



# NORTHSTOWE PHASE 2 PLANNING APPLICATION

Transport Assessment: Main Report

August 2014

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# Homes and Communities Agency

## Northstowe Phase 2

### Transport Assessment

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# 1 Introduction

## 1.1 Background

Hyder has been commissioned by the Homes and Communities Agency (HCA) to undertake a Transport Assessment (TA) to support the planning application for Phase 2 of the Northstowe new town development. The site is situated approximately 10 km to the northwest of Cambridge adjacent to the existing village of Longstanton and is situated within the Local Planning Authority (LPA) of South Cambridgeshire District Council (SCDC) and within the jurisdiction of the Local Highway Authority (LHA) of Cambridgeshire County Council (CCC).

Phase 1 of the Northstowe overall development, being taken forward by Gallagher Estates has been given outline planning permission in April 2014 for up to 1500 new dwellings, a primary school, a mixed-use local centre, leisure, community, residential institutions, cultural, health and employment provision, recreational space and a household recycling centre. The Phase 1 site will be accessed from the B1050 Station Road at the north western end.

The main Northstowe Phase 2 development area is situated adjacent and to the south east of the Phase 1 site and is providing a separate access route(s) into the Northstowe new town development from the south linking to the B1050.

## 1.2 Planning Submission

The planning submission comprises a planning application for development of Phase 2 of Northstowe with details of appearance, landscaping, layout, scale and access reserved (save for the matters submitted in respect of the Southern Access Road (West)) comprising:

1) development of the main Phase 2 development area for up to 3,500 dwellings, two primary schools, the secondary school, the town centre including employment uses, formal and informal recreational space and landscaped areas, the eastern sports hub, the remainder of the western sports hub (to complete the provision delivered at Phase 1), the busway, a primary road to link to the southern access, construction haul route, engineering and infrastructure works; and

2) construction of a highway link (Southern Access Road (West)) between the proposed new town of Northstowe and the B1050, improvements to the B1050, and associated landscaping and drainage.

## 1.3 Site Description

The application site extends to 216 hectares and comprises two parts: the main Phase 2 development area and the Southern Access Road (West), as shown on Plan 3 - Application Areas Plan. Each of the parts is described below.

### 1.3.1 Main Phase 2 Development Area

The area of the main Phase 2 development area is approximately 165 hectares. The area is bordered to the east by the route of the Cambridgeshire Guided Busway, and to the west by Longstanton. The area includes the former Oakington Barracks, which

currently comprises of three buildings, with no current use; slabs remaining from demolished buildings; remaining facilities associated with the barracks including sports amenities and green space; and a water tower which is the tallest structure on the site and visible feature in the wider landscape. The area surrounds the existing settlement of Rampton Drift, comprised of 92 properties, originally built as part of the barracks complex, although this area is not included in the application. The wider main Phase 2 Development area includes areas of hard standing and open space associated with the former airfield (much of this currently occupied by agricultural tenants), farmland including Brookfield Farm and Larksfield Farm. The area also includes a section of Rampton Road.

To the south of the main Phase 2 development area, and through which its proposed access routes run is land that is identified for future phases of development of Northstowe.

### 1.3.2 Southern Access Road (West)

The area for the Southern Access Road (West) runs from the B1050 to the boundary of Northstowe, as shown on the Plan 3 – Application Areas Plan. This area currently comprises arable fields and extends to approximately 51 hectares. Wilson’s Road, a public right of way crosses the area, providing a link from Longstanton towards Bar Hill.

