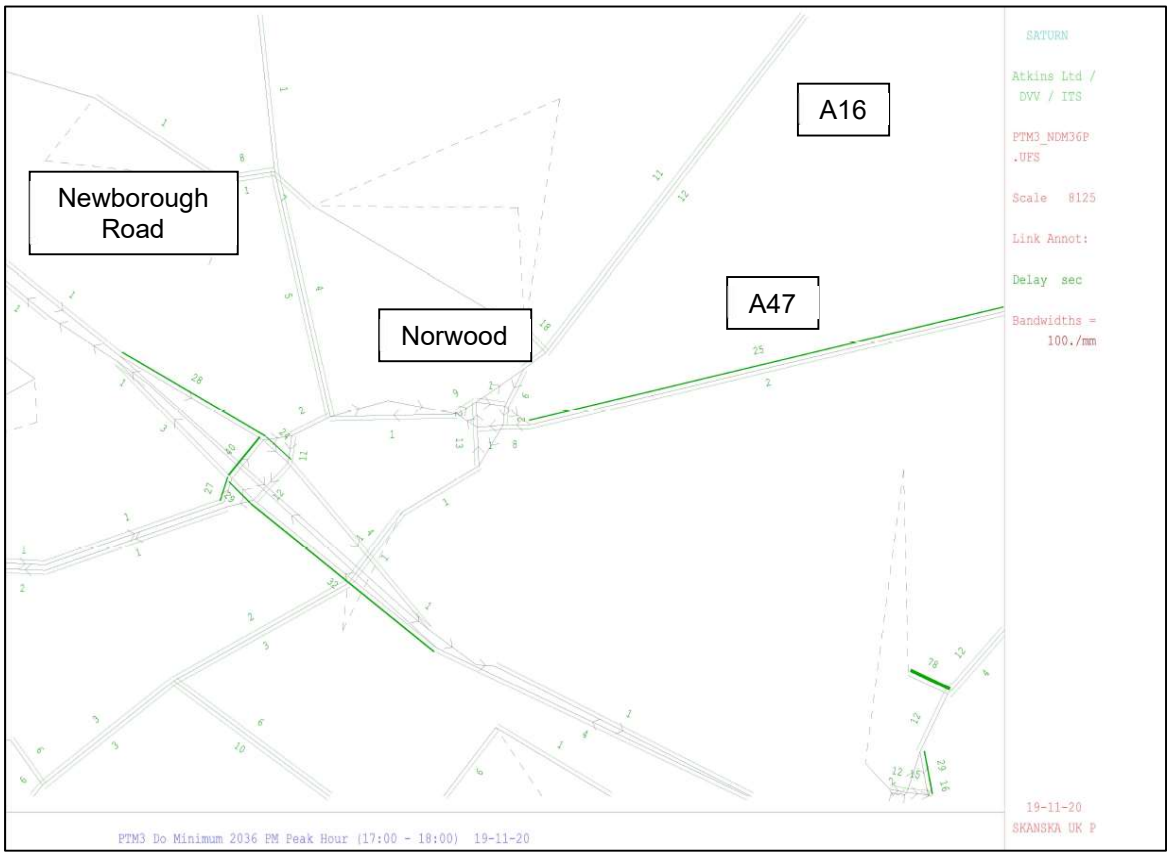


Figure 2.8: PM Peak Hour Delay (seconds per vehicle) 2036 Do-Minimum Scenario (PTM3)

2.5.12 Figure 2.8 suggests that delay is less pronounced in the PM peak hour, however delay is evident on the A47 eastbound in several places. Existing and future issues of delay are expected to be at their worst during the AM peak hour. This is as a result of the tidal nature of traffic entering Peterborough during the morning peak hour, when more vehicles use the A16 southbound and A47 westbound approaches towards Peterborough.

Likelihood of Accidents will Increase

2.5.13 It is likely that accidents will increase within the study area, in particular at the A16 / A47 / Welland Road roundabout, if no intervention done. As previously mentioned, the forecast increase in delay and travel time is expected to rise which will entail more stopping and starting on approach to the junction.

Local Growth Stalls

2.5.14 At present, the development of Leeds Farm only has permission to build up to 200 dwellings[15] as the only access is via Newborough Road. However, this is an interim arrangement, and further development cannot progress beyond 200 dwellings without broader improvements to the highway network. No viable package of measures has yet been proposed by developers that would enable the Norwood site to be fully developed, and this is a risk to local growth.

2.5.15 The proposed packaged of measures contained within this OBC does however provide comprehensive improvements that will support the full growth of the Norwood site and can be delivered in conjunction with the developers and National Highways.

Attractiveness of Norwood as a Place to Live and Peterborough as a Place to Work Will Decrease

2.5.16 The A16 corridor provides a main access point to the east of Peterborough, which contains many businesses and developments that will be affected by its operation. As traffic, queueing and delays increase, it is likely the area will become more congested in peak times. Businesses and their employees in the east of Peterborough will increasingly become frustrated with the difficulty of accessing and exiting their premises and may look to relocate or work elsewhere.

2.5.17 This may also have a detrimental impact on the Council's objective for Peterborough to be an attractive place to live and work. If residents and employees experience increased journey times around the city when accessing employment opportunities, they may choose to work elsewhere. In addition, companies looking to relocate to the city may instead consider other towns and cities with better transport conditions.

2.5.18 The location of Norwood by the A47 and A16, and the impact of delay and congestion along the A16 and at the A16 / A47 / Welland Road Roundabout (often encouraging commuters to reroute via the A1139 Eye Road during the peak periods) means that issues at this location have an impact across the east of Peterborough, and also on strategic long-distance trips that have no suitable alternatives for east-west travel.

2.5.19 It should also be noted that without a coherent plan for delivering the infrastructure of the Norwood site, there is an increased risk that development comes forward in a piecemeal and disjointed fashion, whereby developer contributed highway mitigations do not address wider network requirements. If this were to occur The Council and National Highways would likely inherit future network issues.

[15] http://plandocs.peterborough.gov.uk/PublicDocuments/01262474.pdf

2.6 Internal Drivers for Change

2.6.1 Internal drivers for change are the factors that are driving the need for change, and come from the scheme promoter, such as aspirations for growth, or to increase network resilience. In this instance the scheme promoters are the CPCA and Peterborough City Council.

2.6.2 The internal drivers for improvements for Norwood come from levels of deprivation for the city, local growth aspirations, and the structured framework of support provided by the CPCA to enable this growth to be realised.

Index of Deprivation

2.6.3 As highlighted in Section 1.3, Peterborough's population has grown considerably over recent years, with levels of growth being significantly higher than the national average and other counties within the region.

2.6.4 Despite high population growth, the socio-economic growth of the city has not grown at an equal rate, resulting in the city being reported as one of the 'most deprived' areas within the country and CPCA region[16], in relation to income deprivation and income disparity[17].

2.6.5 Figure 2.9 overleaf shows residential areas of the city by Index of Multiple Deprivation (2019)[18]. Areas in dark red are amongst the top 10% most deprived in England and areas of dark green are amongst the 10% least deprived.

[16] Peterborough.pdf (cambridgeshireinsight.org.uk)
[17] Office of National Statistics, English indices of deprivation 2019
[18] CDRC Mapmaker: Deprivation Indices (IMD) (English 2019 IMD (E19))

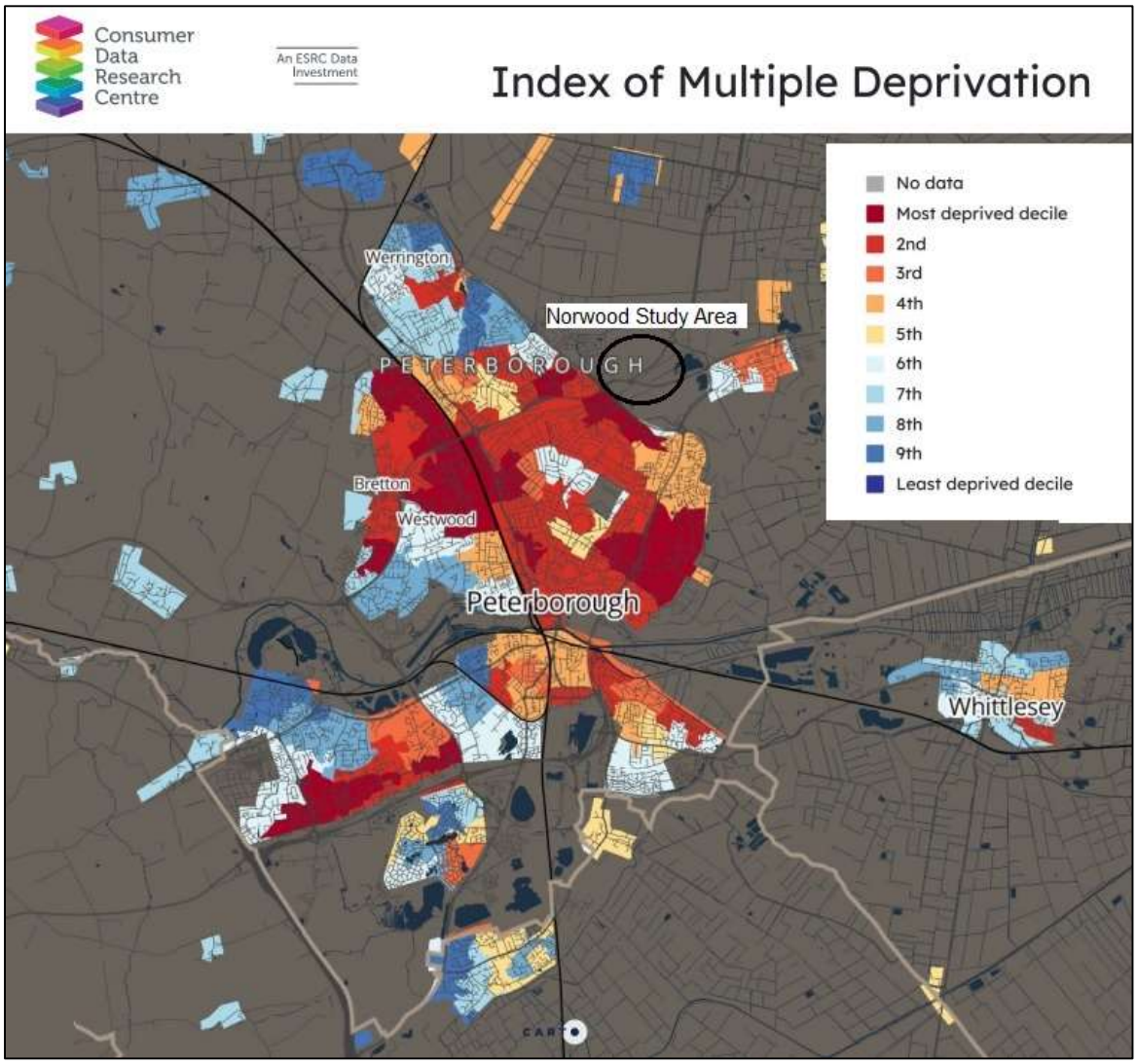


Figure 2.9: 2019 Index of Multiple Deprivation (Consumer Data Research Centre)

2.6.6 As highlighted in Figure 2.9, residential areas surrounding the City Centre rank amongst the top 40% of the most deprived in the country, whilst residential areas surrounding the study area are shown to vary from the top 10-30% most deprived within Peterborough.

2.6.7 The deprivation issues of Peterborough have been acknowledged by government with the city being categorised as a 'Priority One Area' within the context of the Levelling Up Agenda. This allocation demonstrates investment is required within the city to tackle economic differences and drive prosperity, enabling socio-economic opportunities to be realised. The £4.8 billion Levelling Up Fund will allow Peterborough and other Priority One areas to be prioritised for investment into local infrastructure, essentially 'levelling up' left behind regions of the UK.

Local Growth Aspirations

2.6.8 Peterborough is forecast to experience significant employment and population growth over the next few decades, reflecting a continuation of past trends. The Peterborough Local Plan (adopted July 2019) sets out the overall vision, priorities and objectives for Peterborough for the period up to 2036. The updated strategy identifies the required delivery of 19,440 new homes and 17,600 new jobs by 2036[19]. This level of growth will in turn further strengthen the City's economy, contribute to regional growth, and increase the demand for travel on the local network.

2.6.9 Peterborough strives to become a 'destination of choice', to be continually recognised as a regional centre and economic partner with Cambridge. With the attractiveness of the City set to increase as a place to live, work and travel, this in turn creates pressure in relation to housing and employment growth, which in turn increases the strain on the transport infrastructure. Improving the transport infrastructure to support the continuing of Peterborough's strong history of growth is a key internal driver for change for the A16 Norwood Scheme.

2.6.10 It is acknowledged that if no changes are made to existing congestion and journey time issues on major routes across the City, then growth aspirations will be compromised. The Local Transport Plan identifies infrastructure requirements that are needed to address existing capacity constraints on the network and those that are required to cater for the travel demand arising from the growth ambitions of the City.

2.6.11 Section 2.5 also noted that no scheme beyond these proposals has been identified that would enable full local growth to be realised. Planning permission for the Leeds Farm site has only been granted for 200 dwellings due to the lack of alternative access beyond Newborough Road, and the detrimental impact that u-turning traffic from Newborough Road is known to have on the A16 / A47 / Welland Road Roundabout and surrounding highway network.

Combined Authority Support

2.6.12 The CPCA has identified a number of strategic projects which it believes will provide transformational benefits for the area. This feasibility study for highway improvements along the A16 corridor is one of the studies shortlisted as a priority, beginning in the financial year 2017 / 2018.

[19] https://www.peterborough.gov.uk/council/planning-and-development/planning-policies/local-development-plan.

2.6.13 The CPCA recognises that the development of a wider, multi-year pipeline of transport schemes can also contribute towards its objectives. The benefits of such a pipeline include:

- The provision of a steady flow of transport improvements over the short, medium and long-term including potential strategic projects of the future
- Greater opportunity to consider local issues and spread investment around the Combined Authority area
- Early investment in the development of schemes places the Combined Authority in a strong position to bid for and secure additional funding as alternative sources become available.

2.6.14 In order to facilitate the pipeline of work, the process includes initially exploring the feasibility of schemes, and then developing business cases. These are essential steps in defining an improvement and securing funding for its realisation.

2.6.15 In October 2017 the CPCA methodology for prioritising investment was based on the criteria shown in Table 2.3 below.

Table 2.3: Combined Authority Criteria

Case	Criteria
Strategic	• Reduce congestion • Unlock housing and jobs
Economic	• Scale of impact • Value for money
Financial	• Other funding sources / contributors
Management	• Delivery certainty • Project risks • Stakeholder support

2.6.16 The A16 corridor has been prioritised for investment by the CPCA, and the CPCA's investment strategy is another internal driver for change, and an enabler for a scheme to be developed at this location.

2.7 External Drivers for Change

2.7.1 External drivers for change are factors that are driving the need for change, that are outside of the scheme promoter's organisation. Examples include public opinion, legislative changes, or response from other events.

The A47 Alliance

2.7.2 The A47 Alliance is a campaign group comprised of twenty-four organisations including Local Authorities, MPs, Local Enterprise Partnerships and wider support from business groups and other stakeholders along the A47 trunk road in East Anglia. The Alliance's primary objective is the full dualling of the entire 115-mile stretch of the A47 between Peterborough and Lowestoft, with appropriate grade separation (bridges and flyovers) by 2030 which will:

- Boost the regional economy as a result of new employment
- Unlock housing developments planned along the route
- Reduce additional costs to businesses from as a result of delays along the A47
- Improve productivity

2.7.3 Improvements at the A16 / A47 / Welland Road Roundabout will be necessary in order to:

- Boost the attractiveness of the east of Peterborough as an employment area by reducing delays and queueing along the A47
- Support local growth
- Reduce additional costs to businesses in the east of Peterborough by reducing delays and queueing along the A47.

2.7.4 Improvements at the junction at the A16 / A47 / Welland Road Roundabout will be considerate of future aspirations for dualling from this junction to the east.

2.7.5 Beyond the dualling of the A47, the scheme will also create opportunities to deliver active travel routes and connections within the wider area, enhancing PCC's Local Cycling and Walking Infrastructure Plan (LCWIP) and Rural Cycling Strategy.

2.8 Scheme Objectives

Strategic Objectives

2.8.1 A transport scheme can have both primary and secondary objectives. The primary objectives are the fundamental outputs which must be achieved, whereas secondary objectives are other outputs that may result from the scheme but are not necessary to the success of the scheme. The secondary objectives tend to be delivered as a consequence of delivering the primary objectives, as a causal chain effect. The primary objectives therefore represent the transport outcomes required by the scheme.

2.8.2 The objectives of the A16 Norwood improvement scheme were developed ahead of the Option Development Workshop to provide a framework against which to score potential options. The objectives are based on the goals and outcomes from local policy documents such as the Peterborough Local Plan.

2.8.3 Although these objectives pre-date those of the CPCA as previously discussed in this chapter, work has been undertaken to build upon the objectives and ensure they align with those of the CPCA. The primary and secondary objectives for the A16 Norwood Improvement Scheme are listed beneath.

2.8.4 Primary objectives include:

- **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout
- **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised
- **Limit impact on the local environment and improve biodiversity**: Fully mitigate any adverse environmental impacts of a scheme, and ensure a biodiversity net gain within the study area
- **Improve active travel routes to provide a viable alternative to private car travel**: Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.
- **Improve road safety:** Reduce accidents and improve personal security for all travellers within the study area.

2.8.5 Secondary objectives include:

- **Positively impact traffic conditions on the wider network:** Positively impact the performance of local routes impacted by the traffic and congestion in and around the A16 corridor, such as the A47, A15 Paston Parkway, A1139 Eye Road and Newborough Road.

2.8.6 The schemes developed for the A16 Norwood Improvement study will need to satisfy all of the primary objectives, and as many of the secondary objectives as possible.

SMART Objectives

2.8.7 Based on the strategic objectives, it is valuable to further establish Specific, Measurable, Achievable, Relevant and Time-constrained (SMART) spending objectives, to act as measures of success and provide a clear basis for post-implementation evaluation. The following SMART objectives have been defined for the A16 Norwood Improvement project:

- **Tackle congestion and improve journey times:** to ensure that, by 2031, delay remains beneath the following levels on approach to the A47 / A16 / Welland Road Roundabout (representing no more than a 50% increase on DS modelled delay, and representing a significant improvement over the DM scenario):
    - A16 southbound approach – 30 seconds (AM peak) / 10 seconds (PM peak)
    - A47 westbound approach – 50 seconds (AM peak) / 30 seconds (PM peak)
- **Support Peterborough's growth agenda:** to provide sufficient highway capacity at the A16 / A47 / Welland Road junction to support the creation of 2,000 dwellings across the Norwood growth site within the current Local Plan period (to 2036).
- **Limit impact on the local environment and improve biodiversity:** to achieve a 20% biodiversity net gain within one year of completion of the scheme.
- **Improve Active Travel Routes to provide viable alternative to private car travel:** to provide an LTN 1/20 compliant route connecting the Norwood growth site with Welland Road to the south of the A47 within five years of scheme completion.
- **Improve road safety:** to achieve a 40% per year reduction in personal injury accidents at the A16 / A47 / Welland Road roundabout following completion of the scheme.
- **Positively impact traffic conditions on the wider network:** to ensure that highway junctions within the study area do not exceed capacity (RFC 0.85) as a result of growth from the Norwood sites within the Local Plan period (to 2036).

2.9 Measures of Success

2.9.1 Table 2.4 beneath sets out the measures for success against which any potential improvements should be monitored. The primary objectives are shown in white and the secondary objectives are shown in green.

Table 2.4: Study Objectives and Measures of Assessment

Objective	Scheme Outcome	Measure of Assessment
Tackle congestion and improve journey times	• Reduced congestion and delay on the approaches to the A16 / A47 / Welland Road Roundabout.	• Traffic surveys to be conducted within the study area • Comparison of existing and future journey times for key approaches of the A16 / A47 / Welland Road
Support Peterborough's growth agenda	• Ensure successful delivery of committed and statutory development at Norwood, through increasing capacity on the road network, in order to cater for existing and future traffic demand.	• Preferred scheme to be assessed against future traffic growth
Limit impact on the local environment and improve biodiversity	• Mitigate and offset any detrimental environmental impacts of a scheme and enhance natural and historic features around the scheme at all opportunities.	• Post scheme review of biodiversity gain compared to pre-scheme situation
Improve Active Travel Routes to provide viable alternative to private car travel	• Provide increased pedestrian and cycling connectivity within the local area.	• Post scheme review of active travel routes, in relation to quality and safety (as specified in local policies) • Active travel counts to be conducted on new routes to gauge usage
Improve road safety	• Reduce accidents across all modes of transport	• Review the existing accident statistics for the study area, then compare this against future data post construction
Positively impact traffic conditions on the wider network	• Reduce delay on the wider network.	• Traffic surveys to be conducted within the study area • Comparison of existing and future journey times

2.10 Carbon Assessment

2.10.1 In line with the CPCA and PCC's commitment to combating climate change and PCC's aim to achieve 'Net Zero carbon emissions by 2030', the proposed A16 Norwood scheme will undergo a Carbon Assessment prior to gaining formal approval for the final design and construction.

2.10.2 This will fulfil the following commitment stated within The Council's Carbon Management Action Plan (Council CMAP) 2021[20].

'Develop detailed carbon assessments for major highway projects and use the information to influence the final design'

2.10.3 The purpose of the Carbon Assessment is to measure and baseline the carbon cost (tonnes of carbon dioxide equivalent (tCO2e)) of a scheme early in the design process, allowing for opportunities to drive carbon reduction through innovation and to assess the benefits of value engineering, use of alternative materials and implementation of more efficient construction methods.

2.10.4 Figure 2.10 provides an overview of the process followed by Milestone Infrastructure for undertaking carbon emission calculations, initially at Preliminary Design and secondly at Detailed Design as the scheme progresses.

2.10.5 Further information regarding the methodology and data used for Carbon Assessments can be found in Appendix B.

[20] https://www.peterborough.gov.uk/asset-library/council-carbon-management-action-plan-2021.pdf.

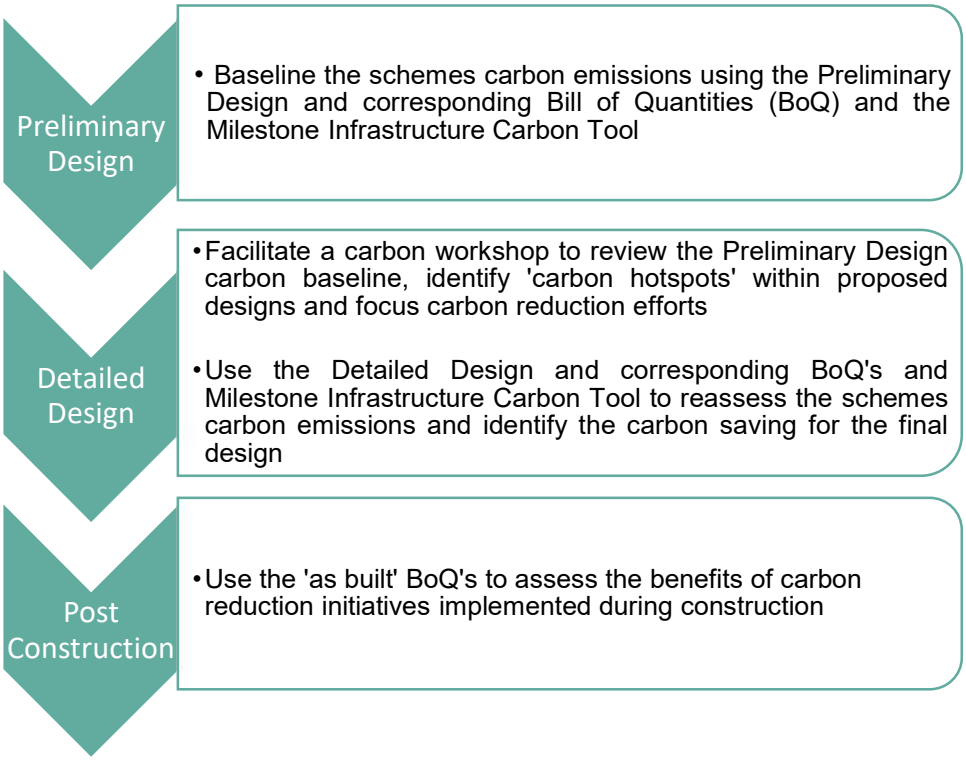


Figure 2.10: Carbon Assessment Process Overview

2.10.6 As per the initial stage illustrated in Figure 2.11 (overleaf), a baseline carbon cost was developed for the A16 Norwood scheme using the Preliminary Design and the corresponding Bill of Quantities. Figure 2.11 overleaf shows the baseline carbon cost generated for the scheme under this phase of work, highlighting the highest carbon contributors of:

- Road Pavement: 490 tCO2e (27%)
- Kerbs and Footways: 376 tCO2e (21%)
- Site Preliminaries: 363 tCO2e. (20%).

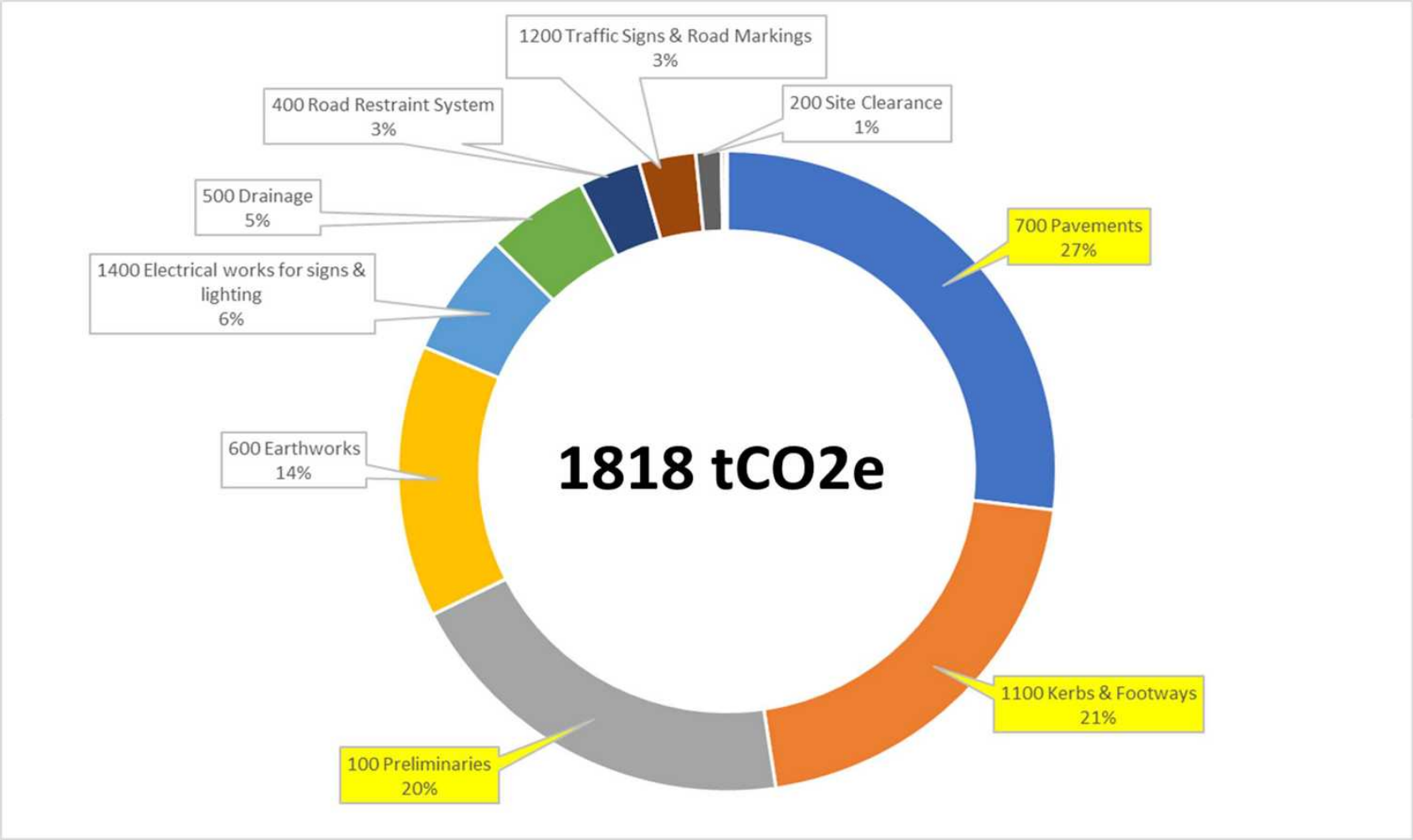


Figure 2.11: Preliminary Carbon Footprint Broken Down by Work Activity 'Series'

2.10.7 Further analysis of these carbon hotspots has enabled the identification of specific work 'categories' and 'activities' which are contributing the most significant proportions of carbon to facilitate a more focused carbon reduction effort. Table 2.5 below and Figure 2.12 overleaf highlight these and provide some suggestions for carbon reduction measures.

Table 2.5: Preliminary Carbon Footprint Broken Down by Work 'Activity'

Work Activity	Carbon Output (tCO2e)	%	Potential Carbon Reduction Measures
Sub Con Week Prelim	193.4	10.6	Mains Electric Connection / Renewable Energy power supply / HVO Fuel
Combined Kerb Drainage Standard Units with Splayed Profile With 280mm Channel Depth (100mm Upstand) - ACO280 Or Similar (SP(KD))	162.0	8.9	Value Engineering / Higher GGBS concrete
320mm thick granular Type 1 sub-base to Clause 803, in carriageway, hard shoulder and hard strip	109.6	6.0	Value Engineering / Recycled Aggregates
Imported acceptable material in embankments and other areas of fill	104.9	5.8	Value Engineering / Use of site-won materials
110mm thick AC20 dense bin 40/60 binder/binder reg course to clause 929	80.8	4.4	Warm Mix Asphalt / Cold Recycled Bound Materials (CRBM)
120mm thick AC20 dense bin 40/60 base course to clause 929	76.4	4.2	Biogenic Binder in Asphalt / Higher RAP content
Signals Installation	65.4	3.6	Re-use functioning signals from elsewhere
Traffic management Maintenance	60.4	3.3	EV alternatives / HVO Fuel / Smart traffic management monitoring systems
225 mm internal diameter PVCu drain, depths to invert not exceeding 2 metres	60.2	3.3	Re-use of excess pipework from elsewhere / Higher recycled content in pipework
Paved area comprising Type 1 unbound mixture sub base 350mm thick	58.9	3.2	Value Engineering / Recycled Aggregates
Disposal of Material	56.7	3.1	Value Engineering / Re-use on site
110mm thick AC20 dense bin 40/60 binder course to clause 929	52.9	2.9	Warm Mix Asphalt / Cold Recycled Bound Materials (CRBM)
50mm thick CASC+ surface course - 53 PSV	50.3	2.8	SuperLow' Asphalt Product / Warm Mix Asphalt
Imported topsoil Class 5B	37.8	2.1	Value Engineering / Re-use site-won material
Paved area comprising AC14 Binder Course in accordance with BS EN 13108-1:2006 with a 40/60 pen binder 90mm thick	33.9	1.9	Ultifaspath pavement material / Cold Recycled Bound Materials (CRBM)
50mm thick TSCS surface course - 68 PSV	32.3	1.8	Warm Mix Asphalt /Higher RAP content
Pre-Cast Concrete Edging Kerbs (150x914x50mm) (EK)	30.5	1.7	Durakerb product / Rediweld product

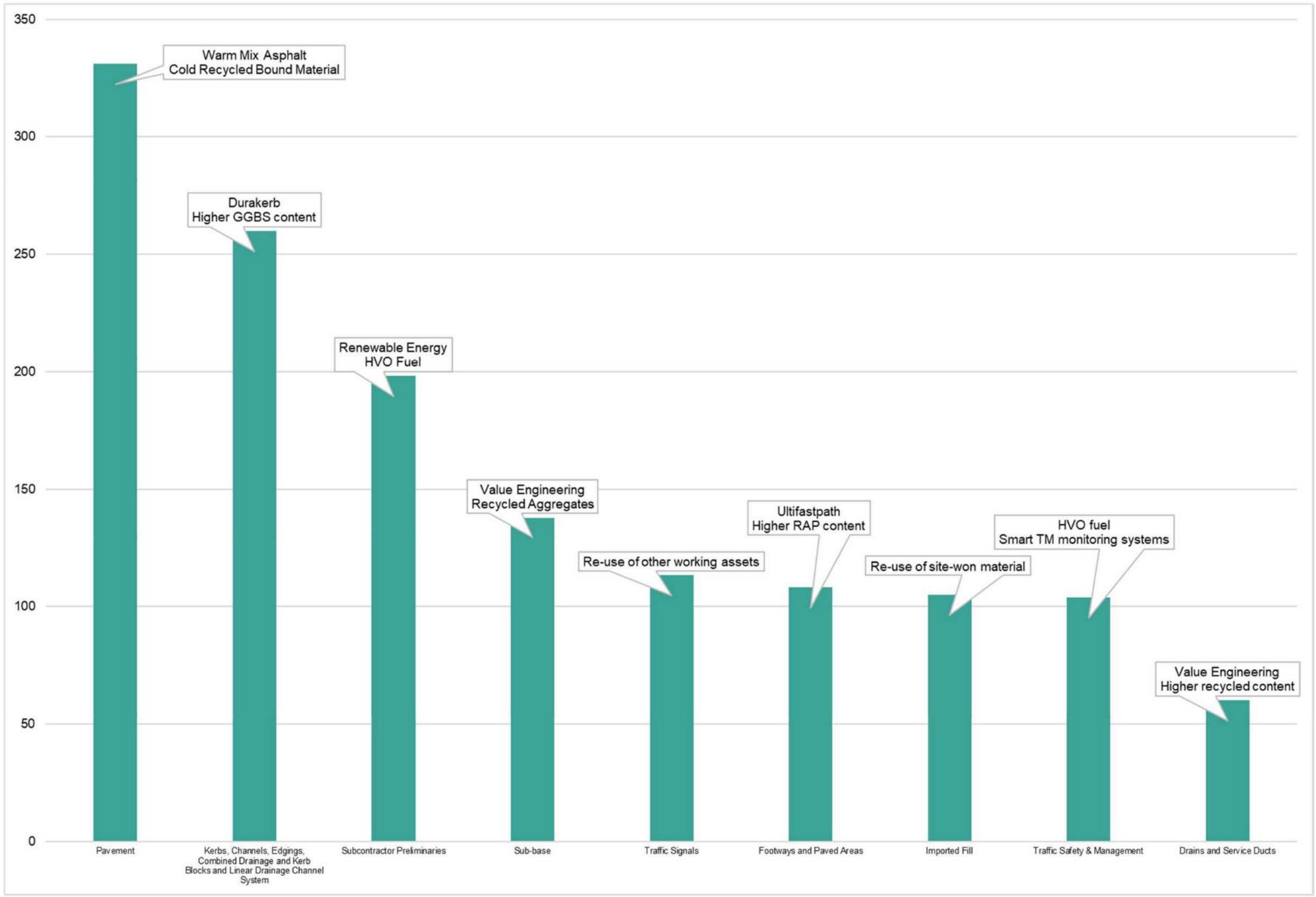


Figure 2.12:Preliminary Carbon Footprint Broken Down by Work ‘Category’

2.10.8 This information and the Preliminary carbon baseline will be used to further inform the design of the Preferred Scheme in the next stage of Detailed Design and FBC. Aspirations identified during this phase of work which will form a minimum carbon effort within the next phase of work include:

- The use of low temperature Asphalt
- Retaining as much of the existing carriageway during construction as possible, using profile planning and regulating to achieve designed surface levels
- The use of a low carbon concrete mixes / products
- The use of plastic kerbing where appropriate
- The use of recycled materials such as Type 4 Plannings in footways
- The introduction of a drainage attenuation feature at the point of outfall.

2.10.9 This Preliminary Carbon Assessment will be updated when the BoQ are made available for the Detailed Design within the next phase of work, enabling a carbon reduction to be demonstrated between business case stages. Additionally, as per Figure 2.10, a final 'as-built' carbon footprint will be calculated for the scheme to highlight any further carbon reductions through the construction phase.

2.10.10 Through the monitoring of carbon at each of the design stages, it is hoped that this approach will lead to tangible changes in scheme design and construction methods, therefore improving the overall sustainability of the scheme in line with the CPCA and The Council's climate objectives.

2.11 Constraints, Powers and Approvals

2.11.1 Scheme constraints are set out in Table 2.6 beneath, including proposed mitigations for how these will be managed.

Table 2.6: Constraints and Measures of Mitigation

Constraint	Detail of Constraint	Response / Mitigation Measure
Funding / Budget	The cost of the scheme will need to compete with other transport infrastructure funding priorities, and the Improvements will need to be achievable within budgets available.	Dialogue with the CPCA to ensure the scheme is identified within its financial programme, and that the scheme is included within all necessary funding decisions.
Alignment to Developer Proposals	There is a requirement to align developer highway mitigations to schemes which will be delivered within this project by PHS. Progression of developer planning applications has the potential to impact the delivery of the PHS highway schemes as the project progresses and wider study area develops.	Consultations between PCC and developers has been continuous throughout this phase of work, and this will continue into Detailed Design, with developer proposals confirmed in the next phase and their timescales for delivering required mitigations agreed prior to construction.
Environmental / Ecology	Land to the east of the A16 (Dogsthorpe Star Pit) is a Site of Special Scientific Interest (SSSI), supporting scarce and nationally rare species and fauna. An area of Ancient Woodland (Little Wood) is also within located close to the SSSI. The study area is located within an Amber and Green zone for great Crested Newts. Ecological site investigations have identified the site as having potential for bats, breeding birds and common reptiles.	Will be managed through ecological / arboricultural surveys to inform design and identify measures necessary to protect vulnerable species and plants during construction. To protect species, works will be undertaken within the appropriate seasons, and under the working methods stated within the agreed Precautionary Method of Works.
Highway Boundary / Scheme Design	Ground conditions associated with highway widening and the likelihood of uncovering hazardous material within the study extents are unknown at this stage.	Surveys are to be commissioned at the start of the Detailed Design phase, to further refine scheme design. Due to the existing carriageway having undergone recent construction / amendments the likelihood of hazardous material such as 'asbestos' is considered low.
Statutory Undertakers Plant	The presence of Statutory Undertakers Plant within the scheme extents is likely to result in the diversion of assets.	NRSWA C3 / C4 process to be undertaken with utility companies, during Detailed Design and prior to construction commencing onsite. Sufficient lead in time for statutory diversions should be incorporated into the construction programme before work onsite commences.
Traffic Management	Complex traffic management requirements are expected for the construction of the scheme, in relation to maintaining the operation of both the A47 and A16.	Early involvement of PCC will be required prior to construction, to plan ahead with TM arrangements and agree a construction programme.
Disapproval from the public or stakeholders	Feedback has been received from stakeholders and members of the public during the consultation period undertaken during this phase of work. Elements within the scheme are considered controversial, and objections from the public and some stakeholders are likely to continue into the final phase of Detailed Design.	Comments received during the stakeholder and public consultations during this phase of work are to be reviewed during the next phase of work and responses integrated into design where appropriate.
COVID – 19	The pandemic had an impact on travel behaviour and the daily use of travel systems, however data from the Peterborough network has shown a steady recovery back to pre-pandemic levels. Despite government restrictions being eased, there continues to be considerations onsite such as social distancing and the need to travel in separate vehicles	Traffic on the Peterborough network (adjacent to the study area) will continue to be monitored and reported within the Business Case process. Routine monitoring of traffic will help determine how flows compare to baseline traffic levels collected at the start of the project. Frequent communication between the project team regarding programme timings, risks and mitigations.

2.11.2 In addition to the constraints shown in Table 2.7, the following powers and approvals will be required to deliver the scheme.

Table 2.7: Powers and Consents

Type	Consent / Approval	Issuer	Description	Current Status
Highways	TTRO	Peterborough City Council	Temporary Traffic Regulation Order allowing temporary restrictions to the road, enabling traffic management required for construction.	Will be sought prior to construciton. Temporary roadspace booking to be confirmed once construction programme finalised.
	TTRO	National Highways	Temporary Traffic Regulation Order allowing temporary restrictions to the road, enabling traffic management required for construction.	Will be sought prior to construciton. Temporary roadspace booking to be confirmed once construction programme finalised.
Environment	Site of Special Scientific Interest (SSSI) Assent	Natural England	Consent needed from Natural England prior to the start of works due to the proximity to the Dogsthorpe Star Pit SSSI site.	Needed prior to construction upon completion of the LSE Assessment (see below). Response from Natural England likely to take up to 28 days. No response has to be taken as refusal of assent. Fast-track service available at a cost.
	Screening for Likely Significant Effect (LSE) Assessment	Local Planning Authority	Report needed to inform the Habitats Regulations Assessment (HRA) which will be undertaken by the competent planning authority as part of the planning process to test if a project could significantly harm the features of a SSSI site.	To be commissioned during the Detailed Design stage.
	Archaeological Watching Brief & Supply of Geotechnical Survey shapefiles	Peterborough City Council (Natural & Historic Environment)	Stakeholder consultation confirmed Archaeological interest in the site due it producing evidence for activity dating back to the Iron Age and Roman period. Archaeological watching brief recommended for all groundworks within undisturbed areas/virgin soils, including ground investigation works. Shapefile data for geotechnical surveys also requested.	Peterborough City Council Archaeologist (Dr Rebecca Casa-Hatton) to be contacted to oversee all ground investigation works and any subsequent groundworks involving disturbance of virgin soils. Shapefile fata for geotechnical surveys to be shared once available.
	Consultation	The Wildlife Trust	Recommended by Natural England as Dogsthorpe Star Pit SSSI is also designated as a County Wildlife Site (CWS) and Local Nature Reserve (LNR).	To be undertaken during the Detailed Design stage.
	Biodiversity Net Gain (BNG) Assessment	Peterborough City Council	Consultation required with Peterborough City Council upon completion of initial BNG Assessment to ensure that a 20% positive BNG is achieved in accordance with organisational targets.	BNG Assessment to be completed before the end of 2022 to allow liaison with PCC (Michael Britton and Darren Sharpe) and inform Detailed Design.
	Land Drainage Consent	Internal Drainage Board (IDB) and/or Lead Local Flood Authority (LLFA)	Consent needed from either the IDB or LLFA where works are likely to temporarily and/or permanently impact on the risk of flooding, maintenance regimes and/or water flows.	Requirements to be determined during the Detailed Design stage.
	Great Crested Newt (GCN) and/or Reptile Mitigation Licence	Natural England	Initial ecological surveys have highlighted an increased risk of needing to obtain mitigation licences for GCN and Reptiles due to potential unavoidable impacts. This will be dependent on the scheme design and follow-up surveys.	Further surveys to be scheduled during Spring 2023 and requirements confirmed during the Detailed Design Stage.
Design	RSA2	Peterborough City Council	Road Safety Audit Stage 2	Road Safety Audit Stage 1 Undertaken, RSA1 Comments need to be agreed with the Client
	National Highways Technical Approval	National Highways	National HIghways Technical Approval of the Design in relation to A47	To commence at Detailed Design Stage
	Drainage Consents	Anglian Water	Potential Drainage Consents	To be reviewed at Detailed Design Stage
	Stopping Up Order for Newborough Road	Peterbough Magistrates Court	Newborough Road to be Closed	Plans to be produced at Detailed Design Stage
	Change in Equestrian Route	British Horse Society	Change in Equestrian Route	Liasion to continue at Detailed Design Stage
Governance	Cabinet Report	Peterborough City Council	A paper will need to be prepared and shared with internal departments for their approval. Once approved an order will be raised for the next stage.	The paper is dependent on obtaining initial funding approval from the CPCA. A request is to be made at November's CPCA Board meeting.

