



# **West Winch Housing Access Road**

## **Environmental Assessment - Chapter 16: Traffic and Transport**

Author: WSP

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# 1 Traffic and Transport

## 1.1 Introduction

1.1.1 This chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Scheme (West Winch Housing Access Road (WWHAR)) on Traffic and Transport.

1.1.2 This chapter (and its associated figures and appendices) is intended to be read as part of the wider Environmental Statement (ES), with particular reference to the Transport Assessment (Document Reference: **NCC/4.01.00/WWHAR**), Public Consultation Report (Document Reference: **NCC/PKA021/WWHAR**) and the following appendices and figures in this chapter:

- Appendix 16.1: Magnitude of Impact
- Appendix 16.2: Non-Motorised User Sensitivity Assessment
- Appendix 16.3: Traffic Link Screening
- Appendix 16.4: Operational Traffic Significance Effect
- Appendix 16.5: Accident and Road Safety Link Sensitivity
- Appendix 16.6: Accident and Road Safety Significance Effect
- Figure 16.1: Extent of Study Area
- Figure 16.2: Existing Public Rights of Way (PROW)
- Figure 16.3 Regional Cycle Network

1.1.3 The assessment considers potential effects of the Proposed Scheme (WWHAR Highway Scheme and associated works) on users of the local transport network surrounding the study area. The Proposed Scheme is described in **Chapter 3: Description of Proposed Scheme**.



- 1.1.4 This chapter explains the methodology followed and provides a review of the existing and future baseline conditions in the vicinity of the site and surrounding area, within the scope of assessment.
- 1.1.5 The results of the assessment are presented by comparing the future situation with the Proposed Scheme plus the Housing Development) in place; with and without mitigation against the future baseline situation without the Proposed Scheme. This forms the basis for assessing the magnitude of impacts and significance of effects on receptors having regard to their sensitivity. Relevant receptors are considered to be users of the transport network or the receiving environment surrounding the scheme.
- 1.1.6 Transport mitigation measures are presented and discussed within the Transport Assessment (Document Reference: **NCC/4.01.00/WWHAR**) and summarised within this chapter, including measures to avoid or minimise significant effects.

## 1.2 Legislative Framework, Policy and Guidance

- 1.2.1 This chapter has been produced in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017.
- 1.2.2 The applicable legislative framework is outlined in the upfront chapters of this ES:

## 1.3 Policy

- 1.3.1 This chapter in conjunction with the Transport Assessment (Document Reference: **NCC/4.01.00/WWHAR**) has considered the following policies:

### National

- National Planning Policy Framework (NPPF), 2023
- National Planning Practice Guidance (PPG, 2021)
- The DfT Circular 01/2022 (2022);
- Cycle Infrastructure Design Local Transport Note LTN 1/20 (2020);



- Gear Change: A Bold Vision for Walking & Cycling (2020);
- Decarbonising Transport: A Better, Greener Britain (Department for Transport, 2021);
- National Bus Strategy – Bus Back Better (2021);
- The Clean Growth Strategy (2017);
- Clean Air Strategy (2019);
- Net Zero Strategy: Build Back Greener (2021);
- National Design Guide (2021);
- National Model Design Code (2021);
- Active Travel: Local Authority Toolkit (2022);
- Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure (2021);
- The Second Cycling and Walking Investment Strategy (2022);
- The Strategic Road Note (SRN) 'Planning for the Future' (2015);

#### Local

- King's Lynn Local Cycling and Walking Infrastructure Plan Main Report (2022);
- King's Lynn and West Norfolk Local Plan;
- King's Lynn and West Norfolk Borough Council Local Plan (Core Strategy) 2011;
- King's Lynn & West Norfolk Site Allocations and Development Management Policies (2016);
- North Runcton and West Winch Neighbourhood Plan (2017);
- Emerging King's Lynn & West Norfolk Local Plan Review (2016-2036);



- Draft Southeast King's Lynn Growth Area Framework Masterplan Spatial Planning Document July 2022;
- Borough Council of King's Lynn & West Norfolk (BCKLWN) Climate Change Policy (October 2020); and
- Norfolk County Council Local Transport Plan (LTP4) 2020 – 2037 (2022)

### Guidance

1.3.2 The following guidance documents have been used during the preparation of this chapter:

- The Guidelines for the Environmental Assessment of Road Traffic (GEART) published by the Institute of Environmental Assessment in July 2023 – now Institute of Environmental Management and Assessment (IEMA));
- Design Manual for Road and Bridges (DMRB LA 104) (DfT 2022);
- Department for Transport TAG Unit A4-1 Social Impact Appraisal (2021); and
- Pedestrian Comfort Guidance for London (2019) by Transport for London (TfL).

## 1.4 Consultation, Scope, Methodology and Significance Criteria

### Consultation Undertaken to Date

1.4.1 The public consultation for the WWHAR ran for 8 weeks between 14 November 2022 until 8 January 2023 and was open to anyone interested in the proposals. Figure 1-1 'Timeline' of the Public Consultation Report (Document Reference: **NCC/PKA021/WWHAR**) presents a timeline of the actions above and when the public consultation for the scheme took place.





1.4.2 Table 1-1 provides a summary of the consultation timeline specific to this chapter and the Transport Assessment (Document Reference **NCC/4.01.00/WWHAR**).

**Table 1-1 – Consultation timeline**

<b>Stakeholders</b>	<b>Dates and times of consultation and correspondence</b>	<b>Summary of Outcomes</b>
NCC WWHAR Public Consultation	14 November 2022 until 8 January 2023	Feedback informed the design of Non-Motorised User elements of the scheme and offered additional local knowledge about how users interact with the local network which has informed the Transport Assessment and development of Sustainable Transport Strategy
Sustainable Transport Stakeholder workshop	24 March 2023	Feedback informed the development of Sustainable Transport Strategy
NCC passenger Transport Team	Email discussions 26 May 2022 10 Jan 2023	Informed bus strategy to support the future housing development scheme
NCC Active Travel Team	9 February 2023 31 March 2023	Considered the wider network and context of existing and proposed NMU routes around West Winch. Influenced retention of the existing A47 underpass within the Proposed Scheme for future links with the LCWIP proposals.
NCC Development Management Team	7 February 2023 2 May 2023 17 November 2023	Development assumptions for the housing scheme and TA scoping discussions



Stakeholders	Dates and times of consultation and correspondence	Summary of Outcomes
National Highways Spatial Planning team	2 May 2023 17 November 2023	TA scoping discussions
NCC Signals team and ITS team	14 November 2023	Scania Way junction and signal design
National Highways Signals team	12 June 2023	Hardwick Interchange Signal design and WWHAR roundabout signals. Resulted in removal of A10 signals.
Active Travel England	24 November 2023	Discussed the Sustainable Transport Strategy and NMU design elements of the proposed scheme

## 1.5 Scope of the Assessment

1.5.1 Traffic and Transport was scoped out of the ongoing scoping process set out in **Chapter 5: Approach to EIA**.

1.5.2 Despite Traffic and Transport being scoped out, a summary chapter was offered for the ES as part of TA scoping discussions for completeness and consistency with other NCC schemes. The IEMA and GEART Guidance was also updated since the EIA scoping was carried out.

1.5.3 This Chapter has been included as the Proposed Scheme is a road scheme which will lead to the release of land for further residential development.

1.5.4 The introduction of the WWHAR will result in the redistribution of traffic on the network which could lead to more than usual traffic being rerouted to sensitive area (schools, recreational areas, high density residential areas etc). The effect of such magnitude of change in traffic on sensitive areas could result in temporal or permanent significant effect in relation to severance, fear and intimidation, pedestrian and cycle delay and amenity, highway safety and the effect of abnormal loads during the construction and operational phases.



1.5.5 Additionally, the housing scheme will increase the residential density and demand for the use of pedestrian and cycle infrastructure. The effect of the changes in traffic based on the additional flows generated by the new development on the existing and proposed highway link could result in temporary or permanent significant effects during the construction and operational phases.

1.5.6 This Traffic and Transport Chapter has therefore been included in this ES to reports the outcome of the assessment of likely significant effects arising from the Proposed Development and housing scheme.

1.5.7 The scope of this assessment was established through a scoping process with statutory consultees including the Local Highway Authority and National Highways (NH). Further information can be found in Section 8 of the **TA** (Document Reference: **NCC/4.01.00/WWHAR**).

## **1.6 Effects Scoped in and out of the Assessment**

1.6.1 No transport effect are scoped out of the assessment in the construction phases.

1.6.2 All effects on receptors are scoped in for the operational phase except for the Proposed Scheme itself as it is yet to be built. It is also scoped out during the 2027 operational future year given the embedded mitigation incorporated into the design. However, it is scoped in in for assessment following the introduction of the housing scheme.

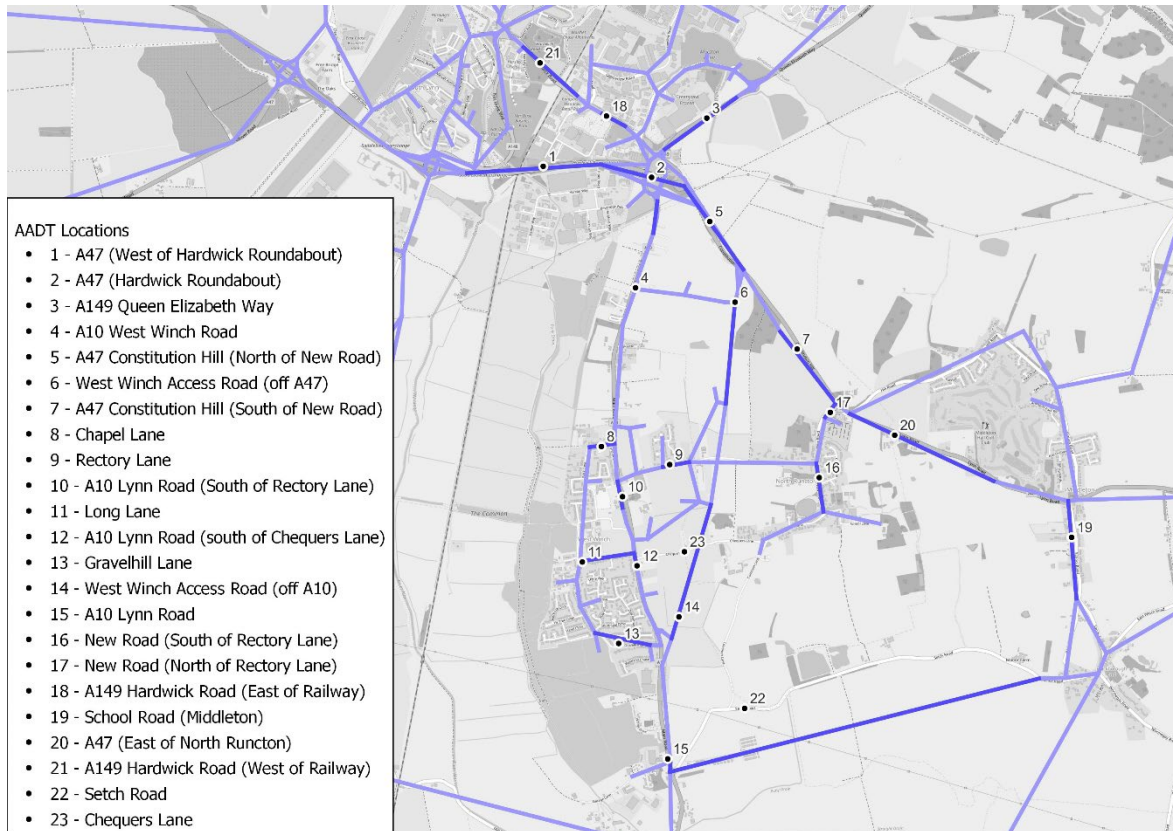
1.6.3 The effects considered for the construction and operational phase include severance, fear and intimidation, pedestrian and cycle delay and amenity, highway safety and the effect of abnormal loads. These are discussed in detail later in **Section 16.4**.

## **1.7 Extent of the Study Area**

1.7.1 The relevant Study Area is based on the links considered in the traffic model shown in **Figure 1-1**.



Figure 1-1 – Extent of study area



1.7.2 The study area was identified based on a review of the early strategic modelling results showing the area of influence in relation to significant changes in traffic flows. The junctions for assessment were agreed with the Local Highway Authority and National Highways in early-stage scoping discussions.

1.7.3 The study area encompasses primary road junctions on A47 (west of Hardwick Interchange), A149 Queen Elizabeth Way (north of Hardwick Interchange), A47 Constitution Hill (east of Hardwick Interchange), A10 Lynn Road (South of Hardwick Interchange), A149 Hardwick Road (North west of Hardwick Interchange).

1.7.4 The study area also includes local roads within West Winch and North Runcton, including roads crossing the proposed WWHAR alignment (Chequers Lane and Rectory Lane) plus Setch Road and A10 through West



Winch continuing south to its junction with A134 at the north edge of Watlington.

Method of Base Data Collection

- 1.7.5 An extensive data collection programme was undertaken in 2018 to support model development and provide sufficient data to enable the calibration and validation of the Kings Lynn Transport Model (KLTM).
- 1.7.6 Due to the extension of the Area of Detailed Modelling (ADM) to include West Winch, additional data were also collected in 2019 for the purposes of the KLTM extension.
- 1.7.7 An October 2022 traffic data collection exercise encompassing all of the ATC locations covered by the 2018 and 2019 surveys was undertaken in order to understand the change in traffic levels which have occurred in the King’s Lynn area post-COVID.
- 1.7.8 The baseline traffic flows have been informed by the 2019 base year flows extracted from the KLTM model. This is considered to offer a robust starting point as it is based on pre-COVID traffic levels. The 2019 baseline traffic flow is set out in Table 1-2.

**Table 1-2 – 2019 Baseline two-way traffic flow**

Link Name	AADT24	HGV 24
A47 (West of Hardwick Roundabout)	40695	3673
A47 (Hardwick Roundabout)	23325	1914
A149 Queen Elizabeth Way	28897	1547
A10 West Winch Road	24919	2406
A47 Constitution Hill (North of New Road)	20457	1348
A47 Constitution Hill (South of New Road)	20457	1348
Chapel Lane	1666	24
Rectory Lane	576	9
A10 Lynn Road	23159	2391



Link Name	AADT24	HGV 24
Long Lane	2373	21
A10 Lynn Road	20890	2370
Gravelhill Lane	602	11
A10 Lynn Road	21044	2385
New Road (South of Rectory Lane)	1107	10
New Road (North of Rectory Lane)	1793	20
A149 Hardwick Road (East of Railway)	20648	1022
School Road (Middleton)	598	33
A47 (East of North Runcton)	20005	1348
A149 Hardwick Road (West of Railway)	25334	881
Setch Road	751	13
Chequers Lane	246	7

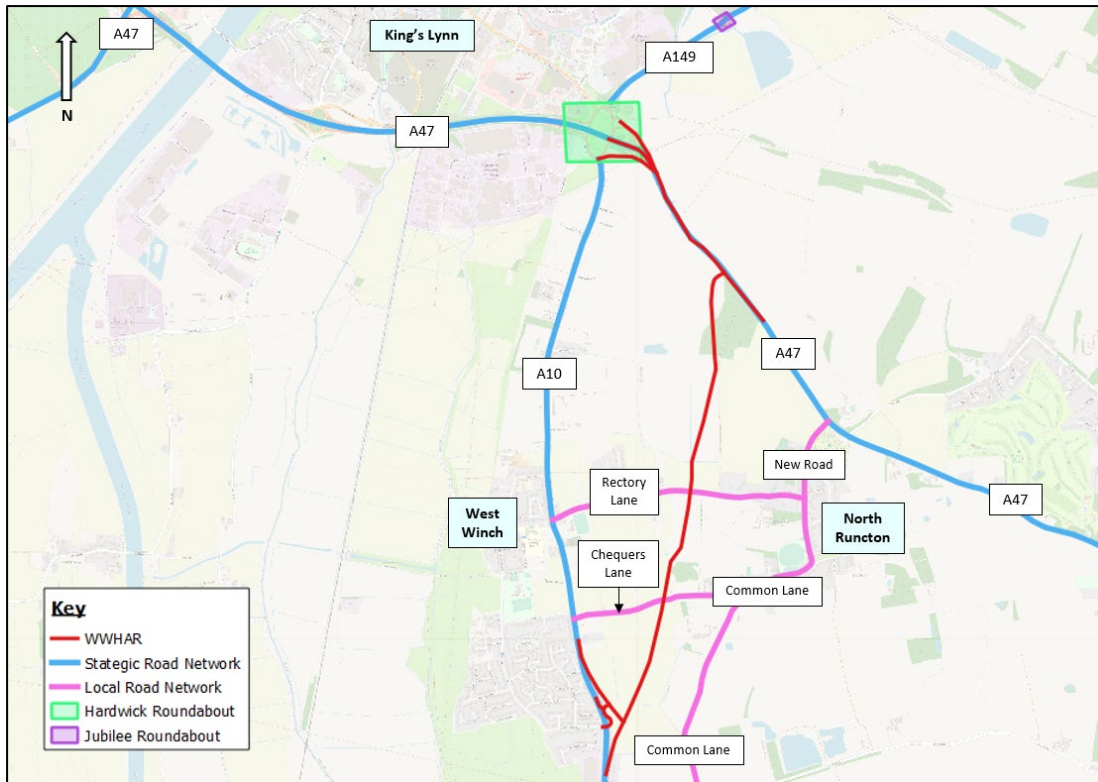
## 1.8 Baseline Conditions

### Site Location and Surrounding Areas

- 1.8.1 The Proposed Scheme would be located within the West Winch Strategic Growth Area (WWSGA) is located to the south-east of King’s Lynn, encompassing the Parishes of North Runcton and West Winch. The area borders the village of West Winch and the main road (A10) north towards Hardwick roundabout and King’s Lynn.
- 1.8.2 The Proposed Scheme would connect the A10 and the A47, comprising a new 2.4 Km road, starting south of Gravelhill Lane in West Winch in the south and joining the A47 before it reaches the Hardwick Junction in the north.
- 1.8.3 A plan showing the location of the Site and surrounding areas is provided in Figure 1-2.