### 1.3.3 The surrounding area

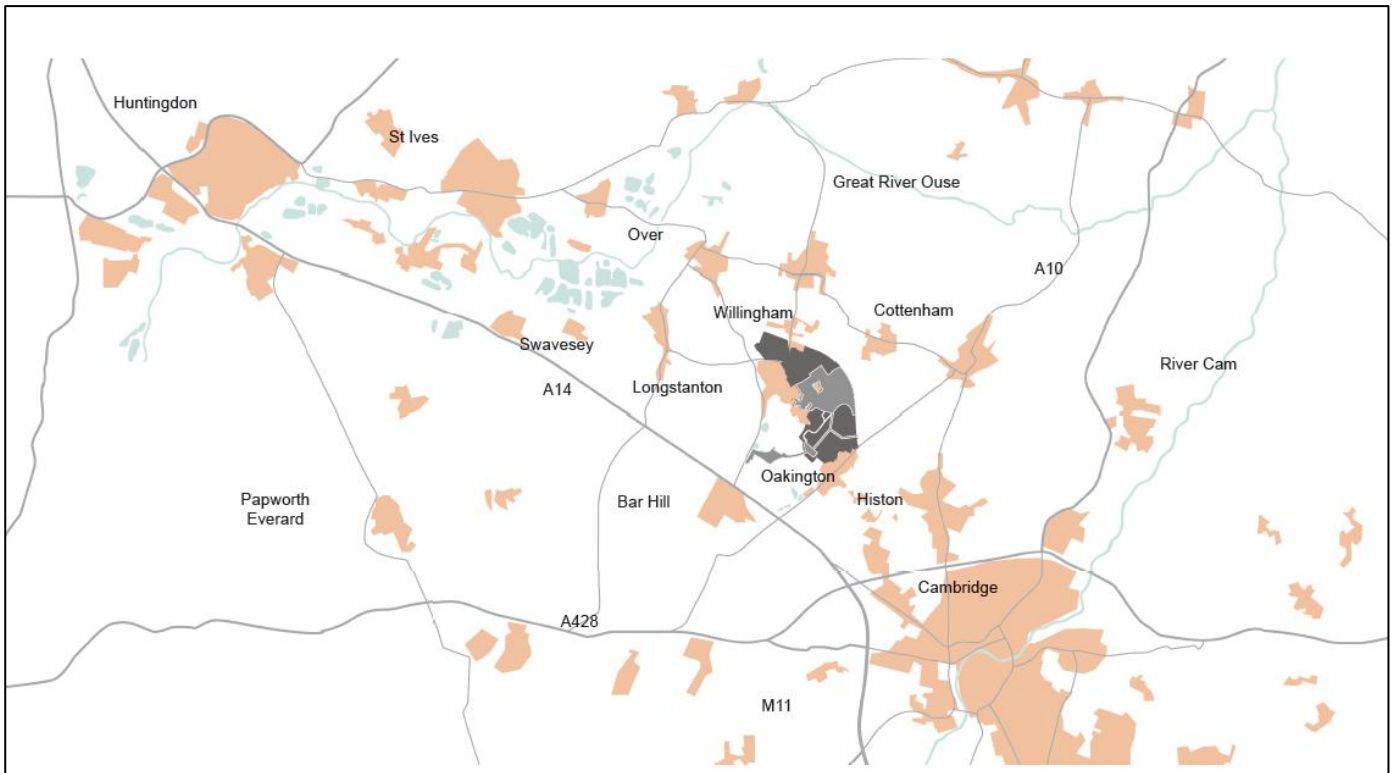
In addition to the settlements of Longstanton, Oakington and Rampton Drift, the site is also in proximity with Rampton (approximately 1km to the north-west), Willingham (approximately 2km to the north) and Cottenham (approximately 2.5km to the east). The site location is shown in Figure 1.1 – Site Location and Road Network with the Phase 2 site shown in light grey and the overall Northstowe development shown in dark grey.

To the north of the Phase 2 development is the proposed site of Phase 1 of Northstowe. The current uses of this site include agricultural fields and Cambridge Golf Club, which closed in August 2013.

To the south of the site, and through which the Northstowe Phase 2 development access route runs is land that is identified for future phases of development of Northstowe.

The A14 runs approximately 3km to the south west of the site. The B1050 Hatton’s Road/ Longstanton western bypass runs from the A14 to a roundabout to the north west of the site.

Figure 1-1: Site Location and Road Network



## 1.4 Purpose of the Report

The purpose of this report is to assess the impact of the proposed Northstowe Phase 2 development on the local and strategic highway network capacity, road safety and on sustainable modes of travel.