2.11.3 All these powers and consents can be obtained by Peterborough City Council, and do not represent a significant risk to delivery. This table will be updated with progress throughout the detailed design phase and completed as part of the FBC.

2.12 Scope

2.12.1 The project scope is to develop and deliver a scheme, which achieves the primary objectives of:

- Tackles congestion and improves journey times: Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout. The package of schemes will add capacity to the highway network, addressing existing peak hour congestion, and help to facilitate planned residential growth within Norwood.
- Support Peterborough's growth agenda: ensure that the planned employment and housing growth at Norwood can be realised.
- Limit impact on the local environment and improve biodiversity: Fully mitigate any adverse environmental impacts of a scheme and ensure a biodiversity net gain is achieved within the study area.
- Improve active travel routes to provide a viable alternative to private car travel: Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.
- Improve road safety: reduce accidents and improve personal security for all travellers within the study area.

2.13 Interdependencies

2.13.1 The Norwood and Paston Reserve urban extensions have been allocated for development within the Peterborough Local Plan 2016 to 2036 (Adopted July 2019). The 80-hectare Norwood site will provide 2,000 dwellings when complete.

2.13.2 The first phase of the Leeds Farm development (2019 – 2031) currently holds outline planning permission (granted April 2021) for 870 dwellings, a primary school and local centre. It should be noted that the planning permission is subject to transport related 'monitor and manage' conditions, as its estimated only 200 dwellings can be built without the introduction of highway mitigation measures.

2.13.3 Under the 'monitor and manage' conditions of the planning application, the developer is required to make the following improvements along the A16 corridor, to accommodate the full number of dwellings:

- New access roundabout with the A16
- New access priority junction with Newborough Road.

2.13.4 These improvements are deemed necessary for traffic from the development to be able to access and interact with the wider network and have been considered whilst developing the Preliminary Design associated with this OBC.

2.13.5 The second phase of development (2026 – 2031) which will complete the Norwood site (1,130 dwellings) currently holds no form of planning permission, however the developers are in pre-application discussions with the Planning Authority for Outline Planning Permission. This will be monitored closely as the project moves into the final stage of the FBC and Detailed Design.

2.14 Key Risks

2.14.1 The scheme is considered to be low risk in construction terms. However, the primary risk for the project concerns developing a coherent plan for delivering the infrastructure required to support local growth, which includes aligning the delivery of the PHS scheme to developer aspirations and timescales.

2.14.2 As mentioned in section 2.13 above, the first phase of the Norwood site holds outline planning permission (granted April 2021), whilst the second phase currently holds no form of planning permission. Confirmed developer plans and timescales are required before the submission of the FBC and Detailed Design (expected March 2024), in order to gain construction funding approval from the CPCA.

2.14.3 In order to mitigate potential impact from developers on the PHS scheme delivery, Peterborough City Council's planning team have been engaging with developers throughout this phase of work, and both developers are now actively engaged in discussion with the Council. This engagement will need to be sustained into the next phase of work to maintain momentum and confirm developer timescales and align developer / PHS highway mitigations in order to address the wider network requirements, as opposed to a fragmented approach by both parties.

2.14.4 These discussions have also considered the requirement for a small parcel of land from the Norwood growth site to accommodate the relocated Bridleway (as a result of the creation of a Left Dedicated Lane from the A47 to the A16). The developer owning this land is aware of the need and prepared to provide the land as part of the scheme. This need will be factored into the development spatial plans as they progress as part of the planning process.

2.14.5 The latest scheme development has condensed the delivery timescales for the A16 Norwood Improvement Project to better reflect the Leeds Farm Development aspirations, and this OBC proposes delivering the improvements in a single phase, rather than a two staged approach as proposed at SOBC.

COVID-19

2.14.6 The COVID-19 pandemic saw significant changes in highway usage during the national lockdowns between 2020 and 2021, creating uncertainty about how transport systems will be used in the long-term. Despite this, data monitoring of the Peterborough area suggests highway usage is back to a minimum of 90% of pre COVID-19 levels[21].

2.14.7 A review of traffic flows along the A47 Trunk Road using National Highway ATC data[22] has shown that traffic flows along the route have recovered following the pandemic. Data shown in Figure 2.13 and Figure 2.14 show a comparison of daily traffic flows covering a month period in October 2020 and October 2021, when compared to a 2019 baseline. This data has been taken from ATC sites located approximately 350m east of the A47 / A16 / Welland Road Roundabout. Data extracted displays both the east and westbound flows for a 24-hour period.

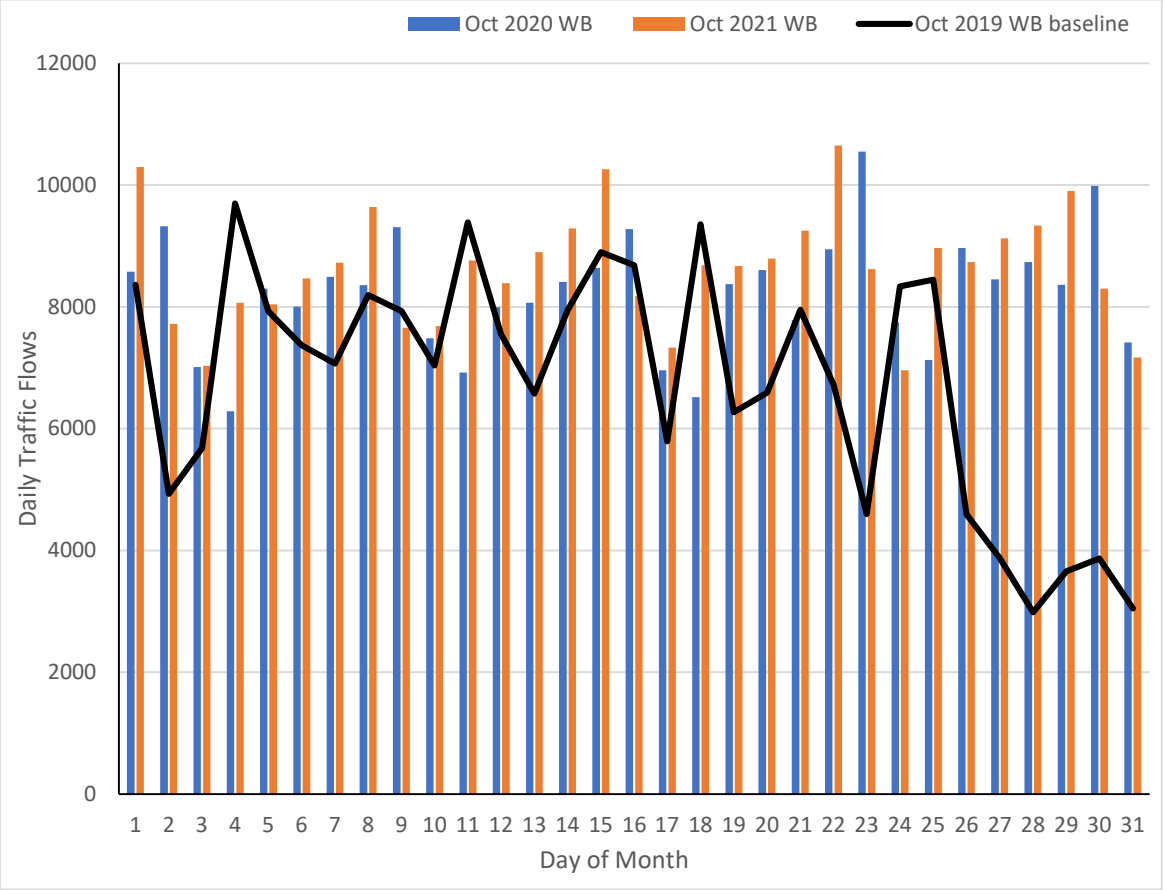


Figure 2.13: A47 Westbound ATC Data Comparison

21 Peterborough live sensor data (2021): Strategic Parkway Route of A1260 Nene Parkway southbound approach to Junction 3, inclusive of Monday to Thursday traffic levels covering a 24-hour period.

22 Highways England - WebTRIS - Map View

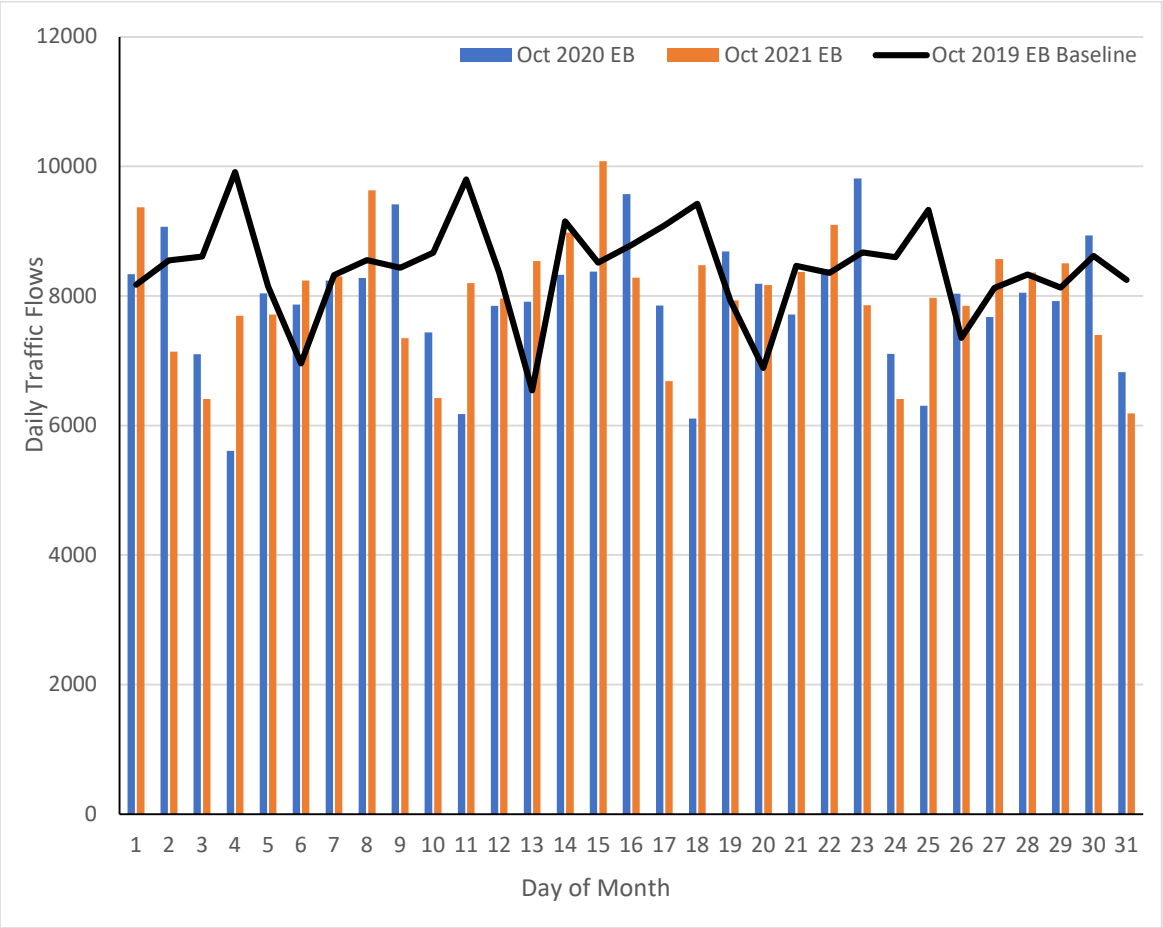


Figure 2.14: A47 Eastbound ATC Data Comparison

2.14.8 Figures 2.13 and 2.14 highlight daily traffic flows across the months follow the same general pattern, with daily traffic flows peaking and troughing at relatively the same time of the month. Traffic flows for October 2021 are shown to be higher than those in October 2020, which is expected, as a greater number of government restrictions were eased at this time (October 2021).

2.14.9 Daily traffic flows for the westbound approach of the A47 during October 2021 range between approximately 7,000 and 10,500 vehicles, whilst traffic flows eastbound are slightly lower ranging between approximately 6,200 – 10,000 vehicles a day at this location. Daily traffic flows for October 2021 are generally above the 2019 baseline, in both directions, indicating a recovery in traffic flows from the pandemic.

2.14.10 Even though evidence suggests a strong recovery of traffic flows on the Peterborough network has already occurred following the pandemic, monitoring of the highway network will continue into the next phase of the study and further data will be presented within the FBC.

2.14.11 Other key strategic risks and their mitigations are identified below:

Table 2.8: Strategic Risks and Mitigations

Risk	Impact	Mitigation
Delay to decision on scope of scheme	Delay in developers obtaining planning approval / establishing a plan for developer contributions to highway mitigation measures. Developer decisions could determine changes to the scope at business case stages.	CPCA will be updated on the planning application outcomes. Its hoped developers will reach a decision on developer contributions to highway improvements before the FBC commences. Communication with developers to be maintained between approval of OBC to start of FBC.
Delay in obtaining approval to commence the next stage	Delay in commencing the FBC and Detailed Design. Without approval its difficult to set timeframes for programme of works, and raise WO for Milestone Infrastructure to undertake the work.	Monitor when the review of the OBC will be completed by, and look for upcoming board meeting where approval can be requested. Draft programme will be prepaped looking at potential timescales for each task.
Project progress on hold	Delay to the project programme, approval / commencement of final business case stage.	Regular progress meetings to be undertaken. Isues which may impact on programme to be identified as early as possible and potential mitigation measures implemented.
Not coming to an agreement with developer	Project could be placed on hold between OBC approval and FBC commencing. Study to date could need updating to reflect any changes proposed by developers.	Communication with developers to be maintained in order to reach agreements. Regular progress meetings to be held, to make project team aware of any changes at earlist point, and included within project programme.
Delay to delivery of the development	Delay of developer contributions to highway mitigations may alter construction of PHS scheme delivery elements.	Monitor developer agreements and interaction this has with planned timescales.

2.14.12 Appendix C contains the Project Risk Register which identifies each of these risks and considers mitigation. The Risk Register is a live document which is managed by PCC and reviewed regularly by the CPCA and PCC during the monthly Project Board meetings.

2.15 Stakeholders

2.15.1 The key stakeholders are considered to be:

- CPCA as the Local Transport Authority and funding body for the scheme
- The Council as the Local Highway Authority
- Norwood Developers and landowners including Taylor Wimpey / Calco 101 in relation to the Leeds Farm Development, and Church Commissions in regard to land to the north of the A47 / A16 / Welland Road Roundabout
- Peterborough City Cabinet Member and Ward Councillors
- National Highways as the organisation responsible for the A47 Trunk Road
- British Horse Society
- Peterborough Local Cycle Forum
- PCC Education Services
- Natural England in regard to ecological / biodiversity assessments within the studies footprint
- Historic England in regard to Archaeology/ Cultural Heritage assessments within the studies footprint
- Environment Agency
- The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, as the organisation responsible for the Dogsthorpe Star Pitt SSSI
- PCC representatives for the natural and historic environment, Archaeology and Heritage, Water and Drainage, Environmental Health and Planning
- Emergency Services
- Residents affected by the scheme, including along Newborough Road
- Businesses affected by the scheme.

2.15.2 Engagement and communication with key stakeholders is an essential element of the planning process for major transport schemes. Stakeholder's needs and requirements should be considered as part of the scheme progression.

Stakeholder Consultation

2.15.3 Stakeholder consultations were undertaken by the Project Team as part of this OBC and Preliminary Design phase of work, ahead of the commencement of Detailed Design. Stakeholders were contacted via email or letter or as part of the Walking, Cycling and Horse Riding (WCHR) Review, for comments on the Preferred Scheme at Preliminary Design Stage.

2.15.4 It should be noted that stakeholder engagement with National Highways began as part of the SOBC and has continued through the development of Preliminary Design and this OBC. Communication with National Highways has included a working group which involves members of the CPCA and The Council's planning team, in order to discuss the project and wider updates on the Leeds Farm Planning Application (part of the Norwood Development). The working group has met quarterly over the past year to discuss the various workstreams of the project, which has helped drive the project forward.

2.15.5 Feedback received from stakeholders during the consultation largely centred on land acquisition for the bridal way, connectivity to the Leeds Farm NMU routes and greater inclusion for active travel provisions within the project, as well as the recent January 2022 updates to the Highway Code.

2.15.6 Consultation feedback regarding active travel was received from the Peterborough Cycle Forum (PCF), in response to the WCHR Review. The PCF work in partnership with The Council to promote cycling within the city and influence policies and plans for future cycle facilities.

2.15.7 Feedback from the PCF demonstrates the organisation supports the need for improvements as part of the A16 Norwood scheme by stating "by increasing capacity and reducing congestion on sections of the A47 and A16 the proposed road scheme will deliver benefits for many drivers, including through traffic, commuters and residents of the Norwood urban expansion". However, further feedback from the PCF suggests the project requires further consideration in relation to active travel provision. PCF would like to see infrastructure provided for a central route (following the shortest distance) which starts from Newborough Road, crossings the A16 and connects into wider networks on Welland Road. With this in mind the PCF suggest:

- The construction of an underbridge to cross the A47, connecting Newborough Road with Welland Road
- The construction of a cycleway / footway from Newborough Road to White Post Road, parallel to the A16 and passing under it at Car Dyke
- The installation of a Toucan crossing on the A47, approximately 60m east of the A47/A16 roundabout
- The removal of the existing signalised crossing on the A16.

2.15.8 Comments received from PCF have been considered during this phase of assessment, and the provision of active travel improvements will be included as the project progresses to FBC and Detailed Design stage, including the provision of a grade separated crossings over the A47 and active travel improvements linking Norwood with the City Centre via Welland Road.

2.15.9 All other comments received from stakeholders during consultation will be explored further and incorporated into scheme design where appropriate as the project progresses to the final phase of Detailed Design.

Public Consultation

2.15.10 Public consultation was undertaken alongside the Preliminary Designs to assess public views of the scheme ahead of Detailed Design. The online consultation which featured on the PCC website and social media for a six-week period (1st November – 13th December 2021) explained the need for improvements, displayed the scheme designs and sought feedback.

2.15.11 A total of 49 members of the public responded during the consultation period. Comments received focused on upgrading active travel routes, poor bus / public transport facilities to the north-east of the city, considerations of the environmental assets within the study area, and more specifically the closure of Newborough Road as proposed by the scheme.

2.15.12 In relation to Newborough Road, 25% of the total comments received related directly to the proposed closure of Newborough Road. Comments received show a mixed opinion from members of the public, however most comments received were against the full closure of Newborough Road.

2.15.13 Closure of the road southbound, and specifically the access onto the A47, are critical components of the wider package of measures because:

- Technical work undertaken to date has demonstrated that this element is required to support wider network efficiency (need to remove u-turning traffic from the A16 / A47 / Welland Road Roundabout)
- Maintaining the Newborough Road access goes against the scheme objectives (removing u-turners is key to achieving a primary objective)
- The internal configuration Newborough Road will ultimately change as the Norwood developments progress.

2.15.14 Further technical assessment undertaken during this phase of the study has demonstrated that the scheme objectives can still be met by retaining access from the A47 onto Newborough Road (northbound only). This would improve access into the Norwood site (and beyond) from the A47, whilst still removing the issues created by u-turning traffic coming from Newborough Road (southbound) onto the A47. The proposed scheme has been updated to reflect this, and this amendment to the package will be incorporated into the Detailed Designs.

2.15.15 Consultation responses relating to active travel have been used to define the improvements that will made as part of the next phase of the project, specifically improvements from the Norwood growth site to Welland Road and on towards the City Centre.

2.16 Option Development

2.16.1 This section discusses the process followed for developing options and shortlisting these against the scheme objectives using the DfT's Early Assessment and Sifting Tool (EAST) assessment. This section also explains the technical work undertaken to assess the shortlisted options and identify a preferred option. Further information on this is included within the A16 Norwood Option Assessment Report (OAR), which was submitted alongside the Strategic Outline Business Case in November 2020. Any subsequent amendments to the package of options are described within this chapter.

2.16.2 An option development workshop was held on the 24th of February 2020 and attended by Peterborough Highway Services staff from a variety of disciplines, including transport planning and design. The workshop reviewed the existing conditions and issues within the A16 Norwood improvement scheme study area, explored its relationship with the surrounding road network and various constraints, and discussed planned growth at the site. The purpose of the workshop was to develop potential improvement options to be considered within this study.

2.16.3 A total of nine options were considered, with potential schemes ranging in estimated cost and potential level of impact on the network. These nine options formed the 'Long List' and are summarised in Table 2.9.

Table 2.9: Long List of Options for A16 Norwood Improvement Scheme

A47 / Newborough Road Priority Junction
Signalisation of A47 / Newborough Road Junction to make it all movement
Creation of a roundabout at the A47 / Newborough Road Junction
Tunnel Newborough Road under the A47
Closure of Newborough Road between the A47 and Norwood Lane
A16
Roundabout on the A16 at Norwood eastern development access
Dual A16 between A16 / A47 / Welland Road Roundabout and Norwood Development Access
A16 / A47 / Welland Road Roundabout
Full signalisation of A16 / A47 / Welland Road Roundabout
Expand existing roundabout and create a 'Hamburger' style junction
Dedicated left turn from A47 to A16

EAST Assessment

2.16.4 The DfT's Early Assessment and Sifting Tool (EAST) was used to assess the Long List of options against objectives to discount any schemes that are not considered to meet the fundamental scheme objectives.

2.16.5 The objectives used in the EAST assessment were formulated to reflect CPCA, Peterborough City Council and scheme objectives, as well as other factors which can influence the deliverability of a scheme (such as likely public and stakeholder support). Scores were based on the discussion and collective opinion of the workshop delegates. The objectives used are outlined in Table 2.10 beneath.

Table 2.10: Scheme Objectives

Strategic Objectives
Ability to reduce congestion/ improve journey times
Making the best use of existing infrastructure
Ability to make Safety Improvements
Ability to support the local growth agenda, including housing and employment growth
Economic Objectives
Affordability (Value for Money)
Scale of impact on local environment (Ecology, Noise and Air)
Management / Deliverability Objectives
Land Acquistion and CPO
Scheme Risk / Buildability
Stakeholder support and public acceptability

2.16.6 The EAST scoring assessment is reported within the OAR. Scores were given in relation to the proportion of the expected impact on the entire junction and not just the section of road it occurs on. A neutral score was given when the score against an objective is uncertain, or there is a comparable negative and a positive element associated with the scheme.

2.17 Shortlisting Summary

2.17.1 Table 2.11 summarises the EAST assessment and identifies which options were shortlisted for inclusion within the traffic modelling. Following the Option Development Workshop, discussions between Peterborough City Council and developers confirmed that Option 5 (Roundabout on the A16 at Norwood eastern development access) would be delivered by the developer as part of their planning obligation. Consequently, this has been removed from the option testing and included within the DM scenario.

2.17.2 Improvements at this location have been an aspiration for Peterborough City Council for many years, and a scheme has been referenced in the last several generations of the Council's Local Transport Plan. Historic attempts to look at low-cost options on this route have been assessed in the past, but nothing satisfactory has been developed and the need for a more significant intervention was acknowledged during the option development phase of this project.

Table 2.11: EAST Assessment Scores

Scheme		Evaluation										
		Strategic Case				Economic Objectives			Management / Deliverability Objectives			Progressed to Option Assessment
		Reduce Congestion / Improve Journey Times	Making best use of existing infrastructure	Safety	Ability to support the local growth agenda, including housing and employment growth	Ecological Impact	Noise / Air Pollution Impact	Value for Money / Affordability	Land Acquisition & CPO	Scheme Risk / Buildability	Stakeholder Support	
1	Signalisation of Newborough Road / A47 junction to make it all movement	1	1	1	2	0	0	2	0	3	0	Yes
2	Creation of a roundabout at the Newborough Road / A47 junction	1	1	-1	2	-1	-1	2	0	0	0	Yes
3	Tunnel Newborough Road under the A47	2	-1	3	1	-2	1	-2	0	-3	0	No
4	Closure of Newborough Road between A47 and Norwood Lane	3	3	3	1	-2	2	3	0	3	0	Yes
5	Roundabout on the A16 at Norwood Development Access	-1	1	-1	3	-1	-1	2	-1	3	3	Yes
6	Dual A16 between A47/A16 roundabout and Norwood Development Access	2	1	0	2	-1	-1	2	0	3	3	Yes
7	Full signalisation of A47/A16 roundabout	1	2	2	1	0	0	2	0	3	0	Yes
8	Expand existing A47/A16 roundabout and create a 'Hamburger' style junction	1	0	-1	1	-1	0	1	-1	0	0	No
9	Dedicated left turn from A47 to A16	1	2	0	1	-1	0	2	-1	3	0	Yes

Low-Cost Options

2.17.3 Beyond the low-cost options considered in the EAST assessment, other low cost (relative to the preferred scheme) options have been considered and assessed prior to the commencement of the A16 Norwood Improvement Project. Technical assessment undertaken in support of the Leeds Farm planning application considered a variety of options including signalising the A47 / Newborough Road and full signalisation of the A47 / A16 / Welland Road roundabout to mitigate the impact of the development. These options were considered by PCC and National Highways as the planning authorities and were not deemed acceptable at either a strategic or operational level. This knowledge was used to inform the option development phase of this study.

2.17.4 Active travel options were also discounted as standalone schemes prior to the option development phase as they would not provide enough capacity alone to bring the developments forward, especially given the location of the Norwood growth site on the periphery of Peterborough, and the high levels of severance created by the A15 Paston Parkway and A47. Active travel improvements will instead form part of the broader package of measures proposed at FBC.

2.17.5 Demand management solutions, such as model filters, reduced parking provision and additional public transport services would also fail to provide the capacity needed, as standalone options, to accommodate the growth, and would make the site unviable. As with active travel measures, demand management solutions will form part of the overall solution for accommodating growth at the Leeds Farm and Norwood sites, however these measures largely relate to the developments themselves and will be explored further through the planning process.

Technical and Economic Assessment (Shortlisting)

2.17.6 The technical assessment of shortlisted options has been undertaken using the PTM3 model and is reported in the A16 Norwood OAR. Note that the improvements discussed within the following sections refer to highway improvements only, however it should be noted that active travel improvements have been identified during Preliminary Design and consultation and will be included within the Detailed Design and Full Business Case.

2.17.7 Active travel improvements will complement the internal layout of the Norwood Development (once known) and provide pedestrians and cyclists with a high standard of connectivity between the development and the wider transport network, particularly the City Centre via improvements along Welland Road.

2.17.8 PTM3 has been developed using SATURN (Version 11.4.07), a traffic and assignment model which can be used to evaluate potential traffic schemes. Saturn focuses on whether a defined network can cope with a defined vehicle demand in a defined period of time.

2.17.9 The Saturn traffic model has been constructed to represent the morning (AM) peak hour from 08:00 to 09:00, and an evening (PM) peak hour from 17:00 to 18:00, in order to represent the most congested time periods. In addition, an Inter-Peak (14:00 to 15:00) model has also been constructed to understand the impact of any improvements outside of the congested periods of the day.

2.17.10 PTM3 has a 2019 baseline, and the model is validated and calibrated to ensure it represents the traffic conditions experienced on the network during the survey period.

2.17.11 To understand traffic conditions in future years, growth factors have been derived from the DfT's Trip End Model Presentation Program (TEMPro) from the appropriate National Trip Ends Model (NTEM) zone for each traffic input zone to the network in the forecast years 2026, 2031 and 2036. Local growth of LGV and HGV traffic has been estimated using 2015 Road Traffic Forecast data produced from the National Transport Model (NTM).

2.17.12 Do-Minimum (DM) models for 2026, 2031 and 2036 have been produced to enable an assessment of the options and a comparison to what would happen if no transport intervention(s) were delivered. The DM models include some infrastructure which the Norwood developments are expected to deliver, such as an internal link road connecting Newborough Road with the A16, and a new roundabout on the A16 providing access into the Norwood development site.

2.17.13 The technical assessment undertaken at this stage of the Norwood Access Study has concentrated on the 2036 future year to capture the full impact of the Local Plan growth and ensure that it can all be facilitated.

Package Development

2.17.14 Two packages of options were developed to address the existing and future issues identified within the study area and were based on options considered within the Option Development Workshop. The Packages differ in the improvements proposed for the A16 / A47 / Welland Road Roundabout.

2.17.15 Each of the packages build from a common starting point, which has been broken down into a series of stages that are discussed below.

Stage 1

2.17.16 Based on the observations from existing conditions, and the DM modelling, the first stage in the package development closed Newborough Road's access onto the A47, effectively removing this junction from the Strategic Network. As a result of this closure, access to the Norwood area (and beyond) is provided via the following locations, all of which feature within the DM network:

- A16 and Developer Roundabout (predominantly for Norwood)
- Junction 21 (A15 Paston Parkway) and Manor Drive (predominantly for Paston Reserve)
- A16 / A15 and B1443 (predominantly for Newborough).

2.17.17 This removed the u-turning traffic from the A16 / A47 / Welland Road Roundabout, which currently compromises the junction's efficiency and safety.

Stage 2

2.17.18 To address the delay caused by an increase in traffic on the A16 from the Norwood site, the 500m section of the A16 between the developer roundabout the A16 / A47 / Welland Road Roundabout was dualled in both directions.

2.17.19 This successfully removed the link delay along the A16 between the two roundabouts, and expectedly reduced the level of delay on the A16 southbound approach to the A16 / A47 / Welland Road Roundabout as reduced congestion on the A16 meant that vehicles were moved more efficiently along the link.

Stage 3

2.17.20 Having addressed the distribution and routing issues created by the Newborough Road access onto the A47, different options were then considered to reduce delay at the A16 / A47 / Welland Road Roundabout. It is at this point that the two packages emerged, each containing the interventions discussed above, but differing in their approach to addressing delay at the A16 / A47 / Welland Road Roundabout. The different packages were:

- **Package 1:** Partial signalisation of the A16 / A47 / Welland Road Roundabout (at-grade improvements)
- **Package 2:** New Grade Separated Junction (grade separated improvements)

2.17.21 Each package was developed iteratively, with different components added to address specific issues identified by the transport modelling. For example, partial signalisation of the A16 / A47 / Welland Road Roundabout led to an increase in delay during the PM peak hour on the A47 eastbound approach which disproportionately affected left turning vehicles (towards A16 northbound). Consequently, a Left Dedicated Lane (LDL) from the A47 to the A16 was incorporated into the package, which removed the delay.

2.17.22 Each package ultimately consisted of the following schemes.

Package 1:

- Closure of Newborough Road access onto A47
- Dualling of A16 between A16 / A47 / Welland Road Roundabout and the Norwood Development Access
- Partial signalisation of A16 / A47 / Welland Road Roundabout on the A16 southbound approach
- A 50-metre flare added to the A47 westbound approach to provide additional capacity for left turning traffic to Welland Road
- Dedicated Left Turn Lane (LDL) from the A47 eastbound to the A16 northbound.

Package 2:

- Closure of Newborough Road access onto A47
- Dualling of A16 between A16 / A47 / Welland Road Roundabout and the Norwood Development Access
- Creation of a Grade-separated junction at the existing A16 / A47 / Welland Road Roundabout, with the A47 having priority through the junction.

2.17.23 The technical and economic assessment of both options identified that Package 1 was the preferred option. These assessments are reported in full in the OAR and are summarised beneath.

Technical Assessment

2.17.24 Figure 2.15 below shows the change in delay (per vehicle) between the 2036 DM scenario and Package 1 during the AM peak hour. Note that blue denotes a decrease in delay because of Package 1, and green an increase in delay.

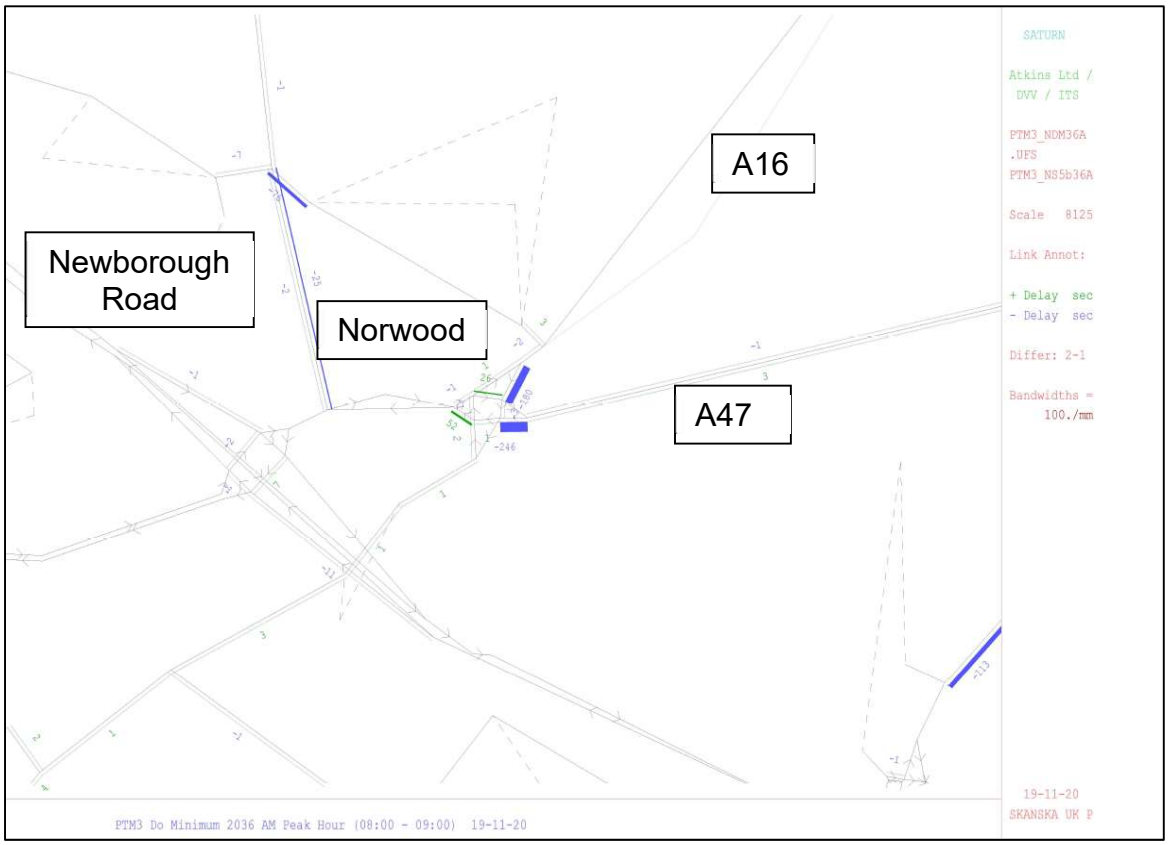


Figure 2.15: 2036 AM Peak Hour Change in Total Delay (seconds per vehicle) – Package 1 Impact on DM Scenario

2.17.25 Figure 2.15 shows that Package 1 is expected to have a significant improvement to the level of delay experienced on the A16 southbound approach to the A16 / A47 /Welland Road Roundabout, with delay reduced by 180 seconds per vehicle compared to the DM scenario.

2.17.26 The A47 westbound approach also demonstrates a decrease in delay of 256 seconds per vehicle compared to the DM Scenario.

2.17.27 Figure 2.16 overleaf shows the change in traffic demand between the DM scenario and Package 1 in the AM peak hour.

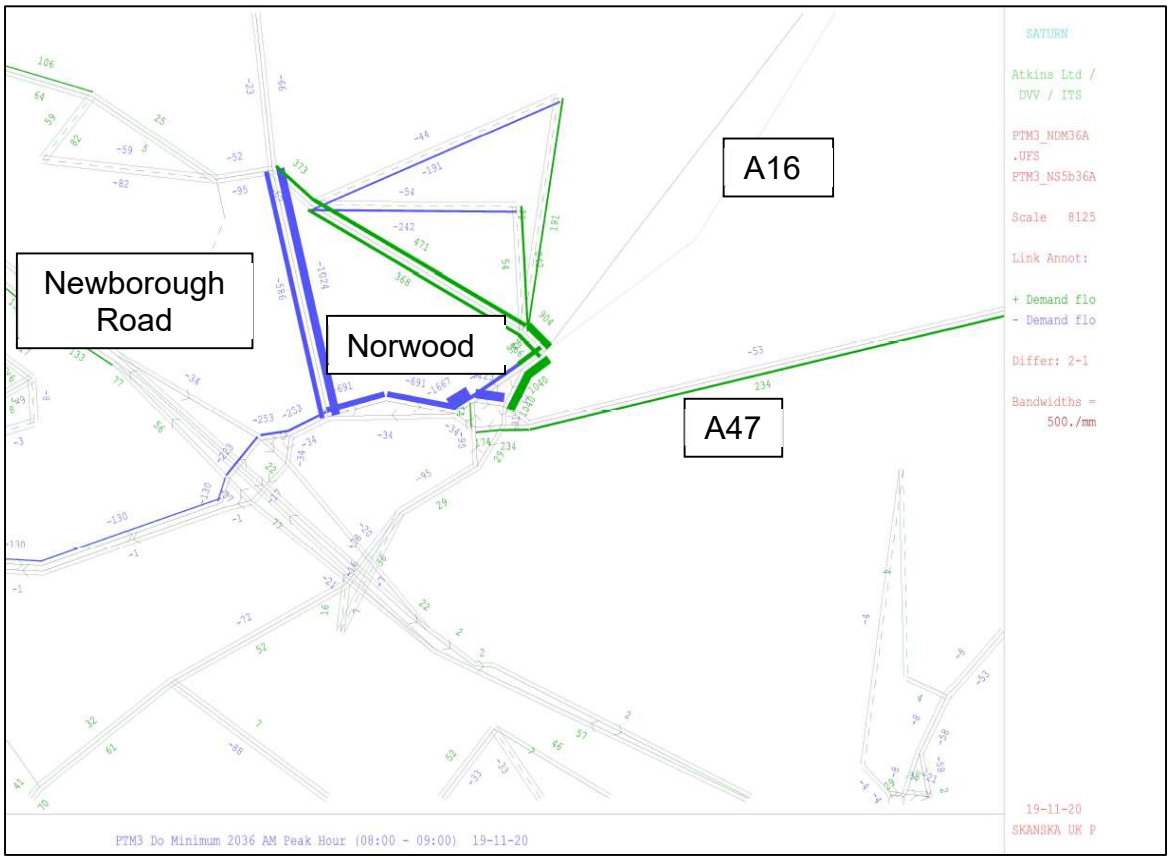


Figure 2.16: 2036 AM Peak Hour Change in Demand Flow – Package 1 Impact on DM Scenario

2.17.28 Figure 2.16 demonstrates that the package successfully removes trips from Newborough Road, including u-turning traffic at the A16 / A47 / Welland Road Roundabout. As these trips re-route, there is an increase in traffic flow along the A16, however delay along this route is significantly reduced as demonstrated in Figure 2.15.

Package 1: 2036 PM Peak Hour Results

2.17.29 Figure 2.17 below shows the change in delay (per vehicle) between the 2036 DM scenario and Package 1 during the PM peak hour. Note that blue denotes a decrease in delay as a result of Package 1, and green an increase in delay.

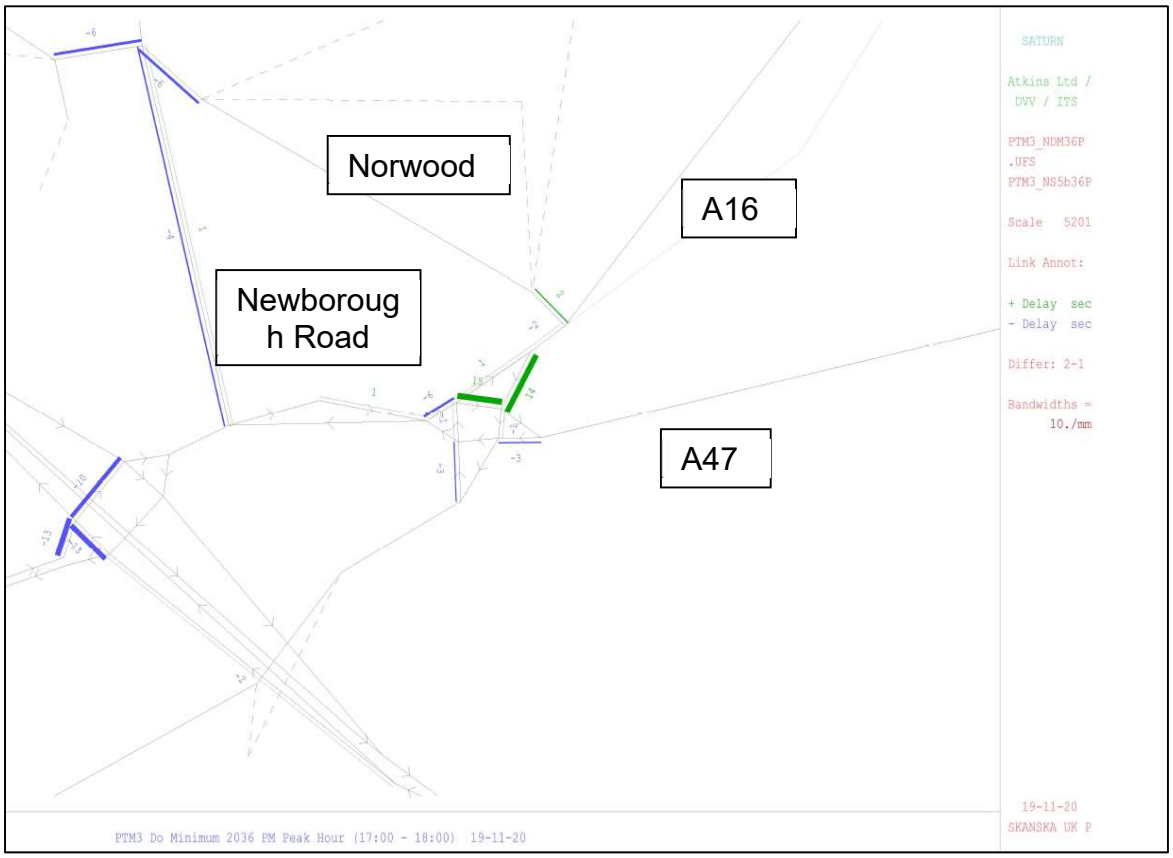


Figure 2.17: 2036 PM Peak Hour Change in Total Delay (seconds per vehicle) – Package 1 impact on DM Scenario

2.17.30 Figure 2.17 shows that Package 1 has a negligible impact on delay during the PM peak hour as the issue of congestion is less pronounced in this time period. There is a 15 second increase on the northern circulatory of the A16 / A47 / Welland Road Roundabout which is transient delay associated with the installation of traffic signals.