Figure 1-2 – Existing highway network



1.8.4 The local highway network is discussed in detail in the Chapter 6 of the **TA** (Document Reference: **NCC/4.01.00/WWHAR**) and summarised below.

### **A10**

1.8.5 The A10 is single carriageway road routing north to south between Cambridge and King's Lynn. The A10 forms a key strategic link in the area, providing a connection to residents of Milton, Waterbeach, Ely, Littleport, Downham Market and West Winch.

1.8.6 The speed limit along the A10 varies significantly along its stretch. On approach to more populated areas, it varies between 30 and 40mph from 60mph.

### **A47**

1.8.7 The A47 is a key section of carriageway, routing east to west across Cambridgeshire and Norfolk. It forms a key part of the strategic road network



connecting Leicester, Peterborough, King's Lynn and Norwich to the port of Lowestoft.

1.8.8 For the majority of its length, the A47 is single carriageway and is subject to a national speed limit of 60mph. Around Norwich the A47 forms a section of dual carriageway that is subject to a national speed limit of 70mph.

1.8.9 On approach to King's Lynn, the A47 intersects with both the A10 and the A149 at a grade-separated junction known as the Hardwick Interchange. The Hardwick Interchange is a complex 6-arm grade-separated junction that is subject to change as part of the Proposed Scheme.

1.8.10 The Proposed Scheme will provide access to the A47 north of the 4,000 home West Winch Housing allocation, helping to relieve the pressure on the existing A10 as a result of the development.

### **A149**

1.8.11 The A149 is a major section of carriageway, running 87 miles from King's Lynn to Great Yarmouth via the North Norfolk coastal villages.

1.8.12 From the Southgates Roundabout in King's Lynn, the A149 heads eastwards away from the town along Hardwick Road.

1.8.13 Within the vicinity of the Proposed Scheme, the A149 is a single carriageway with a speed limit of 50mph, increasing to 60mph on approach to the Jubilee Roundabout approximately 850m north-east of the Hardwick Roundabout.

### **Rectory Lane**

1.8.14 Rectory Lane is a rural, single lane carriageway road that connects the A10 at West Winch to the A47 via New Road in an easterly and westerly direction.

1.8.15 The speed limit on Rectory Lane is restricted to 40mph from the A10 for approximately 910m where it becomes a 30mph road to New Road.





### **Chequers Lane**

1.8.16 Chequers Lane is situated to the east of the A10, approximately 2km south of Hardwick Interchange, and provides connectivity between the villages of West Winch and North Runcton.

1.8.17 From the A10, Chequers Lane is a 60mph road until the residential area north of Runcton where Chequers Lane becomes a 30mph.

### **Common Lane**

1.8.18 Common Lane is located within North Runcton and connects Chequers Lane to New Road.

1.8.19 It is a narrow single-lane carriageway, restricted to a speed limit of 30mph, and provides access to residential dwellings within North Runcton.

### **New Road**

1.8.20 New Road is also situated within North Runcton and connects Common Lane with the A47.

1.8.21 It is a narrow single-lane carriageway, restricted to a speed limit of 30mph, that provides access to residential dwellings within North Runcton.

### **Existing Public Transport**

#### **Bus Services**

1.8.22 There are bus services available throughout the study area and bus stops located on the radial routes into King's Lynn. Within West Winch there are bus stops along the A10, Rectory Lane, and the A47.

1.8.23 Within the immediate vicinity of the Proposed Development are a series of bus stops located along the A10 and Rectory Lane.

1.8.24 Lynx Buses provides several services connecting West Winch, Middleton, Fair Green, Hardwick, Setchey, Watlington, and King's Lynn.

1.8.25 Coach Services provide a service from King's Lynn to Thetford. This is a village stopper service which provides access to many small villages. There is



a good service during school term time. However, there is only five services per day during the school holidays.

1.8.26 Go to Town operate a service from King's Lynn to Mileham via Swaffham.

This is mostly used for school and college travel but does offer one service per day during school holidays – this service uses the A47.

#### Rail Services

1.8.27 There are no rail stations within the immediate vicinity of the Proposed Scheme. The nearest railway line is the Fen Line to the west of West Winch. The other railway line is a freight-only line to the north of West Winch.

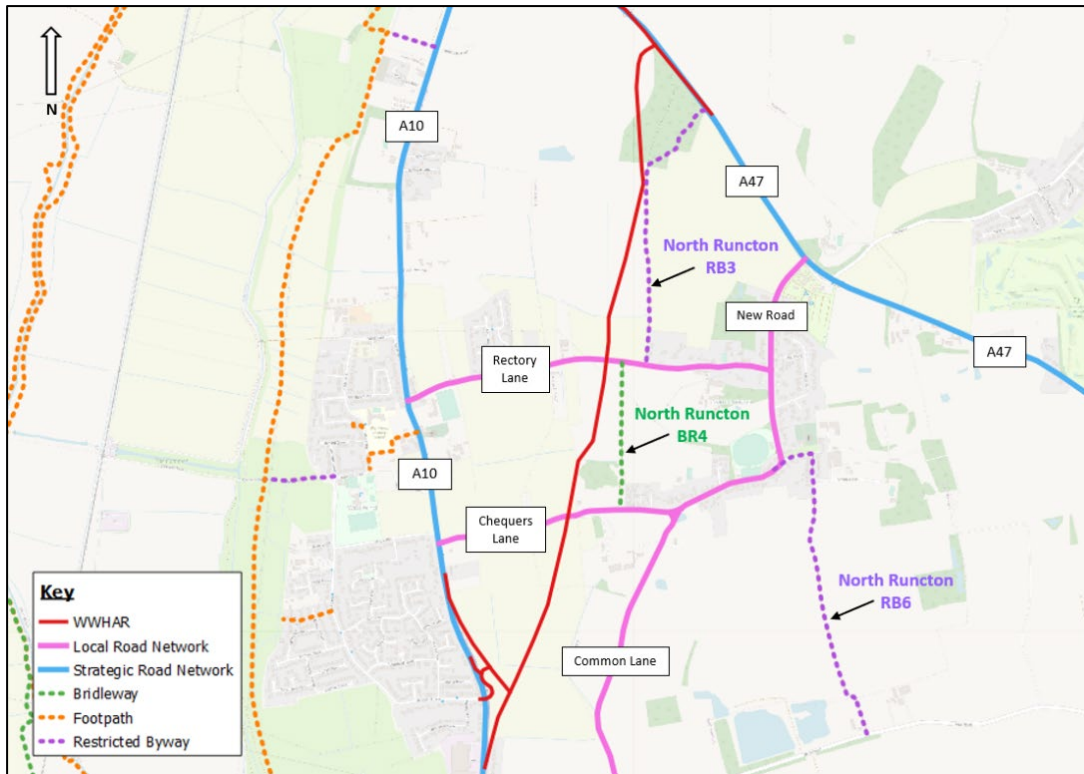
1.8.28 The closest stations to the Proposed Scheme are King's Lynn station which is approximately 5km to the north west and Watlington station which is about 7km to the south of the Proposed Scheme.

#### Existing Accessibility Review

##### **Walking Accessibility and Pedestrian Network**

1.8.29 The area is currently served by a network of existing pedestrian footways and Public Rights of Way (PRoW) predominantly passing through Rectory Lane and Chequers Road as shown in Figure 1-3.

Figure 1-3 – Existing public rights of way



1.8.30 West Winch benefits from a shared use path along the east side of A10, which provides pedestrian and cycle access to southern King’s Lynn connecting via Hardwick Roundabout. The path also continues south to the A134/A10 roundabout north of Watlington.

1.8.31 The Hardwick Roundabout itself has a mix of controlled and uncontrolled crossings on the southern arms, allowing pedestrian and cyclists to access King’s Lynn. There is no NMU (Non-Motorised User) provision on the A47, with no dedicated facilities along Constitution Hill. However it is safer for east-west cyclists and pedestrians to travel via rural lanes such as Rectory Lane and Chequers Lane between West Winch and North Runcton.

1.8.32 There are numerous single-lane rural roads within this study area with no dedicated pedestrian facilities but with low traffic flows, usually less than a 1000 AADT which LTN1/20 identifies as suitable for cycling in mixed traffic where speeds are low.



1.8.33 The Public Right of Way (PRoWs) in the immediate vicinity of the Proposed Scheme include:

- West Winch FP2 – A footpath running southeast to northeast from the A10, crossing agricultural land and Grange Lane, connecting to West Winch FP2 to the north. This footpath is located approximately 800m southwest of the Hardwick Roundabout.
- North Runcton FP1 – A 530m footpath running between Beveridge Way to the north and West Winch FP2 to the south, crossing agricultural land.
- North Runcton RB2 – A 175m restricted byway which runs in an east – west direction connecting North Runcton FP1 to the A10 West Winch Road.
- West Winch FP3 – A 240m footpath running in a south-west direction between the A10 and Watering Lane. The footpath ties into and exiting pelican crossing along the A10.
- West Winch RB1 – A 230m restricted byway running in an east – west direction between Watering Lane and West Winch FP2.
- North Runcton RB3 – A restricted byway stemming from the A47 and running in a southern direction towards Rectory Lane.
- North Runcton BR4 – A restricted byway running in a north – south direction between Rectory Lane and Chequers Lane.
- North Runcton RB6 – A restricted byway running between Common Lane and Setch Road.

1.8.34 These links provide access to several settlements in West Winch within 30-minute walk including:

- North Runcton
- Fair Green



- Setchey
- South King's Lynn

1.8.35 Also, key services are accessible within approximately 30-minute walk of the Proposed Scheme. These include:

- Supermarkets (Sainsbury's and Tesco Extra)
- West Winch Stores and Post Office
- West Winch Primary School
- Hardwick Industrial Estate
- Buttercups Pre-school

#### Cycling Accessibility and Network

1.8.36 West Winch benefits from existing, dedicated cycling infrastructure, mainly centred around the shared footway and cycleway along the A10.

1.8.37 This consists of a wide footway/cycleway between Oakwood Corner Roundabout to the South and Hardwick Roundabout to the north, providing a safer route for cyclists into King's Lynn and most of the way to Watlington.

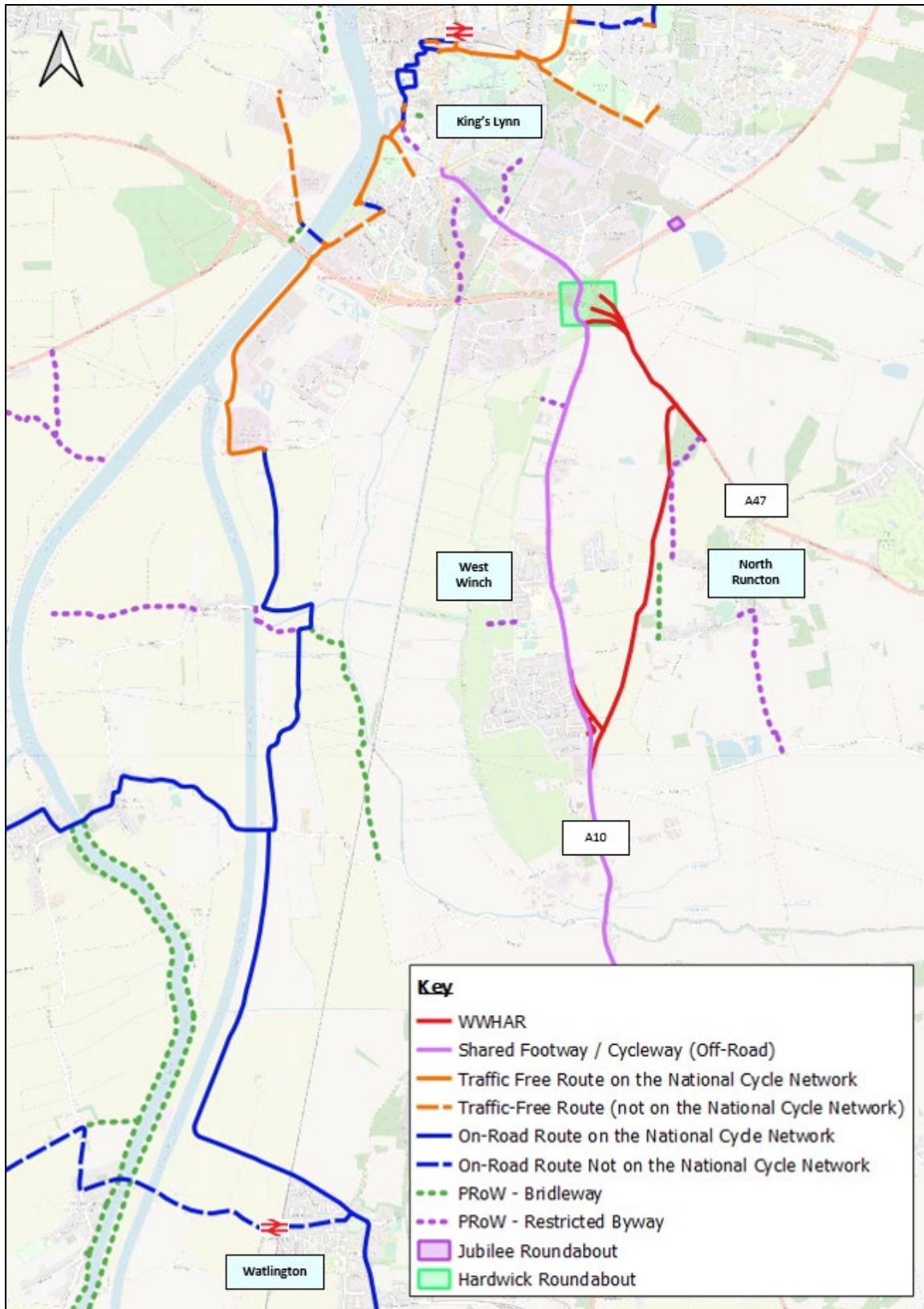
1.8.38 On the Hardwick Roundabout, there are a number of toucan crossings which provide a walking and cycling route across the roundabout under the A47.

1.8.39 The shared path on the A10 continues north across Hardwick Roundabout onto the A149 Hardwick Road, this continues towards South Gates Roundabout, where the shared path links to other cycle tracks for destinations across King's Lynn. The shared space path continues to the south until the Oakwood Corner Roundabout.

1.8.40 Figure 1-4 provides an overview of the cycle network surrounding the Proposed Development. This includes the National Cycle Network, PRowS and the shared footway / cycleway that follows the A10 northbound into King's Lynn to the Southgates Roundabout.



Figure 1-4 – Regional cycle network





1.8.41 Figure 1-4 demonstrates that West Winch benefits from a skeleton network of cycling infrastructure connecting to destinations north and south of the village. Additionally, many of the local side roads and lanes have low motor vehicle traffic, and can be used for east-west movement.

1.8.42 The National Cycle Network (NCN) routes 1 and 11 are near West Winch. National Cycle Route (NCR) 1 joins NCR 11 south west of West Winch on Mill Road, east of Wiggshall. NCR 1 runs parallel to the A10 to the west of West Winch on the other side of the River Nar.

1.8.43 Further details are provided within the **TA** (Document Reference: **NCC/4.01.00/WWHAR**).

Personal Injury Collision (PIC) Data

1.8.44 The most recently available seven-year Personal Injury Collision (PIC) data has been obtained from NCC.

1.8.45 Table 1-3 presents a summary of the PIC data by year and severity. Figure 17 of the **TA** (Document Reference: **NCC/4.01.00/WWHAR**) presents the corresponding locations of the collisions.