The TA includes analysis of trips generated by each mode using the Cambridgeshire Sub Regional Transport Model (CSRM) and a comparison of traffic flows between a Base Year (2011), Do Minimum/ Reference Case 2031 without Northstowe Phase 2 and the Phase 2 proposed development in 2031. The Do Minimum includes the Phase 1 development, thus the transport impacts set out in this document address the cumulative impact of Phase 1 and 2 (as well as other planned developments within the transport model). The TA assesses the change in traffic flows and capacity between the base year and future years with and without development. Where appropriate, mitigation is proposed.

The Northstowe Phase 2 development is situated within 3.5km of the A14 which forms part of the Strategic Road Network (SRN) maintained and operated by the Highways Agency (HA). The HA is developing improvements to the A14 from Cambridge to Huntingdon and these improvements take account of the traffic impact of Northstowe Phase 1 and 2 in the proposed scheme as well as show how the full Northstowe development will be accommodated. The A14 scheme is anticipated to be submitted for a Development Consent Order (DCO) in late 2014. The Phase 2 TA has been undertaken on the premise that the A14 improvements are implemented, in recognition of the interrelationship between further growth of the Northstowe development and the improvements to the A14.



On behalf of the HCA, Hyder has consulted and worked closely with the HA and their consultants' in the production of this Transport Assessment, as well as Cambridgeshire County Council (CCC), South Cambridgeshire District Council (SCDC) and other relevant stakeholders.

The scope for the Transport Assessment was agreed with CCC and the scoping report is included as Appendix 1.

The Transport Assessment should be read in conjunction with the separately submitted Framework Travel Plan, which sets out the targets, measures and actions for sustainable travel for Northstowe Phase 2.

## 1.5 Report Structure

The remaining sections of this report have been set out as follows:

- **Section 2** sets out the baseline situation for sustainable modes and accessibility by all modes of travel.
- **Section 3** provides an overview of the highway network, analysis of the baseline traffic situation and of road traffic accidents.
- **Section 4** provides a review of relevant transport policies and guidance.
- **Section 5** provides full details of the proposals, including consideration of internal movement and access arrangements, parking provision and servicing arrangements.
- **Section 6** sets out details of the transport modelling undertaken to arrive at future year trip forecasts, traffic generation, distribution on the road network and taking into account background traffic growth.
- **Section 7** provides the Access and Travel Strategy for the proposed development.
- **Section 8** provides an impact assessment on the proposed and existing road network and junctions and puts forward off-site mitigation measures which will be incorporated within the development as a result of the impacts identified.
- **Section 9** provides a summary and conclusions.

## 2 Baseline Sustainable Travel

### 2.1 Introduction

This section describes the current conditions for walking and cycling and the provision of public transport in the vicinity of the Northstowe Phase 2 development.

### 2.2 Walking, Cycling and Equestrians

There are a number of existing walking and cycling routes surrounding and adjoining the site including public rights of way, footways and cycleways. The network of public rights of way within close proximity to the site is shown within Figure 2.1.

#### 2.2.1 Rampton Drift

There is a public byway which links Rampton Drift and Longstanton to the southwest to Rampton in the northeast. This right of way crosses the Cambridgeshire Guided Busway (CGB) via an at-grade crossing and also links from Rampton to Histon and a footpath running adjacent to Cottenham Lode. The byway routes through the main Phase 2 development area and is currently grassed over to the west of the CGB with a gravel track to the east.

**Photo 2.1 - Entrance to public byway  
(eastern end – Reynolds Drive)**



**Photo 2.2 - Byway to east of CGB**



The CGB at grade crossing has deep cuttings to guide the buses that cause some difficulty for cyclists to cross at this point as they are required to dismount and carry bicycles across the tracks. The crossing links to a shared footway / cycleway which runs adjacent to the east side of the CGB at this location, crossing to the other side of the CGB to the south at Westwick. This cycleway forms part of the National Cycle Network (Route 51) and links to Cambridge to the south and Huntingdon (via Over / Swavesey) to the north.