Economic Assessment

2.17.31 The Economic Assessment undertaken as part of the Option Assessment Report calculated a Benefit to Cost Ratio (BCR) for Package 1 and Package 2. A comparison of the results from this assessment are presented in Table 2.12 beneath.

Table 2.12: Option Shortlisting Summary

Value (£000's) 2010 prices, benefits discounted to 2010	Package 1	Package 2
Greenhouse Gases	-1	-17
Consumer Users (Commuting)	4,168	1,521
Consumer Users (Other)	5,442	5,144
Business Users / Providers	5,476	6,601
Indirect Taxes	53	56
Present Value of Benefits (PVB)	**15,138**	**13,305**
Broad Transport Budget	4,757	22,035
Present Value of Costs (PVC)	**4,757**	**22,035**
Net Present Value (NPV)	**10,381**	**-8,730**
Benefit / Cost Ratio (BCR)	**3,182**	**0.604**
Value for Money Statement	**High**	**Poor**

2.17.32 The Economic Assessment within the OAR demonstrated that Package provides High Value for Money. Package 2 is expected to provide Poor value for money, due to the significantly higher (relative) cost compared to Package 1. On this basis, Package 1 was selected as the preferred option and progressed for further assessment.

2.17.33 Please note that the results of the Economic Assessment shown above are from the OAR and predate the OBC. An updated Economic Assessment has been completed for the OBC and is included within Chapter 3 (Economic Dimension).

2.18 Operational Assessment

2.18.1 An operational assessment of Package 1 has been undertaken using a PTV VISSIM model to test the operational performance of the proposed improvements. Further details of the VISSIM assessment are available upon request.

2.18.2 The assessment compared the Do-Minimum (DM) and Do-Something (DS) scenarios for the future years of 2026, 2031 and 2036 using forecast traffic flows from the PTM3 SATURN model.

Assessment Results

2.18.3 Results from a comparison of the DM and DS scenarios for each of the modelled years were used to understand the impact of the proposed improvements on the study area and wider network.

2.18.4 Summary results for AM and PM peak hours for key junctions within the study area are presented beneath for the 2026, 2031 and 2036 future years (Tables 2.13 – 2.15).

Table 2.13: VISSIM 2026 Junction Performance Summary

2026		DM				DS			
Time	Junction	Queue Length (m)		Delay (secs)		Queue Length (m)		Delay (secs)	
		Max	Average	Average	LOS†	Max	Average	Average	LOS†
0800-0900	A15 / Gunthorpe Road / Manor Drive	407	38	24	C	1004	312	63	F
	A47 Junction 20	108	7	18	B	112	7	17	B
	A47 / Newborough Road	33	0	2	A	0	0	1	A
	A16 / A47 Eye Road / Welland Road	406	150	59	F	286	59	29	D
	A16 / Developer Roundabout	1014	309	40	E	31	0	10	B
1700-1800	A15 / Gunthorpe Road / Manor Drive	156	21	20	C	338	34	25	C
	A47 Junction 21	496	29	25	C	98	6	13	B
	A47 / Newborough Road	335	47	27	D	0	0	1	A
	A16 / A47 Eye Road / Welland Road	357	122	37	E	220	10	14	B
	A16 / Developer Roundabout	185	4	8	A	149	1	6	A

2.18.5 Results from the 2026 comparison show that for both the AM and PM peak hours, there are predicted improvements to junction capacity, delay and queue lengths at all of the junctions except for Junction 21 A15 / Gunthorpe Road / Manor Drive).

2.18.6 Increases in delay and queues at the A15 / Gunthorpe Road / Manor Drive junction are forecast within both peak hours due to the high forecast number of right-turners from the A15 Paston Parkway into Manor Drive, which reduces the gap availability for traffic on the southbound approach to the junction. This junction is already identified by PCC for improvement, and design work will commence once funding is available. Note that subsequent scheme amendments which are discussed within section 2.19 are also forecast to significantly reduce this issue.

Table 2.14: VISSIM 2031 Junction Performance Summary

2031		DM				DS			
Time	Junction	Queue Length (m)		Delay (secs)		Queue Length (m)		Delay (secs)	
		Max	Average	Average	LOS†	Max	Average	Average	LOS†
0800-0900	A15 / Gunthorpe Road / Manor Drive	740	111	43	E	449	63	36	D
	A47 Junction 20	112	7	19	B	619	65	48	E
	A47 / Newborough Road	79	1	5	A	0	0	1	A
	A16 / A47 Eye Road / Welland Road	1016	406	91	F	669	143	64	F
	A16 / Developer Roundabout	1015	325	81	F	1011	117	31	D
1700-1800	A15 / Gunthorpe Road / Manor Drive	178	24	21	C	261	30	23	C
	A47 Junction 21	902	111	40	D	356	10	17	C
	A47 / Newborough Road	416	96	30	D	13	0	3	A
	A16 / A47 Eye Road / Welland Road	358	133	40	E	294	76	25	C
	A16 / Developer Roundabout	273	13	11	B	330	103	27	D

2.18.7 Results from the 2031 comparison demonstrates an improvement in junction performance at most junctions throughout the study area within both peak hours.

2.18.8 Results for the A15 / Gunthorpe Road / Manor Drive junction and the A47 at Junction 20 vary across peak hours. The A15 / Gunthorpe Road / Manor Drive junction is expected to benefit from reduced queues and delays as a result of the scheme, however there is a modest increase during the PM peak hour. The A47 at Junction 20 is predicted to have the opposite effect, with performance deteriorating in the AM peak and improving in the PM peak hour. This is not considered to be a significant operational concern, as Traffic signals at this junction can be re-validated in future years to help improve operational efficiency of the junction alongside the proposed scheme (the traffic signals were not fully optimised during this assessment).

Table 2.15: VISSIM 2036 Junction Performance Summary

2036		DM				DS			
Time	Junction	Queue Length (m)		Delay (secs)		Queue Length (m)		Delay (secs)	
		Max	Average	Average	LOS†	Max	Average	Average	LOS†
0800-0900	A15 / Gunthorpe Road / Manor Drive	838	151	47	E	644	95	40	D
	A47 Junction 20	502	35	38	D	264	16	26	D
	A47 / Newborough Road	274	53	28	D	0	0	1	A
	A16 / A47 Eye Road / Welland Road	1016	454	92	F	373	95	37	E
	A16 / Developer Roundabout	1016	330	90	F	377	92	19	C
1700-1800	A15 / Gunthorpe Road / Manor Drive	245	29	23	C	372	43	26	C
	A47 Junction 21	908	152	44	D	903	119	32	D
	A47 / Newborough Road	436	75	16	C	97	7	5	A
	A16 / A47 Eye Road / Welland Road	351	115	43	E	300	78	25	C
	A16 / Developer Roundabout	240	13	12	B	346	108	27	D

2.18.9 Results for 2036 again demonstrate an operational improvement at all junctions within the study area with the exception of the A15 / Gunthorpe Road / Manor Drive. Again, this junction is impacted by the increased number of right turners from the A15 Paston Parkway northbound approach into Manor Drive, but subsequent changes to the package (described beneath) are expected to significantly mitigate the impact of this.

Welland Road Sensitivity Test

2.18.10 The operational assessment showed that the Welland Road approach to the A16 / A47 / Welland Road roundabout was experiencing increased vehicle delay. A sensitivity test was undertaken to determine if extending the flare on Welland Road and changing the lane allocations would improve conditions for traffic on this approach.

2.18.11 The proposed improvement consisted of a two-lane approach along the length of the link, with the left-hand approach lane open to left-turning and ahead traffic, and the right-hand lane open to ahead and right-turning traffic, in order to provide greater capacity for the dominant ahead movement.

2.18.12 The results show that the additional lane along Welland Road, and the opening of the left-hand lane at the junction approach to ahead movements initially provides some benefits, with flows forecast to increase during the 2026 and 2031 AM peak periods. However, this ultimately results in an increase in delay (and reduction in traffic flow) during the 2031 and 2036 PM peak hours.

2.18.13 The sensitivity test was not conclusive, and further options will be assessed to improve the performance of this approach as part of the Detailed Design and FBC.

2.19 Scheme Amendments Since SOBC

2.19.1 Further strategic, operational and economic assessment has been undertaken alongside the development of the Preliminary Designs and since the SOBC was submitted in December 2020.

2.19.2 The most significant amendment to the package during this phase has been the change to Newborough Road, which was originally identified for full closure. In line with consultation feedback and supported by sensitivity testing undertaken as part of the economic assessment, the current proposals keep Newborough Road northbound only. This will enable access from the A47 onto Newborough Road, which reduces re-routing disbenefits (particularly notable during the inter peak period when broader scheme benefits are reduced) and reduces pressure on the A15 Paston Parkway / Gunthorpe Road / Manor Drive junction, which was shown to experience issues in the operational assessment as a result of traffic re-routing following the closure of Newborough Road.

2.19.3 Note the access from Newborough Road onto the A47 (southbound) will still be removed as part of the proposed scheme, to avoid the continued degradation to the performance of the A16 / A47 / Welland Road Roundabout because of u-turning traffic.

2.19.4 The consultation and preliminary design development also identified the opportunity to include active travel improvements. These improvements will be considered within the next stage of the assessment, including (but not limited to) a new footbridge over the A47 linking Norwood to Welland Road and active travel improvements along Welland Road, linking the development to the City Centre.

2.20 Strategic Dimension Summary

2.20.1 The Strategic Dimension has outlined the wider policy context for the proposed scheme, including the policy framework of the CPCA, including the Sustainable Growth Ambition Statement, CPIER, Local Industrial Strategy, the Local Transport Plan and emerging LTCP and Gear Change and LTN 1/20 guidance.

2.20.2 The Norwood study area is identified as a key residential growth area in the Peterborough Local Plan, however, it is necessary to increase in highway capacity to unlock congestion and significantly reduce delay along the A16 corridor which will support local growth.

2.20.3 Evidence of existing conditions of the highway network within the study area, demonstrates that there are already congestion issues during the peak hours. If transport infrastructure is not improved and increased transport capacity not provided, local growth cannot be delivered sustainably. Current developer proposals have only secured planning permission for 200 dwellings, and no transport mitigations have been identified (beyond the proposals within this Business Case) to support full growth at Norwood.

2.20.4 These following (pre-COVID) issues have been identified within the study area during peak hours:

- Peak Hour Congestion and Delay (particularly on the A47 and A16)
- U-turning traffic from Newborough Road
- High accident rate.

2.20.5 Without intervention, the existing issues of peak hour delay and congestion along the A16 and A47 will increase further, impacting the operational performance of the highway network across the study area, and will compromise the viability of local growth aspirations.

2.20.6 Assessments undertaken in the PTM3 model have shown that under the 2036 DM scenario, without highway intervention delay would be more pronounced during the AM peak hour, reaching 197 seconds (3 minutes 17 seconds) per vehicle on the A16 southbound, and 270 seconds (4 minutes 30 seconds) on the A47 westbound approach of the A16 / A47 / Welland Road Roundabout during the AM peak hour.

2.20.7 The scheme objectives were developed by considering the existing and future issues within the Norwood study area as well as the wider policy objectives.

2.20.8 Primary objectives include:

- **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout
- **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised
- **Limit impact on the local environment and improve biodiversity:** Fully mitigate any adverse environmental impacts of a scheme and ensure a biodiversity net gain within the study area
- **Improve active travel routes to provide a viable alternative to private car travel**: Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.
- **Improve road safety:** Reduce accidents and improve personal security for all travellers within the study area.

2.20.9 The A16 Norwood Improvement Scheme will satisfy all of the primary objectives, and the secondary objective stated within the Strategic Dimension.

2.20.10 The scheme is considered to be low risk in construction terms. However, the primary risk to the project includes concerns about developing a coherent plan for delivering the infrastructure required to support local growth, which includes aligning the delivery of the PHS scheme to developer aspirations and timescales for both development areas within the Norwood.

2.20.11 At present planning applications from developers are at differing rates of progression. Confirmed developer plans and timescales are required before the submission of the FBC and Detailed Design (expected March 2024), in order to gain construction funding approval from the CPCA.

2.20.12 Peterborough City Council's planning team have been engaging with developers throughout this phase of work to mitigate potential impact from developers on the PHS scheme delivery. This engagement will need to be sustained into the next phase of work to maintain momentum and avoid a fragmented approach by both parties.

2.20.13 The COVID-19 pandemic impacted travel behaviours throughout the lockdowns experienced during 2020 and 2021. Despite this data collection from the Peterborough area has demonstrated that peak hour road traffic has made a strong recovery since the pandemic and is generally above 90% of pre COVID-19 levels.

2.20.14 The option development and assessment process has been reported within this chapter and in greater detail within the Option Assessment Report (OAR) (November 2020). An option identification workshop was held to identify options, which were then scored against objectives using an EAST assessment to shortlist options to take forward for further assessment.

2.20.15 Two packages were created and assessed and the technical and economic assessment identified Package 1 as the Preferred Option. The assessments are reported in full in the OAR.

2.20.16 As reported within the OAR. Package 1 is expected to have a significant reduction in delay of 180 seconds per vhicle in AM peak hour on the A16 southbound approach and a 256 seconds per vehicle reduction in delay on the A47 westbound approach. Package 1 was expected to provide High Value for Money, and this has been confirmed by more recent Economic Assessment undertaken as part of the OBC (reported in the following chapter).

3. Economic Dimension

3.1 Introduction

3.1.1 The Economic Dimension provides evidence of how the scheme is predicted to perform in relation to the stated objectives, the identified problems and targeted outcomes. The Economic Dimension determines if the proposed scheme is likely to provide good value for money, with benefits outweighing its costs.

3.1.2 This section sets out the approach taken to assess the Economic Dimension for the A16 Norwood improvement scheme and demonstrates that the proposed scheme would offer Medium Value for Money.

3.1.3 The scheme appraisal focuses on the aspects of performance that are relevant to the nature of the intervention. These impacts are not limited to those directly impacting on the economy or those which can be monetised. The economic, environmental, social and distributional impacts of the proposal are all examined using qualitative, quantitative and monetised information where appropriate.

3.2 Economic Assessment

Approach to Appraisal

3.2.1 The Economic Dimension for the proposed scheme is focused on the following aspects:

- Assessing the monetised direct, localised, and economic efficiency benefits of the scheme
- Qualitative appraisal of wider scheme benefits, such as environmental, social, and enablement of planned development
- Offsetting identified benefits against the scheme costs to provide a Benefit to Cost ratio (BCR).

Modelling Assessment

3.2.2 The transport benefits of the scheme were assessed using the SATURN based PTM3. The model / appraisal forecast years developed in the SATURN model are 2026, 2031 and 2036, which have been used to appraise the impacts of the core scenario. The 2036 year marks the end of the Local Plan period.

3.2.3 Full details relating to the calibration and validation of the model can be found in the Local Model Validation Report (LMVR), and details about the forecasting procedure can be found in the Forecasting Report.

3.2.4 The key objective of the SATURN model is to forecast, accurately, the likely transport impacts that the proposed schemes would have on highway users of the surrounding road network. User benefits can be calculated by modelling the highway network, in various years, and comparing with / without scheme scenarios to determine how introducing a scheme will impact on travel behaviour and patterns.

3.2.5 The model analysis provided in the OAR demonstrates that Package 1 will reduce congestion, leading to less delay and travel time. The difference between the DM and Package 1 scenario demonstrates the benefits of implementing the scheme, which largely consist of mitigating future issues.

3.2.6 The model output files were then entered into the Transport User Benefits Appraisal (TUBA, 1.9.17) software to undertake the Economic Assessment and calculate a BCR. The annualisation factors shown below in Table 3.1 were specified within TUBA to calculate the likely annual transport user benefits for the AM, Inter and PM peak hours and have been derived from nearby National Highways WebTRIS data. It was found that the 07:00 – 08:00 and 16:00 – 17:00 hour flows closely resembled the total flows observed within the modelled AM and PM peak hours. AM and PM annualisation factors have therefore been calculated that convert the single peak hour demand to annual peak period demand.

Table 3.1: Annualisation Factors

Time Period	Annualisation
AM (07:00 – 09:00)	488
Inter (10:00 – 16:00)	1,624
PM (16:00 – 18:00)	525

3.2.7 A proportionate approach focused on transport user benefits (Transport Economic Efficiency, TEE) has been undertaken to demonstrate the value for money that can be expected from the scheme.

3.2.8 Table 3.2 shows the cost profile used within the Economic Assessment for the scheme, which is derived from the broader project programme.

Table 3.2: Scheme Base Investment Cost Profiles

Cost Profile	2022	2023	2024	2025	Total
Design	£627,547	£506,114	£126,529		£1,260,190
Land					
Construction (Highways)			£2,079,940	£4,159,881	£6,239,821
Construction (Structures)					
Supervision			£205,813	£411,626	£617,439
Other	£64,632	£193,895	£83,819	£70,691	£413,037
Total	**£692,179**	**£700,009**	**£2,496,102**	**£4,642,198**	**£8,530,488**

3.2.9 The activities shown in Table 3.2 include:

- 2022 to 2024 – Detailed Design and Full Business Case
- 2024 – Construction / Supervision of Scheme
- 2025 – Construction complete, and scheme open for use.

Present Value of Costs

3.2.10 A robust scheme cost estimate has been produced based on preliminary designs produced between 2021 and 2022. The Base Investment Costs are detailed in Table 3.3 below, and the subsequent steps taken to calculate the Present Value Costs (PVC) are described beneath.

3.2.11 The benefits assessment was undertaken over a 60-year appraisal period from the scheme opening year (2025 to 2085), with costs included from 2022 through to 2085. Further detail about the scheme costs is provided within the Financial Dimension.

3.2.12 The Base Investment Cost is the capital cost required to construct the scheme in current year (2022) prices, without a risk allowance or optimism bias. This is derived from the scheme cost estimate based on design information and is the building block for all subsequent cost calculations. All Sunk Costs (those already incurred) have been omitted from the economic assessment in line with TAG unit A1.2.

3.2.13 Table 3.3 shows the Base Investment Cost profiled over calendar years, and broken down into Construction, Land, Design and Supervision costs.

Table 3.3: Base Investment Costs (2022 Prices)

Calendar Year	Construction (£)	Land & Property (£)	Preparation / Supervision (£)	Other (£)	Total
2022			627,547	64,632	692,179
2023			506,114	193,895	700,009
2024	2,079,940		332,342	83,819	2,496,102
2025	4,159,881		411,626	70,691	4,642,198
Total	**6,239,821**		**1,877,629**	**413,037**	**8,530,488**

3.2.14 Note that there are not expected to be any land or property costs associated with the scheme at this stage, and that the Preparation and Supervision Costs include Business Case development, all design work including site surveys and supervision during the construction phases.

3.2.15 The PVC has been calculated as followed:

- Real Cost increases were calculated based on the Base Investment Cost spend profile. The Base Cost adjustment factor was calculated by dividing the Construction Industry Inflation Rate (10% to 2024 / 2025, and then 5%[23] thereafter) by the Annual GDP Factor derived from the TAG Databook (May 2022) for each of the years within the assessment period. The inflation rate was derived from construction output price indices as well as knowledge of costs associated with recent schemes in Peterborough. Peterborough Highways Services work is measured using BCIS indices.
- Optimism Bias was then applied in line with guidance provided in TAG unit A1.2 (May 2022). An Optimism Bias of 23% was applied to represent the maturity of the design. The total Optimism Bias applied was £2,356,317.
- Costs were then rebased back to 2010 using factors derived from the TAG Databook (May 2022) GDP Deflator.
- Costs were then discounted to 2010 in line with guidance provided in TAG unit A1.2
- Finally, costs were converted to 2010 Market Prices using a factor of 1.19.

[23] Turner & Townsend raises inflation forecast to 8.5% (theconstructionindex.co.uk)

3.2.16 Table 3.4 beneath shows the costs described above.

Table 3.4: Economic Case Scheme Cost Estimates

Description of Cost Type	Construction Cost (£)	Maintenance Cost Over 60 Years (£)
Base Investment Cost	8,530,488	75,000
Base Cost with Real Cost Increases	10,244,859	455,413
Base Cost with Real Cost Increases and Optimism Bias	12,601,176	455,413
Rebased to 2010 Price Year	9,878,086	357,000
Discounted to 2010 Prices	6,029,184	77,762
Adjusted to Market Prices	6,649,138	92,537

3.2.17 A full profile for the Economic Dimension cost calculations is provided within Appendix D.

Present Value Benefits

Transport User Benefits

3.2.18 The transport user benefits of the scheme were assessed using the SATURN based PTM3 (built in v11.4.07H).

3.2.19 Full details relating to the calibration and validation of the model can be found in the Local Model Validation Report (LMVR), and details about the forecasting procedure can be found in the Forecasting Report.

3.2.20 Two core network scenarios were developed for the Economic Assessment, these were the Do Minimum (DM) and Do Something (DS) scenarios. The DM scenario represents future growth and committed network assumptions without highway intervention (without scheme), and the DS scenario includes the package of schemes within the model network (with scheme) with the same level of future traffic growth.

3.2.21 It should be noted that there are no developer funded / delivered highway mitigations included within the model network in either scenario as the intention is that both developments will make a financial contribution to the delivery of the A16 Norwood Improvement Scheme, which caters for both growth sites as well as wider growth, rather than develop site specific mitigations.

3.2.22 This means that the proposed scheme will generate the benefits resulting from reducing future year congestion associated with growth from both sites (as well as wider area growth), and this is reflected within the model scenarios used in the economic assessment.

3.2.23 The difference between the DM and DS scenarios demonstrates the benefits of implementing the scheme. These benefits are measured using:

- Network assignment statistics
- Link flow changes
- Journey times
- Journey routing.

3.2.24 The model output files were then entered into the Transport User Benefits Appraisal (TUBA, 1.9.17) software to undertake the Economic Assessment and calculate a BCR.

3.2.25 TUBA produces figures for a number of benefits, including Greenhouse Gases, Transport User benefits, and Indirect Taxation. Indirect taxation often provides a negative benefit figure. This is a result of the reduced fuel being purchased as journeys become more efficient with the improvements. This in turn reduces the money the government receives in fuel taxes.

3.2.26 This identifies the TUBA Present Value Benefits (PVB) to be £14,233,000.

3.2.27 The TUBA benefits arising from each time period are shown in Table 3.5 below.

Table 3.5: Transport User Benefits by Time Period

Norwood Improvement Scheme Benefits (£,000)	
Time Period	User Time
AM Peak	8,324
Inter Peak	229
PM Peak	3,564

3.2.28 Table 3.5 shows that the greatest benefits are realised in the AM peak, by more than double that of the PM peak. The Inter peak benefits are the lowest at £229,000.

Accident Benefits

3.2.29 As shown in Figure 3.1 below, the A47 / A16 / Welland Road Roundabout is an accident hotspot, with nine slight and four serious accidents (PIAs) over a five-year period between 2015 and 2019, resulting in 18 casualties.

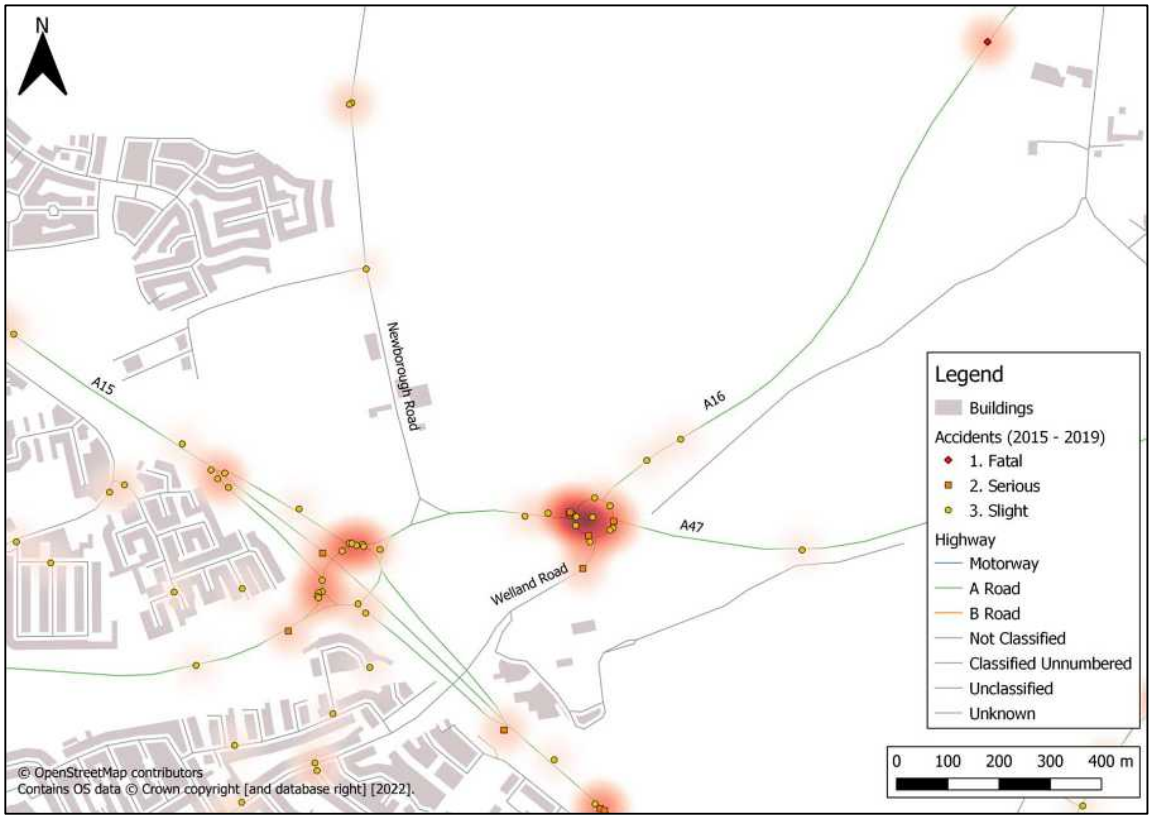


Figure 3.1: Accidents by Severity Heatmap

3.2.30 All except one accident took place during the daytime, of which three were in wet / damp conditions. Seven of the 13 accidents involved a rear-end shunt, as a result of either sudden braking from following too close or failing to look properly. The other accidents were a result of failing to judge another person's path or speed or making a poor turn / manoeuvre.

3.2.31 None of the accidents involved NMUs. One accident involved an OAP and one with children.

3.2.32 A COBALT (v2.3) assessment was undertaken using local accident data collected over a three-year period between 2017 and 2019 and modelled 24-hour AADT with and without scheme flows by link and junction. COBALT calculates the monetised accident savings between with and without scheme for each forecast year over a 60-year appraisal period.

3.2.33 The total accident savings in 2010 values and prices is £7,093,200. COBALT estimates the scheme would result in a reduction of 186.7 accidents over a 60-year appraisal period. There would be a reduction of two fatal, 21.9 serious and 253.6 slight casualties.

3.2.34 A sensitivity test has been undertaken to estimate the total accident savings in 2010 values and prices based on the default accident values within COBALT. The test will determine how accident savings based on local statistics differ from the average.

3.2.35 The total accident savings in 2010 values and prices under the sensitivity test is £3,429,600. COBALT estimates the scheme under the sensitivity test would result in a reduction of 62.5 accidents over a 60-year appraisal period. There would be a reduction of 1.4 fatal, 13.2 serious, and 84.8 slight casualties.

Environmental Benefits

3.2.36 Changes in greenhouse gas emissions, air quality, and noise have been quantitatively assessed and monetised, with and without scheme.

3.2.37 The TUBA assessment estimated £505,000 benefits relating to a reduction of 2,765 tonnes of untraded CO_2 emissions and -8 tonnes of traded CO_2 emissions across all three modelled time periods over a 60-year appraisal period.

3.2.38 Air quality and noise impact assessments had also been undertaken as part of the Preliminary Design and the quantitative results of which had been used within the Air Quality Valuation and Noise Workbooks. The air quality and noise impact assessments used 24-hour AADT and 18-hour AAWT total vehicular flow, % HGV, and speed data extracted from the SATURN models as input.

3.2.39 Baseline noise surveys were undertaken in line with the Calculation of Road Traffic Noise (CRTN) using the 1988 Shortened Measurement method. All surveys have been carried out by suitably qualified acousticians.

3.2.40 Road traffic noise calculations have been carried out in accordance with the methodology set out in the Department for Transport's Memorandum 'Calculation of Road Traffic Noise' using SoundPLAN noise modelling software.

3.2.41 Existing receptor locations have been considered and used to establish the change in the daytime LA10,16h noise levels. As per TAG Unit A3, the results have been converted to LAeq 16h (07:00 to 23:00 hours) to avoid overlap with the Lnight period (23:00 to 07:00). Predictions were generated for the following scenarios:

- Short Term Assessment – Do Minimum scenario in the opening year against the Do Something scenario in the opening year (2026)
- Long Term Assessment (With Scheme) – Do Minimum scenario in the opening year against the Do Something scenario in the future (opening + 15) year (2036 – latest available modelled year)
- Long Term Assessment (Without Scheme) – Do Minimum scenario in the opening year against the Do Minimum scenario in the future (opening +15) year (2036 – latest available modelled year).

3.2.42 The impact magnitudes scales for road traffic noise has been determined based on the guidance within the DMRB LA 111 (Rev 2) and mitigation options will be presented, if required.

3.2.43 The scope of the operational Air Quality assessment includes the following:

- Liaise with the local planning authority to define and agree a scope of works
- Carry out a review of existing local, regional, national and international policies and guidelines regarding the protection of air quality and identify any potential impacts from neighbouring facilities and sensitive receptors with the potential to be affected by the proposed development
- Review existing baseline conditions utilising existing local authority monitoring data and Defra's background mapping concentrations
- Undertake a detailed dispersion modelling using ADMS-Roads to determine the change in pollutant concentrations as a result of the operation of the Scheme at existing sensitive receptor locations.

3.2.44 The following scenarios will be assessed:

- Baseline/ Model verification (likely to be 2019 as this is the most recent year that has not been affected by COVID and thus traffic flows considered "normal")
- Do Minimum (2026) – opening year of the Scheme without development
- Do Something (2026) – opening year of the scheme with development.

3.2.45 The methodology outlined within TAG Unit A3 Section 3 has been followed and the TAG Local Air Quality (LAQ) Workbook utilised.

3.2.46 The study area used for the assessment has been calculated using DMRB LA105 Guidance.

3.2.47 The total air quality benefits in 2010 values and prices are -£53,533 over a 60-year appraisal period. It was estimated that the scheme would result in an increase in NO_2 and PM2.5 concentrations of 501.59 and 936.86, respectively.

3.2.48 It is estimated that 257 properties would benefit from a reduction in PM2.5 levels, and 5,034 properties would experience no change by 2036. However, 1,637 properties would experience a deterioration in PM2.5 levels.

3.2.49 It is estimated that 99 properties would benefit from a reduction in NO_2 levels, and 5,524 properties would experience no change by 2036. However, 1,304 properties would experience a deterioration in NO_2 levels.

3.2.50 The total noise benefits in 2010 values and prices are £47,995 over a 60-year appraisal period, and combines the following benefits:

- Sleep disturbance – £23,657
- Amenity – £16,045
- Acute Myocardial Infarction (AMI) – £5,092
- Stroke – £1,278
- Dementia – £1,925.

3.2.51 It was estimated that the scheme would result in a net reduction of one household experiencing daytime noise.

Benefit Cost Ratio

3.2.52 The estimated PVB has been compared to a PVC to calculate a BCR. A Value for Money (VfM) category is then determined based on this BCR. The VfM categories defined by DfT in the Value for Money Framework, are shown in Table 3.6 below.

Table 3.6: DfT VfM Categories

Value for Money Category	Description
Very High	BCR greater than or equal to 4.0
High	BCR between 2.0 and 4.0
Medium	BCR between 1.5 and 2.0
Low	BCR between 1.0 and 1.5
Poor	BCR between 0.0 and 1.0
Very Poor	BCR less than or equal to 0.0

3.2.53 The values presented in Table 3.7 overleaf indicate the PVB, PVC, Net Present Value (NPV) and BCR for the scheme. The NPV represents the net total value of a scheme, with scheme costs subtracted from its monetised benefits. PVB, PVC and NPV values are expressed in £'000s in 2010 market prices and values to allow direct comparison.

Table 3.7: VfM of the A16 Improvement Scheme

Value (£'000s) 2010 prices, benefits discounted to 2010	
Benefits	
Greenhouse Gases	505
Consumer Users (Commuting)	4,864
Consumer Users (Other)	4,539
Business Users / Providers	4,837
Indirect Taxes	-512
Accident Savings	7,093
Air Quality	-54
Noise	48
Present Value of Benefits (PVB)	21,320
Costs	
Broad Transport Budget	7,254
Present Value of Costs (PVC)	7,254
Net Benefits / BCR Impact	
Net Present Value (NPV)	14,066
Benefit to Cost Ratio (BCR)	2.94

3.2.54 Based on transport user, accident savings, air quality and noise benefits, this scheme will provide High Value for Money, with a BCR of 2.94.

Key Risks, Sensitivities and Uncertainties

3.2.55 Sensitivity tests have been undertaken to confirm the robustness of the business case in the eventuality of a change in scheme costs.

3.2.56 Table 3.8 below shows the PVC values required to achieve each Value for Money statement.

Table 3.8: Cost Sensitivity

Value for Money	BCR	PVB (£'000s)	PVC Range
Poor	BCR between 0.0 and 1.0	21,320	PVC > £21,320
Low	BCR between 1.0 and 1.5	21,320	£21,320 < PVC > £14,213
Medium	BCR between 1.5 and 2.0	21,320	£14,213 < PVC > £10,660
High	BCR between 2.0 and 4.0	21,320	£10,660 < PVC > £5,330
Very High	BCR greater than or equal to 4.0	21,320	PVC < £5,330

3.2.57 The PVC would need to be reduced by £1,924,000 (27%) to achieve a BCR of at least 4.0, which equates to Very High Value for Money. The scheme would achieve Medium Value for Money if the PVC increased by a value between £3,406,000 (47%) and £6,959,000 (96%).

3.2.58 High and Low Growth scenarios have been developed in line with TAG Unit M4 to assess the sensitivity of the scheme's transport user benefits to varying growth assumptions.

3.2.59 The process of generating high and low growth scenarios is as follows:

- Calculate the proportion of base year demand to be added based on parameter *p,* which varies by mode. For one year after the base year (2019), proportion *p* of base year demand is added to the core scenario. For 36 or more years after the base year, proportion 6*p* of base year demand is added to the core scenario. Between one and 36 years after the base year, the proportion of base year demand rises from *p* to 6*p* in proportion with the square root of the years. For example, 16 years after the base year the proportion is 4*p.*
- The value of *p* is set to 2.5% for highway demand, which reflects uncertainty around annual forecasts from the National Transport Model (NTM).
- The core scenario matrix is adjusted on a cell-by-cell basis by taking the appropriate proportion of the model base year matrix and adding it or subtracting it from the future year core scenario matrix.
- The low growth should be based on the same ranges below the core scenario as the high growth scenario is above it.

- Local growth assumptions have been accounted for within the high and low growth scenarios. The most likely sources of growth (Reasonably Foreseeable) that had not been included in the core scenario have been included within the high growth scenario. The less likely sources of growth (More than Likely) that had been included in the core scenario have been excluded from the low growth scenario. Total growth has been constrained to the levels calculated in the previous steps.
- Local assumptions about supply have not been changed from the core scenario, with the exception of access roads to additional developments that have been included and minor changes to the core scenario network needed to accommodate growth in demand.

3.2.60 The trip matrix totals for the Central, High, and Low, growth scenarios are displayed in Table 3.9, and represented graphically in Figure 3.2 to Figure 3.4.

Table 3.9: Number of Trips in Low, Central, and High Growth Scenarios

Total number of trips by scenario (PCUs)			
AM	Low	Central	High
2019	87,476	87,476	87,476
2026	93,889	98,275	104,259
2031	99,634	105,870	113,981
2036	104,325	112,648	122,370
IP	Low	Central	High
2019	72,308	72,308	72,308
2026	77,863	82,003	86,837
2031	82,912	88,587	95,049
2036	87,567	94,742	102,501
PM	Low	Central	High
2019	90,937	90,937	90,937
2026	96,695	101,774	107,876
2031	102,011	109,203	117,394
2036	107,040	116,142	126,013

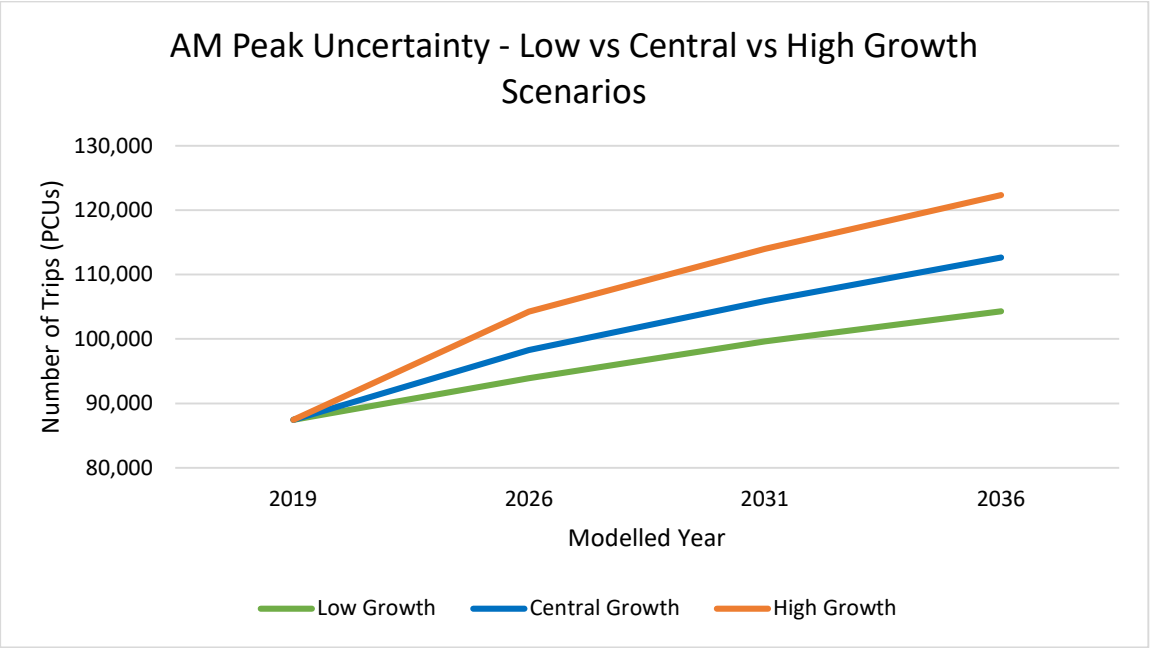


Figure 3.2: AM Peak Hour - Total number of Trips in Model

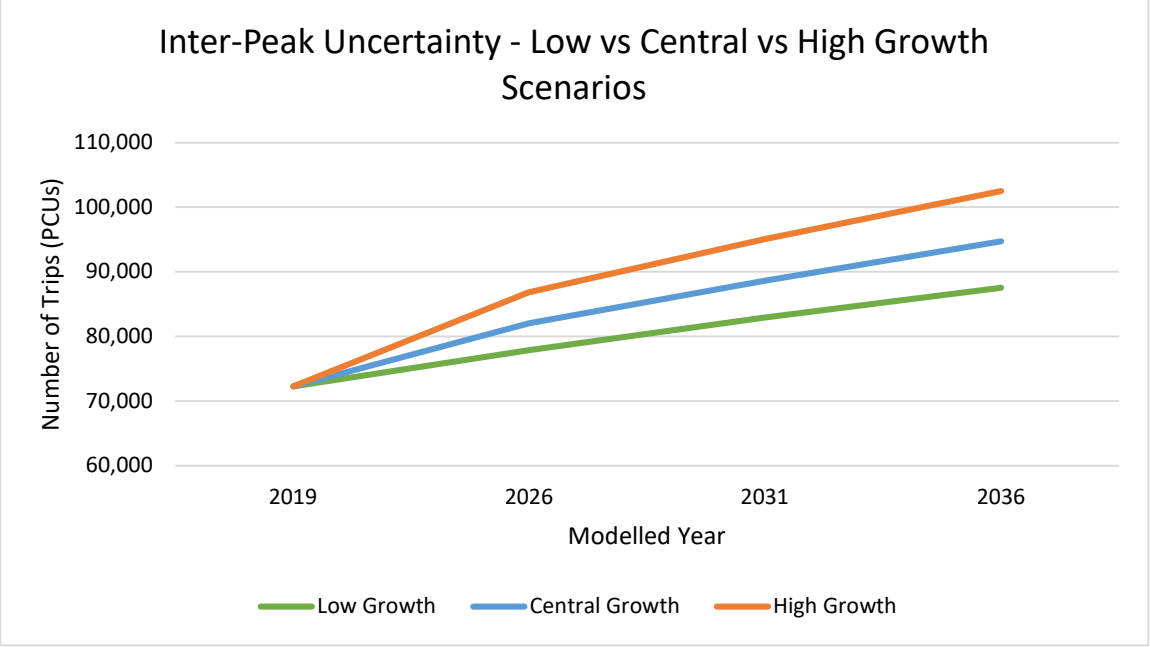


Figure 3.3: Inter-Peak Hour - Total Number of Trips in Model

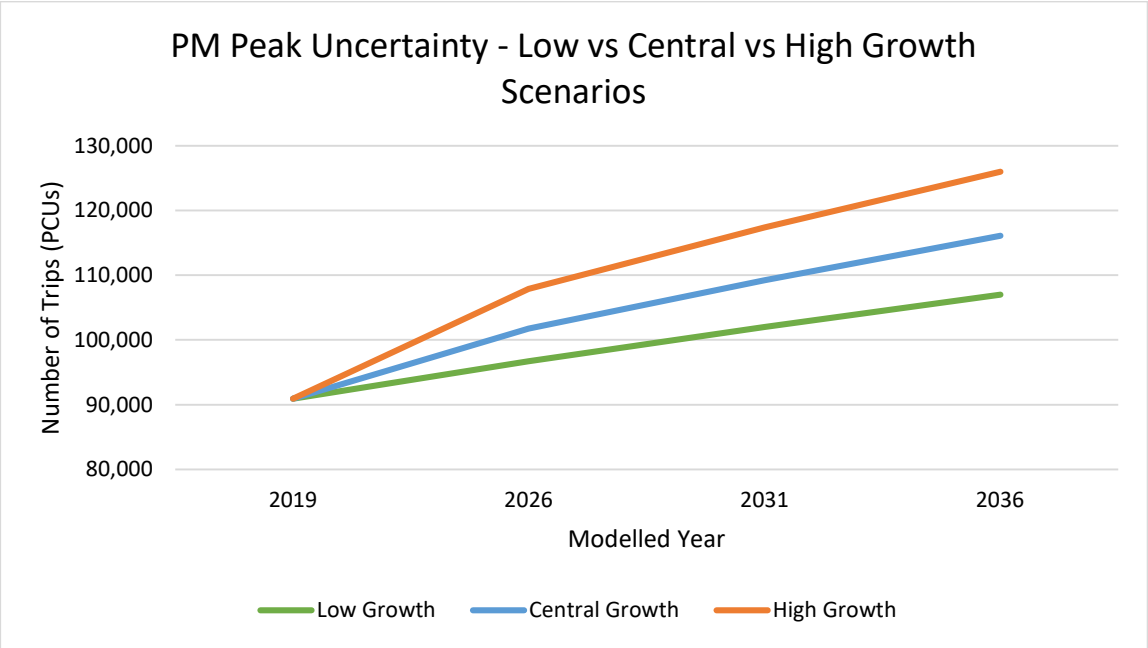


Figure 3.4: PM Peak Hour - Total Number of Trips in Model

3.2.61 Once the low and high growth scenarios had been run and assessed within the model, the Economic Assessment was repeated. Table 3.10 below shows the transport user benefits of the scheme for the high and low growth scenarios.