**Table 1-3 – PIC data by year and severity**

Year	Severity as Slight	Severity as Serious	Severity as Fatal	Total
2016	53	8	1	62
2017	40	6	0	46
2018	38	9	1	48
2019	48	4	0	52
2020	24	8	1	33
2021	17	8	1	26
2022	24	9	0	33
Total	244	52	4	300



1.8.46 Table 1-3 shows that a total of 300 incidents were recorded on the road network in the 7-year period studied. 244 of these collisions were of slight severity, 52 were reported as serious, and four were fatal. It is evident that 2016 experienced the greatest number of collisions (62) and that during 2022 the fewest number of incidents occurred (totalling 33). This excludes the COVID-19 lockdown years of 2020 and 2021 which experienced greatly reduced traffic levels.

1.8.47 Of all collisions between 2015 and 2022, 14% occurred during the morning peak period (0700-1000), while 23% occurred during the evening peak period (1600-1900).

1.8.48 Further analysis of the full dataset, shows that 79% of all collisions occurred on a dry carriageway surface, suggesting that the road condition was not a major causal factor of the recorded collisions.

1.8.49 Of the 300 collisions that were recorded, there were 425 casualties, of which 84% were slightly injured, 14% were seriously injured, and 1% suffered fatal injuries.

1.8.50 Table 1-4 provides a summary of the collisions by severity and casualty class.

**Table 1-4 – Personal injury collision study area information**

Casualty Class	Slight	Serious	Fatal	Total
Driver / Rider	254 (84%)	45 (15%)	3 (1%)	302
Passenger / Pillion	93 (88%)	11 (10%)	2 (2%)	106
Pedestrian	12 (71%)	5 (29%)	0 (0%)	17
<b>Total</b>	<b>359</b>	<b>61</b>	<b>5</b>	<b>425</b>

1.8.51 Table 1-4 shows that most accidents involved drivers / riders (thus 302) of which 84% of these accidents were slight, 15% were serious, and 1% were fatal.





1.8.52 Regarding pedestrian casualties, 17 accidents were recorded which reflects a very small number of casualties in comparison to other casualty classes. This is equivalent to 2 accidents per year, 71% of which are slight with no fatalities.

1.8.53 Fatalities were associated with driver and passenger incidents. Table 1-5 describes the recorded fatal accidents in more detail.

**Table 1-5 – Overview of fatal accidents**

Location	Day/Date	Time/Light	Weather	Road Surface	Vehicles
Saddlebow Interchange, A47	Wed / 19.10.2016	18:45 / Dark	Rain (no wind)	Wet / damp	2 Cars
Constitution Hill, A47	Wed / 17.01.2018	17:21 / Daylight	Fine (no wind)	Wet / damp	1 Van / GV, 1 Bus / coach
Saddlebow Interchange, A47	Fri / 24.01.2020	06:05 / Dark	Fog or mist	Wet / damp	HGV / Pedal cycle
Watlington Road, A10	Mon / 13.12.2021	06:25 / Dark	Fine (no wind)	Wet / damp	2 Cars

Cluster Sites

1.8.54 The identified collision clusters at the locations listed below:

- Hardwick Roundabout (39 total accidents of which 8 were serious and 31 were slight severity).
- Pullover Roundabout (46 of which 8 were serious and 38 were of slight severity).
- A10 (34 – from Hardwick Roundabout to extent of scheme of which 5 serious and 29 slight collisions were reported).

Future Baseline

1.8.55 The assessment considers a future baseline year of 2027 and 2042. This baseline has been derived using the SATURN base model.



1.8.56 Three forecast networks were developed to model a combination of future scenarios with and without the dependant development at the West Winch Growth Area (WWGA) and with and without the proposed West Winch Housing Access Road (WWHAR) scheme. The three scenarios are:

- **Do Minimum (DM)** Scenario (also referred to as Scenario P): Future year network without the proposed transport scheme and with 300 dwellings at the WWGA
- **Do Something 1 (DS1)** Scenario (also referred to as Scenario S): Future year DM network with the Proposed Scheme transport scheme added and with 300 dwellings at the WWGA
- **Do Something 2 (DS2)** Scenario (also referred to as Scenario R): Future year DM network with the proposed Scheme transport scheme added and with 4,000 dwellings at the WWGA

1.8.57 For the Proposed Scheme opening year of 2027 the DS1 and DS2 scenarios are identical as the dependent development will not yet be complete.

1.8.58 The full extent of WWGA housing development (totalling 3,700 dwellings above and beyond the non-dependent 300 dwellings) is assumed to be completed by 2042.

1.8.59 The development of each forecast network is outlined in the **TA** (Document Reference: **NCC/4.01.00/WWHAR**) and summarised below.

#### DM Scenario

1.8.60 The DM Scenario does not include the dependant development or the Proposed Scheme. The DM network was derived from the base model, with the following changes:

- Addition of the proposed Hardwick Green access roundabout on the A10: a three-arm priority roundabout with an access road to provide a connection to the committed 300 home development to the east of A10 in the northern part of the WWGA.



## DS1 Scenario

1.8.61 The DS1 Scenario network does not include the dependant development but does include the Proposed Scheme. The DS1 model was produced from the DS2 model (as set out below), with the following changes:

- The links which would provide access to the future housing development via the Proposed Scheme were assumed to be closed.

## DS2 Scenario

1.8.62 The DS2 Scenario network includes the dependant development and the Proposed Scheme. The following changes were made to the base model to produce Scenario R:

- Addition of the Proposed Scheme: a 40mph urban road which connect with the A47 to the north and the A10 to the south. The Proposed Scheme connects with the A47 via a three-arm roundabout. The A47 approaches are signalised, and the Proposed Scheme approach is unsignalised. There is a westbound off slip from the WWHAR to the A47. The Proposed Scheme connects with the A10 via a three-arm priority roundabout. There are three development access roads off the Proposed Scheme and each of these junctions are modelled as three-arm priority roundabouts.
- The main roads of the West Winch development internal layout, including three access roads off the A10 and three access roads off Rectory Lane. These roads were modelled with a 20mph speed limit.
- The signals at the A10 approach to Hardwick Roundabout have been removed, and the Beveridge Way approach has been signalised.
- Constitution Hill Roundabout has been removed and replaced with a westbound off slip from the A47 to Hardwick Roundabout, and an eastbound on slip from Hardwick Roundabout to the A47.



- Addition of Hopkins Road, which connects with the A10 to the west via a three-arm priority roundabout, and with the Proposed Scheme to the east via a three-arm priority roundabout.
- Along the A10, the speed limit was reduced to 30mph, the bus stops were moved to within the carriageway, and six signalised pedestrian crossings were introduced.

### Committed Developments

1.8.63 Committed developments are the major developments in close proximity, as set out in the agreed Uncertainty Log (UL) for the (KLTM). The Uncertainty Log sets out the committed developments in the study area for the strategic model. The relevant Local Planning Authorities (BCKLWN and NCC) have provided input to the development of the UL as the project has progressed and the status of the developments included in the model have been amended to suit the most likely scenario. The nearby significant developments have been included in the baseline of the updated KLTM model with the extent of anticipated growth at major development sites that are 'near certain' or 'more than likely' in 2027 and 2042 as set out within **Chapter 17** (Document Reference: **NCC/4.01.00/WWHAR**).

1.8.64 The key developments considered within the KLTM model in the vicinity of the Scheme are discussed at Chapter 10 of the **TA** at (Document Reference: **NCC/4.01.00/WWHAR**).

## 1.9 Design and Embedded Best Practice Mitigation Measures

1.9.1 The strategic traffic modelling carried out across the wider network using the KLTM provides a comparison of the scenarios with and without the Proposed Scheme. This indicated a need for mitigation where traffic is shown to re-route in response to the Proposed Scheme:

1.9.2 The SATURN model outputs from the KLTM have then been used to produce a more detailed Paramics Discovery model of the local area around the Proposed Development Scheme and this more detailed assessment has



identified a small number of additional interventions required to be included in the scheme, thus;

- Beveridge Way signalised in both 2027 and 2042.
- A47 approaches to A47 / WWHAR signalised in both 2027 and 2042.
- Improvements to signal timings and validation of SCOOT detection at Scania Way junction with A149 Hardwick Road.

1.9.3 The results show that there is barely any changes in AADT in the future year of 2042. In 2027 the addition of the signals at the A47 approach to A47/WWHAR Roundabout leads to a small decrease (approximately 5%) in trips on the Proposed Scheme which get transferred to the A10 and the parallel route through Saddlebow. However this is considered to be a negligible difference as the level change falls within the typical range of daily variation of traffic (usually 5-10%)

1.9.4 A number of primary and secondary mitigation measures have also been identified through the iterative EIA process and have been incorporated into the design and construction planning of the Proposed Scheme.

1.9.5 The Proposed Scheme will be delivered with embedded mitigation including a segregated walking and cycle routes and additional crossing points on A10. These are to be positioned close to desire lines. This will address severance, fear and intimidation, walking and cycling amenity, pedestrian and cycle day and road safety.

1.9.6 Rectory Lane and Chequers Lane will be physically severed by the Proposed Scheme however, Rectory Lane will have a bridge for vehicles and NMUs crossing over the WWHAR alignment and Chequers Lane will have a signalised at grade NMU crossing to retain east-west connectivity. The small number of daily users of Chequers Lane will be diverted to alternative routes. A dedicated private haulage access will also be installed close to the proposed Chequers Lane crossing to prevent the need for HGVs to divert through the village of North Runcton.



- 1.9.7 Tertiary mitigation measures including Construction Traffic Management Plan (CTMP), Construction Worker Travel Plan (CWTP) and Construction Environmental Management Plan (CEMP) will provide information on measures to manage and mitigate the traffic and transport impacts of construction traffic.
- 1.9.8 To mitigate severance and driver delay, construction access, traffic and temporary diversions will be controlled through the CEMP. This will set out how construction traffic will be managed and its impact minimised.
- 1.9.9 There will be some disruption to footway and cycle routes usually unavoidable during construction of a project of this nature. To mitigate against pedestrian and cycle delay, construction access, traffic and temporary diversions will be controlled through the CEMP. This will set out how construction traffic will be managed and its impact minimised.
- 1.9.10 To mitigate against fear and intimidation, construction traffic will be routed mainly via A and B Roads and local roads only at the point of accessing the project site entrances.
- 1.9.11 Whilst the overall effect on accidents and safety is expected to be minor, it is considered appropriate to ensure that high levels of safety awareness are at the core of construction operations on the surrounding network as HGV movements contribute to a large proportion of cycle deaths.
- 1.9.12 As part of the CEMP, standards will be set for the compliance with the Freight Operator Recognition Scheme that includes driver awareness training. Further details will be set out in the CEMP.
- 1.9.13 During the detailed planning of construction works, efforts will also be made to minimise the footprint of all construction activities to less than the worst-case scenario assessed within this ES.
- 1.9.14 The assessment of likely significant effects of the Proposed Scheme assumes that primary, secondary and tertiary mitigation measures are in place.



## 1.10 Receptor Sensitivity

1.10.1 The sensitivity of receptors to traffic and transport impacts depends upon a combination of its value and susceptibility. The sensitivity of different receptors to traffic and transport effects is outlined in Table 1-6.

**Table 1-6 – Receptor sensitivity**

<b>Receptor Sensitivity</b>	<b>Receptor Type</b>
High	<p>High sensitive receptors (e.g. hospitals, schools, nurseries, nursing homes, a high concentration of residential dwellings and facilities and amenities, areas with high tourist footfall, significant pedestrian/cycle desire lines etc.)</p> <p>Or</p> <p>No / limited separation provided by the highway environment (e.g. no footway provision / cycle provision) in an area where there are significant pedestrian / cycle desire lines.</p>
Medium	<p>Medium sensitive receptors (e.g. medium concentration of residential dwellings and facilities and amenities, designated pedestrian/cycle desire lines including cycle routes and public footpaths).</p> <p>Or</p> <p>No / limited separation from traffic provided by the highway environment (e.g. narrow, intermittent footway provision close to carriageway, substandard pedestrian and cycle provision) in an area where there are some pedestrian / cycle desire lines.</p>
Low	<p>Low sensitive receptors (e.g. small concentration of residential dwellings, facilities and amenities, few pedestrian / cycle desire lines etc)</p> <p>Or</p> <p>A highway environment that can accommodate changes in volume of traffic (e.g. adequate (i.e. to standard) footway provision / cycle provision, well separated provision from carriageway) with few pedestrian / cycle desire lines.</p>



Receptor Sensitivity	Receptor Type
Very Low	<p>No sensitive receptors (e.g., no residential dwellings, facilities and amenities and no pedestrian / desire lines etc) such as a rural area.</p> <p>Or</p> <p>A highway environment that can accommodate changes in volume of traffic (e.g. adequate (i.e. to standard) footway provision / cycle provision, well separated provision from carriageway) with no sensitive receptors (very low).</p>

1.10.2 A review of the link sensitivity for non-motorised users based on Table 1-6 is set out in **Appendix 16.2**.

Accident and Safety - Non Motorised User (NMU) Sensitivity

1.10.3 For accident and safety sensitivity, the IEMA guidance recommends the review of STATS19 data (Collisions on the public highway which involve injury or death are recorded by the police on a STATS19 form and collated by the local highway authority. The data includes a wide variety of information about the collision, such as time, date, location, road conditions) to identify any emerging patterns or factors that could be exacerbated by traffic or movement generation. This should be combined with a Safe System approach which involves:

- Identifying the study area using historic crash data.
- Establishing a baseline road safety level for the roads within the study area (could be based on International Road Assessment Programme (iRAP) (Ref 16.21) Star Ratings protocols or similar tools)
- Assessing the effects of additional development traffic for all users

1.10.4 The scope of the assessment has been based on the Personal Injury Accident (PIA) study area shown in **Figure 17** of the **TA** (Document Reference: **NCC/4.01.00/WWHAR**)





1.10.5 The **TA** (Document Reference: **NCC/4.01.00/WWHAR**) identifies locations where accident clusters on the surrounding highway network have occurred in the most recent five-year period from 1st April 2017 to 26th March 2022 at key locations within the scope of the assessment area.

1.10.6 Following the above, the sensitivity criteria for NMUs (road safety) is based on a qualitative assessment of links using the iRAP (**Ref 16.21**) ratings combined with a review of the collision clusters to determine the road safety sensitivity of discrete areas of the highway network.

1.10.7 This assessment considers:

- Existing highway infrastructure provision (e.g., footways, cycleways, crossing facilities, visibility etc.);
- The type of users using a link (e.g., is a link likely to be used by pedestrians, cyclists, and equestrians); and
- Review of personal injury accident records (e.g., are there any accident clusters?).

1.10.8 The sensitivity of NMUs in the study area is based on the thresholds set out in Table 1-7 adapted from the iRAP ratings.

1.10.9 The rating protocols utilises a 3-star rating (1, 2 and 5), to provide consistency across all the assessment criteria, the rating was interpolated to include 2 and 3 star ratings as shown in Table 1-7 below.



**Table 1-7 – Categories of road safety sensitivity**

<b>Rating</b>	<b>Walking</b>	<b>Cycling</b>	<b>Motorcycle</b>	<b>Vehicles</b>
<b>1 star</b> ★	No Sidewalk No safe crossing 60kmh traffic	No cycle path No safe crossings Poor road surface 70kmh traffic	No motorcycle lane Undivided road Trees close to road Winding alignment 90kmh traffic	Undivided road Narrow centreline Trees close to road Winding alignment 100kmh traffic
<b>2 Stars</b> ★★	No sidewalk/very narrow sidewalk Street lightning No pedestrian refuge 55kmh Traffic	On-road cycle lane Good road surface Street lightning 60kmh Traffic	On-road motorcycle lane Undivided road Good road surface >5m to any roadside hazard 90kmh Traffic	Wide centreline separating oncoming vehicles >5m to any roadside hazard 100kmh Traffic
<b>3 Stars</b> ★★★	Sidewalk present Street lightning Pedestrian refuge 50 kmh Traffic	On-road cycle lane Good road surface Street lightning 60kmh Traffic	On-road motorcycle lane Undivided road Good road surface >5m to any roadside hazard 90kmh Traffic	Wide centreline separating oncoming vehicles >5m to any roadside hazard 100kmh Traffic



Rating	Walking	Cycling	Motorcycle	Vehicles
4 Stars ★★★★	Sidewalk present Signalised crossing with no refuge Street lightning 45kmh Traffic	On-road cycle lane Good road surface Street lighting No raised platform for crossing 32kmh Traffic	On-road motorcycle lane Undivided road, >5m to any roadside hazard Good road surface Street lighting 85kmh Traffic	Wide centreline Separating oncoming vehicles >5m to any roadside hazard Straight alignment 100kmh Traffic
5 Stars ★★★★★	Sidewalk present Signalised crossing with refuge Street lightning 40 kmh Traffic	Off-road dedicated cycling facility Raised platform crossing of major roads Street lighting	Dedicated separated motorcycle lane Central hatching No roadside hazards Straight alignment 80 kmh Traffic	Safety barrier separating oncoming vehicles Protection from roadside hazards Straight alignment 100kmh Traffic

Source: International Road Assessment Programme (iRAP)

1.10.10 The collision cluster data was reviewed based on the criteria set out in Table 1-8.

**Table 1-8 – Collision cluster road safety sensitivity**

Sensitivity	Severity
High	Clusters showing 2 or more killed (K) and or 5 or more serious injuries (SI)
Medium	Clusters showing 1 or more killed (K) and or 5 or more serious injuries (SI)
Low	Clusters showing 2 or more serious injuries (SI)
Very Low	Clusters showing 5 or more slight injuries



1.10.11 To establish the road safety sensitivity level within the study area, the iRAP scoring (Table 1-7) and the collision cluster scoring (Table 1-8) were combined with the receptor sensitivity assessment (Table 1-6) to derive the overall receptor sensitivity attached at **Appendix 16.2**.