**Photo 2.3 - Byway CGB Crossing**



**Photo 2.4 - Byway CGB Crossing**



**Photo 2.5 - Byway CGB crossing**



**Photo 2.6 - Byway CGB crossing**



**Photo 2.5 - Byway to the west of the CGB crossing**



**Photo 2.5 - Cycleway adjacent to east side of CGB from byway crossing**



## 2.2.2 Links from Over

To the south of Over on Longstanton Road there are informal tracks where people have walked down the verge to the cycleway / busway from the road bridge. This section appears to have a high level of demand. There is also no at grade crossing to allow pedestrians / cyclists access to the National Cycle Route 51 on the southern side of the tracks.

**Photo 2.7 – Access to busway from Over over bridge**



**Photo 2.8 - Access to busway from Over over bridge**



## 2.2.3 Routes from Longstanton

The public byway which routes south of Longstanton runs south towards Bar Hill. This does not provide a crossing over the A14 and as such is limited in terms of its use at the southern end.

A byway links to the northwest via a bridleway routing along Over Road and Ramper Road which accesses Swavesey and the Ouse Valley Way to the northwest. The easterly section of Ramper Road from the Over Road junction towards Utton's Drove is marked as part of a long distance footpath but there is no provision for pedestrians.

Shared walking/ cycleways are adjacent to Hatton's Road and the B1050 Station Road link areas to the south of Longstanton to Willingham. These provide suitable and preferred routes for walking and cycling from the site to surrounding areas (although no walking or cycling facilities are provided to the south of the B1050 Hatton's Road roundabout linking to the Bar Hill junction). Funding is being provided as part of Phase 1 of Northstowe to provide improved footways and cycleways in this area

Footways are adjacent to the majority of the carriageways throughout the villages of Longstanton and Oakington. In the High Street in Longstanton these are of standard width and lit. On Woodside there is a footway on one side of the road which is not lit and then the footways discontinue on Longstanton Road. In Oakington there is a footway on one side of the road entering from Longstanton Road and street lighting.. There are a number of access points into the main Phase 2 development area from Longstanton via public rights of way (footpaths, bridleways and byways).