Table 3.10: Low, Central and High Growth Sensitivity Tests – Transport User Benefits

Option	Growth Scenario	PVB (£'000s)	PVC (£'000s)	NPV (£'000s)
Newborough Road Southbound Closure & Full-Time Signals	Low	8,129	7,254	875
	Central	14,233	7,254	6,979
	High	33,414	7,254	26,160

3.2.62 The scheme provides positive benefits in all three growth scenarios based on transport user benefits alone. There are significant transport user benefits in the high growth scenario, which outweigh the PVC by £26,160,000.

3.2.63 The central scenario was further tested to understand the impact of closing Newborough Road fully vs in one direction and the operation of full-time vs part-time signals at the A47 / A16 / Welland Road Roundabout on all core benefits, as shown in Table 3.11 overleaf.

Table 3.11: Newborough Road Closure & A47 / A16 / Welland Road Roundabout Signals Sensitivity Testing

Option	PVB (£'000s)	PVC (£'000s)	NPV (£'000s)	BCR	Value for Money
Full Newborough Road Closure & Part-Time Signals	18,547	7,254	11,293	2.56	High
Full Newborough Road Closure & Full-Time Signals	17,564	7,254	10,310	2.42	High
Newborough Road Southbound Closure & Part-Time Signals	22,460	7,254	15,206	3.10	High
Newborough Road Southbound Closure & Full-Time Signals	21,320	7,254	14,066	2.94	High

3.2.64 Closing Newborough Road in the southbound direction and implementing signals at the A46 / A16 / Welland Road Roundabout in the AM and PM peak periods only provides the greatest benefit, with a BCR of 3.10, which equates to High Value for Money. All infrastructure changes resulted in BCRs greater than 2.0 (High Value for Money).

3.3 Qualitative Appraisal

3.3.1 The appraisal of the scheme and VfM assessments have primarily focused on monetising the following benefits:

- Reducing congestion
- Reducing road accidents
- Improving local air quality
- Reducing noise
- Reducing greenhouse gases.

3.3.2 It is anticipated that there will be additional social, environmental, economic, and distributional benefits resulting from the scheme. Consequently, the current scenario PVB is considered to provide a conservative estimate of the overall level of benefit likely to result from the scheme.

3.3.3 As such, a qualitative appraisal of the likely key additional social, environmental, and economic benefits has been undertaken.

3.3.4 The impact of a scheme on the environment, which includes landscape, townscape, the historic environment, biodiversity, and the water environment, has been appraised using the following generic steps as outlined in TAG Unit A3:

- Step 1 – Scoping and identification of study area
- Step 2 – Identifying key environmental resources and describing their features
- Step 3 – Appraise environmental capital
- Step 4 – Appraise the proposal's impact
- Step 5 – Determine the overall assessment score.

3.3.5 Social impacts consider the human experience of the transport system and its impact on social factors as stated in TAG Unit A4.1 Social Impact Appraisal, and includes:

- Physical Activity
- Journey Quality
- Accidents
- Accessibility
- Personal Affordability
- Security
- Severance.

3.3.6 Note of the above factors, the latter two are not assessed for the scheme and the first two factors will be assessed at the next stage of the project.

3.3.7 The assessment of the impact for each social and environmental resource has been outlined in TAG Worksheets (Appendices E-J) for qualitative appraisal and the Appraisal Summary Table (Appendix K).

3.3.8 Note that these qualitative assessments have not been included within an Adjusted BCR, and that the scheme BCR and Value for Money statement are based purely on transport user, noise, air quality, and accident benefits.

Landscape Impacts

3.3.9 Landscape impacts consider both the 'physical and cultural characteristics of the land (its use and management)' and the perception of those characteristics. These characteristics can make a significant contribution to local distinctiveness and community perception of value, providing a 'sense of place'[24].

3.3.10 The landscape of Peterborough is categorised with five National Character Areas (NCA) as shown in Figure 3.5, of which the Norwood development site lies within Area 46:The Fens. On a smaller scale, the Landscape Character Area (LCA) of the study area is defined as the 'Peterborough Fen Fringe', as identified within Figure 3.6 overleaf[25].

3.3.11 The LCA provides guidance on the character and local distinctiveness of the landscape within areas and assesses the landscape in terms of its sensitivity to change and ability to accept development.

[24] TAG UNIT A3 Environmental Impact Appraisal (publishing.service.gov.uk)
[25] Peterborough Local Plan (Adopted version)

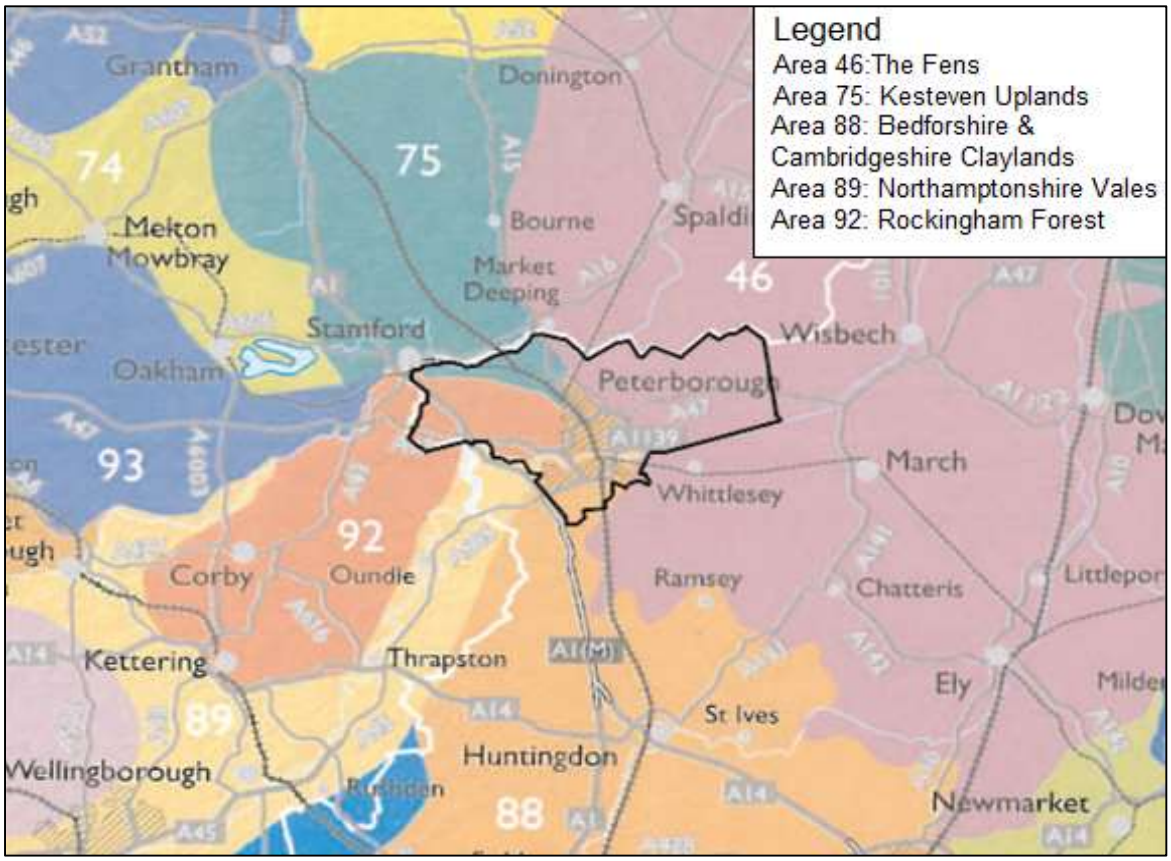


Figure 3.5: Peterborough National Character Areas

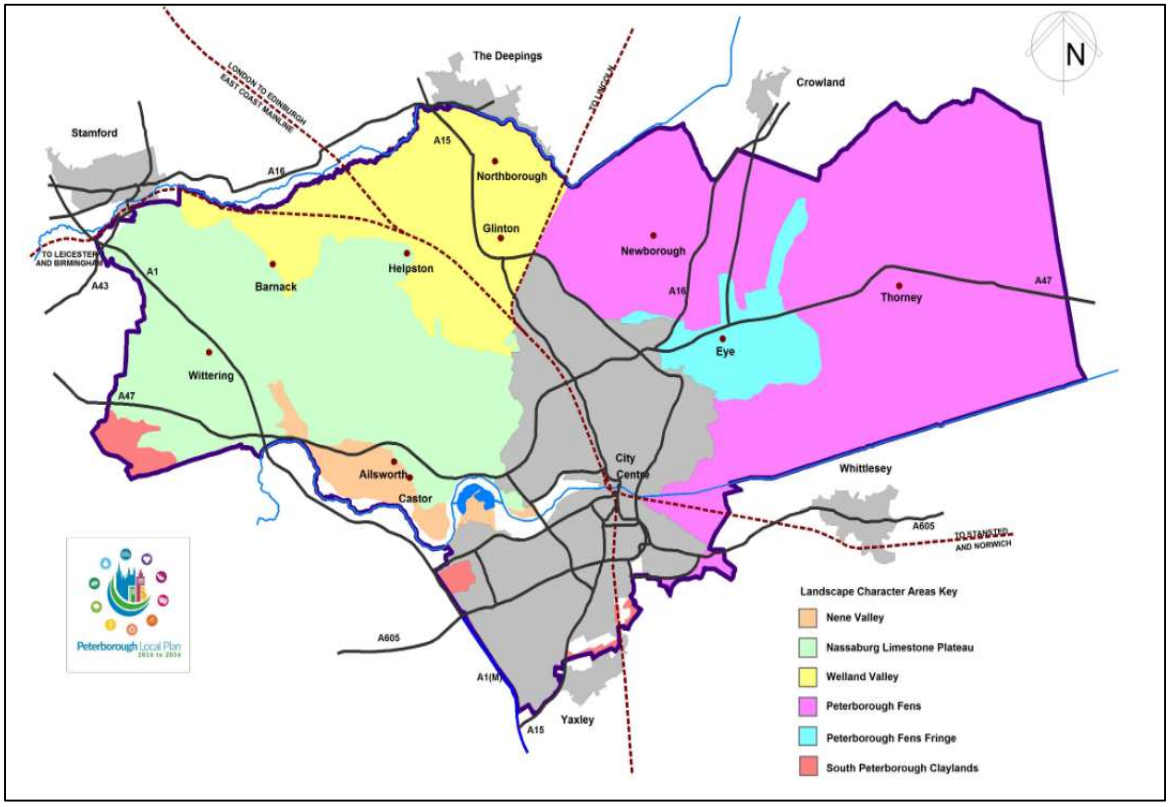


Figure 3.6: Peterborough Landscape Character Areas

3.3.12 The LCA of the Fen Fringe forms a 'transitional, gently undulating, arable agricultural area'[26] between Peterborough and the Fens, which has been influenced by clay extraction activities (notably at Dogsthorpe Star Pit) and the development of highway infrastructure within the area overtime.

3.3.13 The highway network creates visual and audible intrusions on the landscape, however much of the LCA away from these features is open and exposed. The vegetation coverage accompanying the landscape in this area is characterised by hedgerows, scattered trees and tree shelter belts, including those which line local roads.

3.3.14 The area surrounding the Norwood study area is largely flat arable farmland, with the A16 and A47 Trunk Road being the dominant features to the east, and A15 Paston Parkway bounding the study area to the west. The existing land use of the proposed scheme is hardstanding associated with the current road network.

3.3.15 The proposed scheme is not located within a statutory or non-statutory designated for landscape character or quality, and the predominant land use of the area will not change as a result of the proposed scheme which improves the existing road network. As a result, the proposed scheme is considered unlikely to result in any significant adverse effects on the landscape and visual amenity value of the local area.

Townscape Impacts

3.3.16 Townscape is the physical and social characteristics of the built and non-built urban environment, as well as the perception of those characteristics. Given the landscape of the study area is arable low lying, with the main features being the strategic highway routes of the A16 and A47 Trunk Road, Townscape is considered outside the scope of the project and has not been assessed.

Historic Environment Impacts

3.3.17 The man-made historic environment ('heritage', or heritage resource, heritage assets) comprises of:

- Buildings of architectural or historic significance
- Areas, such as parks, gardens, other designed landscapes or public spaces, remnant historic landscapes and archaeological complexes
- Sites, such as ancient monuments, places with historical associations such as battlefields, preserved evidence of human effects on the landscape, and archaeological sites.

[26] PCC Planning and Environmental Protection Committee Paper (April 2021)

3.3.18 The historic environment includes the sense of identity and place that the combination of buildings, areas and sites provides. Characteristics of the historic environment can contribute to local identity and be representative of an area's distinctiveness. They can be significant within the study area of a scheme as a result of form, rarity, or historical associations, with appreciation of characteristics changing with time.

3.3.19 The Norwood study area is not located within a Conservation Area, nor does the site boundary contain any Listed Buildings or designated heritage assets of Parks and Gardens. As shown in Figure 3.7 below, the closest designated historic asset within a 1km radius of the Norwood study area is the Scheduled Monument Car Dyke (namely the section between Whitepost Road and Fen).

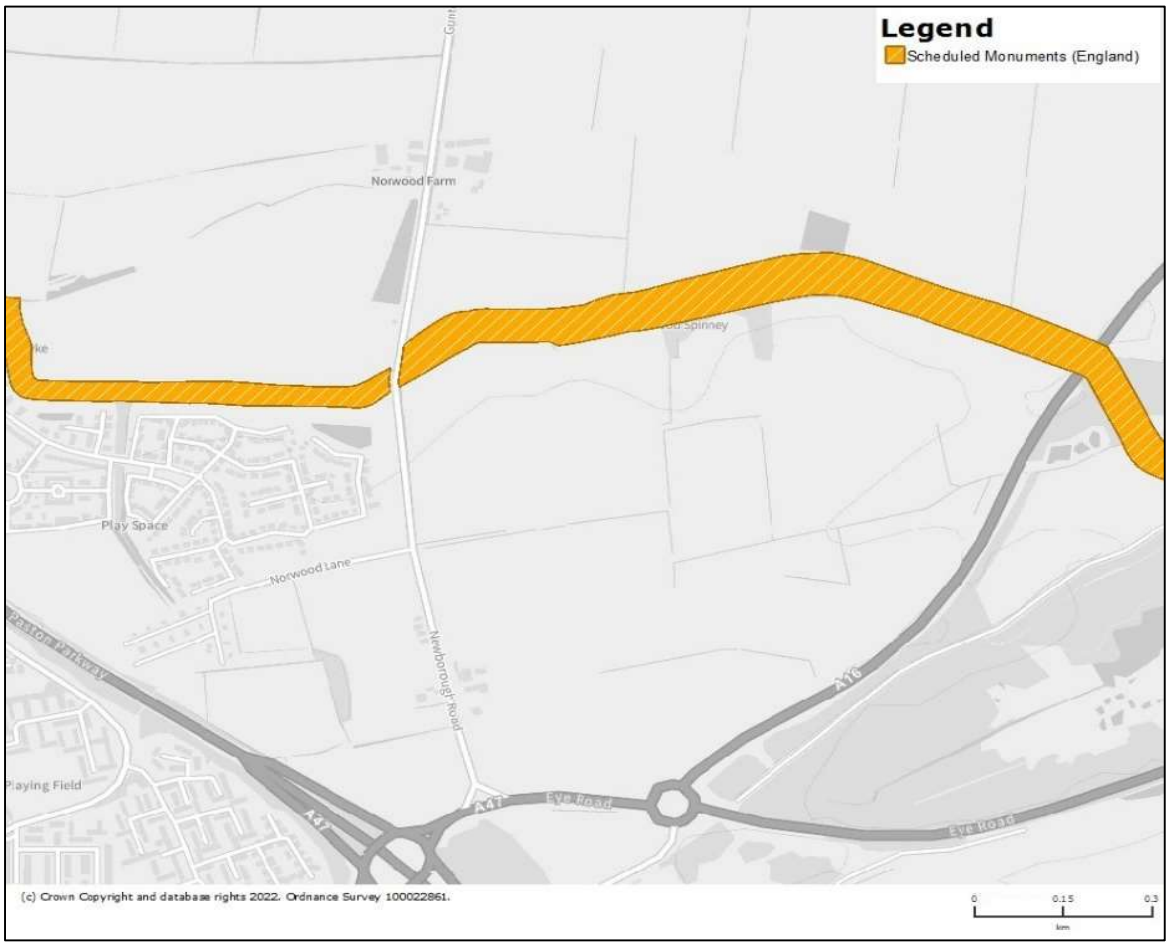


Figure 3.7: Historic Environment Within 1km Radius of the Norwood Study Area

3.3.20 Car Dyke is defined within historic records as a 'rare example of a surviving Roman canal'[27]. Its presence is said to be a significant feature within the existing setting of Peterborough, which helps provide a boundary between the City and the adjacent Fens.

[27] PCC Planning and Environmental Protection Committee Paper (April 2021)

3.3.21 As a Scheduled Monument the asset is considered to represent a heritage receptor of high value and is an important feature of the Roman historical landscape with high archaeological value, through its alignment and function and any deposits that lie within it.

3.3.22 The Scheduled Monument is located approximately 780m north of the proposed Norwood scheme.

3.3.23 The land required for the proposed scheme is within previously developed and disturbed land, however given the close proximity to the Car Dyke Scheduled Monument there is potential for buried archaeological remains to be encountered.

3.3.24 The mitigation measures in respect to unknown buried archaeological remains will be included within the CEMP and adopted during the proposed development to ensure any finds encountered during excavation works are noted, recorded, and subsequently preserved. Mitigation measures will be agreed with key PCC stakeholders such as The Council's Archaeologist and Principal Conservation Officer and aligned' with the Local Plans LP19 policy and subsequent Archaeology policy statements.

3.3.25 Overall, the impact to the historic environment from the proposed scheme is considered to be a slight adverse effect if archaeological remains were to be uncovered during proposed works.

Biodiversity Impacts

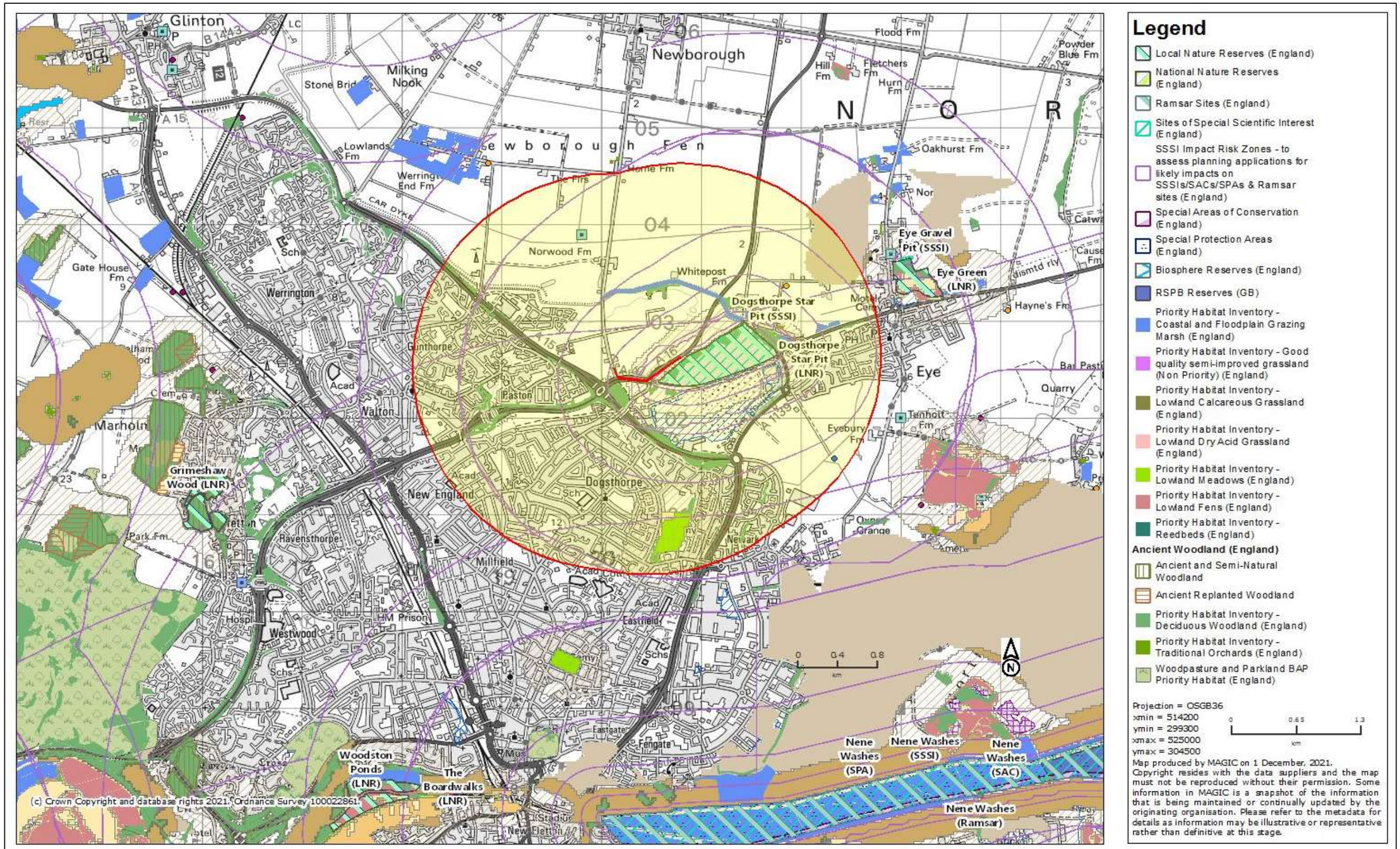
3.3.26 TAG appraisal of biodiversity focuses on the effects of transport schemes on biodiversity and earth heritage (geological) interests.

3.3.27 Policy LP28 (Biodiversity and Geological Conservation) of the Peterborough Local Plan states that for:

- **International Sites**: Proposals having an adverse impact on the integrity of such areas, that cannot be avoided or adequately mitigated to remove any adverse effect, will not be permitted other than in exceptional circumstances. Such circumstances include no suitable alternatives, imperative reasons of overriding public interest, and necessary compensatory provision can be secured
- **National Sites:** Development proposals within or outside an SSSI, likely to have an adverse effect on a SSSI, will not normally be permitted unless the benefits of the development, at this site, clearly outweigh both the adverse impacts on the features of the site and any adverse impacts on the wider network of SSSIs
- **Local Sites:** Developments likely to have an adverse effect on locally designated sites will only be permitted where the need and benefits of the development clearly outweigh the loss and the coherence of the local ecological network is maintained

- **Habitats and Species of Principal Importance:** Where adverse impacts are likely, development will only be permitted where the need for and benefits of the development clearly outweigh these impacts. In such cases, appropriate mitigation or compensatory measures will be required.

3.3.28 Figure 3.8 overleaf highlights the land-based designations within the study area.



Legend

- Local Nature Reserves (England)
- National Nature Reserves (England)
- Ramsar Sites (England)
- Sites of Special Scientific Interest (England)
- SSSI Impact Risk Zones - to assess planning applications for likely impacts on SSSIs/SACs/SPAs & Ramsar sites (England)
- Special Areas of Conservation (England)
- Special Protection Areas (England)
- Biosphere Reserves (England)
- RSPB Reserves (GB)
- Priority Habitat Inventory - Coastal and Floodplain Grazing Marsh (England)
- Priority Habitat Inventory - Good quality semi-improved grassland (Non Priority) (England)
- Priority Habitat Inventory - Lowland Calcareous Grassland (England)
- Priority Habitat Inventory - Lowland Dry Acid Grassland (England)
- Priority Habitat Inventory - Lowland Meadows (England)
- Priority Habitat Inventory - Lowland Fens (England)
- Priority Habitat Inventory - Reedbeds (England)

Ancient Woodland (England)

- Ancient and Semi-Natural Woodland
- Ancient Replanted Woodland
- Priority Habitat Inventory - Deciduous Woodland (England)
- Priority Habitat Inventory - Traditional Orchards (England)
- Woodpasture and Parkland BAP Priority Habitat (England)

Projection = OSGB36
xmin = 514200
ymin = 299300
xmax = 525000
ymax = 304500

0 0.65 1.3 km

Map produced by MAGIC on 1 December, 2021.
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Figure 3.8: Land Based Designations within the 2km of the Norwood Study Area

3.3.29 The Norwood study area lies within an immediate Impact Risk Zone (IRZ) of the Dogsthorpe Star Pit Site of Special Scientific Interest (SSSI) and Local Nature Reserve (LNR).

3.3.30 A SSSI is a statutory land-based designation under the Wildlife and Countryside Act (1981). At the closest point the proposed scheme is within 50m of the designated site.

3.3.31 The now excavated former clay pit associated with the brick industry of Peterborough, spans 37ha and contains a variety of habitats including scrub, grassland, reedbeds, and network of small pools and open water. The site is designated for its diverse aquatic invertebrate assemblage including 64 species of Water Beetle (5 of which are nationally rare and a further 35 nationally scarce), and high array of plant communities which are rare across Cambridgeshire[28]. The importance of the site is considered on a national scale.

3.3.32 It should also be noted that Littlewood County Wildlife Site (CWS) lies immediately east of the Dogsthorpe Star Pit SSSI and is designated for its Ancient Semi Natural Woodland. The site provides a buffer of protection for the SSSI.

3.3.33 The proposed works are not within the SSSI or CWS but have the potential to impact the site through nuisance, pollution, and disturbance.

3.3.34 Alongside designated features mentioned above, habitats within the vicinity of the proposed scheme are comprised of poor semi-improved grassland, scattered bramble scrub, hedgerows, broad-leaved woodland, and areas of planted young trees. An Ecological Site investigation of the proposed work area, undertaken in November 2021, identified the following constraints and mitigations:

- **The site has negligible potential for hosting bats**: All bat species are protected by the Wildlife and Countryside Act (1981) (as amended) and the Conservation of Habitats and Species Regulations (2017) (as amended). Suitable trees were assessed during the site visit, however a lack of suitable features (e.g. cracks/crevices) were observed. Despite negligible potential for bats, wider habitats surrounding the proposed scheme area such as linear hedgerows, grassland and woodland do provide potential commuting and foraging habitats for bats. Additionally, the potential for light pollution exists during the construction and operational phases of the proposed scheme. In response to this, all lighting that is required for the proposed scheme will be further explored at Detailed Design and designed in accordance with the relevant British Standards and Institute of Lighting Professionals

[28] Dogsthorpe Star Pit | Wildlife Trust for Beds, Cambs & Northants (wildlifebcn.org).

- **Tree / grassland vegetation is likely to support breeding birds**: All nesting birds are protected under the Wildlife and Countryside Act (1981). Localised areas of existing vegetation were identified to provide food and nesting opportunities for common bird species. It's expected that vegetation supporting breeding birds will be removed, to enable the proposed works to be undertaken. Further assessments relating to bird species will be undertaken during the next phase of Detailed Design, following greater detail that becomes available in relation to site clearance associated with construction. To avoid adverse effect on breeding birds any clearance works related to the scheme will be completed outside of the bird breeding season (March-September). Further mitigation will be included within the Construction Environment Management Plan (CEMP)
- **The site has moderate potential to host Great Crested Newts (GCN's):** GCN's are protected under Annexe II and IV of the Habitats Directive, Conservation of Habitats and Species Regulations (Schedule 2), and the Wildlife Countryside Act (1981). The proposed scheme site lies within Amber and Green Risk Zones for the protected species of GCN's (See Figure 3.9). These zones indicate population centres for the species and comprise of connecting habitats which aid natural dispersal. Data records dating back to 2001 have indicated varying levels of the species over the years within the locality of the scheme, however 2018 / 2019 survey data (provided by CPERC) have indicated a presence of GCN's associated with the SSSI ponds[29]. The proposed scheme is not expected to result in any loss of habitat such as ponds that could sustain GCN populations, however with suitable foraging and commuting habitats identified for the species it is considered a Precautionary Method of Working (PMoW) for GCN'S should be implemented, whereby any habitat manipulation is carried out under the supervision of a suitably qualified Ecologist who either holds a low-class impact licence or a surveying and handling licence for the species. Further assessments into GCN's will be reassessed within the next phase of work, closer to construction
- **The site has moderate potential to host basking and foraging reptiles:** The site has been assessed as providing potential opportunities to support common reptile species, within grasslands and scattered scrub along the A16 verges and the bridleway. Further assessment closer to construction are required, however, to avoid any potential adverse impact on reptiles if found, works should be programmed during the reptile active season (March-September) and therefore it is considered likely that, should reptiles be present in the area they would move away of their own accord. Should works run outside the active season months, ecological supervision will be introduced for the removal of loose debris/tall ruderals

[29] Ecological Constraints Report_Milestone Infrastructure (Rev.02_January 2022)

- **The site has moderate potential to host deer:** Although not a protected species, observations were made for defined pathways on verges and surrounding arable land which were suitable for deer. Evidence of deer crossing the A16 were also noted during the Ecological Site Investigation. Further assessments into the presence of deer will be undertaken closer to construction of the scheme, with design giving attention to how to deter deer from crossing the proposed dual crossing and/or alert them to the presence of vehicles.

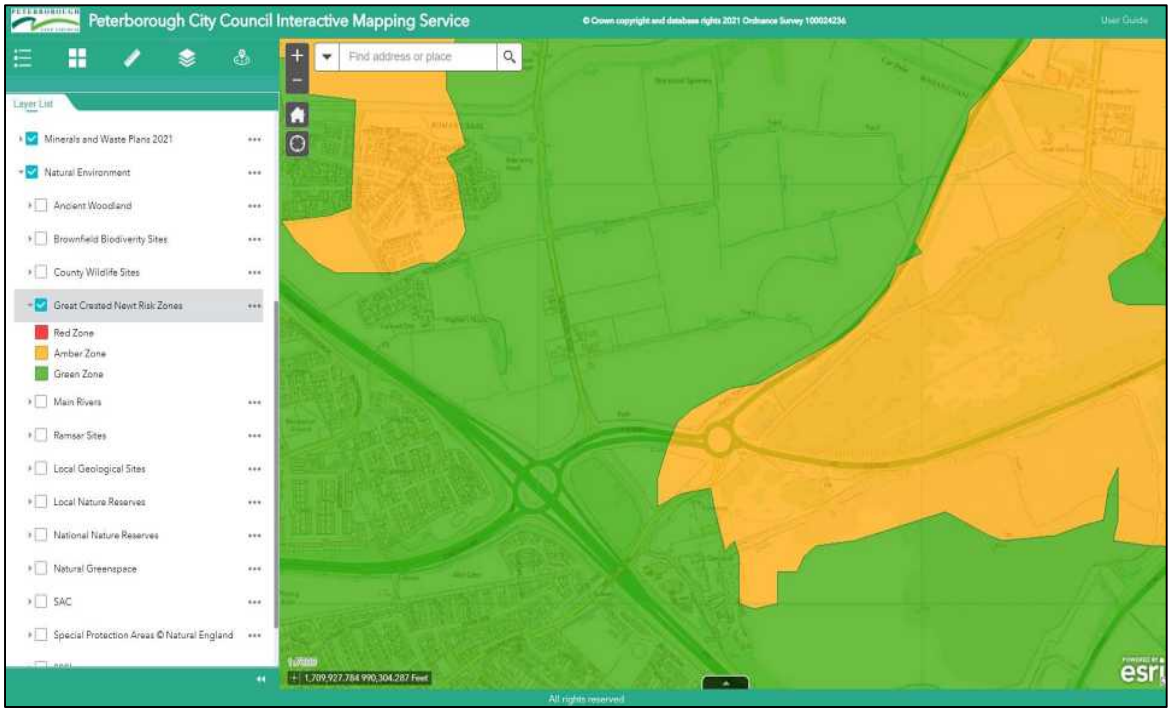

Figure 3.9: Norwood Study Area Great Crested Newt Risk Zones

3.3.35 Most of the proposed scheme is within areas of hardstanding associated with existing highway network; however, vegetation loss is expected for the scheme in areas of poor semi-improved grassland along the A16 verges. Given the nearby designated sites and the initial ecological findings of the site investigation (November 2021), it is concluded that without appropriate mitigation, the proposed scheme is expected to have a slight / moderate adverse impact subject to further design work.

3.3.36 The scheme will however deliver a minimum of 20% net gain in biodiversity to ensure the site is in better condition than it was prior. This consideration will be integrated in further design work.

Water Environment Impact

3.3.37 The Water Environment includes environmental resources such as rivers / canals, floodplains, groundwater, sea and estuaries, and stillwater (lakes and ponds).

3.3.38 Policy LP32 (Flood and Water Management) states that developments must demonstrate that they can contribute positively to the water environment and its ecology where possible and not adversely affect surface and ground water. A new development should not place itself or others at increased risk of flooding.

3.3.39 There are no significant surface waters within or adjacent to the proposed scheme. However, the Norwood and Paston development areas do fall within the Welland Management Catchment Area, for the Folly River (including Werrington and Marholm Brocks) waterbody. This catchment and water body is classified as having 'poor' ecological status as of February 2022 by the Environment Agency. The proposed scheme will have no significant impact on this waterbody catchment area.

3.3.40 As shown in Figure 3.10 below the Norwood study area is located within a Flood Zone 1; 'an area with low probability of flooding'. As a result, the scheme is not expected to have an impact on water environments across the City.

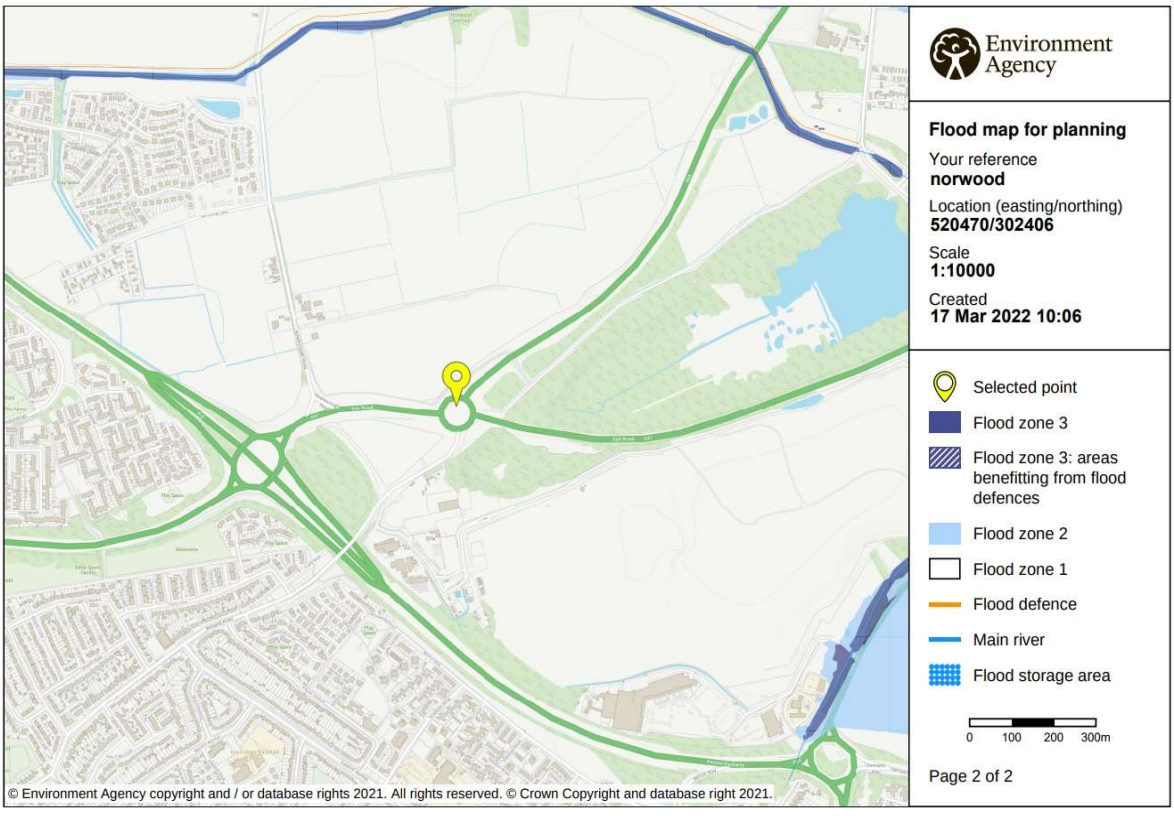

Figure 3.10: Environment Agency Flood Map for Planning

3.3.41 Existing road drainage and the series of ditches within the vicinity of the study area will likely be affected by the scheme. Surface run-off and drainage will be managed onsite during construction, and a further flood risk assessment will be undertaken during Detailed Design stage of the project. Consent from the Environment Agency and the Local Planning Authority will be sought prior to construction.

3.3.42 In conclusion, it is considered the proposed improvement scheme will have a negligible impact on the water environments surrounding the study area.

Personal Security and Severance Impacts

3.3.43 The A16 Norwood Scheme is not expected to have an impact in terms of personal security and severance, and therefore these impacts have not been assessed.

Accessibility Impacts

3.3.44 Accessibility impacts relate to the range of opportunities and choices people have in connecting with jobs, services, and friends and family. Access depends on where people live, where services are located, and the availability of home delivery of goods and services. It can also relate to the availability and affordability of transport, with journeys that are time and cost appropriate.

3.3.45 The appraisal of accessibility focuses on public transport access to employment, services, and social networks, as stated in TAG Unit A4.2.

3.3.46 Figure 3.11 below shows the bus service provision within the study area.

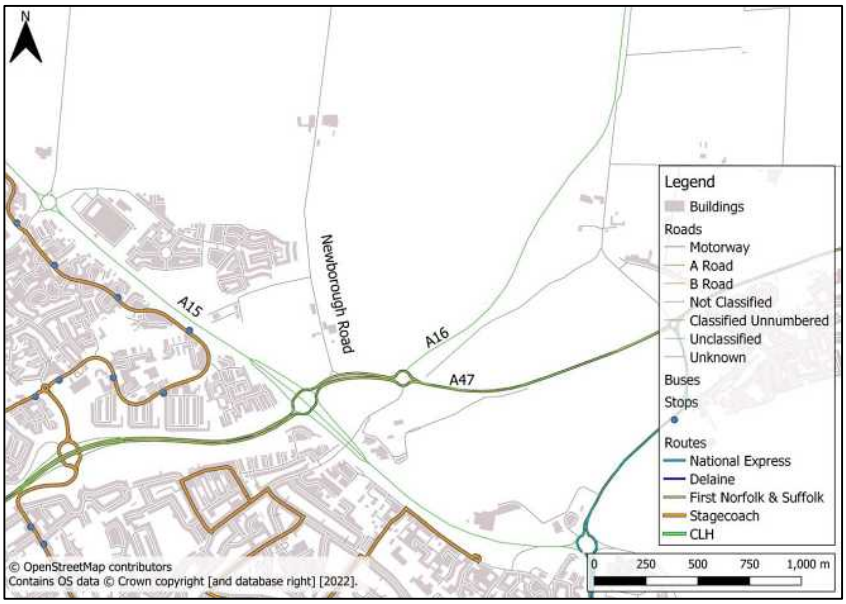

Figure 3.11: Bus Routes and Stops

3.3.47 At present, the only bus route within the study area is the First Norfolk and Suffolk service, which runs every 30 minutes along the A47. There are no bus stops near the Leeds Farm and Norwood sites. However, it is expected that there will be an extension to an existing service to provide reasonable access to the city centre.

3.3.48 A reduction in journey times along the A16 and A47 is expected to improve bus service reliability between the Leeds Farm and Norwood sites, and the city centre, as well for the existing First Norfolk and Suffolk service.

3.4 Value for Money Statement

3.4.1 Delivering the A16 Norwood Improvement Scheme will provide High Value for Money, with a BCR of 2.94 based on transport user, accident savings, air quality, and noise benefits.

3.4.2 Low and High Growth sensitivity tests have shown that the transport user PVB could range between £8,129,000 and £33,414,000 over a 60-year appraisal period.

3.4.3 The central growth scenario was tested further to understand the impact of closing Newborough Road fully vs closing in one direction, and the operation of full-time vs part-time signals at the A47 / A16 / Welland Road Roundabout on all core benefits. It was found that all infrastructure scenarios would result in at least High Value for Money, except for the delivery of the full Newborough Road closure and full-time signals which would provide Medium Value for Money.

3.4.4 The scheme is expected to have a slight adverse (negative) effect on the Historic Environment and Biodiversity and further scheme development will attempt to mitigate this. However, the scheme is expected to have a neutral effect on Townscape and the Water Environment.

3.4.5 The results of the qualitative, quantitative, and monetary assessments have been summarised in the Appraisal Summary Table (AST), which can be found in Appendix K.

4. Financial Dimension

4.1 Introduction

4.1.1 The Financial Dimension concentrates on the affordability of the proposed scheme, its funding arrangements and technical accounting issues.

4.2 Scheme Costing

4.2.1 The scheme cost estimates for the Financial Dimension have been prepared in line with guidance set out in TAG Unit A1.2 Scheme Costs (DfT, May 2022). Each of the steps taken to produce the cost estimates are explained beneath.

4.2.2 The estimate has been costed based on a bill of quantities produced from the preliminary designs and a schedule of construction activities. These costs have been peer reviewed, and include:

- Development of the Business Case (future FBC)
- Detailed Design Costs, as well as additional surveys where required
- Land acquisition and planning Costs
- Ecology Surveys, and specialist Environmental advice
- Staff and Legal Fees, including local overheads and consultation costs
- Third Party Costs, including Commuted Sums payment for National Highways
- Construction Costs, including mobilisation, supervision and costs associated with statutory undertakers works
- Risk Allowance
- Optimism Bias (for use in the Economic Assessment).

4.2.3 Note that project costs incurred to date have been omitted from the costs presented beneath as “sunk costs” in line with TAG guidance.

4.2.4 The cost profile is based upon the milestone activities set out in the Management Dimension (Chapter 6), and the dates used to calculate the scheme costs, including the application of inflation, are shown in Table 4.1 overleaf.

Table 4.1: Milestone Activities

Timescale	Activity
June 2022 – July 2022	Outline Business Case reviewed by CPCA, and approval sought from CPCA board for the release of funding to undertake Detailed Design and produce a Full Business Case.
September 2022	Work commences on the Detailed Design and Full Business Case.
September 2022 – November 2022	Site Surveys undertkaen to inform the Detialed Design
March 2024	Detailed Design and scheme costings complete. Full Business Case submitted.
April 2024 – May 2024	Full Business Case reviewed by CPCA and approval sought from CPCA board for the release of funding for scheme construction.
September 2024 – August 2025	Construction of the scheme undertaken, lasting approximately 12 months.
August 2026	1-year post-scheme monitoring undertaken
August 2030	5-years post-scheme monitoring undertaken

4.2.5 It is likely that construction programme efficiencies will be identified as part of the next phase of work, and the timescales presented above are considered robust for this phase of assessment.