1.10.12 The route sensitivity assessment was undertaken for the Do Minimum (reference case) scenario and compared with the Do-Something scenarios (with road scheme and road scheme + housing scheme) to establish any changes in levels as follows:

- No Step Change      Very Low
- 1 Step Change        Low
- 2 Step Change        Medium
- 3 Step Change        High

## 1.11 Assessment Methodology

1.11.1 The methodology follows the guidance set out in **Section 16.2.4** of this ES.

1.11.2 The IEMA Guidelines states in paragraph 3.12 that:

*“A critical feature of an environmental assessment is determining whether a given effect is significant. Having quantified the magnitude of the impact (i.e. the level of change), there are various ways of interpreting whether or not the resulting outcome is considered significant. There is no definition of a ‘significant effect’ in the EIA Regulations. Furthermore, for many effects, there are no simple rules or formulae that define appropriate assessment thresholds and therefore there is a need for interpretation and judgement on the part of the competent traffic and movement expert, backed up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing an impact and the sensitivity of those people, as well as the assessment of the damage to various natural or cultural resources”.*



## Impacts Assessed

1.11.3 The following types of impacts have been considered as a part of this chapter:

- Severance (pedestrian and cyclist);
- Delay (pedestrian, cyclist and drivers);
- Amenity (pedestrian and cyclist);
- Fear and Intimidation (pedestrian and cyclist);
- Accidents and safety; and
- Hazardous/abnormal Loads.

1.11.4 The construction phase and operational phase effects of the Proposed Scheme and housing scheme have been assessed separately. The assessment within this Chapter is predominantly based on Annual Average Daily Traffic Flows, whereas the **TA** (Document Reference: **NCC/4.01.00/WWHAR**) focusses on the highway peak hours.

## Screening Process

1.11.5 The IEMA Guidelines provide two 'rules of thumb' as a screening process to delimit the scale and extent of the assessment of traffic impacts and the determination of which traffic links require assessment. The rules are as follows:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)
- Rule 2: Include any other specifically sensitive areas (hospitals, schools, nurseries, nursing homes, a high concentration of residential dwellings and facilities and amenities, areas with high tourist footfall, significant pedestrian/cycle desire lines) where traffic flows have increased by 10% or more.



1.11.6 The 30% threshold provides a level for development flows to be assessed against to establish whether additional assessment is needed to establish the significance of the impact.

1.11.7 The threshold of 30% is based on the fact that imperceptible changes in the environmental effects of traffic are generally experienced when there is less than a 30% increase in traffic. Additionally, projected changes in total traffic flow of less than 10% create no discernible environmental effect, hence the second threshold as set out in Rule 2.

1.11.8 As a general rule of thumb, a threshold of 1000 vehicle per day as a result of a scheme prior to mitigation is not considered significant due to low base flows.

1.11.9 This criterion is the equivalent to the 1000 vehicle threshold for Quiet Lane designation. It is also the magnitude of change required to trigger a 1Db noise increase. It is considered that impacts less than 1000 vehicles per day (i.e., adding a quiet lane equivalent to existing traffic) could be tolerated on the majority of the surrounding road network without adversely affecting the quality of life for local residents. This also equates to the DMRB criteria for scoping of links for Air Quality assessment as specified within LA105.

#### Magnitude of Impact

1.11.10 To assist with assigning a magnitude to traffic and transport impacts, the IEMA Guidelines (**Ref 16.15**) sets out considerations, and in some cases thresholds, in respect to changes in the volume and composition of traffic.

1.11.11 The assessment methodology for defining the magnitude of traffic and transport impacts has been derived from IEMA guidance and is set out below. Where no guidance is available, commonly agreed thresholds for judging the magnitude of traffic and transport impacts and professional judgement, backed-up by data/ quantified information has been applied as suggested in paragraph 3.12 of the IEMA guidance (**Ref 16.15**).



- 1.11.12 Dependent on the magnitude of impact, the effect on receptors can be beneficial or adverse or neutral if there is no change. An impact may also be classed as temporary or permanent.
- 1.11.13 **Table 1-9** provides a summary of the criteria used for the assessment of magnitude of impacts based on IEMA guidance (**Ref 16.15**). Details of each impact category is fully explained in **Appendix 16.1**.

**Table 1-9 – Assessment of the magnitude of impact**

<b>Impact</b>	<b>Magnitude of Impact: Very Low</b>	<b>Magnitude of Impact: Low</b>	<b>Magnitude of Impact: Medium</b>	<b>Magnitude of Impact: High</b>
Severance (Ref 16.15 para 2.19)	Change in total traffic of > 0 and <30%	Change in total traffic of >=30 and <60%	Change in total traffic of >=60 and <90%	Change in total traffic of >90%
Delay (pedestrian, cyclist) (Ref 16.16 Table 3.11)	Change in total traffic > 0 and <4000	Change in total traffic >4000 and <=8000	Change in total traffic >8000 and <=16000	Change in total traffic > 16000
Delay (pedestrian, cyclist) (Ref 16.19 Table 5.1)	Change in Severance: None	Change in Severance: Slight	Change in Severance: Moderate	Change in Severance: Severe
<b>Total Delay (pedestrian, cyclist) (Ref 16.19 Table 3.11)</b>	Change in total traffic > 0 and <4000 and no change in severance	Change in total traffic >4000 and <=8000 and slight change in severance	Change in total traffic >8000 and <=16000 and moderate change in severance	Change in total traffic > 16000 and severe change in severance
Amenity (pedestrian and cyclist); (Ref 16.15 Para 3.30)	Change in two way traffic or HGV of >0 and <=100%	Change in two way traffic or HGV of >100% and <=130%	Change in two way traffic or HGV of >130% and <=160%	Change in two way traffic or HGV of >160%
Amenity (pedestrian and cyclist); (Ref 16.20 Appendix B);	Footway width>3.3m	Footway width >2.2m <= 3.3m	Footway width >2.0m <= 3.2m	Footway width >0m <= 2.0m
Amenity (pedestrian and cyclist) (Ref 16.4)	Two way traffic > 2500	Two way traffic >2501 - <=5000	Two way traffic >5000 - <=10000	Two way traffic > 10000
<b>Total Amenity (pedestrian and cyclist) (Ref 16.4)</b>	Change in two-way traffic of >0 and <=100% and AADT two-way traffic less than 2500 vehicles per day and footway width >3.3m	Change in two-way traffic of >100% and <=130% and AADT two-way traffic between >2501 and <=5000 vehicles per day and footway width 2.2m to 3.3m	Change in two-way traffic of >130% and <=160% and AADT two-way traffic between >5000 and <=10,000 and footway width 2.0m to 2.2m	Change in two-way traffic of >160% and AADT two-way traffic greater than >10,000 vehicles per day and footway width 0m to 2m
Fear and Intimidation (pedestrian and cyclist); (Ref 16.15 Table 3.1)	Degree of hazard (0): 18hour AADT +<600, HGV +<1000, speed =>20mph	Degree of hazard (10): 18hour AADT 600-1200, HGV 1000-2000, speed 20-30mph	Degree of hazard (20): 18hour AADT 1200-1800, HGV 2000-3000, speed 30-40mph	Degree of hazard (30): 18hour AADT +1800, HGV +3000, speed =>40mph
Fear and Intimidation (pedestrian and cyclist); (Ref 16.15 Table 3.2)	Levels of fear and intimidation: 0-20	Levels of fear and intimidation: 21-40	Levels of fear and intimidation: 41-70	Levels of fear and intimidation: 71+



<b>Impact</b>	<b>Magnitude of Impact: Very Low</b>	<b>Magnitude of Impact: Low</b>	<b>Magnitude of Impact: Medium</b>	<b>Magnitude of Impact: High</b>
Fear and Intimidation (pedestrian and cyclist); (Ref 16.15 Table 3.3)	Magnitude of impact: No step change	Magnitude of impact: One step change with <400 18 hours AADT vehicles increase and <500 HV increase in total 18hr HV flow	Magnitude of impact: One step change with >400 18 hours AADT vehicles increase and >500 HV increase in total 18hr HV flow	Two step changes in level
Driver Delay	Average vehicle delay changes >0s and <= 20s (LOS A, B)	Average vehicle delay changes >20s and <= 30s (LOS C, D)	Average vehicle delay changes >30s and <= 60s (LOS E)	Average vehicle delay changes > 60s (LOS F)
Accidents and safety	Qualitative assessment based on the likely impact of a change in traffic flows on road user safety (Criteria based on professional judgement)	Qualitative assessment based on the likely impact of a change in traffic flows on road user safety (Criteria based on professional judgement)	Qualitative assessment based on the likely impact of a change in traffic flows on road user safety (Criteria based on professional judgement)	Qualitative assessment based on the likely impact of a change in traffic flows on road user safety (Criteria based on professional judgement)



## Construction Traffic Impact Assessment

1.11.14 The magnitude of an impact is typically defined by four factors:

- Extent (area over which an effect occurs);
- Duration (time over which the effect occurs);
- Frequency (how often the effect occurs); and
- Severity (degree of change relative to existing environmental conditions).

### Significance of Effects

1.11.15 As set out in Schedule 4 of the EIA Regulations, it is the effects, not the impacts, of a development which are to be reported. The significance of the traffic and transport effect is a product of the receptors' sensitivity and magnitude of impact. The effects are classified as beneficial or adverse or neutral (if there is no change) and temporary or permanent.

1.11.16 The significance of effect on receptors for each of the environmental effects have been considered in relation to the significance matrix from Table 3.8.1 of Section 3 of DMRB LA 104 (**Ref 16.16**). The matrix used to establish the significance of the effect is provided in Table 1-10 below. It should be noted that for consistency the matrix has been adjusted to align with the criteria established in calculating the magnitude of impact and receptor sensitivity.



**Table 1-10 – Significance matrix**

<b>Nature of Effect Magnitude / Probability / Reversibility</b>	<b>Receptor Sensitivity / Value: High</b>	<b>Receptor Sensitivity / Value: Medium</b>	<b>Receptor Sensitivity / Value: Low</b>	<b>Receptor Sensitivity / Value: Very Low</b>
High	Substantial	Substantial	Moderate	Minor
Medium	Substantial	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible
Very Low	Minor	Minor	Negligible	Negligible

1.11.17 The following terms have been used to define the significance of the effects identified where moderate and substantial are regarded as significant:

- **Substantial effect** – where the Proposed Scheme could be expected to have a significant effect (either beneficial or adverse) on users of the local transport network.
- **Moderate effect** – where the Proposed Scheme could be expected to have a noticeable effect which is significant (either beneficial or adverse) on users of the local transport network.
- **Minor effect** – where the Proposed Scheme could be expected to result in a small, barely noticeable effect, which is not significant (either beneficial or adverse) on users of the local transport network.
- **Negligible** – where no discernible effect is expected as a result of the Proposed Scheme on users of the local highway network.

1.11.18 The IEMA guidance (**Ref 16.15**) advise that as a general rule of thumb, environmental assessment practitioners should consider:



*“the forecast changes to baseline (magnitude of change/impact), the relative value/sensitivity/importance of the affected asset/receptor and the scale, nature and significance of the effect (consequence). The EIA Regulations also require consideration of whether the anticipated effect is short-term, medium-term or long-term and whether it is permanent or temporary.*

1.11.19 For transparent and systematic identification of likely significant environmental effects from the Proposed Scheme, the use of the terms ‘impact’ and ‘effect’ will follow the below definition:

- **Impacts:** changes resulting from an action; and
- **Effects:** the consequences of impacts.

#### Assumptions and Limitations

1.11.20 Any qualitative assessment will be subject to interpretation by the assessor. However, the assessor has experience in this area and has therefore applied their knowledge and expertise to provide a robust assessment of effects.

### **1.12 Assessment of potential effects, mitigation and residual effects**

1.12.1 This section sets out the outcome of the assessment of the transport effects arising from the construction and operation of the Proposed Scheme following the methodology set out in Section 16.4.

### **1.13 Construction phase**

1.13.1 There will be a temporary increase in HGV traffic during the construction period. HGV movements will be principally associated with the delivery of plant and materials, and the removal of construction waste. In addition, construction personnel and visitors to the site will also generate car and van movements as they arrive and depart.

1.13.2 The Proposed Scheme construction is planned to take about 24 months from commencement. The works will be carried out in phases, with appropriate traffic management measures set out within the CTMP discussed in **Section**



**16.5** to facilitate safe construction access and protect members of the public from highway safety issues where there is increased risk of conflict.

Construction Traffic Impact Assessment

### **Construction traffic routing**

1.13.3 Prior to the appointment of a competent contractor to build the scheme, assumptions have been made on construction methodology and traffic routing. Based on a review of potential material source locations and discussions with the Contractor it has been assumed that for the duration of construction, the following split of construction HGV movements will occur once the WWHAR internal haul road is in place:

- 64% of construction vehicles will access the Proposed Scheme site via the A47 (approaching from the east of the site).
- 29% of construction vehicles will access the Proposed Scheme site via the A47 (approaching from the west of Hardwick Roundabout)
- 7% of construction vehicles will access the Proposed Scheme site via the A149 Queen Elizabeth Way.

1.13.4 Staff travel to site and LGV movements on the network are predicted to be assigned to the local network as follows:

- 7% of construction worker and LGV vehicles will access the Proposed Scheme site via the A47 (approaching from the east of the site).
- 54% of construction worker and LGV vehicles will access the Proposed Scheme site via the A47 (approaching from the west of Hardwick Roundabout).
- 16% of construction worker and LGV vehicles will access the Proposed Scheme site via the A149 Queen Elizabeth Way.
- 14% construction worker and LGV vehicles will access the Proposed Scheme site via the A10 West Winch Road/Lynn Road.



- 9% construction worker and LGV vehicles will access the Proposed Scheme site via the A149 Hardwick Road.

1.13.5 As set out above, construction traffic is planned to be routed via A47, A149, A10 and to a lesser extent A17, avoiding rural minor roads. This will minimise disruption to local residents and local environment throughout the construction period.

1.13.6 For access to Rectory Lane, where bridge works will be taking place, the WWHAR alignment will be used as a haul road for access to the Rectory Lane compound. The majority of HGVs would avoid the part of Rectory Lane in the village to access for construction of the bridge works site, once the internal haul road is in place.

1.13.7 For a robust assessment, flows for the 2019 base year has been utilised in Section 16.10.3 for the construction impact assessment, rather than forecasting to the peak construction future year as this would increase the base flow and consequently reduce the estimated impact.

1.13.8 The construction AADT of the Proposed Scheme including the non-dependent dwellings (300 dwellings) have also been considered in this assessment, as it is possible these would be constructed within the same timeframe. This approach offers a robust assessment and also considers the combined effects of the two schemes as a worst case scenario. The associated peak construction traffic flows have been set out in Table 1-11 and Table 1-12.