**Photo 2.9 – Footway / Cycleway – B1050 Station Road**



**Photo 2.10 - Footway / Cycleway – B1050 Station Road**



**Photo 2.11 – Footway / Cycleway – Hatton’s Road**



**Photo 2.12 - Footway / Cycleway – Hatton’s Road**

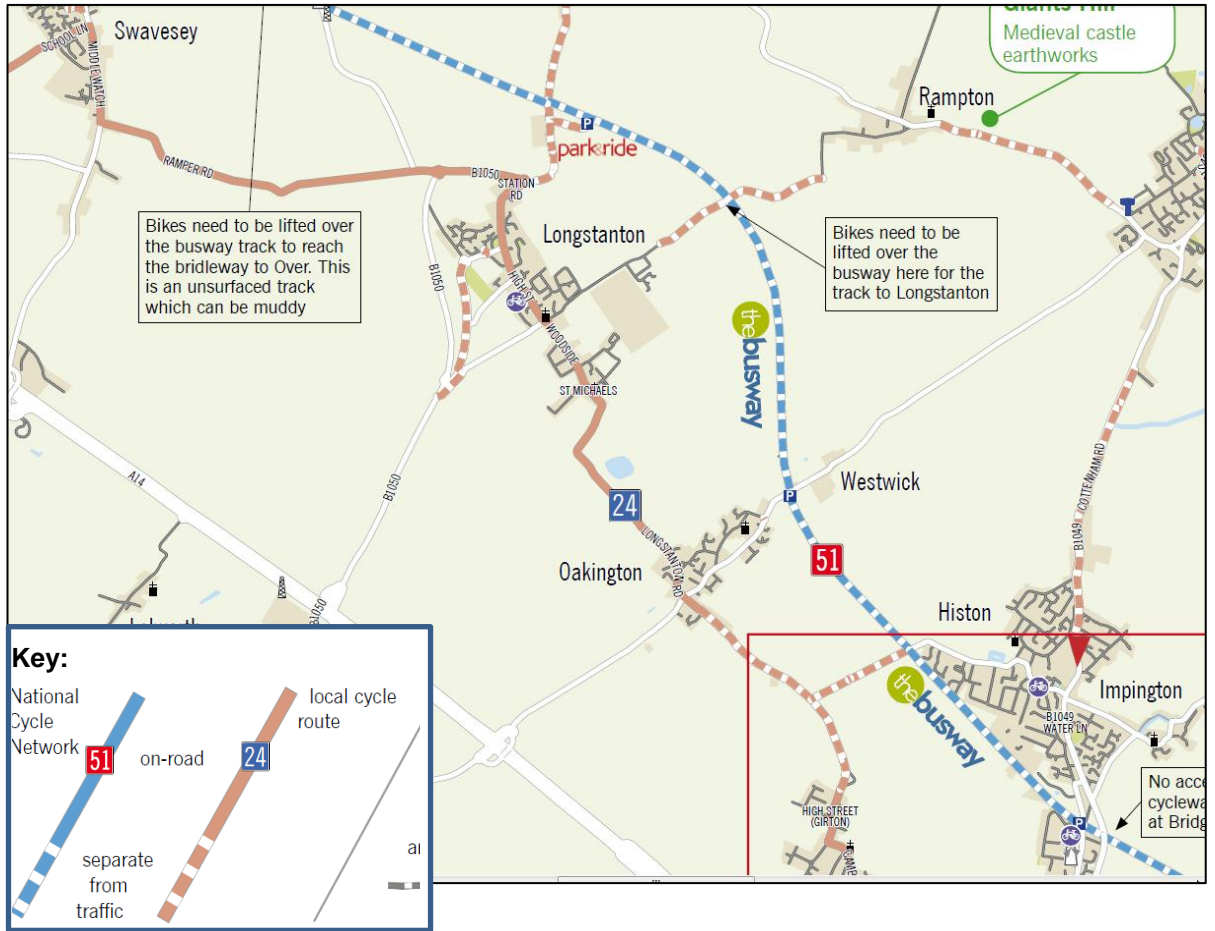


## 2.2.4 Wider cycling connections

The cycle routes between the site and Swavesey to the north and Histon / Girton in the south are shown on Figure 2-2. This demonstrates the National Cycle route adjacent to the busway as well as a local cycle route (24) which routes from Girton to Swavesey along Cambridge Road/ Longstanton Road/ Longstanton High Street / B1050 / Ramper Road/ Middlewatch.

Between Girton and Oakington there is an off-carriageway shared walking/cycleway provided on the northern side of the carriageway, which also ties into an off-carriageway route adjacent to Park Lane linking to Histon and the CGB. At the Oakington crossroads, advanced stop lines are provided for cyclists to ease movements across the junction. On Longstanton Road from the Oakington crossroads the route becomes on-carriageway and for the remainder of the route to Swavesey the cycle route is on-carriageway. At its southern end in Girton the cycle route ties into the extensive network of routes within Cambridge.

**Figure 2.2: Existing Cycle Routes**



Source: Cambridgeshire County Council

**Photo 2.13 – Footway / Cycleway – northern side of Cambridge Road (Cycle Route 24)**



**Photo 2.14 - Footway / Cycleway – Park Lane**



Photo 2.15 – Longstanton Road (Cycle Route 24)



Photo 2.16 - Longstanton Road (Cycle Route 24)



Photo 2.17 – Oakington Crossroads crossing (Cycle Route 24)



Photo 2.18 - Oakington Crossroads crossing (Cycle Route 24)



## 2.2.5 Cycle parking at CGB stops

Covered, well lit and CCTV monitored cycle parking is available at the two closest busway stations to the site to encourage cycling as follows:

- Longstanton Park & Ride - 50 spaces
- Oakington - 30 spaces

## 2.2.6 Access to Local Amenities

Although the proposed Phase 2 development will provide a new town centre and include schools, health facilities, community facilities, retail, leisure and employment, there are also a number of existing local facilities and services which would be accessible within a reasonable walking and cycling distance via the existing walking

and cycling routes. The facilities within 5km (a reasonable cycling distance<sup>1</sup>) have been summarised within Table 2.1 and shown on Figure 2.3 and demonstrate that the Phase 2 development is highly accessible to a range of existing facilities, in addition to those being provided in the development.