Scheme Cost Estimates

4.2.6 Each of the scheme cost estimates presented within the Financial Dimension are shown in Table 4.2 beneath and explained in further detail overleaf.

Table 4.2: Financial Dimension Scheme Cost Estimates

Description of Cost Type	Cost (£) Total
Base Investment Cost	8,530,488
Risk Adjusted Base Cost	10,290,443
Risk Adjusted Base Cost with Construction Industry Inflation (**Outturn Cost**)	**12,932,753**
Inflated Risk Adjusted Costs incorporating Whole Life Costs (60 year assessment period)	13,388,167

4.2.7 Note that the costs calculated for use within the Economic Assessment are presented in the Economic Dimension (Chapter 3).

Base Investment Cost

4.2.8 The Base Investment Cost is the capital cost required to construct the scheme in current year (2022) prices, without a risk allowance or inflation. This cost is based on a bill of quantities derived from the Preliminary Designs and is the building block for all other scheme cost calculations. This cost also includes all activities required to be undertaken in advance of construction, such as Detailed Design, production of the Full Business Case, and planning and engagement costs (amongst others).

4.2.9 Table 4.3 below shows the Base Investment Cost broken down into Construction, Preparation (including design and business case development) and Supervision costs, and 'Other' costs which relate to planning, environment, third party costs and project management. Note that it is assumed that there are no land costs associated with this scheme as the small amount of land required is within the Norwood development, which this scheme helps to facilitate.

Table 4.3: Base Investment Cost (2022 Prices)

Calendar Year	Construction Costs (£)	Preparation and Supervision Costs (£)	Other Costs (£)	Total Base Investment Cost (£)
2022		627,547	64,632	692,179
2023		506,114	193,895	700,009
2024	2,079,940	332,342	83,819	2,496,102
2025	4,159,881	411,626	70,691	4,642,198
Total	**6,239,821**	**1,877,629**	**413,037**	**8,530,488**

4.2.10 The Base Investment Cost in 2022 prices is £8,530,488 for the A16 Norwood Improvement Scheme. This includes £6,239,821 of Construction related costs, £1,877,629 of Preparation and Supervision costs and £413,037 of 'Other' costs.

4.2.11 Other costs consist of the following items:

- Affected property overheads
- Peterborough City Council staff costs
- Public engagement / communication costs
- National Highways commuted sums payments
- Post completion design activities, including road safety audits, as built drawings and health and safety files.

Risk Adjusted Base Cost

4.2.12 The Risk Adjusted Base Cost takes the Base Investment Cost and adds on a risk allowance. The risk has been calculated for the schemes using the following allowances:

- Contractor's Risk Provision (5%) of construction cost: of for standard contracting risks such as inclement weather and plant failure.
- Budget Detail Contingency (5%) of construction cost: for incidental costs not covered by the core bill of quantities.
- Design Development Contingency (15%) of construction cost: for alterations to the design or scope at later phases of the project.
- Employer's Risk: based on experience of similar recent schemes. This equates to 3% of the construction cost.

4.2.13 The total risk allowance equates to 28% of the construction costs, or 17% of the total project costs. The values are discussed further beneath.

4.2.14 Table 4.4 below shows the inclusion of the risk allowance within the scheme costs for the improvement scheme. The application of risk has been profiled to match the construction programme.

Table 4.4: Risk Adjusted Base Cost (2022 Prices)

Calendar Year	Construction Costs (£)	Preparation and Supervision Costs (£)	Other Costs (£)	Risk Allowance (£)	Risk Adjusted Base Cost (£)
2022		627,547	64,632		**692,179**
2023		506,114	193,895		**700,009**
2024	2,079,940	332,342	83,819	586,652	**3,082,753**
2025	4,159,881	411,626	70,691	1,173,304	**5,815,502**
Total	**6,239,821**	**1,877,629**	**413,037**	**1,759,955**	**10,290,443**

4.2.15 The total risk allowance included within the cost estimate is £1,759,955, and takes the Risk Adjusted Base Cost to £10,290,443. Note that a Quantified Risk Assessment has not been produced at this stage of the project but will be completed as part of the Detailed Design once full ECI has been engaged. The QRA will be used to inform the Financial and Economic assessments within the FBC.

Inflated Risk Adjusted Cost (Outturn Cost)

4.2.16 The Inflated Risk Adjusted Cost, or Outturn Cost, is the Risk Adjusted Base Cost with inflation applied (real cost increases). The real cost increase value is calculated in line with TAG Unit A1.2 (May 2022) as follows:

Construction Industry Inflation / Annual GDP Factor

4.2.17 The Annual GDP Factor has been derived from the TAG Databook (May 2022).

4.2.18 This construction industry inflation has been calculated using forecast indices from the BCIS General Civil Engineering Cost Index (February 2022). An inflation rate of 10% has been used for calculating the Inflated Risk Adjusted Base Cost for the years 2022 – 2024, and then a reduced rate of 5%[30] has been applied to all costs incurred from 2025 onwards (including maintenance costs in the Economic Assessment).

4.2.19 Inflation has been applied in line with the profile shown in the Management Dimension (Chapter 6) and the cost of this is presented in Table 4.5 below.

[30] Turner & Townsend raises inflation forecast to 8.5% (theconstructionindex.co.uk)

Table 4.5: Inflation Increases on Construction Costs (2022 – 25)

Calendar Year	Risk Adjusted Base Cost (£)	Cost of Inflation (£)	Total with Inflation (£)
2022	692,179		692,179
2023	700,009	70,001	770,010
2024	3,082,753	647,378	3,730,131
2025	5,815,502	1,924,931	7,740,433
Total	**10,290,443**	**2,642,310**	**12,932,753**

4.2.20 The cost of inflation is £2,642,310 which is accrued between 2023 and 2025 when Construction is scheduled to complete. The application of inflation brings the Scheme Outturn Cost to £12,932,753.

4.2.21 The Outturn Cost represents the amount required by PCC to deliver the scheme.

Inflated Risk Adjusted Cost Including Whole Life Costs

4.2.22 Maintenance costs have also been calculated within the 60-year assessment period taking account of inflation. Maintenance costs have been applied from construction completion onwards.

4.2.23 Maintenance costs have been included for the introduction of traffic signals at the A16 / A47 / Welland Road Roundabout and have been priced on recent experience of traffic signal maintenance. This assumes a maintenance cost of £12,500 per approach (£25,000 in total) every fifteen years from 2039 onwards (fifteen years after scheme opening).

4.2.24 Note that no maintenance allowance has been included for the carriageway widening as it is considered that this will be offset by the removal of the current maintenance liability following the closure of part of Newborough Road.

4.2.25 Maintenance costs are shown in Table 4.6 below.

Table 4.6: Calculation of Whole Life Maintenance Costs

Whole Life Maintenance Costs	Cost (£)
Maintenance Cost per year (every 15 years)	£25,000
Maintenance Cost for 60 Assessment Period (without inflation)	75,000
Maintenance Cost for 60 Assessment Period (with inflation)	455,413

4.2.26 Table 4.7 below shows the total Inflated Risk Adjusted Cost Including Whole Life Costs.

Table 4.7: Inflated Risk Adjusted Cost Including Whole Life Costs

Inflated Risk Adjusted Cost Including Whole Life Costs	Calendar Years of Cost	Cost (£)
Risk Adjusted Base Cost with Construction Industry Inflation **(Outturn Cost)**	2022 - 2025	12,932,753
Inflated Whole Life Costs	2026 - 2085	455,413
Inflated Risk Adjusted Cost Including Whole Life Costs	2022 - 2085	13,388,167

4.2.27 The Inflated Risk Adjusted Cost Including Whole Life Costs over the 60-year assessment period is £13,388,167. Note that only the Outturn Cost is required to deliver the scheme, which is £12,932,753.

4.2.28 A full cost schedule for the assessment period (2022 – 2085) which shows how the costs have been calculated is presented in Appendix L.

4.3 Budgets and Funding Cover

Funding Cover

4.3.1 It is anticipated that the full scheme Outturn Cost of £12,932,753 will be jointly funded through developer contributions from the Norwood growth sites and by the CPCA Single Investment Fund.

4.3.2 The CPCA have an infrastructure delivery budget of £20 million per year, allocated for the next 30 years. This funding is held within the CPCA's Single Investment Fund and is invested to boost growth within the region. This funding pot is then supplemented by further capital budgets.

4.3.3 The CPCA currently have an allocation of £12,000,000 in the mid-term financial strategy for this scheme. This will be used to supplement developer contributions which will be agreed ahead of the FBC. Exact amounts for developer contributions are yet to be confirmed as discussions are still underway. Both developers are engaged in these discussions and support delivery of the scheme.

4.3.4 The funding profile by source is shown in Table 4.8 beneath. Note that developer contributions cannot be reported as these are still in discussion as part of the planning process, however the exact amounts will be confirmed at FBC.

Table 4.8: Funding Profile by Source

Funding Source	2022	2023	2024	2025	Total
Leeds Farm Developer Contribution			Amount TBC	Amount TBC	TBC
Land North of the A47 / A16 Developer Contribution			Amount TBC	Amount TBC	TBC
CPCA MTFS Allocation	£ 692,179	£ 770,010	Amount TBC - subject to confirmed developer contributions.	Amount TBC - subject to confirmed developer contributions.	TBC
Total	£ 692,179	£ 770,010	£ 3,730,131	£ 7,740,433	£ 12,932,753

4.3.5 In addition to developer contributions, developer funded access arrangements, such as the Norwood internal access road and the new A16 Norwood Development Roundabout, will support the delivery of this package.

4.3.6 There are not known to be any financial constraints beyond the availability of funding from the CPCA Single Investment Fund, which is currently considered adequate to cover the scheme costs.

4.4 Completion of the Business Case

4.4.1 Subject to acceptance of the OBC, the next stage of scheme development is Detailed Design and production of an FBC. Costs for these tasks are currently included within the scheme costs reported in this chapter and the Value for Money assessment undertaken within the Economic Dimension.

4.4.2 It is requested that funding for the Design Cost is released in advance of the funds required for construction, to undertake the further design and business case development stages. These costs would then be reported as costs already incurred within the scheme cost estimates included within the FBC.

4.4.3 The funding required to complete the next stage is £1,179,484, which includes:

- Site Surveys
- Detailed Design, including active travel design and A47 footbridge feasibility assessment
- Full Business Case
- Planning engagement
- Environment specialist input and surveys
- Staff costs
- Public engagement and project communications.

5. The Commercial Dimension

5.1 Introduction

5.1.1 This chapter demonstrates the commercial viability of the scheme, outlining the procurement strategy and how the scheme can be reliability implemented through existing channels whilst ensuring value for money in its delivery.

5.2 Output Based Specification

5.2.1 The A16 Norwood Option Assessment Report (OAR) details the work undertaken to develop multiple improvement options at this location, and the modelling undertaken to identify the Preferred Scheme.

5.2.2 The OAR discusses the process through which the Preferred Scheme has been identified. The scheme will include the following outputs:

- Closure of the Newborough Road Junction access onto the A47 (southbound only)
- Dualling of the A16 between the Norwood Development Roundabout and the A16 / A47 / Welland Road Roundabout
- Partial Signalisation of the A16 / A47 / Welland Road Roundabout (A16 approach)
- Creation of a flare to provide a third lane on the A47 westbound approach to the A16 / A47 / Welland Road Roundabout
- Creation of a Left Dedicated Lane (LDL) from the A47 eastbound approach to the A16 northbound exit
- Realignment / reconstruction of the bridal way to the north of the A16 / A47 / Welland Road Roundabout, connecting the signalised crossing to Newborough Road
- Active travel enhancements from the Norwood site down Welland Road to the Dogsthorpe Road Junction
- A pedestrian bridge over the A47 between the Norwood site and Welland Road (feasibility to be considered at the next stage)
- Wildflower planting is proposed in the immediate areas of the A16 development and on the decommissioned section of Newborough Road
- Linear planting of native trees and shrubs along sections of the A16 (north of the bridge) infilling gaps in the existing roadside hedgerows
- Tree and enhanced wildflower planting at Bluebell Avenue Open Space, located approximately 370m to the west of Junction 20.

5.2.3 Preliminary Design work has been completed on the highway scheme elements, and the General Arrangement (GA) drawing for this is provided in Appendix M. As previously stated, the active travel and environmental enhancements that complement the highway elements have been identified during the Preliminary Designs and stakeholder consultation and will be developed further within the next phase of work.

5.2.4 As well as the scheme outputs, delivery of the scheme will also ensure that the primary scheme objectives, which are outlined in the Strategic Dimension, are realised, including.

- **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout
- **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised
- **Limit impact on the local environment and improve biodiversity:** Fully mitigate any adverse environmental impacts of a scheme, and ensure a biodiversity net gain within the study area
- **Improve active travel routes to provide a viable alternative to private car travel:** Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.
- **Improve road safety:** Reduce accidents and improve personal security for all travellers within the study area.

5.2.5 Details of how the scheme will be measured against these objectives are provided in the Scheme Evaluation Plan (Appendix O) as discussed within the Management Dimension.

5.2.6 In order to deliver the above scheme outcomes, the procurement strategy will be required to deliver the following outputs:

- **Cost certainty:** Achieve cost certainty, ensuring the A16 Norwood Scheme can be delivered within the agreed budget
- **Programme Certainty:** Achieve an efficient delivery that ensures that the scheme is delivered to programme and operational in 2025
- **Quality:** Ensure an appropriate level of detail within the Preliminary and Detailed Design stages, as well as in the final scheme delivery, matching the scheme promoters' expectations

- **Continuity of Knowledge:** Maintain project knowledge to support scheme progression and construction and the successful rebuttal of any project challenge. Scheme knowledge generated through the current phase of work and into the next phase of Detailed Design and FBC development, is an asset and will help enhance quality of delivery and achievement of programme.

5.3 Procurement Strategy

5.3.1 All phases of the scheme, including Detailed Design, Construction and Site Supervision will be delivered in house by Peterborough Highway Services (PHS). PHS is a ten-year NEC3 Term Service Contract between Peterborough City Council and Milestone Infrastructure, with the responsibility for improving and maintaining Peterborough's transport network. The collaboration began in 2013 and, following the award of a five-year extension, runs until 2028.

5.3.2 The contract is built upon a collaborative and multi-disciplined team capable of developing schemes from policy concept right through to design and construction, and then maintaining them.

5.3.3 The existing subcontractor supply chain is appropriate for undertaking the work associated with the A16 Norwood scheme, and the scheme will be delivered within the contract's lifespan (before 2028).

5.3.4 Procuring the scheme directly through the PHS contract enables PCC to appoint a contractor to construct the scheme (Milestone Infrastructure) in an efficient manner. Using PHS' in-house delivery capability offers the following benefits over alternative procurement routes.

- PHS is reliable and has a **proven track record** of delivering major schemes successfully, and this serves as a positive indicator of future performance.
- The scheme can be procured **far quicker** than would be the case with alternative procurement routes. As well as reducing the procurement costs for the procuring authority, the project benefits will be realised sooner.
- The integrated delivery model creates **a single point of responsibility** and encourages more **effective collaboration** between client, designer and contractor to reduce costs. As the scheme has been identified, planned and designed within PHS, continuity can be assured through to construction, and any issues identified on site can be quickly resolved by the design team.
- A well-established supply chain is already in place which provides **Value for Money**. All subcontract packages will be competitively tendered to ensure best value and will be put to a minimum of three tenderers where possible.

- **Strong performance is highly incentivised** as all schemes delivered within the PHS contract contribute to a suite of KPIs which impacts on the term of the contract. Consistent good performance is rewarded with contract term extensions whereas consistently poor performance would see a reduction in the contract term.
- The contract duration and **strong collaborative relationship** encourages both parties to work towards long term gain rather than short term commercial gain.

5.3.5 There are also risks associated with using the PHS contract for delivery, including:

- **Price comparisons cannot be made at a scheme level:** although direct price comparisons cannot be made on individual basis at the scheme delivery level, all work packages within the scheme will be competitively tendered to sub-contractors, ensuring value for money and allowing for price comparisons to be made at a work package level.
- **Different approaches to delivery and risk are not available**: the delivery and risk models are fixed by the contract, meaning that there is no scope to vary these within the context of the PHS contract. However, these models have been used successfully on previous schemes delivered by PHS and all involved are familiar and comfortable operating with them, making scheme delivery more efficient.

5.3.6 There is sufficient expertise within PHS and the local supply chain to ensure that there will be a competitive tender for sub-contractors. The Junction 15 Highway Improvement Scheme was awarded £8.1m of funding for construction by the CPCA in November 2021 and procurement of sub-contractors was undertaken in the first few months of 2022. This exercise was successfully completed to enable the preferred contractor to begin on site in May 2022 to construct the main highway works within the scheme. The same procurement and construction team would be leading the procurement phase of the A16 Norwood Improvement Scheme.

5.4 Market Maturity

5.4.1 PHS has successfully developed and delivered multiple highway schemes around Peterborough since the beginning of the contract in 2013, including several CPCA schemes. PHS has been responsible for all planning and design work undertaken on the A16 Norwood scheme to date. All skills and competencies to deliver this scheme are available within the PHS contract.

5.4.2 To ensure that the procurement remains commercially competitive and offers value for money, all subcontract packages will be subject to competitive tendering.

5.4.3 Schemes of a similar value and nature have been successfully procured through PHS in recent years, demonstrating that the local supply chain have the capability and capacity to deliver these works. Some examples of these schemes include:

- Junction 15 Improvement Scheme (£8.1m - 2022) - a highway improvement scheme along Peterborough's Parkway network adding a third lane between Junction 33 and Junction 15, along with associated active travel and environmental improvements.
- A605 Pondersbridge (£5.5m - 2020) – a highway improvement scheme along the A605 connecting Peterborough to the Market Town of Whittlesey which provided additional capacity and reduced an acute congestion hotspot.

5.5 Sourcing Options

5.5.1 The scheme will be delivered by PHS, using sub-contractors to assist with the delivery of the scheme.

5.5.2 A pool of pre-qualified sub-contractors for the provision of key work streams will be selected based on a considered selection criteria including:

- Technical Competence
- Financial Health
- Robustness of HSEQ Management and Risk Management Systems
- Previous Performance
- Ethical Standards
- Collaborative Behaviours
- Commitment to Inclusion
- Diversity and Equality
- Commitment to Community Investment and Social Value.

5.5.3 These providers / disciplines are regularly reviewed, including the undertaking of joint KPI performance reviews, to ensure that PHS has the right supply chain in place to provide healthy competition and delivery resilience for our forward pipeline of work.

5.5.4 For larger projects, such as this scheme, individual packages of work are competitively tendered, and quotations are obtained from a minimum of 3 sub-contractors. These quotations are then subject to a structured tender adjudication with a balanced assessment including, but not limited to, cost, programme, quality, experience and performance to inform selection.

5.5.5 Sub-contracts are let on a NEC Framework contract and individual packages of work awarded under Task Orders. All effort will be made to avoid any sub-subcontracting of works. In any case, the use of sub-subcontractors must be approved prior to their appointment.

5.5.6 This process has been used on a number of major scheme projects over recent years and has enabled major schemes to de delivered successfully and to a high standard in Peterborough.

5.6 Contract and Payment Mechanisms

5.6.1 The scheme will be procured through the existing PHS NEC3 contract. The NEC is an industry-leading suite of contracts which is widely used in the construction sector. The benefits of the NEC3 contract are:

- It provides a stimulus to good project management
- It promotes collaborative working between partners
- It is relatively easy to use
- It provides flexibility.

5.6.2 The following Payment Mechanisms associated with the NEC3 contract will be used:

- Option A (Schedule of Rates) will be used for the completion of the Full Business Case and Detailed Design
- Option C (Target Cost) will be used for construction of the scheme. This incentivises both parties (PCC and M Group Services) to work together to reduce cost through a pain / gain mechanism, which is tapered to ensure that neither party experiences excessive pain nor gain.

5.6.3 Under these commercial arrangements, payment would be monthly based on work done to date. In the case of Option C, closure of the final account would include the proportioning of any pain / gain amount.

5.7 Pricing Framework / Charging Mechanisms

5.7.1 Under the NEC3 contract framework there are performance based KPI's that Milestone Infrastructure are required to achieve. If work is priced as a Target Cost, savings generated from the contract are shared using the contract pain / gain mechanism. All changes to projects (including Risk) are recorded, monitored and communicated promptly using contractual procedures in place.

5.7.2 Under the operation of Milestone Infrastructure's fully transparent 'Open Book System', all incurred costs and supporting information such as invoices and applications associated with projects, are validated and presented to the client for review on a monthly basis. All costs are periodically audited, and no cost is processed to client unless its genuine and not disallowable costs. Forecast end costs and programmes are also updated periodically, in order to ensure the client is updated in relation to the expected scheme final spend.

5.7.3 Milestone Infrastructure will actively be involved in the value engineering workshop and ECI process during the design and construction phases of the scheme, with full commitment to deliver best value to the client.

5.8 Risk Allocation and Management

5.8.1 Because the PHS contract is already established there is limited opportunity to modify the allocation of risk, however the contract does include inherent features that encourage effective risk management and mitigation, such as:

- Each party is required notify each other of any matter which could affect the cost, completion, progress or quality of the project through Early Warning Notices. This is to promote early intervention which could reduce the impact of any potential risk
- In the case of Option C (Target Price) both parties are incentivised to reduced cost through the pain / gain mechanism.

5.8.2 The above will also be supplemented with good project management practices during the delivery of the scheme. Both parties will maintain a shared Risk Register (Appendix C), which will be reviewed regularly at project progress meetings. Further details on the management of risk are provided in the Management Dimension.

5.8.3 Detail about the allocation of project risk between the CPCA and PCC, and the responsibilities for managing this, can be found within Chapter 6 of the CPCA's Assurance Framework[31].

5.8.4 However, in summary, risk is allocated to the CPCA by default, but the CPCA reserve the right to reallocate this risk to PCC in the event that the risk has not been managed appropriately. The signed Funding Agreement~~,~~ and Project Initiation Document~~,~~ will be used to determine whether PCC has managed the project risk appropriately, and therefore where the risk should be allocated.

[31] https://cambridgeshirepeterborough-ca.gov.uk/assets/Assurance-Framework-Publication-Nov-2019.pdf.

5.9 Contract Length

5.9.1 The original PHS contract runs until 2023, and a five-year extension has recently been agreed prolonging the contract until 2028. The PHS contract has the relevant skills and competencies to deliver this scheme, and its delivery of the A16 Norwood Improvement Scheme will be fully completed within the contract lifespan.

5.9.2 A detailed Construction Programme will be produced as part of the Full Business Case as part of the next phase of work. At this stage however, it is estimated that construction of the scheme will begin in Autumn of 2024.

5.9.3 A high-level overview of the project timescales is provided in Table 5.1 below. Note that timescales relating to CPCA review and approval are assumed and have not yet been agreed.

Table 5.1: Project Implementation Timescales

Timescale	Activity
June 2022 – July 2022	Outline Business Case reviewed by CPCA, and approval sought from CPCA board for the release of funding to undertake Detailed Design and produce a Full Business Case.
September 2022	Work commences on the Detailed Design and Full Business Case.
September 2022 – November 2022	Site Surveys undertaken to inform the Detailed Design
March 2024	Detailed Design and scheme costings complete. Full Business Case submitted.
April 2024 – May 2024	Full Business Case reviewed by CPCA and approval sought from CPCA board for the release of funding for scheme construction.
September 2024 – August 2025	Construction of the scheme undertaken, lasting approximately 12 months.
August 2026	1-year post-scheme monitoring undertaken
August 2030	5-years post-scheme monitoring undertaken

5.9.4 These dates are indicative only and assume that funding will be available to progress each of the stages. The milestones shown above may change as the scheme evolves, or to reflect changes in external factors, such as the Norwood development programme.

5.10 Contract Management

5.10.1 Project progress meetings and existing governance arrangements such as the Peterborough Highways Project Board have been used to date to monitor delivery of the scheme and all commercial arrangements relating to this. The PHS Project Board meets monthly to discuss progress and matters relating to live and upcoming schemes.

5.10.2 A Project Manager has been appointed by PCC, to oversee the project and take responsibility of the delivery of the scheme. This individual will work closely with the delivery team during the progression of design and the business case stages, as well as the final construction of the scheme.

5.10.3 Governance between PCC and the CPCA will be managed through progress meetings and monthly highlight reports in line with the CPCA's Assurance Framework. Further details of how PHS will manage the contract are set out within the Management Dimension (Chapter 6).

6. The Management Dimension

6.1 Introduction

6.1.1 The Management Dimension explains how the scheme promoter will successfully manage delivery of the proposed scheme and achieve the expected outcomes.

6.2 Evidence of Similar Projects

6.2.1 Peterborough has a long history of significant growth spanning back to its designation as a New Town in 1967, and consequently the City is used to managing and delivering large highway infrastructure projects.

6.2.2 The Council, through PHS, has completed the following highway improvement schemes in recent years. Both of these schemes are located on the Parkway Network at strategically sensitive locations and demonstrate PHS' ability to successfully manage and deliver highway schemes of this scale.

Junction 20 Improvement Scheme (A47 Soke Parkway / A15 Paston Parkway) - £5.7m

6.2.3 This scheme was constructed between summer 2016 and spring 2017 and involved fully signalising a grade separated roundabout and adding significant capacity, through the creation of additional lanes on approaches and the circulatory of the roundabout. The scheme was required to address an existing congestion pinch point and to enable nearby housing growth.

6.2.4 Since completion, the scheme has met its objectives and reduced congestion and journey times at a crucial section of the network. It has also provided additional network capacity, enabling the developments of Norwood and Paston Reserve to be progressed.

6.2.5 Junction 20 is a major interchange on Peterborough's network, and at the time of construction up to 4,500 vehicles an hour passed through it. With such a high traffic demand, the careful planning and implementation of the traffic management required to construct the scheme was crucial. Close collaboration between all delivery partners meant that this was achieved with limited disruption to the highway network.

6.2.6 As with Junction A16 Norwood scheme, Junction 20 is located on the strategic A47 route linking the A1 and Midlands with Norfolk and East Anglia. The Council and its partners worked closely with HE to successfully plan and manage the delivery of the scheme.

6.2.7 Junction 20 is located 400 metres to the west of the A16 / A47 / Welland Road Roundabout, and local knowledge and experience from that site will be applied to the delivery of this scheme.

Figure 6.1: Junction 20 Improvement (Post Completion)

Junction 17 – Junction 2 Improvement Scheme (A1139 Fletton Parkway) - £18m

6.2.8 This scheme was constructed between spring 2014 and summer 2015 and involved the widening of the A1139 Fletton Parkway from two to three lanes, between the A1 (M) and Junction 2 in Peterborough to provide significant and critically needed capacity improvements. The total cost of the scheme was £18m and it was funded through the Greater Cambridgeshire and Greater Peterborough Local Enterprise Partnership, Developer Funding and Council Capital Funding.

6.2.9 The scheme successfully delivered a major upgrade to Peterborough's Parkway network. Despite extensive ground investigations during the design phase, abnormally high levels of soil contamination were discovered during construction throughout the site, and significant volumes of soil had to be sent for specialist treatment and disposal. However, through careful management and collaborative working amongst all partners, there was minimal impact on the scheme delivery programme, and additional funding was provided by the DfT due to the severity of the contamination which had not been detected despite all of the industry standard Waste and Contamination (WAC) tests being undertaken.

Figure 6.2: Junction 17 (A1M) Improvement (Post Completion)

6.3 Programme / Project Dependencies

6.3.1 The scheme delivery programme will need to consider the following key dependencies:

- **Leeds Farm Development Delivery:** The proposed package is intended to facilitate growth at the Norwood site (as identified within the Local Plan). This development constitutes a significant proportion of the anticipated growth within the study area, and the viability and requirement of the schemes would need to be reassessed if delivery of the Leeds Farm site was compromised.
- **Leeds Farm Development Programme:** Design, Business Case submission and the delivery of the package of schemes should be coordinated with the development proposals of the Leeds Farm Development, to ensure highway improvement works do not hold back planned growth. The delivery of the Business Case and scheme programme will need to adjust if the development programme changes.
- **National Highways (NH) Consent:** Delivery of the scheme will be dependent on consent from NH to work on sections of their network. Other space may be needed within their boundary for the positioning of equipment and the deployment of traffic management. NH are aware of the scheme and have been an active stakeholder throughout the project. The Council have a successful track record of working with NH on schemes along the A47, and they will be included within the progression of the FBC and Detailed Design as well as scheme delivery planning.
- **Programme Constraints**: The construction programme will need to carefully consider any other infrastructure works that may be underway on the highway network during the same period. The programme will be planned to avoid works that may compound the disruption caused to road users as a result of the A16 Norwood Improvement Scheme. Careful liaison with NH will be necessary to ensure that the scheme does not conflict with any planned works that they have along this section of the route.
- **Construction Disruption:** The Council have significant recent experience of undertaking maintenance and delivering improvements on its highway network, particularly on strategic routes, and is proficient in mitigating the impact of this.
- **Utility Diversions:** Initial stats searches have identified some utilities within the area of the proposed scheme that will be impacted by the works. The design has taken account of these utilities, and any necessary diversions have been included within the scheme cost estimates and Risk Register. Early engagement with the relevant utility companies will begin during the Detailed Design phase to ensure that these diversions are factored into the construction programme to mitigate any delay to the delivery of the scheme.

6.4 Governance, Organisational Structures and Roles

6.4.1 The CPCA are the organisation ultimately responsible for the delivery of the A16 Norwood Improvement Scheme, and the Council are nominated as the delivery partner.

6.4.2 Delivery of the scheme to date has been managed by the PCC Project Manager and wider Project Team, consisting of key project delivery partners. The Project Team have been responsible for the daily running of the project, coordinating with all key stakeholders, and managing the delivery programme.

6.4.3 The existing PHS Project Board will be used to oversee the continued development and delivery of the scheme by the Project Team, and to make key decisions relating to the delivery of the project. The Project Board will be supported by technical specialists, and key stakeholders will be invited to attend as necessary.

Project Management Team

6.4.4 The Project Management Team will report to the Project Board and ultimately to the CPCA Board.

6.4.5 The Project Management Team will be responsible for delivery and day-to-day management of the consultants and contractors. They will co-ordinate inputs from technical advisors responsible for the delivery of key work streams within an agreed programme, including:

- Stakeholder Engagement
- Design Development
- Transport Modelling
- Environmental Assessment
- Business Case Development
- Early Contractor Involvement (ECI) and Scheme delivery.

6.4.6 The key roles and lines of accountability for the development and delivery of the scheme are shown beneath in Figure 6.3.

6.4.7 The team has successfully developed and delivered multiple highway schemes around Peterborough since the beginning of the contract in 2013, including several CPCA schemes. PHS has been responsible for all planning and design work undertaken on the A16 Norwood Improvement Scheme to date. All skills and competencies to deliver this scheme are available within the local PHS contract.

CPCA Board	**Responsible Officers** CA Board Members	**Responsibilities Include** To support PCC in the development of the scheme To undertake technical review of the business case To make recommendations on future project stages
Programme Board	**Responsible Officers** CPCA Transport Programme Representatives, PCC, DfT and National Highways	**Responsibilities Include** To approve change requests and RAG changes
Project Board	**Responsible Officers** Contract Manager, Programme Team Lead, Transport Planning Lead, Design Team Lead, Engineering Lead, Major Scheme & Delivery Lead	**Responsibilities Include** To hold monthly meetings to discuss progress and issues To review / approve recommendations made by the Project Team
Funding Partner (CPCA)	**Responsible Officers** Programme Co-Ordinator	**Responsibilities Include** To secure funding and support PCC in scheme development Undertake technical review to ensure scheme value for money
Delivery Partner	**Responsible Officers** Transport Planning Officers, Project Engineers	**Responsibilities Include** Manage / review day to day project issues Monitor progress / key milestones Report issues to the Project Board Engage with Stakeholders
Contractor (PHS)	**Responsible Officers** Transport Planning, Highway Design, Environment, Network Manager and Street Works Co-Ordinator	**Responsibilities Include** Technical delivery of the scheme Day to day running of the project Highlighting project / scheme risks Identifying options and assessing scheme value for money

Figure 6.3: Key Project Roles and Responsibilities

6.4.8 The Project Manager will be Lewis Banks from PCC through detailed design and FBC. Beyond FBC a project manager will be (nominated from PCC's Highway Maintenance Team to mange the project through the construction phase. The PCC Project Manager is part of the Delivery Partner Team shown in Figure 6.3 and reports into multiple layers in the governance structure above.

6.5 Programme / Project Reporting

6.5.1 The Project Manager is responsible for reporting how the project is performing against the project objectives and key milestones, using established finance and programme management tools such as Verto, with updates reported on a regular basis to the Project Board.

6.5.2 Every month the Project Manager will also submit a Highlight Report alongside Finance Management Reports to the CPCA, recording what progress has been made and whether there are any new risks that could impact the scheme.

6.5.3 Financial progress will be reported to the PHS Dashboard, which monitors the progress of work delivered through the PHS contract, and approval for any key decisions is made by the Project Board.

6.5.4 Regular Project Progress Meetings have been held throughout the duration of the scheme, to allow key staff to discuss important issues that could affect the delivery of the scheme. Delivery of the scheme through the PHS Framework contract ensures that all stages of work are conducted in-house, ensuring a smooth transition of information and communication between the different delivery teams.

6.6 Programme / Project Plan

6.6.1 Key project milestones for progressing to scheme delivery are outlined in Table 6.1 overleaf:

Table 6.1: Key Project Milestones

Timescale	Activity
June 2022 – July 2022	Outline Business Case reviewed by CPCA, and approval sought from CPCA board for the release of funding to undertake Detailed Design and produce a Full Business Case.
September 2022	Work commences on the Detailed Design and Full Business Case.
September 2022 – November 2022	Site Surveys undertaken to inform the Detailed Design
March 2024	Detailed Design and scheme costings complete. Full Business Case submitted.
April 2024 – May 2024	Full Business Case reviewed by CPCA and approval sought from CPCA board for the release of funding for scheme construction.
September 2024 – August 2025	Construction of the scheme undertaken, lasting approximately 12 months.
August 2026	1-year post-scheme monitoring undertaken
August 2030	5-years post-scheme monitoring undertaken

6.6.2 These dates are indicative only and assume that funding will be available to progress each of the stages.

6.6.3 At present, construction of the scheme is expected to commence in Autumn 2024, however this will be dependent on external factors, such as successful consultation with the developers of the Norwood site.

6.7 Assurance and Approvals

6.7.1 The project has been managed by The Council in line with their existing assurance and approvals process. The daily running of the project has been under the responsibility of the Project Manager, and any approvals required have been provided by the Project Board.

6.7.2 The Cambridgeshire and Peterborough Combined Authority Assurance Framework sets out the fundamental principles in relation to the use and administration of the Cambridgeshire and Peterborough Investment and outlines a culture underpinned by processes, practices and procedures. The Assurance Framework sits alongside a number of other Cambridgeshire and Peterborough Combined Authority documents including the Constitution and Devolution Deal.

6.7.3 Further to the above, the Combined Authority has developed the 10 Point Guide which outlines project management governance requirements which should be followed throughout the life cycle of the project. It details the requirements at project initiation including, establishing a Project Board with the Combined Authority and delivery partners. The purpose of the Project Board is to provide oversight to the project, ensure appropriate governance, risk management and to provide assurance in accordance with the scope, budget and programme. The Project Board should be attended by the Combined Authority's head of Transport and Transport Programme Manager, PCC's Project Manager and by the Group Manager for Highways and Transport. The Project Board should also establish a RACI chart, a copy of the RACI template is in the Combined Authority's 10 Point Guide.

6.7.4 Technical Assurance has also been provided by the CPCA's Assurance Framework, with each stage of the project being reviewed by the CPCA's independent technical reviewer. Once the independent technical reviewer is satisfied, a recommendation is made to the CPCA Board to approve funding for further stages of the project, including construction.

6.7.5 Based on the assurance and approvals guidance detailed above, Table 6.2 beneath details the approvals pathway required for the remainder of the project as it progresses through the business case stages.

Table 6.2: Approvals Pathway

Assurance Framework Stage	Approvals
Gateway 2: OBC	Independent Technical Review sign off CPCA Board Approval / release of FBC funding. Chief Finance Officer (CFO) sign off.
Gateway 3: FBC	Monthly CPCA Project Board approvals Design Approvals – Issue of Detailed Design Drawings / RSA / PCC Technical Review Developer and National Highways Review Target Cost Approval Compound Agreement Independent Technical Review sign off CPCA Board Approval for Construction Funding
Gateway 4: Construction and Delivery	Construction Order Raised CPCA Project Close Out / Written confirmation to CPCA director Prepare / Agree Final Accounts Final Highlight Report
Gateway 5: Monitoring and Evaluation	CPCA Road Safety Audit to be conducted 1 year after construction Project Monitoring 1 Year After Construction Report – PCC / CPCA report approval Project Monitoring 5 Year After Construction Report – PCC / CPCA report approval

6.8 Communication and Stakeholder Management

6.8.1 Communication and Stakeholder engagement has consisted of:

- Providing regular updates on delivery progress and key activities to the local community, businesses and key stakeholders (including National Highways)
- Engaging with the local community, businesses and key stakeholders regarding delivery of the scheme, ensuring local needs are taken into account throughout the duration of the project.
- Ensuring information is shared using appropriate methods of communication to all sectors of the community, businesses and key stakeholders.

Project Liaison Officer

6.8.2 A designated Project Liaison Officer (PLO) will be assigned to the scheme throughout the stakeholder and public consultation period and will be present during the final phase of construction. The PLO will act as a single point of contact for outgoing and incoming communication and will be attached to the scheme delivery team.

6.8.3 It is the responsibility of the PLO to issue progress updates via email and social media in the lead up to, and during construction, and coordinate responses to members of the public and key stakeholders when queries are received.

6.8.4 The PLO will report findings from the post-scheme monitoring to stakeholders and respond to queries and feedback about the scheme through the council's usual communications channels.

Stakeholder Consultation

6.8.5 The key stakeholders identified for the A16 Norwood scheme are:

- CPCA as the Local Transport Authority and funding body for the scheme
- The Council as the Local Highway Authority
- Norwood Developers and landowners including Taylor Wimpey and Calco 101 in relation to the Leeds Farm Development, and Church Commissions in regard to land to the north of the A47 / A16 / Welland Road Roundabout.
- Peterborough City Cabinet Member and Ward Councillors
- National Highways as the organisation responsible for the A47 Trunk Road
- British Horse Society
- Local Cycle Forum
- PCC Education Services
- Natural England in regard to ecological / biodiversity assessments within the studies footprint
- Historic England in regard to Archaeology/ Cultural Heritage assessments within the studies footprint
- Environment Agency
- The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, as the organisation responsible for the Dogsthorpe Star Pitt SSSI
- PCC representatives for the natural and historic environment, Archaeology and Heritage, Water and Drainage, Environmental Health and Planning
- Emergency Services
- Residents affected by the scheme, including Newborough Road
- Businesses affected by the scheme.

6.8.6 Stakeholder consultations were undertaken by the Project Team as part of this OBC and Preliminary Design phase, in line with the timings of the public consultation. All stakeholders were consulted via email, letter or as part of the Walking, Cycling and Horse-Riding Review (WCHR) for comments on the Preferred scheme.

6.8.7 Feedback received from stakeholders during the consultation largely centred on land acquisition for the bridal way, connectivity to the Leeds Farm NMU routes as well as the recent January 2022 updates to the Highway Code. All comments received during this consultation will be explored further and incorporated into scheme design where appropriate as the project progresses to the final phase of Detailed Design.

Public Consultation

6.8.8 Public consultation on the concept of a scheme at this location was initially undertaken in the summer of 2019, as part of the CPCA Local Transport Plan that was adopted in January 2020. At this point, no indication of the scheme type was made to residents (as this was yet to be developed), but it should be noted that no objections relating to the development of Norwood and the principle of improvements to this area were received.

6.8.9 Public perceptions on the A16 Norwood Improvement Scheme were reassessed as part of the OBC and Preliminary Design stage. The online consultation featured on the PCC website and social media for 6 weeks between the 1st November and 13th December 2021. A total of 49 responses were received during the consultation period.

6.8.10 Comments received largely focused upon Newborough Road and the proposed closure of the current access from the A47, suggestions for active travel improvements and highlighting the environmental assets within the study area.

6.8.11 Amendments have been made to the proposed scheme to reflect the comments received, and the scheme design has been updated to retain access from the A47 onto Newborough Road (northbound only) and define the active travel improvements that will be developed as part of the next phase of the project, which will include a link from the Norwood growth site to Welland Road (south of the A47) and improvements along Welland Road towards the City Centre.

6.8.12 All comments received during the consultation will be further reviewed during the Detailed Design phase of the project and incorporated where appropriate. Further development of the active travel improvements will also be possible once further detail is available in relation to the development site layouts and active travel connections to the wider highway network.

6.9 Key Issues for Implementation

6.9.1 The following table assesses the complexity of delivering the A16 Norwood Improvement Scheme, considering buildability, potential disruption during construction, likely delivery agents (complexity of partnership arrangements), stakeholder acceptability and public acceptability / support.

Table 6.3: Key Issues Associated with Scheme Delivery

Implementation Issue	Description and Comment
Buildability	Moderate significance with buildability issues
	Issues with NRSWA Statutory Diversionary Works possible following findings of high-level communication network onsite along the A47 corridor, including City Fibre, UKPN and National Grid IP Mains. Must provide sufficient lead in time for diversion / slewing of existing assets.
	Additional drainage in the form of a highway attenuation pond may be required at the outfall on the A16, catering for the additional northbound carriageway to the A16. Land may be required to accommodate the required highway pond. Issue to be mitigated against in the next phase of Detailed Design.
	Unknown ground conditions associated with the extension of earthworks required to accommodate the additional lane on the A16. Surveys to be commissioned during the next phase of Detailed Design.
	Minimal potential for hazardous materials to be discovered within the study area, including coal Tar in pavements and asbestos. Issue is considered low risk as the carriageway has been constructed / altered recently.
	The design of how the northern section of the A16 will tie into the developer roundabout is not yet known, and therefore current Preliminary Designs is truncated to assume a tie-in point. Depending on the junction arrangement and timing of works from the developer, a temporary tie in design may be required.
Approvals Prior to Construction	Low risk with approvals
	A Section 6 Agreement is required between PCC and National Highways, to allow works to be conducted on parts of National Highways Strategic Road Network. The Section 6 Agreement will be addressed during Detailed Design and is subject to design drawings being formally issued to the National Highways Project Manager and then comments being integrated into the Final Design. An agreement on any departures from standards will also be required with National Highways. Non agreement from National Highways is unlikely as the organisation is a key stakeholder and communication will be continued throughout the progression of Detailed Design.
	Consent is required from both the PCC Drainage Team and the Environment Agency at Detailed Design stage, in relation to drainage and discharge in the study area. Agreement from both stakeholders is subject to design drawings being formally issued and then comments being integrated into the Final Design.
Disruption During Construction	Moderate disruption to construction
	COVID-19 poses a continued risk during construction. Prior planning to programme adequately allowing for safe COVID practices including adequate welfare provisions alongside the prior procurement of long lead items/ materials is vital to minimise disruption whilst onsite.
Complexity of Partnerships	Moderate complexity with Partners
	Land required from the Church Commissioners to accommodate the realigned bridleway has been questioned (during the WCHR questionnaire) by the landowners consultant as ‘excessive’. The alternative proposal set forward by the stakeholder in response to the consultation will be reviewed during the next phase of Detailed Design, whereby discussions of land acquisitions will be explored further. At this stage the design remains of the bridle realignment remains.
	The progression of developer planning applications remains slow, which has the potential to impact the delivery of the PHS highway scheme as the project progresses and wider study area develops. Communication with developers is to be continued into Detailed Design, with developer timescales agreed prior to construction.
Environment / Habitat Mitigation	Moderate complexity for environmental issues
	Land to the east of the A16 (Dogsthorpe Star Pit) is a Site of Special Scientific Interest (SSSI), supporting scarce and nationally rare species and fauna. An area of Ancient Woodland (Little Wood) is also located close to the SSSI. Will be managed through ecological / arboricultural surveys to inform design and identify measures necessary to protect vulnerable species and plants during construction.
Stakeholder / Public Acceptability	Moderate impact of stakeholder acceptability
	There is potential for negative publicity during the final phase of Detailed Design and construction from both stakeholders and the public. Comments received during the stakeholder and public consultations during this phase of work are to be reviewed during the next phase of work and responses integrated into design where necessary.