**Table 1-11 – Total daily two-way construction traffic (all vehicles) and magnitude of impact**

Link	2019 Base (All Vehicles)	Proposed Scheme	Impact	Link Sensitivity
A47 (West of Hardwick Roundabout)	40695	166	0.41%	Very Low
A47 (Hardwick Roundabout)	23325	166	0.71%	Very Low
A149 Queen Elizabeth Way	28897	38	0.13%	Very Low
A10 West Winch Road	24919	110	0.44%	Medium
A47 Constitution Hill (North of New Road)	20457	110	0.54%	Very Low
West Winch Access Road (off A47)	0	282	0.00%	Low
A47 Constitution Hill (South of New Road)	20457	172	0.84%	Very Low
A10 Lynn Road (south of Rectory Lane)	23159	110	0.47%	Medium
A10 Lynn Road (south of Chequers Lane)	20890	110	0.53%	Medium
West Winch Access Road (off A10)	0	134	0.00%	Low
A10 Lynn Road (North of Setch Road)	21044	24	0.11%	Medium
A149 Hardwick Road (East of Railway)	20648	16	0.08%	Medium
A47 (East of North Runcton)	20005	172	0.86%	Low
A149 Hardwick Road (West of Railway)	25334	16	0.06%	Medium



**Table 1-12 – Total daily two-way construction traffic (HGVs) and Magnitude of impact**

Link	2019 Base (All Vehicles)	Proposed Scheme	Impact	Link Sensitivity
A47 (West of Hardwick Roundabout)	3673	74	2%	Very Low
A47 (Hardwick Roundabout)	1914	74	4%	Very Low
A149 Queen Elizabeth Way	1547	10	1%	Very Low
A10 West Winch Road	2406	42	2%	Medium
A47 Constitution Hill (North of New Road)	1348	42	3%	Very Low
West Winch Access Road (off A47)	0	202	0%	Low
A47 Constitution Hill (South of New Road)	1348	160	12%	Very Low
A10 Lynn Road (south of Rectory Lane)	2391	42	2%	Medium
A10 Lynn Road (south of Chequers Lane)	2370	42	2%	Medium
West Winch Access Road (off A10)	0	42	0%	Low
A10 Lynn Road (North of Setch Road)	2385	0	0%	Medium
A149 Hardwick Road (East of Railway)	1022	0	0%	Medium
A47 (East of North Runcton)	1348	160	12%	Low
A149 Hardwick Road (West of Railway)	881	0	0%	Medium





- 1.13.9 Based on rule 1 and 2 of the IEMA Guidance (**Ref 16.15**) none of the roads are scoped in for assessment.
- 1.13.10 Based on the traffic flows outlined in Table 1-11 and Table 1-12, it is evident that the effects of the construction traffic movements on the strategic 'A' roads are generally less than the typical daily variation of traffic (+/- 5%), so would not be noticeable to other road users.
- 1.13.11 As the majority of materials can be sourced locally from various quarry sites located off the A47 to the east within close proximity to West Winch. This route is away from the local road network, avoiding local villages and already an approved HGV access route.
- 1.13.12 According to the Norfolk Minerals and Waste Development Framework (2017), there are designated quarry sites to the east of West Winch already permitted to generate in excess of 3 million tonnes of materials. As these are already locally permitted sites which is expected to generate a significant amount of HGVs directly accessed via A47, impact on the local and Strategic Road Network would be unlikely to be noticeable.
- 1.13.13 The magnitude of change is therefore not realistically expected to be noticeable as the site would be generating HGV movements as part of its permitted activity and many of these would be routed via A47 in any case. The sensitivity of the link is also very low as such the effect will be minor.

#### Construction Traffic Effects

- 1.13.14 Construction traffic routing as discussed above is planned to be via A47, A10, A149 and A17 which are either part of the Strategic Road Network or part of the Primary Road Network in the NCC hierarchy which have relatively low sensitivity and low magnitude of change.
- 1.13.15 As no roads have been scoped in for further assessment due to low sensitivity or low magnitude of effect, it is expected that the significance of effect on driver delay, pedestrian and cyclist delay, severance, accident and road



safety, amenity and fear and intimidation will be at most **temporary minor adverse effect** which is **not significant**.

1.13.16 With a CEMP in place to secure appropriate routing once a competent contractor is appointed and more detailed construction phase plans are available, it is not anticipated that further mitigation would be required during the construction phase.

#### 1.14 Operation phase

##### Assessment Scenarios

1.14.1 The traffic and transport effects of the Proposed Scheme has been established by comparing the scenarios set out in **Section 16.7**, thus:

- **Do Minimum (DM):** Future Baseline situation without Scheme
- **Do Something 1 (DM1):** Proposed Scheme
- **Do Something 2 (DM2):** Proposed Scheme + Housing Scheme

##### Traffic Link Screening

1.14.2 The link screening has been based on the KLTM. The KLTM model shows how traffic will be likely to re-route and alter existing journey patterns to access the Proposed Scheme.

1.14.3 The links within the study area have been screened to identify those scoped in for further assessment in line with the IEMA guidelines (**Ref 16.15**).

1.14.4 The links that have been scoped in have been assessed for the DS and DM scenarios. However, in the DS1 scenario the Proposed Link has been scoped out given the embedded measures incorporated into the design of the road to ensure good accessibility, safety, crossing points, segregated shared cycle / footpaths.

1.14.5 The full link assessment is set out in **Appendix 16.3** summarised in Table 1-13 to Table 1-16.



**Table 1-13 – Link screening (DM and DS) 2027**

Link ID	Street Name	AADT	AADT	AADT	HGV	HGV	HGV DS2
		DM	DS1	DS2	DM	DS1	
8	Chapel Lane	1508	2007	2007	24	37	37

**Table 1-14 – Link screening (DM v DS) change in traffic flow 2027**

Link ID	Street Name	Receptor Sensitivity	AADT	AADT	HGV	HGV DS2
			DS1	DS2	DS1	
8	Chapel Lane	High	33%	33%	51%	51%

1.14.6 The 2027 (DS1 and DS2 flows are the same as the residential scheme is post 2027) assessment shows that with the DS1 scenarios in place, the network sees some traffic redistribution with additional traffic using some of the local roads (scoped in above).

1.14.7 Table 1-14 shows that only Chapel Lane is expected to see additional traffic flows including an increase in the proportion of HGVs above the threshold and so has been scoped in for assessment.

1.14.8 Summary of the link selection for the DM and DS scenarios in 2042 are set out in Table 1-15 and Table 1-16 overleaf.

**Table 1-15 – Link screening (DM and DS) 2042**

Link ID	Street Name	AADT DM	AADT DS1	AADT DS2	HGV DM	HGV DS1	HGV DS2
8	Chapel Lane	1600	1650	1803	26	32	32
11	Long Lane	2256	2383	3655	23	28	28
13	Gravelhill Lane	624	439	1220	12	1	1
16	New Road	1077	1290	1259	11	19	19



**Table 1-16 – Link screening (DM v DS) change in traffic flow 2042**

Link ID	Street Name	Receptor Sensitivity	AADT	AADT	HGV	HGV
			DS1	DS2	DS1	DS2
8	Chapel Lane	Medium	3%	13%	33%	33%
11	Long Lane	Medium	6%	62%	31%	31%
13	Gravelhill Lane	Medium	-30%	95%	-90%	-90%
16	New Road	High	20%	17%	81%	81%

1.14.9 Table 1-16 shows that the 2042 scope includes three additional links

compared to the 2027 scope i.e. Long Lane, New Road and Gravelhill Lane.

1.14.10 It is worth noting that though these links have less than 30% change in Annual Average Daily Traffic in the DS1 scenario, but have been scoped in under IEMA rule 2 because they are in a high/medium sensitivity area (thus having a high residential concentration. Also, New Road has a narrow footway only to one side) with more than 10% change in traffic flows.

1.14.11 In DS1, Long Lane is scoped in due to additional HGV movements (31%) and additional general traffic above 30% in DS2.

1.14.12 Gravelhill Lane is scoped in for DS2 due to additional general traffic (95%) albeit a significant reduction in HGVs (-90%).

1.14.13 New Road is scoped in for both DS1 and DS2 scenarios due to additional HGV movement above 10%.

1.14.14 Due to proposed new and improved bus routes which will increase the West Winch bus catchment, hence the local roads identified in Table 1-16 will see an increase in HGV movements, as a result of increased bus movement (since buses are classed as HGVs in the model). This could also be interpreted as a beneficial effect, with increased opportunity for access to public transport for local residents.

1.14.15 The modelling also indicates that there may be some limited localised re-routing of traffic via Gravelhill Lane, Long Lane and Chapel Lane in response



to the short section of 20mph speed limit proposed on the A10 in the centre of West Winch, as the alternative routes are subject to 30mph speed limits. In reality, these routes are unlikely to offer reduced travel times in comparison with the A10 when ad-hoc on-street parking and tight bends are taken into account which are not fully **simulated by the model**. The effects reported in Table 1-16 are therefore expected to be exaggerated.

- 1.14.16 Monitoring of post-opening traffic on the links identified in Table 1-16 above could be undertaken and if shown to experience significant re-routing with the Proposed Scheme in place, 20mph speed limits could be imposed or additional measures to make these alternative routes less attractive could be implemented.

#### Assessment of Significant Effects

- 1.14.17 This section sets out the significance of the traffic and transport effects for both the DS1 and DS2 scenarios for 2027 and 2042. The results are summarised below with full link assessment at **Appendix 16.4**.

#### Severance

##### **2027 Scenario**

- 1.14.18 The approach used for assessing the effects on severance is summarised in paragraphs 3.13 to 3.18 of the IEMA guidance (**Ref 16.15**) which suggests that changes in traffic flow of 30%, 60% and 90% would be low, medium and high magnitude of impact on severance, respectively. The complete assessment of severance on the links screened into the assessment is summarised in Table 1-17 to Table 1-19 overleaf.

**Table 1-17 – Severance (DS1) - 2027**

Link ID	Street Name	DM	DS1	DS1-DM (%)	Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
8	Chapel Lane	1508	2007	33%	Medium	Low	Minor	Adverse

1.14.19 The assessment shows that in 2027 **DS1** scenario Chapel Lane with a low magnitude of change and medium sensitivity is expected to see a **permanent, minor, adverse** effect which is **not significant** so no mitigation is needed.

### 2042 Scenario

1.14.20 The complete assessment of severance on the selected links are summarised in Table 1-18 and Table 1-19.

**Table 1-18 – Severance (DS1) - 2042**

Link ID	Street Name	DM	DS1	DS1-DM (%)	Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
6	West Winch Access Road	0	19144	100%+	Low	High	Moderate	Adverse
8	Chapel Lane	1600	1650	3%	Medium	Very Low	Minor	Adverse
11	Long Lane	2256	2383	6%	Medium	Very Low	Minor	Adverse
13	Gravelhill Lane	624	439	-30%	Medium	Very Low	Minor	Beneficial



Link ID	Street Name	DM	DS1	DS1-DM (%)	Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
14	West Winch Access Road	0	19141	100%+	Low	High	Moderate	Adverse
16	New Road	1077	1290	20%	Medium	Very Low	Minor	Adverse

**Table 1-19 – Severance (DS2) - 2042**

Link ID	Street Name	DM	DS2	DS2-DM (%)	Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
6	West Winch Access Road	0	25317	100%+	Low	High	Moderate	Adverse
8	Chapel Lane	1600	1803	13%	Medium	Very Low	Minor	Adverse
11	Long Lane	2256	3655	62%	Medium	Medium	Moderate	Adverse
13	Gravelhill Lane	624	1220	95%	Medium	High	Substantial	Adverse
14	West Winch Access Road	0	20389	100%+	Low	High	Moderate	Adverse
16	New Road	1077	1259	17%	Medium	Very Low	Minor	Adverse



### Scenario DS1

1.14.21 The assessment in Table 1-18 shows that in 2042, the Proposed Scheme will experience a **permanent, moderate adverse** effect which is **significant**. The Proposed Scheme however will have a segregated shared-use spine footway/cycle way along the road with formal crossing points and residential dwellings will be set back from the road once the housing development comes forward, without direct access or need to cross the road, other than at designated crossing points. Following these embedded mitigation measures the effect of severance will therefore be **permanent minor** or **negligible** which is **not significant**.

1.14.22 Chapel Lane, Gravelhill Lane, Long Lane and New Road will see a lesser effect on severance. These roads are expected to see a **permanent, minor adverse** effect on severance which is **not significant**. As set out above in sections 16.10.14-16.10.16 this effect is likely to be exaggerated in terms of re-routing of traffic via the residential area to the west of A10 and also beneficial in terms of increased bus access for existing residents.

### Scenario DS2

1.14.23 The assessment in Table 1-19 shows that in 2042 **DS2** scenario, the Proposed Scheme will experience a **permanent, moderate adverse** effect which is **significant**. The Proposed Scheme will however have a segregated shared-use spine footway/cycle way along the road with formal crossing points. As a result of these embedded mitigation, the effect of severance will be **permanent minor** or **negligible** which is **not significant**.

1.14.24 Gravelhill Lane is expected to see the highest effect on severance, thus a **substantial adverse effect** on severance which is **significant**.

1.14.25 Gravelhill Lane however has a base flow less than 1000 AADT which is considered low. With a low base flow (<1000 AADT), a relatively small change in flow will result in a significant magnitude of change. The DS2 flows on Gravelhill Lane as illustrated in Table 1-19 are expected to be just over 1000





vehicles which is not considered significant as discussed in **Paragraph 16.4.8**.

1.14.26 However, given the magnitude of the impact in the DS2 scenario with the proposed housing in place, further mitigation could be provided by the housing developers if required as this is outside the scope of the Proposed Scheme.

1.14.27 Long Lane is expected to see a **moderate adverse effect** on severance which is **significant in the DS2 scenario**. This is however unrelated to the Proposed Scheme and further mitigation will be required to be considered by the housing developers.

1.14.28 Chapel Lane and New Road will see a lower magnitude effect. These roads are expected to see a **permanent, minor adverse** effect on severance which is **not significant**.

#### Pedestrian and Cycle Delay

1.14.29 The approach used for assessing the effects on pedestrian and cycle delay is summarised in Section 16.5. The assessment has been undertaken to estimate the potential increase/decrease in pedestrian delay on each link, utilising the IEMA (**Ref 16.15**) recommended threshold based on Table 3.11 of DMRB LA112 (**Ref 16.16**) traffic flow thresholds and TAG Unit A4.1 (**Ref 16.19**) Table 5.1 (Change in Severance) as set out in **Section 16.5**.

1.14.30 The magnitude of change has been calculated based on the changes in severance ratings between the DM and DS scenarios based on TAG Unit A4.1 Table 5.1, combined with changes in traffic flows based on thresholds set out in Table 3.1 of DMRB LA112.

#### 2027 Pedestrian and Cycle Delay

1.14.31 The results for magnitude of change is set out in Table 1-20 and Table 1-22.

**Table 1-20 – Change in traffic flow/day DMRB LA112 Table 3.11) 2027**

Link ID	Street Name	Two-way AADT (DM)	Two-way AADT (DS1)	Traffic Flow DM	Traffic Flow DS1	Magnitude Step Change_DM-DS1
8	Chapel Lane	1508	2007	Very Low	Very Low	Very Low

**Table 1-21 – Change in severance (TAG Unit A4.1 Table 5.1) 2027**

Link ID	Street Name	DM Severance (without Scheme)	DS1 Severance (with Road Scheme)	Magnitude Step Change in Severance (DM-DS1)
8	Chapel Lane	Low	Low	Very Low

1.14.32 The step change between the DM and DS cases for the traffic flow and severance thresholds have been combined to provide an overall step change. This has then been combined with the receptor sensitivity ratings to generate the significance of effect. This is summarised in Table 1-22.

**Table 1-22 – Pedestrian and cycle delay – significance of effect (2027)**

Link ID	Street Name	Magnitude Step Change in Traffic_DM-DS1	Magnitude Step Change in Severance (DM-DS1)	Combined Magnitude of Change (DM-DS1)	Receptor Sensitivity	Effect Significance	Effect Polarity
8	Chapel Lane	Very Low	Very Low	Very Low	Medium	Minor	Adverse

1.14.33 The assessment in Table 1-22 shows that in 2027, Chapel Lane with a very low magnitude of change in a medium sensitivity area is expected to see a permanent, **minor adverse** effect on severance which is **not significant**.

2042 Pedestrian and Cycle Delay

**DS1 Scenario**

1.14.34 The results for magnitude of change is set out in Table 1-23 and Table 1-24.

**Table 1-23 – Change in traffic flow/day (DMRB LA112 Table 3.11) 2042**

Link ID	Street Name	Two-way AADT (DM)	Two-way AADT (DS1)	Traffic Flow DM	Traffic Flow DS1	Magnitude Step Change_DM-DS1
6	West Winch Access Road	0	19144	Very Low	High	High
8	Chapel Lane	1600	1650	Very Low	Very Low	Very Low
11	Long Lane	2256	2383	Very Low	Very Low	Very Low
13	Gravelhill Lane	624	439	Very Low	Very Low	Very Low
14	West Winch Access Road	0	19141	Very Low	High	High
16	New Road	1077	1290	Very Low	Very Low	Very Low

**Table 1-24 – Change in severance (TAG Unit A4.1 Table 5.1) 2042**

Link ID	Street Name	DM Severance (without Scheme)	DS1 Severance (with Road Scheme)	Magnitude Step Change in Severance (DM-DS1)
6	West Winch Access Road	High	Very Low	High
8	Chapel Lane	Low	Low	Very Low
11	Long Lane	Low	Low	Very Low
13	Gravelhill Lane	Low	Low	Very Low

Link ID	Street Name	DM Severance (without Scheme)	DS1 Severance (with Road Scheme)	Magnitude Step Change in Severance (DM-DS1)
14	West Winch Access Road	High	Very Low	High
16	New Road	Medium	Very Low	Medium

1.14.35 The step change between the DM and DS cases for the traffic flow and severance thresholds have been combined to provide an overall step change. This has then been combined with the receptor sensitivity ratings to generate the significance of effect. This is summarised in Table 1-25.