**Table 2.1: Existing Accessible Facilities and Services via walking or cycling**

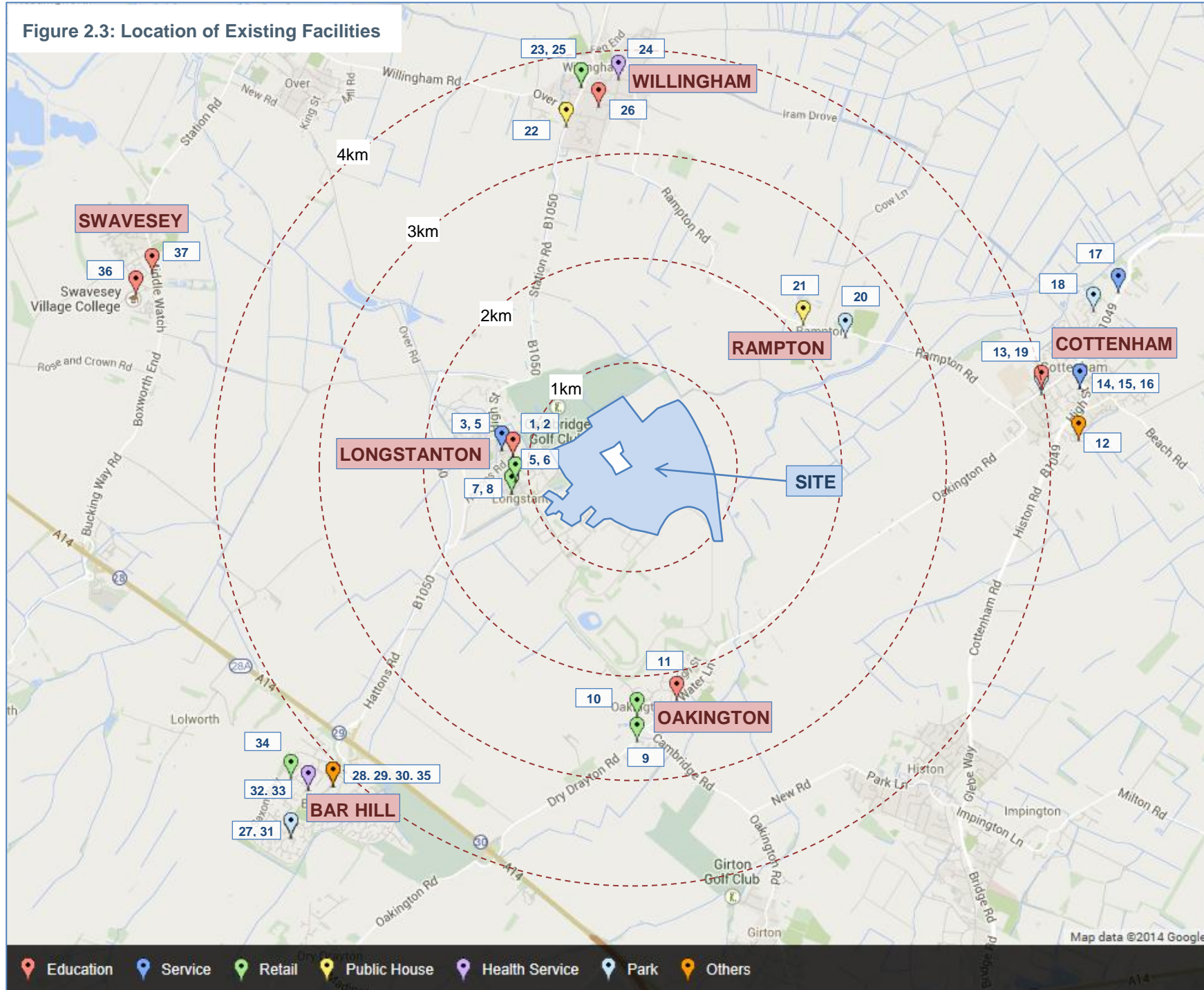
Name	Village	Road	Category
Hatton Park Primary School	Longstanton	Hatton's Park	Education
Mad Hatters Pre-School	Longstanton	Hatton's Park	Education
Village Vets	Longstanton	High Street	Service
Hairdressers	Longstanton	High Street	Retail
The Black Bull	Longstanton	High Street	Public House
Clive Jones - Dental Surgery	Longstanton	High Street	Service
Longstanton Post Office and Stores	Longstanton	Rectory Close	Retail
Longstanton Branch Surgery	Longstanton	Magdalene Close	Health Service
Oakington Garden Centre	Oakington	Dry Drayton Road	Retail
Crossways Hairdressers	Oakington	Dry Drayton Road	Retail
Oakington COE Primary School	Oakington	Water Lane	Education
Cottenham Sports Centre	Cottenham	High Street	Sports/Recreation
Cottenham County Primary School	Cottenham	Lambs Lane	Education
Cambridge Building Society	Cottenham	High Street	Service
Cottenham Post Office	Cottenham	High Street	Retail
Pharmacy	Cottenham	High Street	Retail
Village Vets	Cottenham	High Street	Service
Cottenham Park	Cottenham	Ivatt Street	Park
King Georges Playing Field	Cottenham	Lambs Lane	Park
Rampton Park	Rampton	Church End	Park
Black Horse	Rampton	High Street	Public House
The Black Bull	Willingham	Station Road	Public House
Barbers	Willingham	High Street	Retail
Medical Practice	Willingham	Long Lane	Health Service
Willingham Post Office	Willingham	High Street	Retail
Willingham Primary School	Willingham	Thodays Close	Education
Bar Hill Recreation Ground	Bar Hill	Gladeside	Park
Bar Hill Library	Bar Hill	Gladeside	Recreation
Bar Hill Post Office	Bar Hill	Gladeside	Service
Bar Hill Primary School	Bar Hill	Gladeside	Education
Bar Hill Sports & Social Club	Bar Hill	The Spinney	Recreation
Bar Hill Dental Clinic	Bar Hill	Viking Way	Health Service
The Maple Surgery	Bar Hill	Hanover Close	Health Service