6.10 Risk Management Strategy

6.10.1 A Risk Register was produced during project initiation to identify potential risks and to evaluate factors that could have a detrimental effect on the project.

6.10.2 The Risk Register has been a live document throughout the project and has been used to identify and catalogue any potential risks, consider the impact they may have, the likelihood of them occurring and the measures that can be taken to provide mitigation.

6.10.3 The Risk Register has been reviewed regularly during progress meetings, with updates reported to the CPCA through the monthly Highlight Reports. A copy of the Risk Register has been provided within Appendix C.

6.11 Scheme Evaluation

6.11.1 The Scheme Evaluation Plan for the A16 Norwood study will be prepared prior to scheme construction, to set out how the effects should be evaluated following implementation. The Scheme Evaluation Plan comprises the Benefits Realisation Plan and the Monitoring and Evaluation Plan.

6.11.2 The purpose of the Scheme Evaluation is to clearly set out which indicators should be monitored to verify that the scheme achieves its objectives. Post monitoring is important for determining that the scheme has been successful.

Expected Benefits

6.11.3 The scheme objectives, outputs and outcomes are summarised below. These objectives are described within the Strategic Dimension and explain what the scheme is expected to deliver.

6.11.4 The primary objectives include:

1. **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout
2. **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised
3. **Limit impact on the local environment and improve biodiversity**: Fully mitigate any adverse environmental impacts of a scheme, and ensure a biodiversity net gain within the study area
4. **Improve active travel routes to provide a viable alternative to private car travel:** Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.
5. **Improve road safety:** Reduce accidents for all travellers within the study area.

6.11.5 Secondary objectives include:

6. **Positively impact traffic conditions on the wider network:** Positively impact the performance of local routes impacted by the traffic and congestion in and around the A16 corridor, such as the A47, A15 Paston Parkway, A1139 Eye Road and Newborough Road.

Benefits Realisation Plan

6.11.6 An outline Benefits Realisation Plan has been prepared for the A16 Norwood project, which sets out the approach to managing the realisation of benefits of the proposed improvement schemes. In accordance with guidance from the DfT (2022)[32], this document is outlined at this stage of work and will be completed at the FBC stage.

6.11.7 The outline Benefits Realisation Plan is included within Appendix N of this report. The plan has been prepared in accordance with the guidance provided by the DfT (Transport Business Cases, 2022), HMT (The Green Book[33]), and the 'Guide to Developing the Project Business Case' (2018)[34].

6.11.8 Table 6.4 overleaf provides a summary of the benefits register as detailed in the Benefits Realisation Plan.

[32] DfT (2022) Transport business case guidance - GOV.UK (www.gov.uk)
[33] HMT (2020). The Green Book: Central Government Guidance on Appraisal and Evaluation
[34] Guide to developing the Project Business Case (2018)(publishing.service.gov.uk)

Table 6.4: Benefits Register Summary

Benefit	Benefit Category and Class	Description	Service Feature	Activities Required	Responsible Officer	Performance Measure	Timescale
Reduced congestion and improved journey times	Monetised journey time savings	Enhanced network performance	Implementation of new highways infrastructure / mitigations at the A16 / A47 / Welland Road Roundabout and adjoining A16 and A47 strategic routes	Successful delivery of the A16 Norwood improvement schemes.	Peterborough City Council (PCC) / Cambridgeshire, Peterborough Combined Authority (CPCA)	Will contribute to objective 1. Ratio of peak hour to free flow journey times to be less than 1.5. No blocking back present between junctions.	Benefit(s) to be realised once the scheme has been implemented and is open to the public
Planned housing and employment growth	Wider social benefits (improved availability of housing and employment)	Realisation of local plan housing and employment growth ambitions	Improved highways capacity as a result of the implementation of improved highways infrastructure, to facilitate traffic growth on the transport network			Will contribute to objective 2 – Developments are not restricted in this area due to transport network issues.	
Improved air quality	Environmental benefits; wider social benefits (improved population health)	Improved air quality in future years	Reduction in emissions from vehicles as a result of reduced congestion, due to improved highways infrastructure.			Will contribute to objective 3 – Air quality impact matches or improved on modelled values.	
Achievement of biodiversity net gain	Environmental benefits; wider social benefits (improved population health)	Increase in the scale of replanting and environmental mitigations onsite in the future	Implementation of replanting, environmental enhancements across the site area including wildflower enhancement areas and linear planting along the A16			Will contribute to objective 3 – Biodiversity Net Gain of 20% or greater achieved.	
Provision of new active travel infrastructure	Wider social benefits (improved health), Environmental benefits;	Increased number of active travel routes connecting the development site to wider network and city centre	Implementation of safer highways infrastructure including a Pegasus controlled crossing, route improvements along Welland Road and the potential for a new bridge over the A47 (subject to feasibility).			Will contribute to objective 4 – Increased length of active travel provision including pedestrian provision and LTN 1/20 compliant cycleways	
Improved wider network efficiency	Monetised journey time savings	Enhanced network performance	Implementation of new highways infrastructure / mitigations at the A16 / A47 / Welland Road Roundabout and adjoining A16 and A47 strategic routes			Will contribute to objective 6 - Journey times within 20% of forecast change.	
Improved road safety	Monetised (quantifiable) benefits due to fewer accidents	Reduction in the number of KSI incidents at proposed intervention sites	Implementation of new highways infrastructure / mitigations at the A16 / A47 / Welland Road Roundabout and adjoining A16 and A47 strategic routes. Alongside the implementation of new active travel provisions including a controlled crossing, route improvements along Welland Road and the potential for a new bridge over the A47 (subject to feasibility). .			Will contribute to objective 5 – Accident statistics are reduced compared to the forecast in line with Cobalt predictions.	

Monitoring and Evaluation

6.11.9 An outline Monitoring and Evaluation Plan has been prepared for the A16 Norwood project, which outlines the arrangements for monitoring and evaluating the proposed improvement schemes. As per the DfT guidance for the Benefits Realisation Plan, this document is outlined at this stage of work and will be completed at the FBC stage.

6.11.10 The outline Monitoring and Evaluation Plan is included in Appendix O of this report. The outline Monitoring and Evaluation Plan has been prepared in accordance with the guidance provided by the DfT (The Transport Business Cases, 2022) Monitoring and Evaluation Framework for Local Authority Major Schemes[35] and HMT (The Green Book[36]).

6.11.11 The plan provides information relating to the scheme background and context, scheme objectives and outcomes, data collection methods, resourcing and governance arrangements, delivery plan, and dissemination plan.

6.11.12 Crucially, the delivery plan identifies the key monitoring and evaluation tasks to be undertaken during pre-construction, construction, and post construction phases of scheme development. It is envisaged that the monitoring and evaluation work will culminate with the production of a One Year After Monitoring and Evaluation Report (to be produced 12-24 months post scheme implementation) and a Final Monitoring and Evaluation Report (to be produced approximately five years post scheme implementation).

6.11.13 The logic map detailed in Figure 6.4 (overleaf) highlights the links between context, inputs, outputs, outcomes, and impacts of the scheme and gives a visual representation of where Monitoring and Evaluation should be focused. The logic model outlines the causal chain of events that represent the process by which the desired outcomes and scheme objectives are to be achieved.

6.11.14 The logic model has informed the approach proposed in the Monitoring and Evaluation Plan and will help ensure monitoring resources are targeted appropriately through the timeline of scheme development and provide effective measurement of objectives and outcomes.

6.11.15 The implementation of the Monitoring and Evaluation Plan will help provide an understanding of the following:

- Inputs (did we apply the money and resources that we said we would?)
- Outputs (how much did we build / provide?)
- Outcomes (what changes in behaviour came about as a result?)
- Impacts (what effect did the outcomes have on the economy, society and environment?).

[35] DfT (2012). Monitoring and Evaluation Framework for Local Authority Major Schemes
[36] HMT (2020). The Green Book: Central Government Guidance on Appraisal and Evaluation

Context

Norwood and Paston reserve urban extension areas are key areas of growth for Peterborough, as identified in the Local Plan 2016 – 2036 (Adopted July 2019), which will generate a combined total of 2,945 dwellings within the proposed study area

The Scheme will provide the necessary increase in highway capacity to unlock the identified growth throughout the area, as well as tackle any associated congestion issues from the proposed growth

Inputs

CPCA funding and resources

PCC resources

Contractor resources

Sub-contractor resources

Stakeholder support

Network Improvement Scheme

Outputs

Closure of Newborough road southbound access onto A47

Dualling of the A16 between the A16 / A47 / Welland Road roundabout and the Norwood development Access

Partial signalisation of the A16 / A47 / Welland Road roundabout on the A16 southbound approach

Addition of a flare to the A47 westbound approach, to provide additional capacity for left turners to Welland Road

Addition of a dedicated left lane, from the A47 eastbound approach to the A16 Northbound exit

Replanting within the study area including linear tree / shrub planting along the A16 and wildflower planting at several locations

Active travel route enhancements from the Norwood site down Welland Road

Pedestrian bridge over the A47 (subject to further feasibility)

Transport Outcomes

Improved journey times for users within the study area, particularly of the A16 / A47 / Welland Road roundabout

Reduction in queue lengths, during peak times on all key approaches

The separation of movements on key junctions, aiding the reduction in accidents

People, Business, and Place Outcomes

Improved network efficiency will help facilitate the Norwood development area, and will increase the attractiveness of the City as a place to live and invest

Early environmental considerations, aiding the achievement of a minimum 20% biodiversity net gain across the study area

Impacts

Economy benefits, including reduced costs, investment and regeneration, and benefits to local businesses

Society benefits, including improved health and wellbeing, and better connectivity to services

Environmental benefits, including biodiversity improvements, improved air quality, and reduced emissions

Figure 6.4: Monitoring and Evaluation Logic Map

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Appendices

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Appendix A – Wider Policy Context

Appendix A: Wider Policy Context

National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and should be considered in the preparation of development plans. Proposed development that accords with an up to date Local Plan should be approved unless other material considerations indicate otherwise.

The NPPF states that all plans are expected to be based upon and to reflect the presumption in favour of sustainable development with clear policies that will guide how the presumption should be applied locally.

The scheme will contribution to delivering the following NPPF objectives:

- **Delivering a sufficient supply of homes.** The scheme will provide crucial transport capacity along the Parkway network which will support the housing growth set out for Peterborough within the Local Plan.
- **Building a strong, competitive economy.** The NPPF states that development proposals should support economic growth and productivity. The scheme will provide essential network capacity at a crucial location to enable Peterborough to deliver the jobs set out in the Local Plan.
- **Promoting healthy and safe communities and sustainable transport.** The NPPF stipulates that communities should be safe, accessible and supportive of a healthy lifestyle through the provision of cycling and walking facilities. The scheme not only provides highway capacity for strategic Parkway trips, but also includes local sustainable transport infrastructure improvements to upgrade access to Thorpe Wood Business Park from the east and the south.

Department for Transport Single Departmental Plan

The single departmental plan for the Department for Transport sets out the strategic objectives to 2020 and the plans for achieving them. The DfT's overall mission is to create a safe, secure, efficient and reliable transport system that works for the people who depend on it; supporting a strong productive economy and the jobs and homes people need.

The objectives outlined in the plan are:

- Support the creation of a stronger, cleaner more productive economy
- Help to connect people and places, balancing investment across the country
- Make journeys easier, modern and reliable
- Make sure transport is safe, secure and sustainable

- Prepare the transport system for technological progress, and a prosperous future outside the EU
- Promote a culture of efficiency and productivity in everything we do.

Peterborough City Council's Vision and Strategic Priorities

The Council's vision is to

'Create a bigger and better Peterborough that grows the right way and through truly sustainable development and growth:

- *Improves the quality of life of all its people and communities, and ensures that all communities benefit from the growth and the opportunities is brings*
- *Creates a truly sustainable Peterborough, the urban centre of a thriving sub-regional community of villages and market towns, a healthy, safe and exciting place to live, work and visit, famous as the environmental capital of the UK'.*

The strategic priorities for the Council are:

- Drive growth, regeneration and economic development
- Improve education attainment and skills
- Safeguard vulnerable children and adults
- Implement the Environment Capital agenda
- Support Peterborough's culture and leisure trust Vivacity
- Keep all our communities safe, cohesive and healthy
- Achieve the best health and wellbeing for the city

Peterborough City Council Local Plan

The Local Plan (adopted July 2019) updates the 2011 Core Strategy and looks to deliver 20,112 new homes between 2017 and 2036, and 17,600 jobs between 2015 and 2036. The development strategy for the new Local Plan is to focus the majority of new housing development in, around and close to the urban area of the city of Peterborough. Only a small percentage of residential development is allocated to the villages and rural area. Similarly, employment development will be focussed on the city centre, urban area or urban extensions.

The Local Plan will deliver the council's corporate priorities (listed below) which aim to improve the quality of life for all residents and communities.

- Drive growth, regeneration and economic development
- Improve education attainment and skills

- Safeguard vulnerable children and adults
- Implement the Environment Capital agenda
- Support Peterborough's culture and leisure trust Vivacity
- Keep all our communities safe, cohesive and healthy
- Achieve the best health and wellbeing for the City. The Local Plan identifies Thorpe Wood as a strategic employment location for the city and additional B1 use is allocated within the area.

Policy LP13: Transport states that the impact of growth on the city's transport infrastructure will require careful planning and that new development must ensure that appropriate provision is made for the transport need that it will create.

Policy LP14: Infrastructure identifies that the major growth and expansion of Peterborough will be supported by necessary infrastructure such as roads, schools and health and community facilities is in place to help the creation of sustainable communities.

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Appendix B – Carbon Assessment Methodology

1. Appendix B_PHS Carbon Assessment Methodology

1.1 Introduction

1.1.1 This section sets out the approach for calculating the embodied greenhouse gas (GHG) emissions associated with Peterborough Highway Services (PHS) Majors schemes and culminates in a total embodied carbon value which can be used as a baseline to drive carbon reductions and assess the benefits of value engineering, using alternative materials, and implementing more efficient construction methods.

1.1.2 Embodied carbon is the term used for the GHG emissions associated with the creation of a highway's asset, including the production and transportation of materials to site. It is referred to within this report as 'carbon' and is measured in tonnes of carbon dioxide equivalent (tCO2e). The quantification and assessment of embodied carbon is a key stage in the carbon management process in accordance with PAS2080 principles.

1.1.3 Materials, fuel and energy use, waste arisings and transportation during construction all produce carbon emissions either directly, as in the case of transportation, or indirectly as embodied carbon which relates to the emissions from production/manufacturing processes for the materials being used.

1.1.4 Peterborough City Council (PCC) declared a climate emergency in May 2019 and aims to be a carbon neutral organisation by 2030. There is also an objective for net-zero carbon emissions across the entire county by 2045. In line with the Cambridgeshire & Peterborough Combined Authority (CPCA) and PCC's commitment to combating climate change and achieving 'Net Zero' carbon emissions by 2030, proposed schemes will undergo carbon assessments prior to gaining formal approval for the final design and construction.

1.1.5 Carbon emissions associated with proposed scheme will be quantified using a combination of the Milestone Infrastructure Carbon Tool and manual calculations. The carbon data will be presented in a dashboard to facilitate identification of carbon 'hotspots' and help designers/delivery teams to focus their carbon reduction efforts accordingly. This assessment will be undertaken based on the information available at preliminary and detailed design development with assumptions and interpretation where necessary.

1.2 Methodology

1.2.1 The following methodology is proposed for calculating carbon emissions associated with preliminary and detailed design phases of the proposed scheme. It would also be possible to update the carbon assessment post-construction using an as-built Bill of Quantities to assess the benefits of any carbon reduction initiatives implemented during the construction phase.

1.2.2 The calculation of carbon emissions associated with proposed schemes will be undertaken using a combination of the Milestone Infrastructure Carbon Tool and manual calculations. This tool uses carbon conversion factors from the UK Government GHG Conversion Factors and Inventory of Carbon and Energy (ICE) databases.

1.2.3 The data used within the Carbon Tool will comprise estimates of proposed scheme construction material types and quantities, based on information provided by the Design Team in the form of a Bill of Quantities (BoQ). This data is used as inputs to the Carbon Tool to generate an initial estimate of the carbon footprint of the proposed scheme. The tool is based on the standard Method of Measurement for Highways Works from the Specification for Highways Works to align with the typical BoQ format. In addition to fuel and energy usage, it captures Scope 1, 2 and 3 emissions for the follow 'Bill' elements:

- Site Preliminaries
- Traffic Management
- Site Clearance
- Fencing
- Vehicle Restraint Systems
- Drainage
- Earthworks
- Pavements
- Kerbs & Footways
- Signs and Road Markings
- Street Lighting
- Ducting & Electrical
- Structural Concrete
- Piling
- Waterproofing
- Bridge Joints
- Brickwork & Blockwork

1.2.4 Each category within the Carbon Tool is further divided into item /material types e.g. fill and aggregate (within the bulk materials category). For each item type the Carbon Tool provides a unit and CO2e value for that item.

1.2.5 It is noted that elements of the design would continue to be refined throughout the design process resulting in changes in material quantities.

1.3 Data and Key Assumptions

1.3.1 Attempts will be made to calculate the carbon emissions for every item. However, in some scenarios, either carbon factors do not currently exist (and therefore carbon cannot be estimated with a suitable degree of accuracy) or suitable information does not exist on which to base carbon assumptions.

1.3.2 In scenarios where an appropriate carbon factor in the carbon tool is not available; a suitable alternative will be used (i.e. manual calculation to estimate carbon emissions based on spend data or other available information).

1.3.3 It is expected that the highway construction will require maintenance and replacement during its design life. The carbon emissions associated with these future activities have will be excluded from the assessment due to the inherent uncertainty in their frequency and extent.

1.3.4 The information provided will be based on the carbon footprint following any carbon reduction initiatives delivered during the preliminary and detailed design phases. Further carbon reductions could be driven by the contractor going forwards and should be a point of discussion where construction methods may contribute to a reduction or increase in emissions.

1.4 Approach to Carbon Reduction

1.4.1 Reporting and guidance, such as PAS 2080:2016 (BSI, 2016) indicate that the potential to influence carbon emissions decreases as a project progresses. The largest savings can be achieved during the planning stage, with more modest reductions achievable during design and construction.

1.4.2 Carbon quantification is necessary on the proposed scheme to better understand the carbon footprint of the scheme and to enable opportunities for carbon savings to be identified.

1.4.3 The facilitation of workshops will help to identify how design decisions and construction activities can influence the proposed schemes carbon footprint. The most significant carbon reductions are likely to be attributed to the fact that opportunities have been sought to enhance the sustainability of the design early in the process. Workshops will help to highlight ‘carbon hotspots’ and allow designers to focus carbon reduction efforts in the right areas whilst highlighting the carbon implications of certain decisions throughout the design development.

1.4.4 As a starting point, the ongoing design specification should aim to reduce or avoid where practicable, the use of significant high impact materials, (e.g. steel and concrete), or processes (e.g. significant earthwork excavations). Where this is not possible, material volumes or processes should be substituted with lower intensity replacements if achievable within the bounds of the design standards for safety and quality.

1.4.5 It is hoped that this approach leads to tangible changes in the design which improve the overall sustainability of the scheme in line with the CPCA and The Council’s climate objectives.

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Appendix C – Project Risk Register

Risk ID	Date Identified	Cause(s)	Risk Event	Effect(s)	Mitigation Plan	Likelihood (1-5)	Impact (1-5)	RAG score (likelihood x impact)	Risk Owner	Date Closed
26	Oct-21	Need for use of developer land	**Purchase of land** Third Party (developer land) may be required at the A47 / A16 roundabout – would be needed to provide a bridleway.	Increase in scheme costs Possible delay to scheme if an agreement cannot be reached within current programme	Discussions will be held with developer early to understand if land can be purchased. If land is not available than alternative options will be considered.	3	3	9	Lewis Banks (PCC Project Manager)	
27	Oct-19	Need for more walking and cycling elements to be included in scheme	**Aligning project to CPCA objectives for sustainable travel** It is important that the project includes deliverables focusing on sustainable travel modes.	Help secure future funding Reduce car travel	Development of the business case will consider scheme options for buses, walking and cycling. The project consultation will offer an opportunity to understand where routes are most needed.	3	3	9	Lewis Banks (PCC Project Manager)	
21	Apr-21	Developer agreement	If the two planned developments don't progress, it will have an impact on elements of the scheme (The Link Road).	Delay to programme Additional budget required	PCC planning to continue dialogue with both developers.	2	3	6	Lewis Banks (PCC Project Manager)	
18	Feb-21	Change to project scope	**Impact on budget and programme** Risk of a project scope increase to include the Norwood Link Road and associated roundabout. Potential to impact both budget and programme.	Delay to scheme delivery Additional budget may be required	Options are being considered and meetings are being held with relevant parties to bring forward development of link road.	2	3	6	Lewis Banks (PCC Project Manager)	
20	Apr-21	Archaeological findings	**Archaeological findings** There is a risk that improvement works could be impacted by discovery of archaeological remains that may require excavating.	Delay to programme	During the development of the business case and design investigative work will be undertaken to understand the site and advice will be sought from archaeological specialist.	3	2	6	Lewis Banks (PCC Project Manager)	
13	Feb-20	Unknown Envrionmental Issues	**Environmental Issues** Environmental Issues such as noise, air or ecology may cause a delay to design and construction if suitable mitigation approaches not considered. Furthermore, if surveys identify anything significant on site, further surveys may be required.	Potential to introduce delays to programme and additional costs	Desktop Environmental study was undertaken at SOBC stage to identify any possible environmental issues. At OBC stage an environmental report will be undertaken to indentify any environmental impacts (such as SSSI sites and tree loss) and mitigation measures.	2	3	6	Lewis Banks (PCC Project Manager)	

28	Mar-22	Budget under spend	**Carry over of unspent budget to 2022/23** There is a posibility that the project budget allocated for 2021/22 will not be fully spent within the financial year.	Budget will need to be requested to be carried over into 2022/23.	PCC will monitor spend and if there is a possibility that not all of the budget will be spent, the CPCA will be informed.	2	3	6	Lewis Banks (PCC Project Manager)	
19	Apr-21	Fly tipping	**Fly tipping** There is a risk that fly tipping issues in the area where the improvements are planned may continue or become worse once the Newborough Road access is closed.	Increased cost in clearing Complaints from landowners Bad publicity	During the scheme design this will be looked at further. Possible solutions will be considered and these will be incorporated into the design.	2	2	4	Lewis Banks (PCC Project Manager)	
3	Mar-20	Delay to project	**Coronavirus outbreak** There is risk that with the rise of coronavirus cases that some of the staff working on the project may become infected and would have to.self isolate.	Likely effect is that a delay would be caused	Government guidance would be followed. Any member of staff or their family do become unwell, they would be recommended to work from home for a 10 day period/self islolate.	2	2	4	Lewis Banks (PCC Project Manager)	
6	Dec-19	Results of surveys which may necessitate alterations to proposed works scope or methodology	**Change in proposals** There also is a possibility that the data may provide results that may require change in what we propose as improvements.	Likely effect is that a delay would be caused	Ensure all investigations are carried out at an early design stage	2	2	4	Lewis Banks (PCC Project Manager)	
8	Dec-19	Public and stakeholder objections	**Consultation** There is good possibility that we may receive objections for the improvements that we may decide to undertake for the project.	Likely effect is that a delay would be caused Possible changes to design	Early consultation/notification as deemed necessary by PCC. Develop publicity strategy and liaise with businesses/residents affected by the works and scheme mobilisation	2	2	4	Lewis Banks (PCC Project Manager)	
12	Feb-20	Unknnown STATS	**Unknown Stats** STATS maybe found at the junction and cause a delay to design or construction if not found early enough	Likely effect is that a delay would be caused	STAT Plans are being requested at an early stage of the project prioir to design to ensure engineers are aware of the STATS that are present within the vicnity of the junction	2	2	4	Lewis Banks (PCC Project Manager)	
14	Feb-20	Adverse publicity	**Disruption to network** There is possibility that adverse publicity may be received due to the disruption to the network during construction	Likely effect is that a delay would be caused	Advise the public as early as possible about the consutruction timetable. Avoid busy periods such as christmas to minimis the delays to travelling public	2	2	4	Lewis Banks (PCC Project Manager)	
22	Apr-21	HE agreement	If during the HE technical review any changes are needed, this could have delay to progression of study and programme.	Delay to programme	Mitigation is to maintain strong communication with HE as a key stakeholder.	2	2	4	Lewis Banks (PCC Project Manager)	

23	May-21	Time required for surveys	**Survey delay** The programme provided currently shows a delay which takes the submission of the OBC to 9th May 2022, which in turn squeezes the July Project Board. This is as the result of the 12 week road space lead in that we've added for the Topo surveys	Possibility that OBC may not be ready for the July 2022 Board meeting	The site team have been working with the survey company and revised the TM requirements to reduce the road-space requirement, especially on the HE network. As a result of this, we expect to reduce the 12 weeks to 6 weeks or less, which fits with the original July Board dates. Once revised programme had confirmed the above, it will be issued and the dates below confirmed.	2	2	4	Lewis Banks (PCC Project Manager)	
29	Mar-22	Biodiversity Net Gain	Difficulty is achieving Biodiversity Net Gain objectives currently set for project.	Risk of not meeting standards ste by DEFRA.	PCC and Milestone will hold a meeting with CPCA to discuss this further. If Biodiversity Net Gain cannot be achieved there will still be a number of environmental enhancements delivered as part of this scheme.	2	2	4	Lewis Banks (PCC Project Manager)	
25	Oct-21	Further transport modelling required	**Delay to completion of VISSIM/Saturn** It has been realised that additional modelling is required to assess the different options that are being considered	Delay to completion of transport modelling Task end to be amended	The end date will be revised, but overall impact will be low as the task is not within the critical pathway on the programme.	3	1	3	Lewis Banks (PCC Project Manager)	
24	Jul-21	Passenger Transport services	**Inclusion of passenger transport services** Inclusion of passenger transport services Other than highway improvements, the scheme should also include improvements to public transport into the development.	Inclusion of buses services into development Encourage residents to travel by public transport	To include the CPCA Passenger Transport team in discussions with proposals of scheme. Seek their advice on what can be done to include buses into scheme.	1	1	1	Lewis Banks (PCC Project Manager)	
9	Feb-20	Budget escalation	**More funding required** Work to develop options or time take to model the options may take longer than originally anticpated	Likely effect is that more funding would be required	Programme has allowed for additional time for option development and modelling tasks based on experience of pervious priojects. Overall budget for project is being managed closely to ensure it is to programme, and early warnings can be goven if an overspend is likely.	2	3	6	Lewis Banks (PCC Project Manager)	

17	Jan-21	Change of supplier	**Delay to start of OBC** Current supplier, Skanska is in the process of selling part of its business to M Group Services. This includes highway services. There is a possible risk that transfer of resource may result in delay of project delivery. The consequences of which could impact progress.	Likely effect is that a delay would be caused	Regular communication will be maintained and programme will be revised should there be a need.	2	2	4	Lewis Banks (PCC Project Manager)	
16	Oct-20	Delay in obtaining approval to commence next stage of the project - OBC Raising order to Skanska	**Delay to start of OBC** Due to not receiving approval it becomes difficult to set time frames for programme of works.	We will not be in a postion to raise an order. Skanska will not able to start work on the Outline Business Case.	We will monitor when the review of the SOBC will be completed and will then look for the upcoming board meeting where we can request approval to commence the next stage. A draft programme will be prepared looking at timescales for each of the tasks. UPDATE PCC governance process currently underway. Approval is being sought and will hopefully be confirmed by end of April.	1	1	1	Lewis Banks (PCC Project Manager)	May-21
15	May-20	Limited benefits compared to costs	**Low score BCR** Potential for poor scheme BCR (due to limited benefits compared to costs).	Risk scheme may not offer value for money or achieve the outcomes desired	Will monitor closely during economic assessment and wider benefits explored if necessary.	1	1	1	Lewis Banks (PCC Project Manager)	Oct-20
10	Feb-20	Failure to achieve project outcomes	**Not meeting outcomes** Preferred option does not deliver the original project outcomes	likely effect is the scheme will not resolve the original problems identified.	Scheme objectives will be developed based on the problems identified at the junction and the wider policy objectives. Options will be scored against scheme objectives to ensure that they fit with what is to be achieved.	1	1	1	Lewis Banks (PCC Project Manager)	Oct-20
11	Feb-20	Poor value for money	**BCR Score** BCR for scheme is poor/low value for money.	Likely effect is the scheme will not be deliverable/funded	Options are developed with a good understanding of the existing problems, including an understanding of the current congestion/delay at the junction. Therefore is is likely that a preferred scheme would deliver a postivie BCR. If a only a poor BCR is achieveable, the project will be halted at SOBC stage and not progressed further.	1	1	1	Lewis Banks (PCC Project Manager)	Oct-20

1	Feb-20	Delay in use of PTM3	**Modelling Issues** The PTM3 Saturn Model is still being validated and therefore any delays to the PTM3 programme will impact on this programme	Likely effect is that a delay would be caused	Priority is being given to the PTM3 project in terms of resources to ensure it is ready to test options for this project.	1	1	1	Lewis Banks (PCC Project Manager)	Oct-20
4	Dec-19	Inaccuracy or delay in receiving survey information	**Data issues** Issues with the data such as a road closure/accident may not provide accurate data.	If needed we may decide to undertake another survey to provide us with more data to analyse.	We will plan to schedule the survey at a time when there are no other road works on the network close to the site of the survey.We will contact survey company at an early stage so they can provide a date when the survey can be carried out to avoid a delay, if there is delay then we will contact other survey companies to ask if they have availability/resource to carry out the survey.	1	1	1	Lewis Banks (PCC Project Manager)	Oct-20
7	Sep-19	Delay in obtaining approval to commence project	**Unable to raise order to Skanska** Without approval to start the project we will not be able to get a works order over to Skanska.	Skanska will not able to start work on business case.	To hold a meeting with Skanska to discuss order and schedule of works for rest of the financial year	1	1	1	Lewis Banks (PCC Project Manager)	Jan-20
2	Nov-19	Delay in obtaining approval to commence	**Fully spending grant within financial year**	There will be grant unspent, which could	To hold a meeting with Skanska to discuss what can be achieved	1	1	1	Lewis Banks (PCC Project Manager)	Apr-20
5	Oct-19	Delay in obtaining approval to commence project Raising order to Skanska	**Time frames for delivery** Due to not receiving approval it becomes difficult to set time frames for programme of works.	Skanska will not be able to provide accurate programme of works for the project. Therefore it will not be known how much of the budget will be spent.	Utilise Peterborough Highways contract to ensure best use of available time and resources. Getting the programme confirmed early	1	1	1	Lewis Banks (PCC Project Manager)	Jan-20
30	Apr-22	LTN 1/20 active travel components	The amount of active travel components included within the scheme has been raised within Board meetings, and will be explored further in the next stage once development masterplans are known, so active travel components tie together with the development proposals	Potential for CA funding to be impacted should active travel components not be at the required level.	The Walking Cycling and Horse Riding Review completed as part of consultation for this phase of work will help understand current issues and improvements required. Comments will be investigated in the next phase of work.	2	4	8	Lewis Banks (PCC Project Manager)	
31	Apr-22	Rise in inflation	Scheme construction cost may increase significantly following rise in inflation of raw materials.	More funding than previously identified would be required	This will be regularly monitored. One of the options considered could be to procure raw materials early.	3	3	9	Lewis Banks (PCC Project Manager)	

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Appendix D – Economic Dimension 60 Year Cost Profile (Construction and Maintenance)

A16 Norwood - Do Something Scheme Costs in 2010 Market Prices for Input to Economc Case

Calendar Year	Assessment Year	(1) Base Cost Estimate (2022 Prices)						(2) Base Cost Estimate Including Real Cost Increases (2022 Prices)			(3) Risk Adjusted Base Cost (2022 Prices)		(4) Total Contribution of Optimism Bias		(5) Rebased to 2010 Price Base	(6) Discounted to 2010 Prices			(7) Adjusted to Market Prices
		Construction Costs (Highways)	Construction Costs (Structures)	Land & Property Costs	Preparation and Supervision Costs	Other Costs	Total	Real Cost Inflation	Contribution to Real Cost Increases	Total (Including Real Cost Increases)	Quantified Risk Adjustment	Risk Adjusted Cost	Optimism Bias Adjustment	Optimism Bias Adjusted Cost		Discount Rate	Discount Factor	Discounted to 2010 Prices	
2022	1	£0	£0	£0	£627,547	£64,632	**£692,179**	0.000	£0.00	**£692,179**	£0	**£692,179**	£159,201	**£851,380**	**£667,398**	1.035	0.662	**£441,673**	**£525,590.98**
2023	2	£0	£0	£0	£506,114	£193,895	**£700,009**	1.078	£54,333.00	**£754,342**	£0	**£754,342**	£173,499	**£927,841**	**£727,336**	1.035	0.639	**£465,062**	**£553,423.53**
2024	3	£2,079,940	£0	£0	£332,342	£83,819	**£2,496,102**	1.170	£423,797.61	**£2,919,899**	£0	**£2,919,899**	£671,577	**£3,591,476**	**£2,815,365**	1.035	0.618	**£1,739,281**	**£2,069,744.55**
2025	4	£4,159,881	£0	£0	£411,626	£70,691	**£4,642,198**	1.266	£1,236,240.06	**£5,878,439**	£0	**£5,878,439**	£1,352,041	**£7,230,479**	**£5,667,987**	1.035	0.597	**£3,383,168**	**£4,025,969.97**
2026	5	£0	£0	£0	£0	£0	**£0**	1.308	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.577	**£0**	**£0.00**
2027	6	£0	£0	£0	£0	£0	**£0**	1.349	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.557	**£0**	**£0.00**
2028	7	£0	£0	£0	£0	£0	**£0**	1.393	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.538	**£0**	**£0.00**
2029	8	£0	£0	£0	£0	£0	**£0**	1.438	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.520	**£0**	**£0.00**
2030	9	£0	£0	£0	£0	£0	**£0**	1.485	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.503	**£0**	**£0.00**
2031	10	£0	£0	£0	£0	£0	**£0**	1.535	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.486	**£0**	**£0.00**
2032	11	£0	£0	£0	£0	£0	**£0**	1.586	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.469	**£0**	**£0.00**
2033	12	£0	£0	£0	£0	£0	**£0**	1.640	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.453	**£0**	**£0.00**
2034	13	£0	£0	£0	£0	£0	**£0**	1.695	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.438	**£0**	**£0.00**
2035	14	£0	£0	£0	£0	£0	**£0**	1.753	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.423	**£0**	**£0.00**
2036	15	£0	£0	£0	£0	£0	**£0**	1.811	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.409	**£0**	**£0.00**
2037	16	£0	£0	£0	£0	£0	**£0**	1.871	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.395	**£0**	**£0.00**
2038	17	£0	£0	£0	£0	£0	**£0**	1.933	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.382	**£0**	**£0.00**
2039	18	£0	£0	£0	£0	£0	**£0**	1.998	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.369	**£0**	**£0.00**
2040	19	£0	£0	£0	£0	£0	**£0**	2.065	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.356	**£0**	**£0.00**
2041	20	£0	£0	£0	£0	£0	**£0**	2.135	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.344	**£0**	**£0.00**
2042	21	£0	£0	£0	£0	£0	**£0**	2.208	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.333	**£0**	**£0.00**
2043	22	£0	£0	£0	£0	£0	**£0**	2.284	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.321	**£0**	**£0.00**
2044	23	£0	£0	£0	£0	£0	**£0**	2.363	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.310	**£0**	**£0.00**
2045	24	£0	£0	£0	£0	£0	**£0**	2.446	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.300	**£0**	**£0.00**
2046	25	£0	£0	£0	£0	£0	**£0**	2.532	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.290	**£0**	**£0.00**
2047	26	£0	£0	£0	£0	£0	**£0**	2.622	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.280	**£0**	**£0.00**
2048	27	£0	£0	£0	£0	£0	**£0**	2.715	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.271	**£0**	**£0.00**
2049	28	£0	£0	£0	£0	£0	**£0**	2.812	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.261	**£0**	**£0.00**
2050	29	£0	£0	£0	£0	£0	**£0**	2.913	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.253	**£0**	**£0.00**
2051	30	£0	£0	£0	£0	£0	**£0**	3.017	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.035	0.244	**£0**	**£0.00**
2052	31	£0	£0	£0	£0	£0	**£0**	3.125	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.289	**£0**	**£0.00**
2053	32	£0	£0	£0	£0	£0	**£0**	3.237	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.281	**£0**	**£0.00**
2054	33	£0	£0	£0	£0	£0	**£0**	3.353	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.272	**£0**	**£0.00**
2055	34	£0	£0	£0	£0	£0	**£0**	3.473	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.264	**£0**	**£0.00**
2056	35	£0	£0	£0	£0	£0	**£0**	3.597	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.257	**£0**	**£0.00**
2057	36	£0	£0	£0	£0	£0	**£0**	3.725	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.249	**£0**	**£0.00**
2058	37	£0	£0	£0	£0	£0	**£0**	3.858	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.242	**£0**	**£0.00**
2059	38	£0	£0	£0	£0	£0	**£0**	3.995	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.235	**£0**	**£0.00**
2060	39	£0	£0	£0	£0	£0	**£0**	4.136	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.228	**£0**	**£0.00**
2061	40	£0	£0	£0	£0	£0	**£0**	4.281	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.221	**£0**	**£0.00**
2062	41	£0	£0	£0	£0	£0	**£0**	4.431	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.215	**£0**	**£0.00**
2063	42	£0	£0	£0	£0	£0	**£0**	4.586	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.209	**£0**	**£0.00**
2064	43	£0	£0	£0	£0	£0	**£0**	4.745	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.203	**£0**	**£0.00**
2065	44	£0	£0	£0	£0	£0	**£0**	4.909	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.197	**£0**	**£0.00**
2066	45	£0	£0	£0	£0	£0	**£0**	5.075	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.191	**£0**	**£0.00**
2067	46	£0	£0	£0	£0	£0	**£0**	5.243	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.185	**£0**	**£0.00**
2068	47	£0	£0	£0	£0	£0	**£0**	5.420	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.180	**£0**	**£0.00**
2069	48	£0	£0	£0	£0	£0	**£0**	5.603	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.175	**£0**	**£0.00**
2070	49	£0	£0	£0	£0	£0	**£0**	5.795	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.170	**£0**	**£0.00**
2071	50	£0	£0	£0	£0	£0	**£0**	5.991	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.165	**£0**	**£0.00**
2072	51	£0	£0	£0	£0	£0	**£0**	6.196	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.160	**£0**	**£0.00**
2073	52	£0	£0	£0	£0	£0	**£0**	6.412	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.155	**£0**	**£0.00**
2074	53	£0	£0	£0	£0	£0	**£0**	6.639	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.151	**£0**	**£0.00**
2075	54	£0	£0	£0	£0	£0	**£0**	6.877	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.146	**£0**	**£0.00**
2076	55	£0	£0	£0	£0	£0	**£0**	7.128	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.142	**£0**	**£0.00**
2077	56	£0	£0	£0	£0	£0	**£0**	7.388	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.138	**£0**	**£0.00**
2078	57	£0	£0	£0	£0	£0	**£0**	7.658	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.134	**£0**	**£0.00**
2079	58	£0	£0	£0	£0	£0	**£0**	7.942	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.130	**£0**	**£0.00**
2080	59	£0	£0	£0	£0	£0	**£0**	8.238	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.126	**£0**	**£0.00**
2081	60	£0	£0	£0	£0	£0	**£0**	8.541	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.123	**£0**	**£0.00**
2082	61	£0	£0	£0	£0	£0	**£0**	8.851	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.119	**£0**	**£0.00**
2083	62	£0	£0	£0	£0	£0	**£0**	9.172	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.116	**£0**	**£0.00**
2084	63	£0	£0	£0	£0	£0	**£0**	9.504	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.112	**£0**	**£0.00**
2085	64	£0	£0	£0	£0	£0	**£0**	9.843	£0.00	**£0**	£0	**£0**	£0	**£0**	**£0**	1.030	0.109	**£0**	**£0.00**
Total		**£6,239,821**	**£0**	**£0**	**£1,877,629**	**£413,037**	**£8,530,488**		**£1,714,371**	**£10,244,859**	**£0**	**£10,244,859**	**£2,356,317**	**£12,601,176**	**£9,878,086**			**£6,029,184**	**£6,649,138**

Step	Description	Scheme Cost at Each Step
(1)	Outlines the initial estimate of the investment costs in 2020 prices but taking no account of real increases in construction costs. Includes Design cost, Construction cost profile, Land cost, Preparation and Administration costs. Year of Opening is assumed to be 2021 in this assessment. No historic (bygone) costs have been provided and it is assumed that these won't influence the investment decision.	**£8,530,488**
(2)	The base costs have been adjusted to incorporate real cost increases (WebTAG A1.2) in construction costs.	**£10,244,859**
(3)	~~Following the real cost adjustment a quantified risk contribution has been applied.~~	**£10,244,859**
(4)	The next stage is to apply optimism bias.	**£12,601,176**
(5)	Optimism bias adjusted costs have been converted to the current price base (i.e. 2010) using the governments GDP deflator tool (WebTAG A1.2).	**£9,878,086**
(6)	Costs have been discounted to 2010 present values by applying a discount rate of 3.5% per year for 30 years and 3.0% thereafter (WebTAG A1.2).	**£6,029,184**
(7)	The final stage in preparing the scheme costs is to convert them from the factor cost to the market price unit of account using the indirect tax correction factor of 1.19	**£6,649,138**

A16 Norwood - Do Something Scheme Costs in 2010 Market Prices for Input to Economc Case