**Table 1-25 – Ped and cycle delay – significance of effect (2042)**

Link ID	Street Name	Magnitude Step Change in Traffic_DM-DS1	Magnitude Step Change in Severance (DM-DS1)	Combined Magnitude of Change (DM DS1)	Receptor Sensitivity	Effect Significance	Effect Polarity
6	West Winch Access Road	High	High	High	Low	Moderate	Beneficial
8	Chapel Lane	Very Low	Very Low	Very Low	Medium	Minor	Adverse
11	Long Lane	Very Low	Very Low	Very Low	Medium	Minor	Adverse
13	Gravelhill Lane	Very Low	Very Low	Very Low	Medium	Minor	Beneficial



Link ID	Street Name	Magnitude Step Change in Traffic_DM-DS1	Magnitude Step Change in Severance (DM-DS1)	Combined Magnitude of Change (DM-DS1)	Receptor Sensitivity	Effect Significance	Effect Polarity
14	West Winch Access Road	High	High	High	Low	Moderate	Beneficial
16	New Road	Very Low	Medium	Low	Medium	Minor	Adverse

1.14.36 The assessment in Table 1-25 shows that in 2042, the Proposed Scheme will experience a permanent, **moderate beneficial** effect which is **significant**.

1.14.37 Due to the reduction in traffic on Gravelhill Lane, the medium sensitivity and very low magnitude of change, it is expected to see a permanent, **minor beneficial** effect on pedestrian and cycle delay which is **not significant**.

1.14.38 Chapel Lane, Long Lane and New Road are expected to see a permanent, **minor adverse** effect on pedestrian and cycle delay which is **not significant**.

DS2 Scenario

1.14.39 The results for magnitude of change is set out in Table 1-26 and Table 1-27.

**Table 1-26 – Change in traffic flow/day (DMRB LA112 Table 3.11) 2042**

Link ID	Street Name	Two-way AADT (DM)	Two-way AADT (DS2)	Traffic Flow DM	Traffic Flow DS2	Magnitude Step Change in Traffic_DM-DS2
6	West Winch Access Road	0	25317	Very Low	High	High
8	Chapel Lane	1600	1803	Very Low	Very Low	Very Low
11	Long Lane	2256	3655	Very Low	Very Low	Very Low
13	Gravelhill Lane	624	1220	Very Low	Very Low	Very Low
14	West Winch Access Road	0	20389	Very Low	High	High
16	New Road	1077	1259	Very Low	Very Low	Very Low

**Table 1-27 – Change in severance (TAG Unit A4.1 Table 5.1) 2042**

Link ID	Street Name	DM Severance (without Scheme)	DS2 Severance (with Road Scheme)	Magnitude Step Change in Severance (DM-DS2)
6	West Winch Access Road	High	Very Low	High
8	Chapel Lane	Low	Low	Very Low
11	Long Lane	Low	Low	Very Low

Link ID	Street Name	DM Severance (without Scheme)	DS2 Severance (with Road Scheme)	Magnitude Step Change in Severance (DM-DS2)
13	Gravelhill Lane	Low	Low	Very Low
14	West Winch Access Road	High	Very Low	High
16	New Road	Medium	Very Low	Medium

1.14.40 The step change between the DM and DS cases for the traffic flow and severance thresholds have been combined to provide an overall step change. This has then been combined with the receptor sensitivity ratings to generate the significance of effect. This is summarised in Table 1-28.

**Table 1-28 – Ped and cycle delay significance of effect (2042)**

Link ID	Street Name	Magnitude Step Change in Traffic_DM-DS2	Magnitude Step Change in Severance (DM-DS2)	Combined Magnitude of Change (DM-DS2)	Receptor Sensitivity	Effect Significance	Effect Polarity
6	West Winch Access Road	High	High	High	Low	Moderate	Beneficial
8	Chapel Lane	Very Low	Very Low	Very Low	Medium	Minor	Adverse
11	Long Lane	Very Low	Very Low	Very Low	Medium	Minor	Adverse
13	Gravelhill Lane	Very Low	Very Low	Very Low	Medium	Minor	Adverse





<b>Link ID</b>	<b>Street Name</b>	<b>Magnitude Step Change in Traffic_DM-DS2</b>	<b>Magnitude Step Change in Severance (DM-DS2)</b>	<b>Combined Magnitude of Change (DM-DS2)</b>	<b>Receptor Sensitivity</b>	<b>Effect Significance</b>	<b>Effect Polarity</b>
14	West Winch Access Road	High	High	High	Low	Moderate	Beneficial
16	New Road	Very Low	Medium	Low	Medium	Minor	Adverse



1.14.41 The assessment in Table 1-28 shows that in 2042, the Proposed Scheme will experience a **permanent, moderate** effect which is **significant**. The Proposed Scheme however will have a segregated shared-use spine footway/cycle way along the road with formal crossing points. The effect on pedestrian and cycle delay will therefore be **permanent minor** or **negligible** which is **not significant**.

1.14.42 Chapel Lane, Long Lane, Gravelhill Lane and New Road are expected to see a **permanent, minor adverse** effect on pedestrian and cycle delay which is **not significant**.

#### Fear and Intimidation

1.14.43 The approach used for assessing the effects on fear and intimidation is summarised **Section 16.5**. All the links scoped into the study have been assessed using the thresholds set out in the IEMA guidance (**Ref 16.15**) to determine what the level of fear and intimidation which would be experienced by non-motorised users with and without the Proposed Schemes in place.

1.14.44 Table 1-29 outlines the recommended criteria set out in the IEMA guidance (**Ref 16.15**). This has been applied to the base and forecast flows to estimate the magnitude of change in fear and intimidation between the DM and DS cases. This has then been combined with the receptor sensitivity to estimate the significance of effect.

#### Degree of Hazard

1.14.45 To estimate the magnitude of change, the degree of hazard has been assessed with reference to the established thresholds (Crompton and Gilbert, 1976 study), and a score has been provided for each highway link under consideration. Table 3.1 ( of this ES) of the IEMA guidance (**Ref 16.15**) provides an example of a scoring system which has been adapted for this assessment.

1.14.46 The total score from all three elements (a+b+c) of the degree of hazard calculations is combined to provide a 'level' of fear and intimidation for all three elements:



- Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)
- Total 18-hour heavy vehicle flow (b)
- Average vehicle speed<sup>18</sup> (c)

1.14.47 As shown in Table 3.2 IEMA guidance (in Table 1-5 of this ES).

### **DS1 2027 Scenario**

1.14.48 The degree of hazard and level of fear and intimidation for the DM and DS1 cases have been set out in in Table 1-29 to Table 1-30.

**Table 1-29 – Level of Fear and Intimidation (F&I) degree of hazard 2027 DM**

Link ID	Street Name	Average 18_Hour Daily Flow	Total 18-hour heavy vehicle flow (b)	Average Speed	Average traffic flow over 18-hour day - all vehicles per hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (C)	Total hazard score (a)+(b)+(C)	Level of F&I
8	Chapel Lane	86	24	20	0	0	0	0	Small

**Table 1-30 – Level of Fear and Intimidation (F&I) degree of hazard 2027 DS1**

Link ID	Street Name	Average 18_Hour Daily Flow	Total 18-hour heavy vehicle flow (b)	Average Speed	Average traffic flow over 18-hour day - all vehicles per hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (C)	Total hazard score (a)+(b)+(C)	Level of F&I
8	Chapel Lane	117	37	20	0	0	0	0	Small

1.14.49 The assessments above demonstrate that in the DM case (Table 1-29), the flows on the network will result in a small level of fear and intimidation on Chapel Lane.



1.14.50 In the DS1 scenario (Table 1-30) Chapel Lane continue to experience a small level of fear and intimidation.

1.14.51 The magnitude of impact is approximated with reference to the changes in the level of fear and intimidation from baseline conditions (DM). This is shown in Table 1-31 below based on (adapted from Table 3.3 of the IEMA guidance). The magnitude of change will be combined with the sensitivity of receptors to deduce the significance of the effect on fear and intimidation.



**Table 1-31 – Fear and Intimidation (F&I) magnitude of change and significance of effect 2027 DS1**

Link	Street Name	DM Level of F&I	DS1 Level of F&I	DS1 Step Change Level of F&I	Change in Total 18hr Traffic	Change in 18hr HGV Traffic	Magnitude of Impact	Receptor Sensitivity	Effect Significance	Effect Polarity
8	Chapel Lane	Small	Small	0	>400	<500	Low	Medium	Minor	Adverse

1.14.52 The assessment in Table 1-31 demonstrates that in 2027, Chapel Lane with minor receptor sensitivity and low magnitude of impact is expected to see a **permanent, minor or negligible** effect on fear and intimidation which is **not significant**.

2042 Fear and Intimidation

**DS1 Scenario**

1.14.53 The degree of hazard and level of fear and intimidation for the DM and DS1 cases have been set out in Table 1-32 to Table 1-33.



**Table 1-32 – Level of fear and intimidation degree of hazard 2042 DM**

Link ID	Street Name	Average 18_Hour Daily Flow	Total 18-hour heavy vehicle flow (b)	Average Speed	Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (C)	Total hazard score (a)+(b)+(C)	Level of fear and intimidation
6	West Winch Access Road	92	0	0	0	0	0	0	Small
8	Chapel Lane	129	26	20	0	0	0	0	Small
11	Long Lane	36	23	18	0	0	0	0	Small
13	Gravelhill Lane	0	12	19	0	0	0	0	Small
14	West Winch Access Road	62	0	0	0	0	0	0	Small



<b>Link ID</b>	<b>Street Name</b>	<b>Average 18_Hour Daily Flow</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average Speed</b>	<b>Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average vehicle speed (C)</b>	<b>Total hazard score (a)+(b)+(C)</b>	<b>Level of fear and intimidation</b>
16	New Road	92	11	19	0	0	0	0	Small



**Table 1-33 – Level of fear and intimidation degree of hazard 2042 DS1**

Link ID	Street Name	Average 18_Hour Daily Flow	Total 18-hour heavy vehicle flow (b)	Average Speed	Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (C)	Total hazard score (a)+(b)+(C)	Level of fear and intimidation
6	West Winch Access Road	1089	1595	33	10	10	20	+40	Extreme
8	Chapel Lane	95	32	20	0	0	0	0	Small
11	Long Lane	137	28	18	0	0	0	0	Small
13	Gravelhill Lane	25	1	19	0	0	0	0	Small
14	West Winch Access Road	1089	1595	33	10	10	20	+40	Extreme

<b>Link ID</b>	<b>Street Name</b>	<b>Average 18_Hour Daily Flow</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average Speed</b>	<b>Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average vehicle speed (C)</b>	<b>Total hazard score (a)+(b)+(C)</b>	<b>Level of fear and intimidation</b>
16	New Road	75	19	19	0	0	0	0	Small

- 1.14.54 The assessments above demonstrate that in the DM case (Table 1-32), the flows on the network will result in a small level of fear and intimidation.
- 1.14.55 In the DS1 scenario (Table 1-33) the Proposed scheme sees an extreme level of fear and intimidation. The remaining links continue to experience a small level of fear and intimidation.
- 1.14.56 The magnitude of impact is approximated with reference to the changes in the level of fear and intimidation from baseline conditions (DM) is shown in Table 1-34 below. The magnitude of change has been combined with the sensitivity of receptors to deduce the significance of the effect on fear and intimidation.

**Table 1-34 – Fear and Intimidation (F&I) magnitude of change and significance of effect 2042 DS1**

Link ID	Street Name	DM Level of F&I	DS1 Level of F&I	DS1 Step Change Level of F&I	Change in Total 18hr Traffic	Change in 18hr HGV Traffic	Magnitude of Impact	Receptor Sensitivity	Effect Significance	Effect Polarity
6	West Winch Access Road	Small	Extreme	3	>400	>500	High	Low	Moderate	Adverse
8	Chapel Lane	Small	Small	0	<400	<500	Negligible	Medium	Negligible	Adverse
11	Long Lane	Small	Small	0	>400	<500	Low	Medium	Minor	Adverse
13	Gravelhill Lane	Small	Small	0	>400	<500	Low	Medium	Minor	Adverse
14	West Winch Access Road	Small	Extreme	3	>400	>500	High	Low	Moderate	Adverse
16	New Rd	Small	Small	0	<400	<500	Negligible	Medium	Negligible	Adverse



1.14.57 The assessment in Table 1-34 demonstrates that in 2042, the Proposed Scheme will experience a **permanent, moderate** effect on fear and intimidation which is **significant**. The Proposed Scheme however will have a segregated shared-use footway/cycle way along the road with formal crossing points. Due to this embedded mitigation, the effect of fear and intimidation is expected to be **permanent minor** or **negligible** which is **not significant**.

1.14.58 Long Lane and Gravelhill Lane are expected to see a **permanent, minor** effect on fear and intimidation which is **not significant**.

1.14.59 Chapel Lane and New Road will see the least effect on fear and intimidation. These roads are expected to see a **permanent negligible** effect on fear and intimidation which is **not significant**.

DS2\_Scenario

1.14.60 The degree of hazard and level of fear and intimidation for the DM and DS2 cases have been set out in Table 1-35 to Table 1-37.

**Table 1-35 – Level of fear and intimidation degree of hazard 2042 DM**

<b>Link ID</b>	<b>Street Name</b>	<b>Average 18_Hour Daily Flow</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average Speed</b>	<b>Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average vehicle speed (C)</b>	<b>Total hazard score (a)+(b)+(C)</b>	<b>Level of fear and intimidation</b>
6	West Winch Access Road	0	0	0	0	0	0	0	Small
8	Chapel Lane	92	26	20	0	0	0	0	Small
11	Long Lane	129	23	18	0	0	0	0	Small
13	Gravelhill Lane	36	12	19	0	0	0	0	Small
14	West Winch Access Road	0	0	0	0	0	0	0	Small



<b>Link ID</b>	<b>Street Name</b>	<b>Average 18_Hour Daily Flow</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average Speed</b>	<b>Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average vehicle speed (C)</b>	<b>Total hazard score (a)+(b)+(C)</b>	<b>Level of fear and intimidation</b>
16	New Road	62	11	19	0	0	0	0	Small

**Table 1-36 – Level of fear and intimidation degree of hazard 2042 DS2**

<b>Link ID</b>	<b>Street Name</b>	<b>Average 18_Hour Daily Flow</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average Speed</b>	<b>Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)</b>	<b>Total 18-hour heavy vehicle flow (b)</b>	<b>Average vehicle speed (C)</b>	<b>Total hazard score (a)+(b)+(C)</b>	<b>Level of fear and intimidation</b>
6	West Winch Access Road	1442	1673	33	20	10	20	+50	Extreme
8	Chapel Lane	104	32	20	0	0	0	0	Small
11	Long Lane	210	28	18	0	0	0	0	Small
13	Gravelhill Lane	70	1	19	0	0	0	0	Small
14	West Winch Access Road	1159	1682	33	10	10	20	+40	Extreme

Link ID	Street Name	Average 18_Hour Daily Flow	Total 18-hour heavy vehicle flow (b)	Average Speed	Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (C)	Total hazard score (a)+(b)+(C)	Level of fear and intimidation
16	New Road	73	19	19	0	0	0	0	Small

1.14.61 The assessments above demonstrate that in the DM case (Table 1-35), the flows on the network will result in a small level of fear and intimidation.

1.14.62 In the DS2 scenario (Table 1-36) the Proposed Scheme will see an extreme level of fear and intimidation. The remaining links continue to experience a small level of fear and intimidation.

1.14.63 The magnitude of impact in reference to the changes in the level of fear and intimidation from baseline conditions (DM) is shown in Table 1-37 below.



**Table 1-37 – Fear and intimidation magnitude of change and significance of effect 2042 DS2**

Link ID	Street Name	DM Level of F&I	DS2 Level of F&I	DS2 Step Change Level of F&I	Change in Total 18hr Traffic	Change in 18hr HGV Traffic	Magnitude of Impact	Receptor Sensitivity	Effect Significance	Effect Polarity
6	West Winch Access Rd	Small	Extreme	3	>400	>500	High	Low	Moderate	Adverse
8	Chapel Lane	Small	Small	0	<400	<500	Negligible	Medium	Negligible	Adverse
11	Long Lane	Small	Small	0	>400	<500	Low	Medium	Minor	Adverse
13	Gravelhill Lane	Small	Small	0	>400	<500	Low	Medium	Minor	Adverse
14	West Winch Access Rd	Small	Extreme	3	>400	>500	High	Low	Moderate	Adverse

Link ID	Street Name	DM Level of F&I	DS2 Level of F&I	DS2 Step Change Level of F&I	Change in Total 18hr Traffic	Change in 18hr HGV Traffic	Magnitude of Impact	Receptor Sensitivity	Effect Significance	Effect Polarity
16	New Road	Small	Small	0	<400	<500	Negligible	Medium	Negligible	Adverse

1.14.64 The assessment in Table 1-37 demonstrates that in 2042, the Proposed Scheme will experience a **permanent, moderate** effect on fear and intimidation which is **significant**. The Proposed Scheme however will have a segregated shared-use spine footway/cycle way along the road with formal crossing points. Following the embedded mitigation, the effect of fear and intimidation is expected to be **permanent minor** or **negligible** which is **not significant**.