<sup>1</sup> Department for Transport's *Local Transport Note 2/08: Cycle Infrastructure Design* identifies that "many utility cycle journeys are under 3 miles, although, for commuter journeys, a trip distance of over 5 miles is not uncommon"



Name	Village	Road	Category
Tesco Extra	Bar Hill	Viking Way	Retail
The Fox	Bar Hill	Viking Way	Public House
Swavesey Village College	Swavesey	Gibraltar Lane	Education
Swavesey County Primary School	Swavesey	Middle Watch	Education

Figure 2.3: Location of Existing Facilities



- Key:**
1. Hatton Park Primary School
  2. Mad Hatters Pre-School
  3. Village Vets
  4. Hairdressers
  5. The Black Bull PH
  6. Clive Jones - Dental Surgery
  7. Longstanton Post Office and Stores
  8. Longstanton Branch Surgery
  9. Garden Centre
  10. Hairdressers
  11. Oakington COE Primary School
  12. Sports Centre
  13. Cottenham Primary School
  14. Cambridge Building Society
  15. Post Office
  16. Pharmacy
  17. Village Vets
  18. Cottenham Park
  19. King Georges Playing Field
  20. Rampton Park
  21. Black Horse PH
  22. The Black Bull PH
  23. Barbers
  24. Medical Practice
  25. Post Office
  26. Willingham Primary School
  27. Bar Hill Recreation Ground
  28. Library
  29. Post Office
  30. Bar Hill Primary School
  31. Bar Hill Sports & Social Club
  32. Dental Clinic
  33. The Maple Surgery
  34. Tesco Extra
  35. The Fox
  36. Swavesey Village College
  37. Swavesey County Primary School

## 2.2.7 Summary of walking and cycling provision

The footway and cycleway links and facilities as well as the public rights of way network surrounding the Phase 2 development provides reasonable permeability to surrounding areas and will encourage walking and cycling to and from these areas. There are however some areas that could be improved which are discussed in the Access and Travel Strategy (Chapter 7).