Calendar Year	Assessment Year	(1) Base Cost Estimate (2022 Prices)		(2) Base Cost Estimate Including Real Cost Increases (2022 Prices)			(3) Risk Adjusted Base Cost (2022 Prices)		(4) Total Contribution of Optimism Bias		(5) Rebased to 2010 Price Base	(6) Discounted to 2010 Prices			(7) Adjusted to Market Prices
		Maintenance Costs	Total	Real Cost Inflation	Contribution to Real Cost Increases	Total (Including Real Cost Increases)	Quantified Risk Adjustment	Risk Adjusted Cost	Optimism Bias Adjustment	Optimism Bias Adjusted Cost		Discount Rate	Discount Factor	Discounted to 2010 Prices	
2022	1	£0	**£0**	0.000	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.662	**£0**	**£0.00**
2023	2	£0	**£0**	1.050	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.639	**£0**	**£0.00**
2024	3	£0	**£0**	1.103	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.618	**£0**	**£0.00**
2025	4	£0	**£0**	1.158	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.597	**£0**	**£0.00**
2026	5	£0	**£0**	1.216	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.577	**£0**	**£0.00**
2027	6	£0	**£0**	1.276	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.557	**£0**	**£0.00**
2028	7	£0	**£0**	1.340	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.538	**£0**	**£0.00**
2029	8	£0	**£0**	1.407	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.520	**£0**	**£0.00**
2030	9	£0	**£0**	1.477	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.503	**£0**	**£0.00**
2031	10	£0	**£0**	1.551	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.486	**£0**	**£0.00**
2032	11	£0	**£0**	1.629	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.469	**£0**	**£0.00**
2033	12	£0	**£0**	1.710	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.453	**£0**	**£0.00**
2034	13	£0	**£0**	1.796	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.438	**£0**	**£0.00**
2035	14	£0	**£0**	1.886	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.423	**£0**	**£0.00**
2036	15	£0	**£0**	1.980	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.409	**£0**	**£0.00**
2037	16	£0	**£0**	2.079	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.395	**£0**	**£0.00**
2038	17	£0	**£0**	2.183	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.382	**£0**	**£0.00**
2039	18	£25,000	**£25,000**	2.292	£32,300.46	**£57,300**	£0	**£57,300**	£0.00	**£57,300**	**£44,918**	1.035	0.369	**£16,563**	**£19,710.45**
2040	19	£0	**£0**	2.407	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.356	**£0**	**£0.00**
2041	20	£0	**£0**	2.527	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.344	**£0**	**£0.00**
2042	21	£0	**£0**	2.653	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.333	**£0**	**£0.00**
2043	22	£0	**£0**	2.786	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.321	**£0**	**£0.00**
2044	23	£0	**£0**	2.925	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.310	**£0**	**£0.00**
2045	24	£0	**£0**	3.072	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.300	**£0**	**£0.00**
2046	25	£0	**£0**	3.225	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.290	**£0**	**£0.00**
2047	26	£0	**£0**	3.386	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.280	**£0**	**£0.00**
2048	27	£0	**£0**	3.556	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.271	**£0**	**£0.00**
2049	28	£0	**£0**	3.733	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.261	**£0**	**£0.00**
2050	29	£0	**£0**	3.920	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.253	**£0**	**£0.00**
2051	30	£0	**£0**	4.116	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.035	0.244	**£0**	**£0.00**
2052	31	£0	**£0**	4.322	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.289	**£0**	**£0.00**
2053	32	£0	**£0**	4.538	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.281	**£0**	**£0.00**
2054	33	£0	**£0**	4.765	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.272	**£0**	**£0.00**
2055	34	£25,000	**£25,000**	5.003	£100,079.71	**£125,080**	£0	**£125,080**	£0.00	**£125,080**	**£98,050**	1.030	0.264	**£25,928**	**£30,854.64**
2056	35	£0	**£0**	5.253	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.257	**£0**	**£0.00**
2057	36	£0	**£0**	5.516	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.249	**£0**	**£0.00**
2058	37	£0	**£0**	5.792	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.242	**£0**	**£0.00**
2059	38	£0	**£0**	6.081	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.235	**£0**	**£0.00**
2060	39	£0	**£0**	6.385	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.228	**£0**	**£0.00**
2061	40	£0	**£0**	6.705	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.221	**£0**	**£0.00**
2062	41	£0	**£0**	7.040	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.215	**£0**	**£0.00**
2063	42	£0	**£0**	7.392	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.209	**£0**	**£0.00**
2064	43	£0	**£0**	7.762	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.203	**£0**	**£0.00**
2065	44	£0	**£0**	8.150	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.197	**£0**	**£0.00**
2066	45	£0	**£0**	8.557	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.191	**£0**	**£0.00**
2067	46	£0	**£0**	8.985	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.185	**£0**	**£0.00**
2068	47	£0	**£0**	9.434	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.180	**£0**	**£0.00**
2069	48	£0	**£0**	9.906	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.175	**£0**	**£0.00**
2070	49	£0	**£0**	10.401	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.170	**£0**	**£0.00**
2071	50	£25,000	**£25,000**	10.921	£248,033.33	**£273,033**	£0	**£273,033**	£0.00	**£273,033**	**£214,031**	1.030	0.165	**£35,270**	**£41,971.42**
2072	51	£0	**£0**	11.467	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.160	**£0**	**£0.00**
2073	52	£0	**£0**	12.041	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.155	**£0**	**£0.00**
2074	53	£0	**£0**	12.643	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.151	**£0**	**£0.00**
2075	54	£0	**£0**	13.275	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.146	**£0**	**£0.00**
2076	55	£0	**£0**	13.939	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.142	**£0**	**£0.00**
2077	56	£0	**£0**	14.636	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.138	**£0**	**£0.00**
2078	57	£0	**£0**	15.367	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.134	**£0**	**£0.00**
2079	58	£0	**£0**	16.136	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.130	**£0**	**£0.00**
2080	59	£0	**£0**	16.943	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.126	**£0**	**£0.00**
2081	60	£0	**£0**	17.790	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.123	**£0**	**£0.00**
2082	61	£0	**£0**	18.679	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.119	**£0**	**£0.00**
2083	62	£0	**£0**	19.613	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.116	**£0**	**£0.00**
2084	63	£0	**£0**	20.594	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.112	**£0**	**£0.00**
2085	64	£0	**£0**	21.623	£0.00	**£0**	£0	**£0**	£0.00	**£0**	**£0**	1.030	0.109	**£0**	**£0.00**
Total		**£75,000**	**£75,000**		**£380,413**	**£455,413**	**£0**	**£455,413**	**£0**	**£455,413**	**£357,000**			**£77,762**	**£92,537**

Step	Description	Scheme Cost at Each Step
(1)	Outlines the initial estimate of the investment costs in 2020 prices but taking no account of real increases in construction costs. Includes Design cost, Construction cost profile, Land cost, Preparation and Administration costs. Year of Opening is assumed to be 2021 in this assessment. No historic (bygone) costs have been provided and it is assumed that these won't influence the investment decision.	£75,000
(2)	The base costs have been adjusted to incorporate real cost increases (WebTAG A1.2) in construction costs.	£455,413
(3)	~~Following the real cost adjustment a quantified risk contribution has been applied.~~	£455,413
(4)	The next stage is to apply optimism bias.	£455,413
(5)	Optimism bias adjusted costs have been converted to the current price base (i.e. 2010) using the governments GDP deflator tool (WebTAG A1.2).	£357,000
(6)	Costs have been discounted to 2010 present values by applying a discount rate of 3.5% per year for 30 years and 3.0% thereafter (WebTAG A1.2).	£77,762
(7)	The final stage in preparing the scheme costs is to convert them from the factor cost to the market price unit of account using the indirect tax correction factor of 1.19	£92,537

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Appendix E – TAG Worksheet: Landscape

TAG Landscape Impacts Worksheet

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The location of the proposed highway scheme is within the LCA of the'Peterborough Fen Fringe'. The landscape surrounding the proposed scheme is characterised by low-lying flat arable farmland, with a small residential area along Newborough Road. Dominant features are the A16 and A47 to east and A15 to the west. The vegetation coverage accompanying the landscape in this area is characterised by hedgerows, scattered trees and tree shelter belts, including those which line local roads. The proposed highway scheme is not located within a statutiry or non-statutory designated area for landscape character or quality, and the predominant land use of the area will not change as a result of the proposed scheme which improves the existing road network.	Locally	At scheme level the landscape is relatively common within the Fens. The main highway routes are common of local infrastructure.	Moderate Local. The proposed scheme lies within a LCA. The main routes within the study area are of high importance for residents and visitors of the City. Policy LP27: Landscape Character of Peterborough Local Plan states that new development in and adjoining the countryside should be located and designed in a way that is sensitive to its landscape setting; retaining, enhancing or restoring the distinctive qualities of the landscape character area and sub area in which it would be situated.	The highway scheme itself would not take anything away from the existing landscape or change the landuse of the area, as proposed works are to the existing highway network.	**Neutral Effect:** The Landscape pattern will not be altered by the scheme.
Tranquility	The scheme is located to the north-east of Peterborough, and has several main roads within the study area, these being the A16 and A47, of which both experience high daily traffic flows. These routes provide key routes for residents / vistors of the city and provide access to wider areas of Crowland and Thorney, then further afield to Kings Lynn. The existing highway network creates visual and audible intrusions on the landscape, however much of the LCA away from these features is open and exposed. The proposed scheme would not impact levels of tranquility in the long-term however construction phases may cause impact.	Locally important routes for the City. Disruption due to the highway network is at a local level.	The level of tranquility is relatively common within the Fens alongside these main roads. Levels of visual, lite and audible intrusion associated with the highway are common within the local wider infrastructure network.	Intrusion is of high importance at a local level, particularly for the residents located along Newborough Road. Likely to worsen as a result of the Norwood and Paston development.	The existing levels of tranqulity would be easily maintained, and potentially imporved over time as vegetation matures. Design improvements could lead to more effective noise attenuation and less intrustive lighting options.	**Slight Adverse Effect.** By improving the operational efficiency of the junction, there is potentuial for the scheme to reduce the visual amentity by increasing the future levels of traffic in the area.
Cultral	The area in which the Norwood scheme lies is the Peterborough Fen Fringe, associated with the history of the Peterborough clay extractions and brick industry. There is a rich cultural heritage in the study area, with the scheme located close proximity to a Scheduled Monumnet.	Locally	Locally rare.	Moderate Local. The proposed scheme lies within a LCA, and close to heritage assets. Policy LP27: Landscape Character of Peterborough Local Plan states that new development in and adjoining the countryside should be located and designed in a way that is sensitive to its landscape setting; retaining, enhancing or restoring the distinctive qualities of the landscape character area and sub area in which it would be situated.	The historic assets are of low substitutability.	**Neutral Effect:** The cultural element of the landscape will not be altered by the scheme.
Landcover	Landcover consists mostly of hedgerows, scattered trees and tree shelter belts, including those which line the local roads. There are no distinctive or unusual trees of particular value at this site. Planting is not unusual to the area and can be seen along the main routes which cross through the study area. Although the trees can be replaced with similar species without difficulty, replacement trees would take some time to reach full maturity	Locally. Screening purpose is present to some degree.	Species for screening trees are typical of surrounding areas on the network.	Moderate importance for their screening function, however are of lower quality.	The scheme will require a degree of vegetation clearence. Replanting can occur without difficulty, but vegetation will need time to reach full maturity. The project will deliver a minimum 10% net gain in biodiversity that would compliment the existing natural features of the study area.	**Slight Adverse Effect.** There is likely going to be vegeation loss associated with the scheme and construction. Lengthy period to re=establish the landcover is needed.

Reference Sources

Step 5 - Summary Assessment Score

Neutral Effect.

Qualitative Comments

The proposed scheme will neutral impact the scale, landform and pattern of the landscape surrounding the Norwood study area. Tranquility associated with improving the operational efficiency may be slightly impacted long-term, however this will be associated in connection with the nearby developments of Norwood and Paston. The likely tree loss along the A16 will be noticeable during and for a time after the works are complete, however vegetation is easily replaced. Replanting measures will allow for no change to landscape in the future. The landscape here is not designated or vulnerable to change.

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Appendix F – TAG Worksheet: Historic Environment

TAG Historic Environment Impacts Worksheet

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	The Norwood study area is not located within a Conservation Area, nor does the site boundary contain any Listed Buildings or designated heritage assets of Parks and Gardens. The closest designated historic asset within a 1km radius of the Norwood study area is the Scheduled Monument Car Dyke (namely the section between Whitepost Road and Fen). The assest is positioned 780m north of the proposed Norwood scheme. Car Dyke is designated for being a 'rare example of a Roman Canal', that is a significant feature within Peterborough's setting. The asset is considered to represent a heritage receptor of high value, representing an important feature of the Roman historical landscape with high archaeological value, through its alignment and function and any deposits that lie within it.	The protection and enhancement of heritage assets is of national concern as set out in the National Planning Policy Framework (NPPF), which sets out to conserve heritage assets in proportion to their significance. Any potential archaeological remains are considered likely to be of local and regional importance.	Buried remains associated with the Scheduled Monument would likely be considered of national significance.	Archaelogical remains in the area is still unknown, but are likely to be relatively 'common' archaeological features for the region.	**Slight Adverse Effect:** Given the distance from the Scheduled Monumnet, it is unlikely that the scheme will directly impact the asset or land surrounding it. Despite this there is potential for buried archaeological remains to be encountered during construction. The scale of this impact is considered minimal due to the nature of the improvement works which are taking place within the confines of the existing Highway infrastructure, which would have likely impacted any buried archaeological remains during the original construction phases of the main routes of A16 / A47. Mitigation could result in an ameliorative outcome, with any remains being recorded prior to removal through implementation of an archaeological watching brief, if required, following consultation with the Peterborough City Council Archaeologist.
Survival	Archaelogical features previously discovered consisted of Early Bronze Age and Post-Medieval. Landuse of the area surrounding the propsed scheme has been significantly altered, following the development of the highway network of the A47 and A16. The survival of any archaeolgical remains since the construction of the parkway is unknown.	The protection and enhancement of heritage assets is of national concern as set out in the National Planning Policy Framework (NPPF), which sets out to conserve heritage assets in proportion to their significance. The condition of heritage assets is a factor to their significance.	If any buried remains were to be uncovered during construction in pockets of undisturbed land, items would likely be considered of national significance.	The condition of the known heritage assets is common locally, as development of the City has been altered.	**Slight Adverse Effect:** Despite the original construction of the A47 / A16 uncovering and excavating extensive archaeological remains, the potential for more intact remains is unknown.
Condition	Heritage assets within the surrounding area of the proposed scheme are documented as maintained. The condition of any remains are unknown but likely to have been impacted previously by the construction of both the highway network.	The protection and enhancement of heritage assets is of national concern as set out in the National Planning Policy Framework (NPPF), which sets out to conserve heritage assets in proportion to their significance. The condition of heritage assets is a factor to their significance.	If any buried remains were to be uncovered during construction in pockets of undisturbed land, items would likely be considered of national significance.	The condition of the known heritage assets is common locally, as development of the City has been altered.	**Slight Adverse Effect:** Despite the original construction of the A47 / A16 uncovering and excavating extensive archaeological remains, the potential for more intact remains is unknown.
Complexity	The complexity of the surviving remains are unknown, but likely to be relatively complex in form if similar to, and potentially associated with, the remains excavated in the Scheduled Monument Area in the past.	The protection and enhancement of heritage assets is of national concern as set out in the National Planning Policy Framework (NPPF), which sets out to conserve heritage assets in proportion to their significance. The complexity of heritage assets is a factor to their significance.	Buried remains associated with the Scheduled Monument would likely be considered of national significance.	Archaelogical remains in the area unknown, but are likely to be relatively 'common' archaeological features for the region.	**Neutral Effect:** The scheme would have a neutral impact on the complexity of the heritage assets.
Context	The norwwod study area is characterised by the highway network facilitating the flow of traffic of residents, workers and visitors between the City and beyond towards Wisbech and Kings Lynn. This layout of the highway network is common and found elsewhere in Peterborough. The landscape surrounding the study area is laregly flat low-lying arable farmland, which is open and exposed. The highway network does provide intrusion on the landscape of the area.	The context of heritage assets is a consideration at all levels.	The context is of locally common.	The context is fairly uncommon in Peterborough.	**Neutral Effect:** The historic environment largley remains the same, given the works remain within the existing highway boundary and previously disturbed archaeological land. If any new discoveries during proposed works were to be discovered, the impact on items would be mitigated against by methods of works / watching briefs etc.
Period	Historic records have shown findings from the early Bronze Age and Post Medieval period.	Policy LP19 details the council's position in terms of the city's historic environment. It states the council recognised that the historic environment plays an important role in the quality of life for local communities and will protect, conserve and seek opportunities to enhance the city's rich heritage and their settings.	The heritage assets are locally significant because they could provide an understanding of the Medieval / Post Medieval development of the region.	If archaeological remains were to be uncovered it would be of local and regional importance, furthering the historic records of the area.	**Neutral Effect:** The historic environment largley remains the same, given the works remain within the existing highway boundary and previously disturbed archaeological land. If any new discoveries during proposed works were to be discovered, the impact on items would be mitigated against by methods of works / watching briefs etc.

Reference Sources

Step 5 - Summary Assessment Score

Slight Adverse Impact.

Qualitative Comments

The archaeological potential of the surrounding area is relatively high but this is in part reduced due to the scale of the highway network within the vicinity of the scheme at present. As the proposed works are of a (relatively) minor scale in terms of land take and depth of excavation, it is considered that the potential to impact any potential buried archaeological remains (if they are indeed present) is low, with the previous construction works for the highway itself having likely removed any archaeological remains. At this stage with mitigations not confirmed for construction, the result is a slight adverse effect, however this can be managed in the next phase of work.

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Appendix G – TAG Worksheet: Biodiversity

TAG Biodiversity Impacts Worksheet

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Nene Washes SPA, SSSI and Ramsar	The Nene Washes is a 15 square km Ramsar internationally important wetland site, a Special Area of Conservation, a Special Protection Area and a Nature Conservation Review site. The site is almost entirely lowland wet grassland managed primarily for breeding waders, which involves grazing and mowing to maintain a short and varied sward. There are swampier areas which support nesting cranes and spotted crakes. Reeds and trees are discouraged. The Nene Washes internationally designated site for nature conservation lies within 5km of the proposed works to the south.	**International**	**Very High** The Nene Washes is a SSSI of local, regional, national and international importance, supporting Wildfowl and wadering birds, invertebrate and botanical species. It accommodates nationally and internationally important groups of migratory, breeding and non-breeding bird species.	**Monitored Species - Above target levels** The Natural England report known as The European Site Conservation Objectives: supplementary advice on conserving and restoring site features for the Nene Washes Special Protection Area (SPA) was published in January 2019. Attributes for each ecological characteric of the designated species and habitats are described, with qualitative and quantitative targets set. As of 2019/2020, there has been a substantial decline in Bewick's swans. The population of the other species are above the target levels. A summary of the population trends for these species is shown in the Addendum to this Worksheet. No data is available for 2020/2021.	**Very High** High importance and rarity, international scale and limited potential for substitution. Nationally designated site	**Neutral** This proposed works are not within the SSSI, and no impact should be proposed.	**Neutral**
Dogsthorpe Star Pit Site of Special Scientific Interest (SSSI) and Local Nature Reserve (LNR) Site within the immediate Impact Risk Zone for the SSSI	Dogsthorpe Star Pit SSSI and LNR spans an area of 37ha and is comprised of a landscape that contains a variety of habitats including scrub, grassland, reedbeds, and network of small pools and open water. The site is a former clay pit associated with the brick industry of Peterborough. The site is designation under the Wildlife and Countryside Act (1981), for its diverse aquatic invertebrate assemblage including 64 species of Water Beetle (5 of which are nationally rare and a further 35 nationally scarce), and high array of plant communities which are rare across Cambridgeshire . The importance of the site is considered on a national scale. The proposed scheme is located 50m away from the SSSI at closets point.	**International / National**	**Very High** The SSSI is of local, regional, national and international importance, supporting a host of species recognised as nationally scarare / rare, and holds high importance within the local area of Cambrisgeshire.	**Unknown** No trend data is evident for this location. The proposed scheme is located within an immediate impact zone for the SSSI, so potential for impact is present. The proposed works are however defined within the existing highway boundary.	**Very High** High importance and rarity, international scale and limited potential for substitution. Nationally designated site	**Minor Negative:** This proposed works are not within the boundary of the SSSI, however works are within an immediate impact zone. Proposed works located 50m away from the site at cloest point/.	**Slight Adverse**
Littlewood County Wildlife Site (CWS)	The CWS lies immediately east of the Dogsthorpe Star Pit SSSI, and is designated for its Ancient Semi Natural Woodland. The site provides a buffer of protection for the SSSI.	**National**	**High** The CWS holds importance on national and local scale, providing a buffer zone for the SSSI, and ancient woodland.	**Unknown** No trend data is evident for this location. The proposed scheme is located within an immediate impact zone for the SSSI, so potential for impact is present. The proposed works are howeverdefined within the existing highway boundary.	**High**	**Neutral** This proposed works are located over 1km away from the CWS, no impact is expected.	**Neutral**
Birds (Protected Species)	Protect species. The proposed working area has potential to impact breeding / nesting bitrds. Localised areas of existing vegetation were identified to provide food and nesting opportunities for common bird species. It's expected that vegetation supporting breeding birds will be removed, to enable the proposed works to be undertaken. To avoid adverse effect on breeding birds any clearance works related to the scheme will be completed outside of the bird breeding season (March-September).	**International**	**Very High** All nesting birds are protected under The Wildlife and Countryside Act 1981 (as amended) and therefore the disturbance of their nesting places is considered an offence.		**High**	**Minor Negative:** Localised areas of existing vegetation were identified to provide food and nesting opportunities for common bird species. It's expected that vegetation supporting breeding birds will be removed to enable the proposed works to be undertaken.	**Slight Adverse**
Bats (Protected Species)	The site has negligible potential for hosting bats. Suitable trees were assessed during the site visit, however a lack of suitable features (e.g. cracks/crevices) were observed. Despite negligible potential for bats, wider habitats surrounding the proposed scheme area such as linear hedgerows, grassland and woodland do provide potential commuting and foraging habitats for bats. Additionally, the potential for light pollution exists during the construction and operational phases of the proposed scheme. In response to this, all lighting that is required for the proposed scheme will be designed in accordance with the relevant British Standards and Institute of Lighting Professionals	**National**	**High** All bat species are protected by the Wildlife and Countryside Act (1981) (as amended) and the Conservation of Habitats and Species Regulations (2017) (as amended).	**Stable** The National Bat Monitoring Programme (NBMP) produce population trends for 11 of Great Britain's breeding bat species. All are considered to have been stable or to have increased since the baseline year of monitoring (1999 for most species).	**High**	**Minor Negative** Should vegetation removal be required, the proposed works may disturb features that are suitable for bats. The construction and final design may impact foraging and commuting bats as well as provide issues of light dispersal.	**Slight Adverse**
Amphibians (Protected Species)	The propsoed working area has moderate potential to host Great Crested Newts (GCN's). The proposed scheme site lies within Amber and Green Risk Zones for the protected species of GCN's. These zones indicate population centres for the species and comprise of connecting habitats which aid natural dispersal. The proposed scheme is not expected to result in any loss of habitat such as ponds that could sustain GCN populations, however with suitable foraging and commuting habitats identified for the species, it is considered a Precautionary Method of Working (PMoW) for GCN'S should be implemented, whereby any habitat manipulation is carried out under the supervision of a suitably qualified Ecologist who either holds a low-class impact licence or a surveying and handling licence for the species. Further assessments into GCN's will be reassessed within the next phase of work, closest to construction.	**International**	**Very High** GCN are protected under Annexe II and IV of the Habitats Directive, Conservation of Habitats and Species Regulations (Schedule 2), and the Wildlife and Countryside Act (1981) (Schedule 5).	**Decline** GCNs have suffered enormous declines with 50% of ponds in the UK lost in the 20th century and 80% of current ponds in a poor state. The population baseline estimate given for the site is that from the 2014 occupancy modelling work undertaken by Froglife, commissioned by Natural England. Data records within the vicinity of the SSSI, dating back to 2001 have indicated varying levels of the species over the years within the locality of the scheme, however 2018 / 2019 survey data (provided by CPERC) have indicated a presence of GCN's associated with the SSSI ponds.	**Very High** GCN are a protected species.	**Minor Negative:** The proposed works are not within the boundary of the SSSI, however works have the potential to impact the suitable foraging and commuting terrestrial habitats for GCN's.	**Slight Adverse**
Common Reptiles	The site has moderate potential to host basking and foraging reptiles. The site has been assessed as providing potential opportunities to support common reptile species, within grasslands and scattered scrub along the A16 verges and the bridleway. To avoid any potential adverse impact on reptiles if found, works should be programmed during the reptile active season (March-September) and therefore it is considered likely that, should reptiles be present in the area they would move away of their own accord.	**International**	**Very High** Retiles are protected under the Wildlife and Countryside Act (1981) (Schedule 5).		**Very High** Reptiles are a protected species.	**Minor Negative:** The proposed works are not within the boundary of the SSSI, however works have the potential to impact the suitable foraging and commuting terrestrial habitats for common reptiles.	**Slight Adverse**

Reference Sources

Summary Assessment Score

Slight Adverse Effect.

Qualitative Comments

The proposed works is located within the Impact Risk Zone of the SSSI, and within a Amber / Green Zone for the protected species of GCN's. At this stage of the project, it is expected that a degree of impact will be placed upon already identified species within an ecological constraints reports (undertken November 2021), with species including common birds, bats, GCN's and wider common reptiles. A precautionary method of works is recommended at this stage, as well as avoiding particular seasons i.e bird breeding season etc.

The scheme is required to deliver a minimum of 10% biodiversity net gain.

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Appendix H – TAG Worksheet: Water Environment

TAG Water Environment Impacts Worksheet

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Flood Risk	Floodplain	Conveyance of flood flows	Low: The study area is within Flood Zone 1, low probability for flooding.	Local	Common	Not feasible	Low	Negligible	Insignificant

Reference Sources

Summary Assessment Score

Neutral Impact

Qualitative Comments

The risk to water quality and surface water across the study area is low. The study area is located within a Flood Risk zone 1, low probability for flooding. The construction activities and the new scheme in operation are considered to have an insignificant impact on water features beyond the study area. Mitigation measures outlined within a CEMP will further prevent any adverse impact on key features. Operational drainage will be designed to ensure there will be no additional flood risk from surface water runoff.

Appendix I – TAG Worksheet: Air Quality Valuation

Air Quality Valuation Workbook - Worksheet 3

Scheme Name:	A16 Peterborough
Present Value Base Year	2010
Current Year	2022
Proposal Opening year:	2031
Project (Road/Rail or Road and Rail):	Road Transport (RT)

Overall Assessment Score:

Damage Costs Approach (Emissions)

Present value of change in NOx emissions (£):	£0
Present value of change in PM2.5 emissions (£):	£0
OR	
Present value of change in PM10 emissions (£):	£0

Impact Pathways Approach (Concentrations)

Present value of change in NO2 concentrations (£):	-£5,278
Of which:	
Concentration costs:	-£3,306
Other impacts:	-£1,972
Present value of change in PM2.5 concentrations (£):	-£48,255
Of which:	
Concentration costs:	-£48,407
Other impacts:	£152

Total Change

Total value of change in air quality (£):	-£53,533

*positive value reflects a **net benefit** (i.e. air quality improvement)

Quantitative Assessment:

Impact Pathways Approach (Concentrations)

Change in NO2 assessment scores over 60 year appraisal period: (between 'with scheme' and 'without scheme' scenarios)	501.59
Change in PM2.5 assessment scores over 60 year appraisal period: (between 'with scheme' and 'without scheme' scenarios)	936.86

Damage Costs Approach (Emissions)

Change in NOX emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios)	0
Change in PM2.5 emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios)	0
OR	
Change in PM10 emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios)	0

Qualitative Comments:

Sensitivity Analysis:

Upper estimate net present value of change in air quality (£):	-£169,680
Lower estimate net present value of change in air quality (£):	-£11,099

Data Sources:

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Appendix J – TAG Worksheet: Noise

Noise Workbook - Worksheet 1

Proposal Name: A16 Norwood

Present Value Base Year	2010
Current Year	2022
Proposal Opening year:	2026
Project (Road, Rail or Aviation):	road

Net present value of change in noise (£):	£47,995

*positive value reflects a **net benefit** (i.e. a reduction in noise)

Net present value of impact on sleep disturbance (£):	£23,657
Net present value of impact on amenity (£):	£16,045
Net present value of impact on AMI (£):	£5,092
Net present value of impact on stroke (£):	£1,278
Net present value of impact on dementia (£):	£1,925

Quantitative results

Households experiencing increased daytime noise in forecast year:	1
Households experiencing reduced daytime noise in forecast year:	2
Households experiencing increased night time noise in forecast year:	n/a
Households experiencing reduced night time noise in forecast year:	n/a

Qualitative Comments:

An outline application (19/00272/OUT) for the erection of up to 870 residential dwellings; provision of a two-form entry primary school and playing field; a local centre up to 0.25ha with A1/A2/A3/A4/A5/D1 use classes; open space and landscaping; and other infrastructure and associated works including demolition of all buildings on site, with access secured and all other matters reserved is planned at Land off Newborough Road, Leed's Farm, Paston, Peterborough. The development is planned in an area where noise levels changes are predicted to be negligible but for the reduction in the immidiacy of Newborough Road due to the closure of the juntion of this road with the A47. Due to the uncertainty linked to the traffic links between the development and the current road network as well as the fact that most of the site is in an area where noise levels changes are predicted to be negligible, a valuation of £0 is considered for the new development.

Data Sources:

Road traffic model produced by Capita.

Appendix K – TAG Worksheet: Appraisal Summary Table (AST)

Appraisal Summary Table

Date produced:	

Contact:	
Name	
Organisation	
Role	

Name of scheme:	A16 Norwood Improvement Scheme
Description of scheme:	A scheme with both highway and active travel improvements to help facilitate growth aspirations of the Norwood and Paston urban extensions to the north-east of Peterborough. Additional highway capacity will address issues of delay and congestion on strategic routes, whilst active travel provision will better connect the future development to the wider network limiting severance for users.

Impacts		Summary of key impacts	Assessment					
			Quantitative				Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme will result in a net reduction in journey times for business users and transport providers over a 60-year appraisal period for all time periods. The most significant benefits are experienced for journeys within 5 minutes.	Value of journey time changes(£)	£4,836,000			Not Assessed	£4,837,000	Not Assessed
			Net journey time changes (£)						
			0 to 2min	2 to 5min	> 5min				
			£1,538,000	£3,250,000	£48,000				
	Reliability impact on Business users	Not Assessed	Not Assessed				Not Assessed	Not Assessed	
	Regeneration	Not Assessed	Not Assessed				Not Assessed	Not Assessed	
	Wider Impacts	Not Assessed	Not Assessed				Not Assessed	Not Assessed	
Environmental	Noise	No Noise Important Areas (NIA) are defined within the study area. No significant adverse effects are expected during the operation of the proposed scheme, with receptors closest to the scheme predicted to have less than 3 dB LA10 change in the long term. No noise or vibration mitigation measures are envisaged to be required for the operational phase of the proposed scheme, and no properties qualify for insulation under the Noise Insulation Regulations 1975.	Not Assessed				Not Assessed	£47,995	Not Assessed
	Air Quality	Dispersion modelling has been carried out to predict the impact of future traffic-related exhaust emissions. Following the assessment completion, the A16 Norwood scheme is predicted to have a negligible impact on NO2, PM10 and PM2.5 concentrations, and all existing receptors considered in the assessment. The overall effect of A16 Norwood operation on air quality is therefore considered to be not significant.	Not Assessed				Not Assessed	-£68,158	Not Assessed
	Greenhouse gases	The Scheme will result in a reduction in non-traded carbon and traded carbon dioxide emissions over a 60-year appraisal period.	Change in non-traded carbon over 60y (CO2e)	-60			Not Assessed	£505	
			Change in traded carbon over 60y (CO2e)	-6,672					
	Landscape	The scheme is not in conflict with policies relating to the protection or enhancement of the landscape. The proposed highway scheme is not located within a statutiry or non-statutory designated area for landscape character or quality, and the predominant land use of the area will not change as a result of the proposed scheme which improves the existing road network.	Not Assessed				Neutral Effect	Not Assessed	
	Townscape	Following an audit of Townscape, this category was considered out of the scope of the project.	Not Assessed				Not Assessed	Not Assessed	
	Historic Environment	The study area is not located within a Conservation Area, nor does the site boundary contain any Listed Buildings or designated heritage assets of Parks and Gardens. However, does contain a Scheduled Monument 'Car Dyke' 780 north of the proposed scheme. The archaeological potential of the surrounding area is relatively high but this is in part reduced due to the scale of the development to the highway network within the vicinity of the scheme at present. As the proposed works are of a (relatively) minor scale in terms of land take and depth of excavation, it is considered that the potential to impact any potential buried archaeological remains (if they are indeed present) is low, with the previous construction works for the highway itself having likely removed any archaeological remains.	Not Assessed				Slight Adverse (negative) Effect	Not Assessed	
	Biodiversity	The proposed works is located within an Impact Risk Zone of a SSSI, and within a Amber / Green Zone for the protected species of GCN's. At this stage of the project, it is expected that a degree of impact will be placed upon already identified species (as reported within an ecological constraints reports, undertken November 2021), with species including common birds, bats, GCN's and wider common reptiles. Therefore, the assessment score at this time is slight adverse in the absence of appropriate mitigations. Subject to further design work at next stage.	Not Assessed				Slight Adverse (negative) Effect	Not Assessed	
	Water Environment	The study area is located within a Gflood Risk zone 1; low probability of flooding. The proposed scheme will have no significant impact on wider waterbody catchment areas or features byond the study area. Operational drainage will be designed to ensure there will be no additional flood risk from surface water runoff.	Not Assessed				Neutral Effect	Not Assessed	
Social	Commuting and Other users	The scheme will result in a net reduction in journey times for commuting and other users over a 60-year appraisal period for all time periods. The most significant benefits are experienced for journeys within 5 minutes.	Value of journey time changes(£)	£9,404,000			Not Assessed	£9,403,000	Not Assessed
			Net journey time changes (£)						
			0 to 2min	2 to 5min	> 5min				
			£1,167,000	£8,257,000	-£20,000				
	Reliability impact on Commuting and Other users	Not Assessed	Not Assessed				Not assessed	Not Assessed	
	Physical activity	To be assessed at next phase							
	Journey quality	To be assessed at next phase							
	Accidents	Accident savings have been assessed using COBALT v2.2 for all links and junctions within the study area based on default accident rates and modelled 24-hour AADT flows. The scheme has been estimated to result in a reduction in accidents and casualties over a 60-year appraisal period.	COBALT estimates the scheme would result in a reduction of 186.7 accidents over a 60-year appraisal period. There would be a reduction of two fatal, 21.9 serious and 253.6 slight casualties.				Not assessed	£7,093,000	Not Assessed
	Security	Not Assessed	Not Assessed				Not Assessed	Not Assessed	Not Assessed
	Access to services	A reduction in journey times along the A16 and A47 is expected to improve bus service reliability between the Leeds Farm and Norwood sites, and the city centre, as well for the existing First Norfolk and Suffolk service.	Not Assessed					Not Assessed	Not Assessed
	Affordability	Not Assessed	Not Assessed					Not Assessed	Not Assessed
	Severance	Not Assessed	Not Assessed				Not Assessed	Not Assessed	Not Assessed
	Option and non-use values	Not Assessed	Not Assessed				Not Assessed	Not Assessed	
Public Account	Cost to Broad Transport Budget	The Cost to Broad Transport Budget incorporates real cost increases, risk assessment, and optimism bias at 23%.						£7,254,000	
	Indirect Tax Revenues							-£512	

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Appendix L – Financial Dimension 60 Year Cost Profile

A16 Norwood - Do Something Scheme Costs for Input to Financial Case

Calendar Year	Assessment Year	(1) Base Cost Estimate 2022 Prices						(2) Risk Adjusted Cost		(3) Risk Adjusted Cost Estimate Including Construction Price Inflation			(4) Inflated Risk Adjusted Cost Including Whole Life Costs	
		Construction Costs (Highways)	Construction Costs (Structures)	Land & Property Costs	Preparation and Supervision Costs	Other Costs	Total	Quantified Risk Adjustment	Risk Adjusted Cost	Inflation Rate	Cost of Inflation	Total (Including Inflation)	Inflated Whole Life Costs	Total (Including Whole Life Costs)
2022	1	£0	£0	£0	£627,547	£64,632	**£692,179**	£0	**£692,179**	0.000	£0.00	**£692,179**	£0	**£692,179**
2023	2	£0	£0	£0	£506,114	£193,895	**£700,009**	£0	**£700,009**	1.100	£70,000.91	**£770,010**	£0	**£770,010**
2024	3	£2,079,940	£0	£0	£332,342	£83,819	**£2,496,102**	£586,652	**£3,082,753**	1.210	£647,378.19	**£3,730,131**	£0	**£3,730,131**
2025	4	£4,159,881	£0	£0	£411,626	£70,691	**£4,642,198**	£1,173,304	**£5,815,502**	1.331	£1,924,931.15	**£7,740,433**	£0	**£7,740,433**
2026	5	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.398	£0.00	**£0**	£0	**£0**
2027	6	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.467	£0.00	**£0**	£0	**£0**
2028	7	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.541	£0.00	**£0**	£0	**£0**
2029	8	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.618	£0.00	**£0**	£0	**£0**
2030	9	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.699	£0.00	**£0**	£0	**£0**
2031	10	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.784	£0.00	**£0**	£0	**£0**
2032	11	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.873	£0.00	**£0**	£0	**£0**
2033	12	£0	£0	£0	£0	£0	**£0**	£0	**£0**	1.966	£0.00	**£0**	£0	**£0**
2034	13	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.065	£0.00	**£0**	£0	**£0**
2035	14	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.168	£0.00	**£0**	£0	**£0**
2036	15	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.276	£0.00	**£0**	£0	**£0**
2037	16	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.390	£0.00	**£0**	£0	**£0**
2038	17	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.510	£0.00	**£0**	£0	**£0**
2039	18	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.635	£0.00	**£0**	£57,300	**£57,300**
2040	19	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.767	£0.00	**£0**	£0	**£0**
2041	20	£0	£0	£0	£0	£0	**£0**	£0	**£0**	2.905	£0.00	**£0**	£0	**£0**
2042	21	£0	£0	£0	£0	£0	**£0**	£0	**£0**	3.051	£0.00	**£0**	£0	**£0**
2043	22	£0	£0	£0	£0	£0	**£0**	£0	**£0**	3.203	£0.00	**£0**	£0	**£0**
2044	23	£0	£0	£0	£0	£0	**£0**	£0	**£0**	3.363	£0.00	**£0**	£0	**£0**
2045	24	£0	£0	£0	£0	£0	**£0**	£0	**£0**	3.532	£0.00	**£0**	£0	**£0**
2046	25	£0	£0	£0	£0	£0	**£0**	£0	**£0**	3.708	£0.00	**£0**	£0	**£0**
2047	26	£0	£0	£0	£0	£0	**£0**	£0	**£0**	3.894	£0.00	**£0**	£0	**£0**
2048	27	£0	£0	£0	£0	£0	**£0**	£0	**£0**	4.088	£0.00	**£0**	£0	**£0**
2049	28	£0	£0	£0	£0	£0	**£0**	£0	**£0**	4.293	£0.00	**£0**	£0	**£0**
2050	29	£0	£0	£0	£0	£0	**£0**	£0	**£0**	4.507	£0.00	**£0**	£0	**£0**
2051	30	£0	£0	£0	£0	£0	**£0**	£0	**£0**	4.733	£0.00	**£0**	£0	**£0**
2052	31	£0	£0	£0	£0	£0	**£0**	£0	**£0**	4.969	£0.00	**£0**	£0	**£0**
2053	32	£0	£0	£0	£0	£0	**£0**	£0	**£0**	5.218	£0.00	**£0**	£0	**£0**
2054	33	£0	£0	£0	£0	£0	**£0**	£0	**£0**	5.479	£0.00	**£0**	£0	**£0**
2055	34	£0	£0	£0	£0	£0	**£0**	£0	**£0**	5.753	£0.00	**£0**	£125,080	**£125,080**
2056	35	£0	£0	£0	£0	£0	**£0**	£0	**£0**	6.040	£0.00	**£0**	£0	**£0**
2057	36	£0	£0	£0	£0	£0	**£0**	£0	**£0**	6.342	£0.00	**£0**	£0	**£0**
2058	37	£0	£0	£0	£0	£0	**£0**	£0	**£0**	6.659	£0.00	**£0**	£0	**£0**
2059	38	£0	£0	£0	£0	£0	**£0**	£0	**£0**	6.992	£0.00	**£0**	£0	**£0**
2060	39	£0	£0	£0	£0	£0	**£0**	£0	**£0**	7.342	£0.00	**£0**	£0	**£0**
2061	40	£0	£0	£0	£0	£0	**£0**	£0	**£0**	7.709	£0.00	**£0**	£0	**£0**
2062	41	£0	£0	£0	£0	£0	**£0**	£0	**£0**	8.094	£0.00	**£0**	£0	**£0**
2063	42	£0	£0	£0	£0	£0	**£0**	£0	**£0**	8.499	£0.00	**£0**	£0	**£0**
2064	43	£0	£0	£0	£0	£0	**£0**	£0	**£0**	8.924	£0.00	**£0**	£0	**£0**
2065	44	£0	£0	£0	£0	£0	**£0**	£0	**£0**	9.370	£0.00	**£0**	£0	**£0**
2066	45	£0	£0	£0	£0	£0	**£0**	£0	**£0**	9.839	£0.00	**£0**	£0	**£0**
2067	46	£0	£0	£0	£0	£0	**£0**	£0	**£0**	10.331	£0.00	**£0**	£0	**£0**
2068	47	£0	£0	£0	£0	£0	**£0**	£0	**£0**	10.847	£0.00	**£0**	£0	**£0**
2069	48	£0	£0	£0	£0	£0	**£0**	£0	**£0**	11.390	£0.00	**£0**	£0	**£0**
2070	49	£0	£0	£0	£0	£0	**£0**	£0	**£0**	11.959	£0.00	**£0**	£0	**£0**
2071	50	£0	£0	£0	£0	£0	**£0**	£0	**£0**	12.557	£0.00	**£0**	£273,033	**£273,033**
2072	51	£0	£0	£0	£0	£0	**£0**	£0	**£0**	13.185	£0.00	**£0**	£0	**£0**
2073	52	£0	£0	£0	£0	£0	**£0**	£0	**£0**	13.844	£0.00	**£0**	£0	**£0**
2074	53	£0	£0	£0	£0	£0	**£0**	£0	**£0**	14.536	£0.00	**£0**	£0	**£0**
2075	54	£0	£0	£0	£0	£0	**£0**	£0	**£0**	15.263	£0.00	**£0**	£0	**£0**
2076	55	£0	£0	£0	£0	£0	**£0**	£0	**£0**	16.026	£0.00	**£0**	£0	**£0**
2077	56	£0	£0	£0	£0	£0	**£0**	£0	**£0**	16.828	£0.00	**£0**	£0	**£0**
2078	57	£0	£0	£0	£0	£0	**£0**	£0	**£0**	17.669	£0.00	**£0**	£0	**£0**
2079	58	£0	£0	£0	£0	£0	**£0**	£0	**£0**	18.552	£0.00	**£0**	£0	**£0**
2080	59	£0	£0	£0	£0	£0	**£0**	£0	**£0**	19.480	£0.00	**£0**	£0	**£0**
2081	60	£0	£0	£0	£0	£0	**£0**	£0	**£0**	20.454	£0.00	**£0**	£0	**£0**
2082	61	£0	£0	£0	£0	£0	**£0**	£0	**£0**	21.477	£0.00	**£0**	£0	**£0**
Total		**£6,239,821**	**£0**	**£0**	**£1,877,629**	**£413,037**	**£8,530,488**	**£1,759,955**	**£10,290,443**		**£2,642,310**	**£12,932,753**	**£455,413**	**£13,388,167**