1.14.65 Long Lane and Gravelhill Lane are expected to see a **permanent, minor** effect on fear and intimidation which is **not significant**.

1.14.66 Chapel Lane and New Road will see the least effect on fear and intimidation. These roads are expected to see a **permanent negligible** effect on fear and intimidation which is **not significant**.

#### Pedestrian and Cycle Amenity

1.14.67 The approach used for assessing the effects on amenity is summarised in **Section 16.5**.



**2027 Scenario**

**Table 1-38 – Pedestrian and cycle amenity – 2027 DS1**

Link ID	Street Name	DM	DS1	DS-DM (%)	Footway Width (DS1) (m)	Footway Width Sensitivity	Receptor Sensitivity	Overall Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
8	Chapel Lane	1508	2007	33%	1.50	High	Medium	High	Very Low	Minor	Adverse

1.14.68 **Table 1-38** demonstrates that in 2027, Chapel Lane is expected to see a permanent, minor adverse effect on fear and intimidation which is not significant.

**2042 Scenario**

1.14.69 The complete assessment of amenity during the operational phase in 2042 for the DS1 and DS2 scenarios are set out in Table 1-39 and Table 1-40.



**Table 1-39 – Pedestrian and cycle amenity – 2042 DS1**

Link ID	Street Name	DM	DS1	DS-DM (%)	Footway Width (DS1) (m)	Footway Width Sensitivity	Receptor Sensitivity	Overall Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
6	West Winch Access Road	0	19144	100%+	4.00	Very Low	Low	Very Low	High	Minor	Adverse
8	Chapel Lane	1600	1650	3%	1.50	High	Medium	High	Very Low	Minor	Adverse
11	Long Lane	2256	2383	6%	1.50	High	Medium	High	Very Low	Minor	Adverse
13	Gravelhill Lane	624	439	-30%	1.00	High	Medium	High	Very Low	Minor	Beneficial
14	West Winch Access Road	0	19141	100%+	4.00	Very Low	Low	Very Low	High	Minor	Adverse
16	New Road	1077	1290	20%	0.50	High	Medium	High	Very Low	Minor	Adverse



**Table 1-40 – Pedestrian and cycle amenity – 2042 DS2**

Link	Street Name	DM	DS2	DS-DM (%)	Footway Width (DS2) (m)	Footway Width Sensitivity	Receptor Sensitivity	Overall Receptor Sensitivity	Magnitude	Effect Significance	Effect Polarity
6	West Winch Access Road	0	25317	100%+	4.00	Very Low	Low	Very Low	High	Minor	Adverse
8	Chapel Lane	1600	1803	13%	1.50	High	Medium	High	Very Low	Minor	Adverse
11	Long Lane	2256	3655	62%	1.50	High	Medium	High	Low	Moderate	Adverse
13	Gravelhill Lane	624	1220	95%	1.00	High	Medium	High	Very Low	Minor	Adverse
14	West Winch Access Road	0	20389	100%+	4.00	Very Low	Low	Very Low	High	Minor	Adverse
16	New Road	1077	1259	17%	0.50	High	Medium	High	Very Low	Minor	Adverse



### 2042 DS1 Scenario

1.14.70 The assessment in Table 1-41 demonstrates that in the DS1 scenario, the Proposed Scheme, Chapel Lane, Long Lane and New Road are expected to see a **permanent, minor adverse** effect on pedestrian and cycle amenity which is **not significant**.

1.14.71 Due to the reduction in traffic, Gravelhill Lane is expected to see a **permanent minor beneficial** effect on pedestrian and cycle delay which is not significant.

### 2042 DS2 Scenario

1.14.72 Table 1-40 demonstrates that in the DS2 scenario, the Proposed Scheme, Chapel Lane, Gravelhill Lane and New Road are expected to see a **permanent, minor adverse** effect on pedestrian and cycle amenity which is **not significant**.

1.14.73 Long Lane is expected to see a **permanent, moderate adverse** effect on pedestrian and cycle amenity which is **significant**.

1.14.74 This is however outside the Proposed Scheme and further mitigation will be implemented by the housing scheme.

#### Driver Delay

1.14.75 The approach used for assessing the effects on driver delay is summarised in **Section 16.5**.

1.14.76 Table 1-41 to Table 1-43 shows the difference in delay at junction arms at or near capacity in the DS1 and DS2 scenarios.

**Table 1-41 – Driver delay (DS1) 2027**

<b>Junction</b>	<b>Approach</b>	<b>DM Driver Delay (seconds)</b>	<b>DS1 Driver Delay (seconds)</b>	<b>Mean Delay Increase (seconds) DM_DS2</b>	<b>Receptor Sensitivity</b>	<b>Magnitude</b>	<b>Effect Significance</b>	<b>Effect Polarity</b>
Hardwick Roundabout	A10 West Winch Rd	58	13	-45	Medium	Medium	Moderate	Beneficial
Hardwick Road/Scania Way	Scania Way SB	68	72	4	High	Very Low	Minor	Adverse

**Table 1-42 – Driver delay (DS1) 2042**

<b>Junction</b>	<b>Approach</b>	<b>DM Driver Delay (seconds)</b>	<b>DS1 Driver Delay (seconds)</b>	<b>Mean Delay Increase (seconds) DM v DS1</b>	<b>Receptor Sensitivity</b>	<b>Magnitude</b>	<b>Effect Significance</b>	<b>Effect Polarity</b>
Hardwick Roundabout	A149 Hardwick Road	34	13	-21	Medium	Low	Minor	Beneficial
Hardwick Roundabout	A10 West Winch Rd	68	17	-26	Medium	Low	Minor	Beneficial
Hardwick Road / Scania Way	Campbells Meadow	60	55	-1	High	Very Low	Minor	Beneficial
Hardwick Road / Scania Way	Scania Way SB	76	90	3	High	Very Low	Minor	Adverse
Hardwick Road / Scania Way	Scania Way EB	40	46	-2	High	Very Low	Minor	Beneficial
A10 / Chequers Lane / Long Lane	Chequers Lane	46	0	-46	High	Medium	Substantial	Beneficial
A10 / Chequers Lane / Long Lane	A10 S	35	0	-35	Medium	Medium	Moderate	Beneficial



**Table 1-43 – Driver delay (DS2) 2042**

<b>Junction</b>	<b>Approach</b>	<b>DM Driver Delay (seconds)</b>	<b>DS2 Driver Delay (seconds)</b>	<b>Mean Delay Increase (seconds) DM v DS2</b>	<b>Receptor Sensitivity</b>	<b>Magnitude</b>	<b>Effect Significance</b>	<b>Effect Polarity</b>
Hardwick Roundabout	A149 Hardwick Road	34	28	-6	Medium	Very Low	Minor	Beneficial
Hardwick Roundabout	A10 West Winch Rd	68	43	-26	Medium	Low	Minor	Beneficial
Hardwick Road / Scania Way	Campbells Meadow	60	59	-1	High	Very Low	Minor	Beneficial
Hardwick Road / Scania Way	Scania Way SB	76	79	3	High	Very Low	Minor	Adverse
Hardwick Road / Scania Way	Scania Way EB	40	39	-1	High	Very Low	Minor	Beneficial
A10 / Chequers Lane / Long Lane	Chequers Lane	46	0	-46	High	Medium	Substantial	Beneficial
A10 / Chequers Lane / Long Lane	A10 S	35	0	-35	Medium	Medium	Moderate	Beneficial



1.14.77 Table 1-41 to Table 1-43 demonstrate that in all scenarios, all links scoped in for further assessment (except Scania Way Southbound) are expected to see a permanent, **minor to Substantial beneficial** effect on driver delay which is **significant**. This is because there are more efficient journey times and routes available for vehicles travelling through the network with the Proposed Scheme in place.

1.14.78 At the Hardwick Road / Scania Way junction there is an increase in delay for vehicles using Scania Way southbound in all scenarios. This is expected to be a permanent, **minor adverse** effect on driver delay but as this adds only 3 seconds of delay per vehicle this is **not significant**.

#### Accident and Road Safety

1.14.79 The approach used for assessing the effects on accident and road safety is summarised in **Section 16.5**. Changes in traffic flow have been based on the vehicle flow thresholds sets out in Table 3.11 of DMRB LA112 to estimate the magnitude of change.

1.14.80 As discussed in **Section 16.6**, the sensitivity criteria for highway users is based on a qualitative assessment of links using the iRAP (Table 1-7) ratings combined with a review of the collision clusters (Table 1-8) and the receptor sensitivity criteria (Table 1-6) to determine the overall road safety sensitivity of discrete areas of the highway network. The full assessment is provided at **Appendix 16.5**.

1.14.81 It is worth noting that for Accident and Road Safety all links within the study area were assessed. All links are expected to see a **permanent negligible neutral or beneficial** effect on accident and road safety except the Proposed Scheme which is expected to see a minor adverse effect. This is because there are no DM flows in the base year to compare with so the change from DM to DS is proportionally high, resulting in a minor adverse effect. It is therefore considered that the effect of the Proposed Scheme on accident and road safety will be a **permanent negligible** effect which is **not significant**.



1.14.82 The change in magnitude and change in receptor sensitivity between the DM and DS scenarios is summarised in **Appendix 16.6**.

## 1.15 Additional Mitigation and Monitoring

1.15.1 This section summarises the need for any additional mitigation following the implementation of all necessary embedded mitigation.

### Construction Phase Mitigation

1.15.2 The assessment of the impact of construction traffic within this chapter has concluded that there are not expected to be any significant adverse effects during construction. Hence no further mitigation is proposed above and beyond the Construction Environmental Management Plan (CEMP) and Construction Worker Travel Plan (CWTP) which will help to further limit effects during construction.

### Operational Phase

#### DS1 – Proposed Scheme

1.15.3 The assessment of the impact of operational traffic within this chapter has concluded that there are not expected to be any significant adverse effects during the operational phase.

1.15.4 Generally, across the network within the study area, there will be a **negligible to minor** impact from traffic and transport on receptors due to the Proposed Scheme. However, the Proposed Scheme itself is expected to see a **moderate adverse** effect as a worst case, without the embedded mitigation. Following the embedded mitigation ie segregated walking and cycle routes with safe crossing points, the effect of the redistributed traffic on the Proposed Scheme is expected to be **permanent minor to negligible adverse** which is **not significant**, as such no further mitigation is proposed.



## 1.16 Residual Effects

1.16.1 Based on the assessment within the chapter, the Proposed Scheme will see no significant residual effects. The redistribution of trips will mean that the A10 will see a reduction in traffic flow following the Proposed Scheme, whilst the A47 will see additional traffic. The adjacent junctions on the A10 and A47 however have capacity as per the modelling results, hence the level of effect is therefore **not significant**.

## 1.17 Cumulative Assessment

### Construction Phase

- 1.17.1 As discussed in **Section 16.7**, there are several committed and planned projects that are being progressed within the King's Lynn and West Winch area. However, many of them will have very little construction impact in combination with the Proposed Scheme due to proximity, construction trip generation, construction route and construction period.
- 1.17.2 The majority of the WWGA housing scheme is considered to be dependent development except the first 300 units, thus the remaining dwellings cannot be occupied until the road is open. However, the 300 non-dependent units could potentially be built out at the same time as the Proposed Scheme so this scenario has been considered in combination with the Proposed Scheme.
- 1.17.3 Additionally, construction traffic for 150 additional dwellings within the WWGA could also potentially be built out simultaneously. This is because parts of the site currently have live planning applications and could be built but not occupied prior to the road opening. These along with construction of the 300 units have been considered in combination with the Proposed Scheme (ie a total of 450 homes in the WWGA).
- 1.17.4 As a worst-case scenario, the peak housing construction traffic has been combined with the Proposed Scheme's peak construction traffic to estimate the magnitude of impact. It should be noted that the likelihood for this



scenario to occur is minimal but has been considered as an upper threshold as the basis of a robust assessment. The combined peak construction traffic is set out in Table 1-44 and Table 1-45.

**Table 1-44 – Total daily two-way daily construction traffic and magnitude of impact**

Link	2019 Base (All Vehicles)	Proposed Scheme	Impact	450 Homes	Impact	In-Combination Flows	In-Combination Impact	Link Sensitivity
A47 (West of Hardwick Roundabout)	40695	166	0.41%	5	0.01%	171	0.4%	Very Low
A47 (Hardwick Roundabout)	23325	166	0.71%	5	0.02%	171	0.7%	Very Low
A149 Queen Elizabeth Way	28897	38	0.13%	1	0.00%	39	0.1%	Very Low
A10 West Winch Road	24919	110	0.44%	3	0.01%	113	0.5%	Medium
A47 Constitution Hill (North of New Road)	20457	110	0.54%	3	0.02%	113	0.6%	Very Low
West Winch Access Road (off A47)	0	282	0.00%	8	0.00%	290	0.0%	Low
A47 Constitution Hill (South of New Road)	20457	172	0.84%	5	0.02%	177	0.9%	Very Low
A10 Lynn Road (south of Rectory Lane)	23159	110	0.47%	3	0.01%	113	0.5%	Medium
A10 Lynn Road (south of Chequers Lane)	20890	110	0.53%	3	0.01%	113	0.5%	Medium
West Winch Access Road (off A10)	0	134	0.00%	4	0.00%	138	0.0%	Low
A10 Lynn Road (North of Setch Road)	21044	24	0.11%	1	0.00%	25	0.1%	Medium
A149 Hardwick Road (East of Railway)	20648	16	0.08%	0	0.00%	16	0.1%	Medium
A47 (East of North Runcton)	20005	172	0.86%	5	0.02%	177	0.9%	Low
A149 Hardwick Road (West of Railway)	25334	16	0.06%	0	0.00%	16	0.1%	Medium

**Table 1-45 – Total daily two-way construction traffic (HGVs) and magnitude of impact**

Link	2019 Base (All Vehicles)	Proposed Scheme	Impact	450 Homes	Impact	In-Combination Flows	In-Combination Impact	Link Sensitivity
A47 (West of Hardwick Roundabout)	3673	74	2%	2	2%	76	2%	Very Low
A47 (Hardwick Roundabout)	1914	74	4%	2	4%	76	4%	Very Low
A149 Queen Elizabeth Way	1547	10	1%	0	1%	10	1%	Very Low
A10 West Winch Road	2406	42	2%	1	2%	43	2%	Medium
A47 Constitution Hill (North of New Road)	1348	42	3%	1	3%	43	3%	Very Low
West Winch Access Road (off A47)	0	202	0%	5	0%	207	0%	Low
A47 Constitution Hill (South of New Road)	1348	160	12%	4	12%	164	12%	Very Low
A10 Lynn Road (south of Rectory Lane)	2391	42	2%	1	2%	43	2%	Medium
A10 Lynn Road (south of Chequers Lane)	2370	42	2%	1	2%	43	2%	Medium
West Winch Access Road (off A10)	0	42	0%	1	0%	43	0%	Low
A10 Lynn Road (North of Setch Road)	2385	0	0%	0	0%	0	0%	Medium
A149 Hardwick Road (East of Railway)	1022	0	0%	0	0%	0	0%	Medium
A47 (East of North Runcton)	1348	160	12%	4	12%	164	12%	Low
A149 Hardwick Road (West of Railway)	881	0	0%	0	0%	0	0%	Medium



1.17.5 Based on rule 1 and 2 of the IEMA Guidance (**Ref16.15**) none of the roads are scoped in for assessment.

1.17.6 As demonstrated in Table 1-45, the anticipated impact of the housing scheme is less 1% uplift in general traffic or HGVs. The Proposed Scheme is expected to have the most significant effect as discussed in **Section 6.10**.

1.17.7 As no roads have been scoped in for assessment, it is expected that the significance of effect on driver delay, pedestrian and cyclist delay, severance, accident and road safety, amenity and fear and intimidation will be at most **temporary minor adverse effect** which is **not significant**.

#### Operational Phase

1.17.8 The main assessment already includes committed development in the DS2 scenario. Hence the cumulative effect has therefore been assessed within the DS2 assessment set out above.

1.17.9 The assessment of the links against the individual criteria thresholds demonstrated that generally across the network within the study area, there will be a **moderate to minor** impact from traffic and transport on receptors due to the housing scheme.

1.17.10 With the housing scheme in place, the Proposed Scheme is expected to see a **moderate adverse** effect as a worst case but given the proposed segregated walking and cycle routes with safe crossing points, the effect of the redistributed traffic on the Proposed Scheme is expected to be **permanent minor to negligible adverse** which is not significant.