Step	Description	Scheme Cost at Each Step
(1)	Outlines the initial estimate of the investment costs in 2020 prices but taking no account of real increases in construction costs. Includes Design cost, Construction cost profile, Land cost, Preparation and Administration costs.	**£8,530,488**
(2)	The base costs have been adjusted to incorporate risk.	**£10,290,443**
(3)	The risk adjusted costs have been adjusted to incorporate increases in construction costs.	**£12,932,753**
(4)	The inflated risk adjusted costs have been adjusted to incorporate whole life costs.	**£13,388,167**

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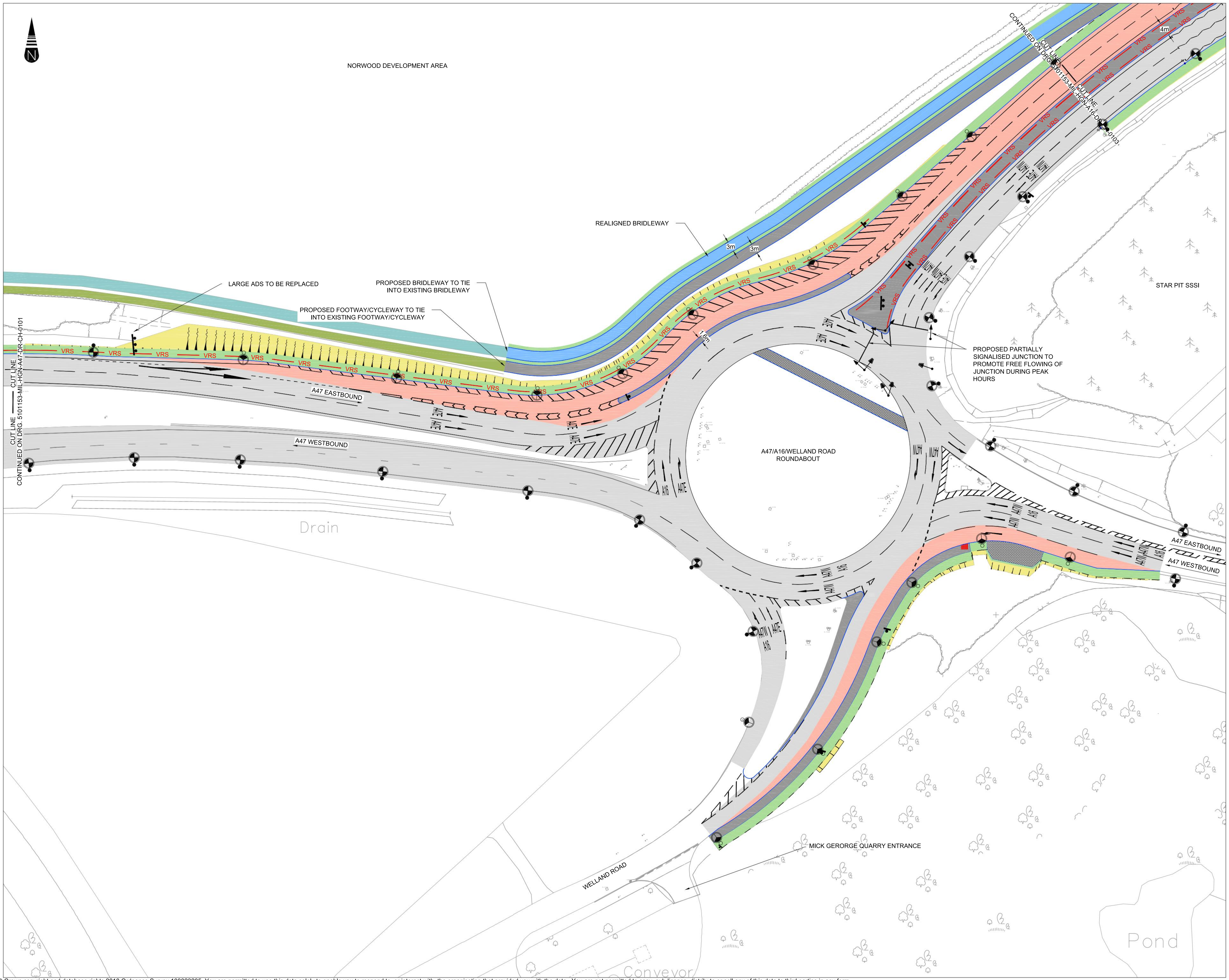
Appendix M – Scheme General Arrangement (GA) Drawings



KEY

- EXISTING CARRIAGEWAY
- PROPOSED CARRIAGEWAY
- PROPOSED CENTRAL RESERVE / TRAFFIC ISLAND / REALIGNED SHARED-USE FOOTWAY/CYCLEWAY
- PROPOSED HIGHWAY VERGE
- PROPOSED EARTHWORKS (1:3 TIE IN)
- EXISTING BRIDLEWAY
- PROPOSED BRIDLEWAY
- PROPOSED MAINTENANCE HARDSTANDING
- PROPOSED TACTILE PAVING
- PROPOSED KERBLINE
- PROPOSED ROAD MARKING
- VRS — PROPOSED VRS
- PROPOSED LIGHTING COLUMN
- EXISTING LIGHTING COLUMN
- PROPOSED TRAFFIC SIGN
- INDICATIVE STUB POLE / 4m POLE
- PROPOSED TRAFFIC SIGNAL HEAD

NOTES:

1. DO NOT SCALE FROM THIS DRAWING
2. ALL MEASUREMENTS SHOWN ARE IN METRES UNLESS STATED OTHERWISE.
3. SITE VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.
4. REPORT ALL DISCREPANCIES TO THE DRAWING ORIGINATOR IMMEDIATELY.
5. FOR DETAILS OF PROPOSED STREET LIGHTING, REFER TO DRAWINGS 5080930-MIL-HLG-OR-DR-EO-1301 TO 1303

Rev	Date	Description	Drn	Chkd	App
P02	21/01/2022	Layout updated with current design	JE	DMB	SPW
P01	21/12/2021	First Issue	"	"	"

Revisions

Drawing Originator

Peterborough Highway Services
Delivered by MILESTONE
PETERBOROUGH CITY COUNCIL

Drawing Status

PRELIMINARY DESIGN

Project Name

A16 NORWOOD IMPROVEMENT SCHEME
A47 - A16 ROUNDABOUT

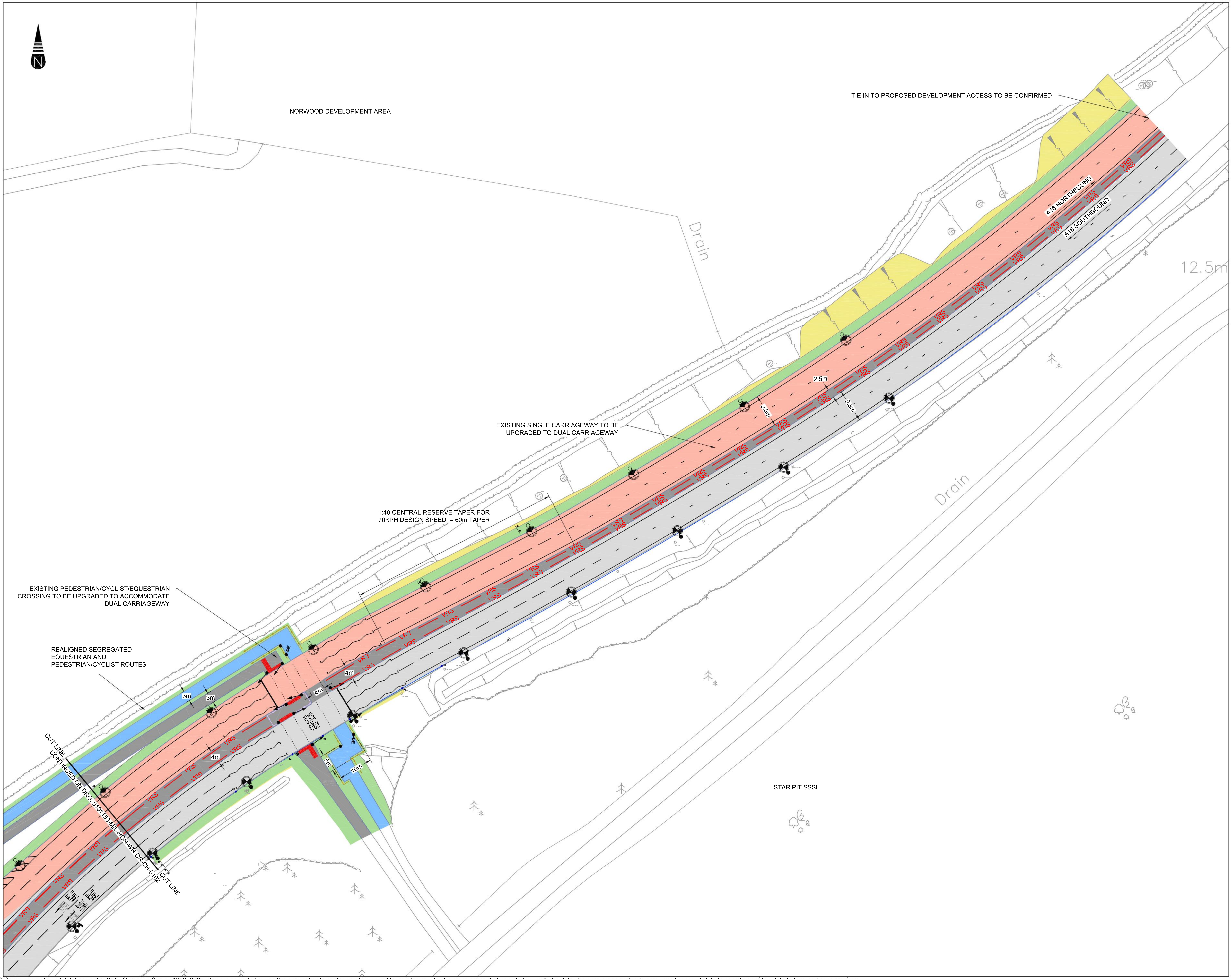
Title

GENERAL ARRANGEMENT
SHEET 2 OF 3

Sheet Size	Scale	Drawn by	Checked by	Approved by
A1	1:500	JE	JS	SPW
		Drawn Date 21/12/2021	Checked Date 21/12/2021	Approved Date 21/12/2021

Drawing Number	Status	Rev
5101153-MIL-HGN-WR-DR-CH-0102	S2	P02

File printed: 21 January 2022 15:18:20 File location: P:\Central Functions\ESol\06 Peterborough Highways\5101153 A16 Norwood Improvement Scheme\8 CAD\8.3 Preliminary\8.3.1 DWG\5101155 A47-A16-WR Rndbt\100\5101153-MIL-HGN-WR-DR-CH-0102 - GA RevB.dwg Printed by: Elliott, Jordan



KEY:

- EXISTING CARRIAGEWAY
- PROPOSED FULL DEPTH CARRIAGEWAY CONSTRUCTION
- PROPOSED RE-ALIGNED BRIDLEWAY
- PROPOSED CENTRAL RESERVE / REALIGNED SHARED-USE FOOTWAY/CYCLEWAY
- PROPOSED HIGHWAY VERGE
- PROPOSED EARTHWORKS (1:3 TIE IN)
- PROPOSED KERBLINE
- PROPOSED TACTILE PAVING
- VRS PROPOSED VEHICLE RESTRAINT SYSTEM
- PROPOSED PEDESTRIAN GUARDRAIL
- PROPOSED POST AND RAIL WOODEN FENCING
- PROPOSED ROAD MARKING
- INDICATIVE STUB POLE / 4m POLE
- PROPOSED TRAFFIC SIGNAL HEAD
- PROPOSED TRAFFIC SIGN
- PROPOSED LIGHTING COLUMN
- EXISTING LIGHTING COLUMN

NOTES:

1. DO NOT SCALE FROM THIS DRAWING
2. ALL MEASUREMENTS SHOWN ARE IN METRES UNLESS STATED OTHERWISE.
3. SITE VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.
4. REPORT ALL DISCREPANCIES TO THE DRAWING ORIGINATOR IMMEDIATELY.
5. FOR DETAILS OF PROPOSED STREET LIGHTING, REFER TO DRAWINGS 5080930-MIL-HLG-OR-DR-EO-1301 TO 1303

Rev	Date	Description	Drn	Chk'd	App
P02	21/01/2022	Layout updated with current design	JE	DMB	SPW
P01	21.12.21	First Issue	-	-	-

Revisions

Peterborough Highway Services
Delivered by MILESTONE / PETERBOROUGH CITY COUNCIL

Drawing Status
PRELIMINARY DESIGN

Project Name
A16 NORWOOD IMPROVEMENT SCHEME
A16 DUALLING

Title
GENERAL ARRANGEMENT
SHEET 3 OF 3

Sheet Size	Scale	Drawn by	Checked by	Approved by
A1	1:500	CJ	JS	SPW
		Drawn Date 21.12.21	Checked Date 21.12.21	Approved Date 21.12.21

Drawing Number	Status	Rev
5101153-MIL-HGN-A16-DR-CH-0103	S2	P02

File Plotted: 21 January 2022 15:21:20 File location: P:\Central Functions\ESol\06 Peterborough Highways\5101153 A16 Norwood Improvement Scheme\8 CAD\8.3 Preliminary\8.3.1 DWG\5101154 A16 Dualling\100\5101153-MIL-HGN-A16-DR-CH-0103-P01 - GA RevB.dwg Printed by: Elliott, Jordan

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Appendix N – Benefits Realisation Plan

A16 Norwood, Peterborough

Benefits Realisation Plan

Delivering what we **promise**

Document Control

Job Number: 5080930						
Document ref: A16 Norwood Benefits Realisation Plan					Authorised	
Rev	Purpose	Originated	Checked	Reviewed	Milestone	Date
1.0	First Report	HP	RMJ	RMJ	RMJ	31/05/2022

Contents

Tables

Figures

No Figures.

1. Introduction

1.1 Background

1.1.1 The purpose of this outline Benefits Realisation Plan is to support the A16 Norwood Outline Business Case (OBC).

1.2 Purpose of This Document

1.2.1 The DfT 'Transport Business Cases' guidance published in February 2022 states the Benefits Realisation Plan should set out the approach to managing the realisation of benefits. The guidance specifies that the Benefits Realisation Plan is outlined at the Outline Business Case (OBC) stage and completed at the Full Business Case (FBC) stage[1].

1.2.2 The 'Guide to Developing the Project Business Case' (2018)[2] states a Benefits Realisation Plan should 'set out a framework for the identification of potential benefits, their planning, modelling and tracking', whilst assigning responsibilities for the realisation of benefits throughout key phases of the project's lifespan'. The Green Book (2022)[3] states all major projects must capture the realisation of benefits within a **'benefits register',** a tool for aiding the implementation and operational management of a project. The benefits register template provided within this guidance includes the following criteria:

- **Benefit category and class**: Categories e.g., public sector benefits (direct / indirect), wider social benefits. Classes such as: cash / noncash releasing, quantitative / qualitative etc.
- **Description**: Including enabling programme, project, or activity
- **Service feature**: What aspect of the proposal will give rise to the benefit – to facilitate monitoring?
- **Potential costs**: Incurred during delivery
- **Activities required**: To secure benefit
- **Responsible officer**: Senior responsible officer (SRO) for project or programme
- **Performance measure**: Key performance indicators (KPIs) and relationship to SMART objectives
- **Target improvement**: Expected level of change • Full-year value – value of benefits (£m)
- **Timescale**: Number of years.

[1] Transport business case guidance - GOV.UK (www.gov.uk)
[2] Guide to developing the Project Business Case (publishing.service.gov.uk)
[3] The Green Book (2022) - GOV.UK (www.gov.uk)

1.3 Document Structure

1.3.1 This document is structured as follows:

- **Chapter 2:** Provides information relating to the scheme objectives
- **Chapter 3:** Contains the benefits register for the A16 Norwood Improvement Scheme.

2. Scheme Objectives

2.1.1 The objectives of for A16 Norwood improvement scheme were developed during the Strategic Outline Case (SOC), ahead of the initial Option Development phase of the project. The project objectives are based on goals and outcomes of local policy documents and have provided a framework in which potential options have been scored and developed further as the business case process progresses.

2.1.2 Although the objectives devised within the SOC pre-date those of the CPCA, in should be noted that work has been undertaken to build upon the objectives and ensure they align with those of the CPCA. The primary and secondary objectives for the A16 Norwood Improvement Scheme are listed beneath:

2.1.3 Primary objectives include:

1. **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout
2. **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised
3. **Limit impact on the local environment and improve biodiversity**: Fully mitigate any adverse environmental impacts of a scheme, and ensure a biodiversity net gain within the study area
4. **Improve active travel routes to provide a viable alternative to private car travel**: Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.

2.1.4 Secondary objectives include:

5. **Positively impact traffic conditions on the wider network:** Positively impact the performance of local routes impacted by the traffic and congestion in and around the A16 corridor, such as the A47, A15 Paston Parkway, A1139 Eye Road and Newborough Road.
6. **Improve road safety:** Reduce accidents and improve personal security for all travellers within the study area.

2.1.5 The scheme objectives above relate to the benefits that the proposed intervention schemes of the A16 Norwood project seek to realise.

3. Benefits Register

3.1.1 The benefits register for the A16 Norwood Improvement Scheme is provided in Table 3.1, overleaf.

3.1.2 It should be noted that the benefits register has been completed to an 'outline' level at this stage of work in accordance with the DfT guidance on 'Transport Business Cases (2022) The benefits register will be updated to a 'completed' state at the FBC stage, along with the remainder of the Benefits Realisation Plan requirements.

Table 3.1: A16 Norwood Improvement Scheme Benefits Register

Benefit	Benefit Category and Class	Description	Service Feature	Potential Costs	Activities Required	Responsible Officer	Performance Measure	Target Improvement	Full Year Value	Timescale
Reduced congestion and Improved journey times	Monetised journey time savings	Enhanced network performance	Implementation of new highways infrastructure / mitigations at the A16 / A47 / Welland Road Roundabout and adjoining A16 and A47 strategic routes	**TBC**	Successful delivery of the A16 Norwood improvement schemes.	Peterborough City Council (PCC) / Cambridgeshire, Peterborough Combined Authority (CPCA)	Will contribute to objective 1	TBC – scope of this benefit to be quantified using traffic modelling	**TBC**	Benefit(s) to be realised once the scheme has been implemented and is open to the public
Planned housing and employment growth	Wider social benefits (improved availability of housing and employment)	Realisation of local plan housing and employment growth ambitions	Improved highways capacity as a result of the implementation of improved highways infrastructure, to facilitate traffic growth on the transport network	**TBC**			Will contribute to objective 2	**TBC**	**TBC**	
Improved air quality	Environmental benefits; wider social benefits (improved population health)	Improved air quality in future years	Reduction in emissions from vehicles as a result of reduced congestion, due to improved highways infrastructure.	**TBC**			Will contribute to objective 3	**TBC**		
Achievement of biodiversity net gain	Environmental benefits; wider social benefits (improved population health)	Increase in the scale of replanting and environmental mitigations onsite in the future	Implementation of replanting, environmental enhancements across the site area including wildflower enhancement areas and linear planting along the A16	**TBC**			Will contribute to objective 3	**TBC**	**TBC**	
Provision of new active travel infrastructure	Wider social benefits (improved health), Environmental benefits;	Increased number of active travel routes connecting the development site to wider network and city centre	Implementation of safer highways infrastructure including a Pegasus controlled crossing, route improvements along Welland Road and the potential for a new bridge over the A47 (subject to feasibility).	**TBC**			Will contribute to objective 4	**TBC**	**TBC**	
Improved network efficiency	Monetised journey time savings	Enhanced network performance	Implementation of new highways infrastructure / mitigations at the A16 / A47 / Welland Road Roundabout and adjoining A16 and A47 strategic routes	**TBC**			Will contribute to objective 5	TBC – scope of this benefit to be quantified using traffic modelling	**TBC**	
Improved road safety	Monetised (quantifiable) benefits due to fewer accidents	Reduction in the number of KSI incidents at proposed intervention sites	Implementation of new highways infrastructure / mitigations at the A16 / A47 / Welland Road Roundabout and adjoining A16 and A47 strategic routes. Alongside the implementation of new active travel provisions including a controlled crossing, route improvements along Welland Road and the potential for a new bridge over the A47 (subject to feasibility).	**TBC**			Will contribute to objective 6	**TBC**	**TBC**	

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Appendix O – Scheme Evaluation Plan

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A16 Norwood, Peterborough

Scheme Evaluation Plan

Delivering what we promise

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Document Control

Job Number: 5080930						
Document ref: A16 Norwood Scheme Evaluation Plan					Authorised	
Rev	Purpose	Originated	Checked	Reviewed	Milestone	Date
1.0	Draft Report	HP	RMJ	RMJ	RMJ	31/05/2022

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Contents

Tables

Figures

1. Introduction

1. Background

1. The purpose of this Monitoring and Evaluation Plan is to support the A16 Norwood Outline Business Case (OBC).

2. Purpose of this Document

1. The DfT 'Transport Business Cases' guidance published in February 2022 states the Monitoring and Evaluation Plan should set out the arrangements for monitoring and evaluating the intervention. The guidance specifies that the Monitoring and Evaluation Plan is outlined at the Outline Business Case (OBC) stage and completed at the Full Business Case (FBC) stage[1].

2. As defined in The Green Book (2022)[2], 'Evaluation is a systematic assessment of an intervention's design, implementation, and outcomes', designed to determine if the project:

    - Has been designed and delivered as expected in an efficient manor
    - What effect the intervention has had, for whom and why
    - Has met the requirements of the stated scheme objectives
    - Has achieved the desired outcomes and impacts
    - Represents value for money
    - Resulted in any unintended outcomes and impacts (both positive and negative)

3. This document has been prepared in accordance with the HM Treasury 'Guide to Developing the Project Business Case' (2018)[3].

[1] Transport business case guidance - GOV.UK (www.gov.uk)
[2] The Green Book (2022) - GOV.UK (www.gov.uk)
[3] Guide to developing the Project Business Case (publishing.service.gov.uk)

3. Document Structure

1. The Cambridgeshire and Peterborough Combined Authority (CPCA) Assurance Framework[4] sets out the fundamental principles in relation to the use and administration of funding from the CPCA and their proposed approach to monitoring and evaluation of projects.

2. The Assurance Framework states that all transport schemes (over £5m) will follow the DfT Monitoring and Evaluation Guidance for Local Authority Major Schemes. The DfT Monitoring and Evaluation Guidance (2012)[5] identifies three tiers of Monitoring and Evaluation:

    - **Standard Monitoring**: Schemes are required to be monitor and reported on a standard set of measures
    - **Enhanced Monitoring**: For schemes costing more than £50m or are anticipated to have a significant impact on particular indicators
    - **Fuller Evaluation**: For DfT- specified selection of schemes.

3. The cost of the A16 Norwood Improvement Scheme is expected to be significantly less than £50m and the study has not been specified for Fuller Evaluation, resulting in the project falling under the Standard Monitoring tier.

4. The Structure of this Monitoring and Evaluation Plan is as follows:

    - **Chapter 2:** Provides information relating to the scheme background and context
    - **Chapter 3:** Provides information relating to the scheme objectives and outcomes
    - **Chapter 4:** Outlines the data collection methods
    - **Chapter 5:** Outlines the resourcing and governance arrangements
    - **Chapter 6:** Outlines the delivery plan
    - **Chapter 7:** Outlines the dissemination plan.

[4] Local-Assurance-Framework-.pdf .
[5] Major Scheme Business Cases: Evaluation Guidance for Local Authority Major Schemes (publishing.service.gov.uk)

2. Scheme Background and Context

1. Scheme Context

1. The study area encompasses the Norwood and Paston Reserve Urban Extension sites, which are bordered to the west by the A15 Paston Parkway, to the east by the A16 and to the south by the A47 and intersected by Newborough Road.

2. The Norwood and Paston Reserve urban extensions, shown below in Figure 1, are key areas of residential growth for Peterborough and have been allocated for development within the Peterborough Local Plan 2016 to 2036 (Adopted on 24th July 2019)[6], generating a combined total of 2,945 dwellings in the study area.

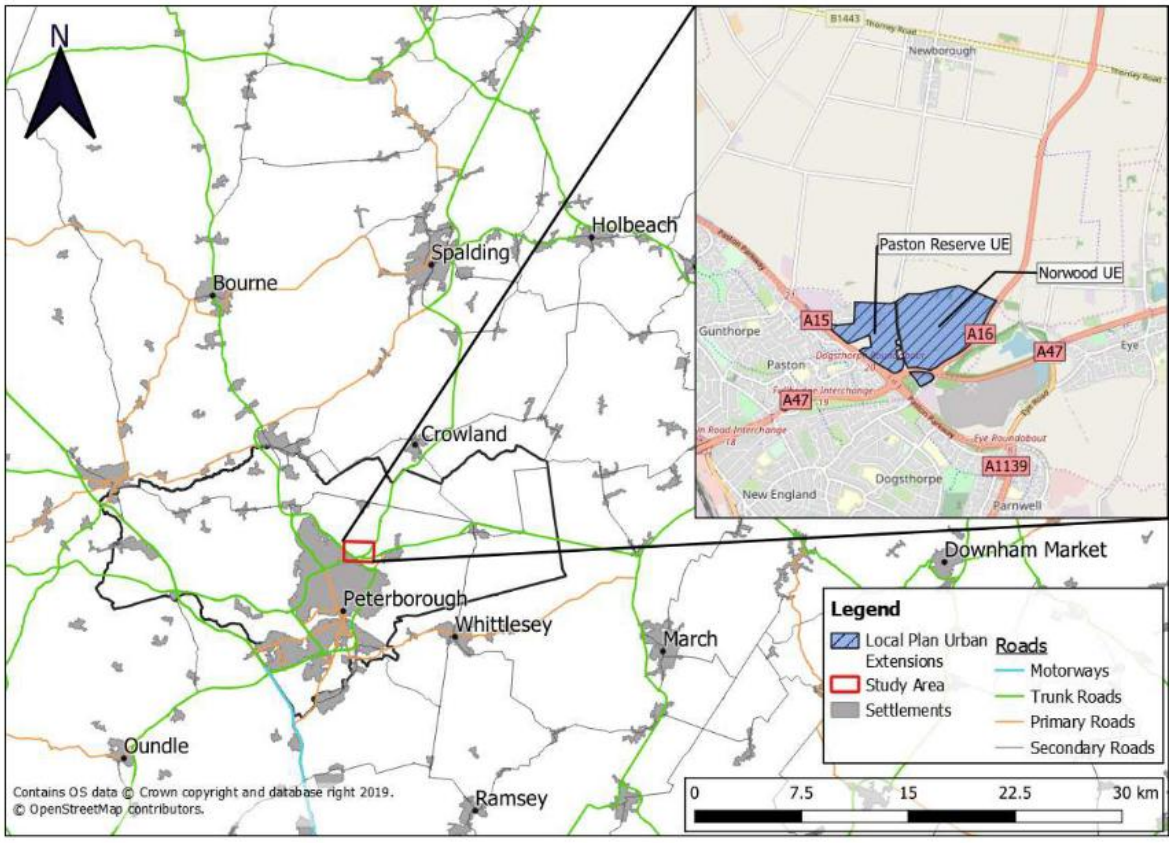

Figure 1: A16 Norwood Improvement Scheme Area

3. The scheme will help facilitate growth aspirations of Peterborough City Council in relation to the planned Norwood and Paston urban extensions. Highway improvements of the scheme will add capacity and address existing and future issues of congestion and delay along the A16 corridor, whilst active travel improvements will help reduce the severance for users between the north-east of Peterborough and the City centre.

[6] Peterborough Local Plan (Adopted version).

2. Scheme Development

1. A SOC and an Optional Appraisal Report (OAR) were submitted to the Cambridgeshire and Peterborough Combined Authority (CPCA) and approved in October 2019. The project is currently at the Outline Business Case (OBC) and Preliminary Design stage.

3. Scheme Objectives and Outcomes

1. Introduction

1. The purpose of this chapter is to define the scheme objectives and the associated outcomes and impacts. Assumptions underpinning how the scheme will achieve the scheme objectives and the associated outcomes and impacts is provided in the form of a logic map.

2. Scheme Objectives and Outcomes

1. The objectives of the A16 Norwood improvement scheme were developed during the Strategic Outline Case (SOC), ahead of the initial Option Development phase of the project. The project objectives are based on goals and outcomes of local policy documents and have provided a framework in which potential options have been scored and developed further as the business case process progresses.

2. Although the objectives devised within the SOC pre-date those of the CPCA, in should be noted that work has been undertaken to build upon the objectives and ensure they align with those of the CPCA. The primary and secondary objectives for the A16 Norwood Improvement Scheme are listed beneath:

3. Primary objectives include:

    1. **Tackle congestion and improve journey times:** Tackle congestion and reduce delay along the A16 and on the primary approaches to the A16 / A47 / Welland Road Roundabout

    2. **Support Peterborough's growth agenda:** Ensure that the planned employment and housing growth at Norwood can be realised

    3. **Limit impact on the local environment and improve biodiversity**: Fully mitigate any adverse environmental impacts of a scheme, and ensure a biodiversity net gain within the study area

    4. **Improve active travel routes to provide a viable alternative to private car travel**: Ensure that the scheme provides a comprehensive network of pedestrian and cycling routes where needed.

1. Secondary objectives include:

    5. **Positively impact traffic conditions on the wider network:** Positively impact the performance of local routes impacted by the traffic and congestion in and around the A16 corridor, such as the A47, A15 Paston Parkway, A1139 Eye Road and Newborough Road.

    6. **Improve road safety:** Reduce accidents and improve personal security for all travellers within the study area.

1. It is evident from the above objectives that the main associated outcomes and impacts of the scheme are:

    - The mitigation of existing traffic congestion and poor journey times, enhancing the wider network
    - The facilitation of housing and employment growth
    - The improvement of local environmental conditions
    - The facilitation of active travel routes
    - The mitigation of safety issues within the study area.

2. Logic Map

1. The logic model shown in Figure 2 outlines the causal chain of events that represents the process by which the desired outcomes and scheme objectives are to be achieved.

2. The Logic Map will be updated to a 'complete' status as the project progresses to the Full Business Case (FBC) stage.

Context

- Norwood and Paston reserve urban extension areas are key areas of growth for Peterborough, as identified in the Local Plan 2016 – 2036 (Adopted July 2019), which will generate a combined total of 2,945 dwellings within the proposed study area
- The Scheme will provide the necessary increase in highway capacity to unlock the identified growth throughout the area, as well as tackle any associated congestion issues from the proposed growth

Inputs

- CPCA funding and resources
- PCC resources
- Contractor resources
- Sub-contractor resources
- Stakeholder support

Network Improvement Scheme

Outputs

- Closure of Newborough road southbound access onto A47
- Dualling of the A16 between the A16 / A47 / Welland Road roundabout and the Norwood development Access
- Partial signalisation of the A16 / A47 / Welland Road roundabout on the A16 southbound approach
- Addition of a flare to the A47 westbound approach, to provide additional capacity for left turners to Welland Road
- Addition of a dedicated left lane, from the A47 eastbound approach to the A16 Northbound exit
- Replanting within the study area including linear tree / shrub planting along the A16 and wildflower planting at several locations
- Active travel route enhancements from the Norwood site down Welland Road
- Pedestrian bridge over the A47 (subject to further feasibility)

Transport Outcomes

- Improved journey times for users within the study area, particularly of the A16 / A47 / Welland Road roundabout
- Reduction in queue lengths, during peak times on all key approaches
- The separation of movements on key junctions, aiding the reduction in accidents

People, Business, and Place Outcomes

- Improved network efficiency will help facilitate the Norwood development area, and will increase the attractiveness of the City as a place to live and invest
- Early environmental considerations, aiding the achievement of a minimum 20% biodiversity net gain across the study area

Impacts

- Economy benefits, including reduced costs, investment and regeneration, and benefits to local businesses
- Society benefits, including improved health and wellbeing, and better connectivity to services
- Environmental benefits, including biodiversity improvements, improved air quality, and reduced emissions

Figure 2: A16 Norwood Scheme Logic Map

7. Data Collection Methods

1. Introduction

1. The purpose of this chapter is to provide an overview of the data collection approaches, including assumptions being made about sample sizes, mode, and frequency of data collection. Where appropriate, maps will be provided to show the spatial coverage of data collection.

2. Data Collection Approach

1. Data will be collected to support the production of the One Year After Monitoring and Evaluation Report (12-24 months post scheme implementation) and the Final Monitoring and Evaluation Report (approximately five years post scheme implementation). These reports will consider all the schemes implemented as part of the package for the A16 Norwood Improvement Scheme.

2. More detailed information relating to the data collection approaches will be provided at the FBC stage, at which point the monitoring and evaluation arrangements will be completed.

3. Spatial Coverage

1. Data will be collected for the study area, which comprises of the area surrounding the Norwood and Paston Reserve development sites, including the A16 and A47 Strategic routes, as outlined in Figure 1.1 of this report.

8. Resourcing and Governance

1. Introduction

1. The purpose of this chapter is to provide details of the monitoring and evaluation budget(s) and the governance structure for the delivery of the Monitoring and Evaluation plan, including details of who will be responsible for delivering the plan and procedures for risk management and quality assurance.

2. Monitoring and Evaluation Budget

The Green Book Guidance

1. The Green Book specifies that the 'monitoring and evaluation of all proposals should be proportionately included in the budget and the management plan of all significant proposals as an integral part of all proposed interventions'.

2. Table 1 overleaf provides a summary of the 'outline' monitoring and evaluation plan for the A16 Norwood Improvement Scheme, highlighting data collection, reporting programme and indicative costs. It should be noted that the cost is estimate at this point in the project, and a detailed cost estimate for these activities and information relating to budgetary responsibility will be provided at the FBC stage.

Table 1: Monitoring and Evaluation Measures and Budget Estimate

	Measure	Measure of Success	Data Source and Expected Findings	Data Collection / Reporting Programme			Ownership	Impact Type	Indicative Cost Estimate
				Baseline	Delivery	Post Completion			
Inputs-	Scheme Costs	CPCA Funding	CPCA Funding / submission of Full Business Case / Cost Data	Planned	Actual		CPCA / PCC	-	
Outputs	Scheme Build / Delivered Scheme	Infrastructure delivered as part of the scheme	Site Inspection	2023	2024 - 2025	2026	CPCA / PCC	-	£1500
Objectives	**Outcomes**								
1 / 5 / 6	Travel Time and Reliability	Enhanced Network Performance, particularly during Peak Hours for the A16 /A47 / Welland Road roundabout	Satellite Navigation Data / Travel Time data / Site Visits / Survey Footage, showing that ratio of peak hour to free flow travel times is below 1.5, and that no blocking back occurs due to queues.	2022 - 2024	-	2026	CPCA / PCC	Economical	£500 for data analysis at both 1 year and 5 years reporting Total = £1000
		New Infrastructure for Sustainable Modes	Site Inspection / Usage Data. Increased length of pedestrian provision and LTN1/20 compliant cycleways.	2022 - 2024	-	2026	CPCA / PCC	Economical	£500 for data analysis at both 1 year and 5 years reporting Total = £1000
		Reduce the number of KSI incidents across the study area	Peterborough Database of Road Traffic Records. Expected decreased accidents in line with cobalt forecast.	2022 - 2024	-	2026	CPCA / PCC	Societal / Economical	£500 for data analysis at both 1 year and 5 years reporting Total = £1000
4	Travel Demand	Enhanced Network Performance, on the A47 / A16 and wider network of A16 corridor, such as the A47, A15 Paston Parkway, A1139 Eye Road and Newborough Road	Manual Classified Counts / Site Visits / Video Survey Footage. Expected increase in vehicles with no blocking back observed as a result of queues.	2022 - 2024	-	2026	CPCA / PCC	Economical	£4000 for MCC surveys and £500 for data analysis at both 1 year and 5 years reporting Total = £5000
2	Impact on Economy	Realisation of Local Housing and Employment Growth Ambitions	PCC Planning Portal - Local and Regional Economic Reports / Development Figures Post scheme opening	2022 - 2024	-	2026	CPCA / PCC	Economical	£500 for data analysis at both 1 year and 5 years reporting Total = £1000
3	Impact on the Local Environment	Ensure a Net Gain of Biodiversity across the Study Area	Biodiversity Calculation / Site Survey and Desk Based Assessment. Biodiversity net gain of 20% or greater.	2022 - 2024	-	2026	CPCA / PCC	Environmental	£1000 for site inspections and data analysis at both 1 year and 5 years reporting Total = £2000
3	Carbon	Improvement to Air Quality in Future Years	FBC Calculations for Carbon assessment / PCC Air Quality Monitoring Sites / Future traffic demand data. Air quality impact to be less than or equal to modelled values	2022 - 2024	-	2026	CPCA / PCC	Environmental / Societal	£1000 data analysis at both 1 year and 5 years reporting Total = £2000
Reporting	Year 1 report summarising the outcomes of the monitoring and evaluation work			2023	-	2026	CPCA / PCC	-	£3,000
	Year 5 report summarising local economic growth, scheme impacts and development figures prior and post opening of the scheme			-	-	2030	CPCA / PCC	-	£3,000
	Total Monitoring and Evaluation Budget								**£20,500**

3. Governance Structure

1. The CPCA have the responsibility for ensuring Value for Money from the A16 Norwood Improvement Scheme. Under the CPCA, PCC will be responsible for ensuring the Scheme Evaluation Plan is undertaken as outlined within this report.

2. Figure 3 provides an outline of the overall governance structure highlighting key roles and lines of accountability for the development and delivery of the scheme.

3. Further information regarding the governance structure for the delivery of the Monitoring and Evaluation Plan will be completed at the FBC stage.

CPCA Board	**Responsible Officers** CA Board Members	**Responsibilities Include** To support PCC in the development of the scheme To undertake technical review of the business case To make recommendations on future project stages
Programme Board	**Responsible Officers** CPCA Transport Programme Representatives, PCC, DfT and National Highways	**Responsibilities Include** To approve change requests and RAG changes
Project Board	**Responsible Officers** Contract Manager, Programme Team Lead, Transport Planning Lead, Design Team Lead, Engineering Lead, Major Scheme & Delivery Lead	**Responsibilities Include** To hold monthly meetings to discuss progress and issues To review / approve recommendations made by the Project Team
Funding Partner (CPCA)	**Responsible Officers** Programme Co-Ordinator	**Responsibilities Include** To secure funding and support PCC in scheme development Undertake technical review to ensure scheme value for money
Delivery Partner	**Responsible Officers** Transport Planning Officers, Project Engineers	**Responsibilities Include** Manage / review day to day project issues Monitor progress / key milestones Report issues to the Project Board Engage with Stakeholders
Contractor (PHS)	**Responsible Officers** Transport Planning, Highway Design, Environment, Network Manager and Street Works Co-Ordinator	**Responsibilities Include** Technical delivery of the scheme Day to day running of the project Highlighting project / scheme risks Identifying options and assessing scheme value for money

Figure 3: Organisation and Governance Structure Overview

4. Risk Management

1. The risk management approach will be confirmed at the FBC stage.

5. Quality Assurance

1. The quality assurance approach will be confirmed at the FBC stage.

9. Delivery Plan

1. Introduction

1. The purpose of this chapter is to outline the project plan and timeframe for data collection, provide details regarding progress reporting back to the DfT, and outline the strategy for the reporting of monitoring and evaluation findings.

2. Scheme Construction Programme / Project plan

1. Table 2 below shows key project milestones for progressing scheme delivery.

Table 2: Key Project Delivery Milestones

Timescale	Activity
June 2022 – July 2022	Outline Business Case reviewed by CPCA, and approval sought from CPCA board for the release of funding to undertake Detailed Design and produce a Full Business Case.
September 2022	Work commences on the Detailed Design and Full Business Case.
September 2022 – November 2022	Site Surveys undertaken to inform the Detailed Design
March 2024	Detailed Design and scheme costings complete. Full Business Case submitted.
April 2024 – May 2024	Full Business Case reviewed by CPCA and approval sought from CPCA board for the release of funding for scheme construction.
September 2024 – August 2025	Construction of the scheme undertaken, lasting approximately 12 months.
August 2026	1-year post-scheme monitoring undertaken
August 2030	5-years post-scheme monitoring undertaken

3. Delivery Plan and Timeframe for Data Collection

1. An outline delivery plan, which includes information relating to the timeframe for data collection, for the monitoring and evaluation of the A16 Norwood project is provided in Table 3, below.

Table 3: Monitoring and Evaluation Plan Outline Delivery Plan

Task	Timeframe
Pre-Construction	
Production of outline Benefits Realisation Plan	May 2022
Outline of Monitoring and Evaluation Plan	May 2022
Completion of Benefits Realisation Plan	FBC stage
Completion of Monitoring and Evaluation Plan	FBC stage
During Construction	
Collection / collation of baseline data requirements before and / or during scheme construction (i.e. as close as possible to the opening year of the scheme)	During construction
Collection of data used to monitor scheme delivery performance and processes to be collected during construction	During construction
Post Construction	
One Year After Monitoring and Evaluation Report	12-24 months post scheme implementation
Final Monitoring and Evaluation Report	Approximately five years post scheme implementation

2. Note that the delivery plan in Table 3 will be completed at the FBC stage, in accordance with guidance from the DfT.

4. Reporting of Monitoring and Evaluation Findings

1. The monitoring and evaluation findings will be reported as follows, to the timeframes outlined in Table 3:

   - One Year After Monitoring and Evaluation Report
   - Final Monitoring and Evaluation Report.

10. Dissemination Plan

1. Introduction

1. The purpose of this chapter is to provide details of how the findings from the evaluation will be communicated to key stakeholders and how the lessons will be disseminated.

2. Outline Dissemination Plan

1. It is envisaged that the findings from the evaluation, reported in the form of the **One Year After Monitoring and Evaluation Report** and **Final Monitoring and Evaluation Report**, will be shared with the key stakeholders involved in the development of the A16 Norwood Project once they are available. The reports associated with this Monitoring and Evaluation will likely be published on the PCC website.
2. Note that this dissemination plan will be completed at the FBC stage.