1.17.11 Long Lane following the housing scheme is expected to see a **permanent moderate adverse** effect on severance and pedestrian and cycle amenity which is **significant**.

1.17.12 Also, Granvelhill Lane is expected to see a **substantial adverse effect** on severance which is **significant**.





1.17.13 These effects are however outside the Proposed Scheme. It is therefore expected that the housing scheme will consider additional mitigation at these locations.

1.17.14 The DS2 scenario will also result in a change in sensitivity of some of the links due to the additional dwellings. However due to the reduction in traffic on most local roads, the impact remains as discussed in the main assessment. The Proposed Scheme with the relatively high traffic volume could be expected to see a substantial adverse effect when the sensitivity is changed from low to medium. However, this is because there are no base flows to compare the future flows with, so the magnitude of impact is exaggerated.

1.17.15 The effect as assessed is therefore expected to be minor adverse on the Proposed Scheme due to the NMU infrastructure proposed .

## 1.18 Residual Effects

1.18.1 The housing scheme result in Long Lane seeing a **permanent moderate adverse** effect on severance and pedestrian and cycle amenity which is **significant**.

1.18.2 Gravelhill Lane is also expected to see a **substantial adverse effect** on severance which is **significant**.

1.18.3 However, a package of complementary sustainable travel measures are set out within the STS (Document Reference **NCC/4.02.00/WWHAR**). This will assist with improving access for Non-Motorised Users and enhancing opportunities for crossing the A10 and Proposed Scheme alignment safely.

## 1.19 Summary of Effects

1.19.1 The summary of the worst-case effects resulting from the Construction and Operational phases of the Proposed Scheme are presented within Table 1-46 to Table 1-48 respectively.



- 1.19.2 It should be noted that Table 1-46 to Table 1-48 do not show the effects on any locations where there are positive or neutral effects and that only the worst-case adverse effects are reported.
- 1.19.3 That said there are many links scoped out of the assessment because they were shown to experience beneficial effects rather than adverse effects which are considered in more detail in this chapter. For example, as shown in **Appendix 16.4** A47 Hardwick roundabout is predicted to experience a reduction of 33% in AADT traffic flows in the opening year, A10 West Winch Road is expected to see an AADT reduction of 70%, increasing to 82% south of Rectory Lane and 88% south of Chequers Lane in the DS1 scenario in the opening year. This illustrates the level of reduction due to transfer of trips to the Proposed Scheme main highway alignment. In the DS2 scenario in 2042, there is also a significant reduction in traffic on the existing A10, even with the extra traffic generation associated with the proposed housing development, with 61% reduction south of Rectory Lane and 81% reduction south of Chequers Lane in comparison with the DS2 scenario.
- 1.19.4 All links are expected to see a **permanent negligible neutral** or **beneficial** effect on accidents and road safety except the Proposed Scheme itself which is expected to see a minor adverse effect as it is a new link and there are no existing base flows for comparison.
- 1.19.5 Driver delay is expected to reduce on the majority of junction approaches with significant time savings per vehicle offered as a result of the Proposed Scheme. The only exception is at Scania Way southbound approach where driver delay increases of 3 seconds per vehicle are anticipated.
- 1.19.6 As noted in section 16.10.14 there is also beneficial increase in access to bus services expected in the future assessment years for existing and future residents will have increased frequency of bus services operating through West Winch and North Runcton.

**Table 1-46 – Summary of transportation effects – construction phase**

Description of Likely Significant Effects	Significance of Effects Prior to Mitigation/Enhancement	Summary of Mitigation / Enhancement Measures/Monitoring	Residual Transportation Effects
Severance	Minor Adverse (not significant) T / D / ST	Construction access, traffic and temporary diversions will be controlled through the CEMP.  Construction traffic will be routed mainly via A and B Roads and avoid local roads where possible.	Negligible to Minor Adverse (not significant) T / D / ST
Driver Delay	Minor Adverse (not significant) T / D / ST	Construction access, traffic and temporary diversions will be controlled through the CEMP	Negligible to Minor Adverse (not significant) T / D / ST
Pedestrian and Cyclist Delay	Minor Adverse (not significant) T / D / ST	CEMP, Diversion of Non-Motorised Users, advisory signage on approach routes.	Negligible to Minor Adverse (not significant) T / D / ST
Pedestrian and Cyclist Amenity	Minor Adverse (not significant) T / D / ST	CEMP, Public Rights of Way closures and diversions to prevent conflicts of Non-Motorised Users with construction vehicles.	Negligible to Minor Adverse (not significant) T / D / ST
Fear and Intimidation	Minor Adverse (not significant) T / D / ST	CEMP, Diversion of Non-Motorised Users, advisory signage on approach routes.	Negligible to Minor Adverse (not significant) T / D / ST
Accidents and Safety	Minor Adverse (not significant) T / D / ST	CEMP, advisory signage on approach routes.	Negligible to Minor Adverse (not significant) T / D / ST
Hazardous/abnormal Load	NA	Hazardous/abnormal loads require specific permission from National Highways via the ESDAL (Electronic Service Delivery for Abnormal Loads) system and notification will be made for any Abnormal Loads which can be dealt with on a case by case basis. Specific permission and notifications would be made to the Local Planning Authority (LPA) and National Highways. Details of the access routing, timings and number of abnormal load movements would be discussed and agreed with the LPA. A specific abnormal loads assessment would be carried out by a competent contractor. However, routes to be considered on approach to site would include A47 and A10. Appropriate Traffic Management Measures would be in place on relevant roads to prevent conflicts with public vehicles. This may include temporary road closures on minor rural roads of short duration in accordance with the New Roads and Street Works Act 1991. This is consistent with the approach taken by other DCO applications within the local area. Co-operation agreements will be in place to manage in-combination effects with other major schemes.	NA

**Key:** P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable.

**Table 1-47 – Summary of transportation effects – operation phase (2027 DS1/DS2)**

<b>Description of Likely Significant Effects</b>	<b>Significance of Effects Prior to Mitigation/Enhancement</b>	<b>Summary of Mitigation / Enhancement Measures/Monitoring</b>	<b>Residual Transportation Effects</b>
Severance	Moderate Adverse (significant) T / D / LT	NMU Provision (See <b>Sustainable Transport Strategy (STS)</b> Document Reference 4.02.00).	Minor Adverse (not significant) T / D / LT
Driver Delay	Minor Adverse (not significant) T / D / LT	Proposed Scheme + mitigation including junction capacity improvement at Beveridge Way and A47 approaches to A47 / WWHAR	Negligible to Minor Adverse (not significant) T / D / LT
Pedestrian and Cyclist Delay	Minor Adverse (not significant) T / D / LT	NMU Provision (See <b>Sustainable Transport Strategy (STS)</b> Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Pedestrian and Cyclist Amenity	Minor Adverse (not significant) T / D / LT	NMU Provision (See <b>Sustainable Transport Strategy (STS)</b> Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Fear and Intimidation	Minor Adverse (not significant) T / D / LT	NMU Provision (See <b>Sustainable Transport Strategy (STS)</b> Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Accidents and Safety	Minor Adverse (not significant) T / D / LT	NMU Provision (See <b>Sustainable Transport Strategy (STS)</b> Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT

Description of Likely Significant Effects	Significance of Effects Prior to Mitigation/Enhancement	Summary of Mitigation / Enhancement Measures/Monitoring	Residual Transportation Effects
Hazardous/abnormal Load	NA	Hazardous/abnormal loads require specific permission from National Highways via the ESDAL (Electronic Service Delivery for Abnormal Loads) system and notification will be made for any Abnormal Loads which can be dealt with on a case by case basis. Specific permission and notifications would be made to the Local Planning Authority (LPA) and National Highways. Details of the access routing, timings and number of abnormal load movements would be discussed and agreed with the LPA. A specific abnormal loads assessment would be carried out by a competent contractor. However, routes to be considered on approach to site would include A47 and A10. Appropriate Traffic Management Measures would be in place on relevant roads to prevent conflicts with public vehicles. This may include temporary road closures on minor rural roads of short duration in accordance with the New Roads and Street Works Act 1991. This is consistent with the approach taken by other DCO applications within the local area. Co-operation agreements will be in place to manage in-combination effects with other major schemes.	NA

**Key:** P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable.

**Table 1-48 – Summary of transportation effects – operation phase (2042 DS1)**

Description of Likely Significant Effects	Significance of Effects Prior to Mitigation/Enhancement	Summary of Mitigation / Enhancement Measures/Monitoring	Residual Transportation Effects
Severance	Moderate Adverse (significant) T / D / MT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Driver Delay	Minor Adverse (not significant) T / D / MT	Proposed Scheme + mitigation including junction capacity improvement at Beveridge Way and A47 approaches to A47 / WWHAR	Negligible to Minor Adverse (not significant) T / D / LT

<b>Description of Likely Significant Effects</b>	<b>Significance of Effects Prior to Mitigation/Enhancement</b>	<b>Summary of Mitigation / Enhancement Measures/Monitoring</b>	<b>Residual Transportation Effects</b>
Pedestrian and Cyclist Delay	Minor Adverse (not significant) T / D / MT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Pedestrian and Cyclist Amenity	Minor Adverse (not significant) T / D / MT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Fear and Intimidation	Moderate Adverse (significant) T / D / MT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Accidents and Safety	Minor Adverse (not significant) T / D / MT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Hazardous/abnormal Load	NA	Hazardous/abnormal loads require specific permission from National Highways via the ESDAL (Electronic Service Delivery for Abnormal Loads) system and notification will be made for any Abnormal Loads which can be dealt with on a case by case basis. Specific permission and notifications would be made to the Local Planning Authority (LPA) and National Highways. Details of the access routing, timings and number of abnormal load movements would be discussed and agreed with the LPA. A specific abnormal loads assessment would be carried out by a competent contractor. However, routes to be considered on approach to site would include A47 and A10. Appropriate Traffic Management Measures would be in place on relevant roads to prevent conflicts with public vehicles. This may include temporary road closures on minor rural roads of short duration in accordance with the New Roads and Street Works Act 1991. This is consistent with the approach taken by other DCO applications within the local area. Co-operation agreements will be in place to manage in-combination effects with other major schemes.	NA

**Key:** P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable.

**Table 1-49 – Summary of transportation effects – operation phase (2042 DS2)**

<b>Description of Likely Significant Effects</b>	<b>Significance of Effects Prior to Mitigation/Enhancement</b>	<b>Summary of Mitigation / Enhancement Measures/Monitoring</b>	<b>Residual Transportation Effects</b>
Severance	Significant Adverse (significant) T / D / LT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00). Housing development will provide additional mitigation on Long Lane	Significant Adverse (significant) T / D / LT
Driver Delay	Minor Adverse (not significant) T / D / LT	Proposed Scheme + mitigation including junction capacity improvement at Beveridge Way and A47 approaches to A47 / WWHAR	Negligible to Minor Adverse (not significant) T / D / LT
Pedestrian and Cyclist Delay	Minor Adverse (not significant) T / D / LT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Pedestrian and Cyclist Amenity	Moderate Adverse (significant) T / D / LT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00). Housing development will provide additional mitigation on Long Lane	Minor Adverse (not significant) T / D / LT
Fear and Intimidation	Moderate Adverse (significant) T / D / LT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT
Accidents and Safety	Minor Adverse (not significant) T / D / LT	NMU Provision (See Sustainable Transport Strategy (STS) Document Reference 4.02.00).	Negligible to Minor Adverse (not significant) T / D / LT

Description of Likely Significant Effects	Significance of Effects Prior to Mitigation/Enhancement	Summary of Mitigation / Enhancement Measures/Monitoring	Residual Transportation Effects
Hazardous/abnormal Load	NA	<p>Hazardous/abnormal loads require specific permission from National Highways via the ESDAL (Electronic Service Delivery for Abnormal Loads) system and notification will be made for any Abnormal Loads which can be dealt with on a case by case basis. Specific permission and notifications would be made to the Local Planning Authority (LPA) and National Highways. Details of the access routing, timings and number of abnormal load movements would be discussed and agreed with the LPA. A specific abnormal loads assessment would be carried out by a competent contractor. However, routes to be considered on approach to site would include A47 and A10. Appropriate Traffic Management Measures would be in place on relevant roads to prevent conflicts with public vehicles. This may include temporary road closures on minor rural roads of short duration in accordance with the New Roads and Street Works Act 1991. This is consistent with the approach taken by other DCO applications within the local area. Co-operation agreements will be in place to manage in-combination effects with other major schemes.</p>	NA

**Key:** P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable.





## 1.20 Conclusions of significance Evaluation

### Summary of Baseline and Policy

- 1.20.1 The assessment of traffic and transport considers potential effects of the Proposed Scheme on users of the local transport network in the immediate vicinity. The results of the assessment are presented by comparing the future situation with the Proposed Scheme in place against a future baseline without it.
- 1.20.2 The Proposed Scheme responds to recent transport policy requirements and includes provision for pedestrians, cyclists and horse riders, such as new green bridges crossing the highway and new sections of Public Rights of Way which join up and enhance the existing network and connect with National Highways Improvement Scheme Proposals.
- 1.20.3 The baseline studies for traffic and transportation considered the current state of the road network for pedestrians, cyclists and drivers and travel by public transport.
- 1.20.4 The existing highway network is constrained in terms of highway geometry as set out within the **TA** (Document Reference: **NCC/4.01.00/WWHAR**) and the Do Minimum scenario is characterised by increased traffic on key routes such as the A10 and rural roads that are not designed to cater for strategic traffic movements. This makes them less attractive for active travel.

### Summary of Construction effects

- 1.20.5 The construction assessment found there will be a temporary increase in HGV traffic during the construction period. HGV movements will generally be for the delivery of plant and materials and the removal of construction waste. Site workers and visitors will also generate traffic movements. The works will be carried out in phases, construction traffic will be contained within the site with internal haul roads where possible to minimise movement on existing rural roads. Beyond the site boundary appropriate traffic management measures will be put in place for safe construction access and to protect members of the



public. The assessment found that, taking into account the measures recommended for inclusion in the CEMP to manage and monitor construction traffic associated with the Proposed Scheme, there would be no significant adverse effects to traffic and transportation.

#### Summary of Operation effects

1.20.6 The Proposed Scheme is not expected to generate new trips on the network but rather result in the redistribution of vehicle journeys. This means some routes could receive an uplift in traffic, while others receive a corresponding reduction and beneficial traffic relief. The assessment found that in the opening year (2027) and in the future assessment year (2042), there would be no significant adverse effects to traffic and transportation following the Proposed Scheme as the Scheme will provide a more suitable route for strategic traffic and HGV movement that helps to offer resilience to the local highway network and future proofing.

1.20.7 The future year assessment with the housing scheme shows additional traffic on the network resulting in a permanent moderate adverse effect on severance and pedestrian and cycle amenity on Long Lane which is **significant**. There is opportunity to mitigate this via the associated Housing development proposals.

### 1.21 References

Ref 16.1 - National Planning Policy Framework (NPPF) 2023

Ref 16.2 - National Planning Practice Guidance (PPG, 2021)

Ref 16.3 - Department for Transport Circular (2022)

Ref 16.4 - Cycle Infrastructure Design Local Transport Note LTN 1/20 (2020)

Ref 16.5 - Gear Change: A Bold Vision for Walking & Cycling (2020)

Ref 16.6 - Decarbonising Transport: A Better, Greener Britain (Department for Transport, 2021)



Ref 16.7 - Norfolk Strategic Framework: Shared Spatial Objectives for a Growing County (2017)

Ref 16.8 - Transport for Norwich (TfN) Strategy (2021)

Ref 16.9 - Joint Core Strategy for Broadland, Norwich and South Norfolk (2011/2014)

Ref 16.10 - Broadland District Council (BDC) Local Plan (Adopted 2016)

Ref 16.11 - South Norfolk District Local Plan (Adopted 2011)

Ref 16.12 - Breckland District Council Local Plan (2019)

Ref 16.13 - The Emerging Greater Norwich Local Plan (2018-2038)

Ref 16.14 - Local Cycling and Walking Infrastructure Plan (2022)

Ref 16.15 - The Guidelines for the Environmental Assessment of Road Traffic by Institute of Environmental Management and Assessment (IEMA) 2023.

Ref 16.16 - Design Manual for Road and Bridges (DMRB LA104) (DfT 2022).

Ref 16.17 – New Roads and Street Works Act (NRSWA) 1991

Ref 16.18 – Transport Research Laboratory (TRL SR356, Goldschmidt, 1976)

Ref 16.19 – Department for Transport TAG Unit A4-1 Social Impact Appraisal (2021)

Ref 16.20 – Pedestrian Comfort Guidance for London (2019) by Transport for London (TfL)

Ref 16.21 – International Road Assessment Programme (iRAP)

Ref 16.22: Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Statutory Instrument 2017 No. 571