## 2.3 Public Transport

### 2.3.1 Bus Services

Within the vicinity of the Phase 2 development there are a number of existing bus services in operation that serve Oakington and Longstanton, including the four services which route along the Cambridgeshire Guided Busway (CGB). The existing bus services are shown in Figure 2.4. The closest stops to the development in Longstanton are on High Street which is around 600 metres from the boundary of the Main Phase 2 development area. The closest stops in Oakington are situated on High Street which is around 400 metres from the boundary of the site. The CGB stops are located approximately 1km to the south east and the north of the Phase 2 development.

Services Citi 5, Citi 6, 95, 96, Busway A and Busway B are operated by Stagecoach and Busway C and D are operated by Whippet Coaches Ltd.

Service Citi 5 provides a route to Cambridge City Centre to Bar Hill, Longstanton and Swavesey with a journey time of approximately 35 minutes from Longstanton to Cambridge. This operates with an hourly frequency from Monday to Saturday (with two other services per hour stopping at Bar Hill but not at Longstanton). The service starts at around 0700 and operates until around 1800. The route links the villages of Bar Hill, Longstanton, Willingham, Over and Swavesey in a circuit. Whilst this provides accessibility for the communities including the mobility impaired, elderly and those without access to a car, it is unlikely to attract people to switch from car use. It is proposed as part of the Phase 1 development to enhance the frequency of the services from Longstanton to Willingham, Over and Swavesey to every 20 minutes from the current hourly service, in line with the services to Bar Hill.

Service Citi 6 provides a route to Cambridge City Centre directly from Oakington with a journey time of approximately 24 minutes. This operates with a frequency of 20 minutes throughout the day from Monday to Saturday, with an hourly service on Sundays. The service starts at around 0700 and operates until around 2300.

The Busway is served by four bus services (A, B, C, D) which have a combined frequency of approximately nine services per hour (one service per seven minutes) from Monday to Saturday and once per hour on a Sunday. The journey time to Cambridge City Centre is approximately 22 minutes (A, B and C) and to Cambridge Rail Station is 29 minutes (A and C). Service D provides the first service of the day from Hill Rise to Cambridge. Services provide a very high level of accessibility by public transport in the vicinity of Northstowe Phase 2 and the CGB journey time and cost offers advantages over using the car.

The bus services also route to St Ives in 13 minutes and bus service B routes to Huntingdon in 41 minutes. Bus service B also provides an hourly route to Peterborough. The first service commences at around 0600 and the last service finishes at around midnight. Services 95 and 96 are school buses which serve Swavesey Village College and Long Road Sixth Form College.

The bus services have been summarised within Table 2.2 and the Citi 5, Citi 6 and CGB routes are shown in Figure 2.5.

**Table 2.2: Bus Services within the Vicinity of the Phase 2 Development**

Route No.	Stop	Route	Weekday			Weekend		
			Frequency (approx. minutes)			Frequency (approx. minutes)		
			AM Peak	Off Peak	PM Peak	Evening	Sat	Sun
Citi 5	1	Fenstanton - Swavesey - Longstanton - Cambridge	Hourly	Hourly	Hourly	No Service	Hourly	No Service
Citi 5	1	Cambridge - Longstanton – Swavesey – Fenstanton	Hourly	Hourly	Hourly	2 services	Hourly	No Service
Citi 6	2	Oakington – Girton – City Centre	20 mins	20 mins	20 mins	20 mins	20 mins	Hourly
Citi 6	2	City Centre - Girton – Oakington	20 mins	20 mins	20 mins	20 mins	20 mins	Hourly
CGB - A, B	3	Peterborough – Huntingdon - St Ives – Cambridge - Addenbrookes Hospital	8 services	8 services	8 services	15 mins to hourly	8 services	20 mins
CGB - A, B	3	Addenbrookes Hospital - Cambridge – St Ives - Peterborough (one per hour)	8 services	8 services	8 services	15 mins to hourly	8 services	20 mins
CGB - C	3	St Ives to Cambridge	2 services	Hourly	6 services	3 services	Hourly	Hourly
CGB - C	3	Cambridge to St Ives	Hourly	Hourly	3 services	Hourly	Hourly	Hourly

1 = High Street, Longstanton 2 = High Street, Oakington 3 = Guided Busway (Longstanton P&R / Oakington)

Figure 2.5: Cambridgeshire Guided Busway Routes

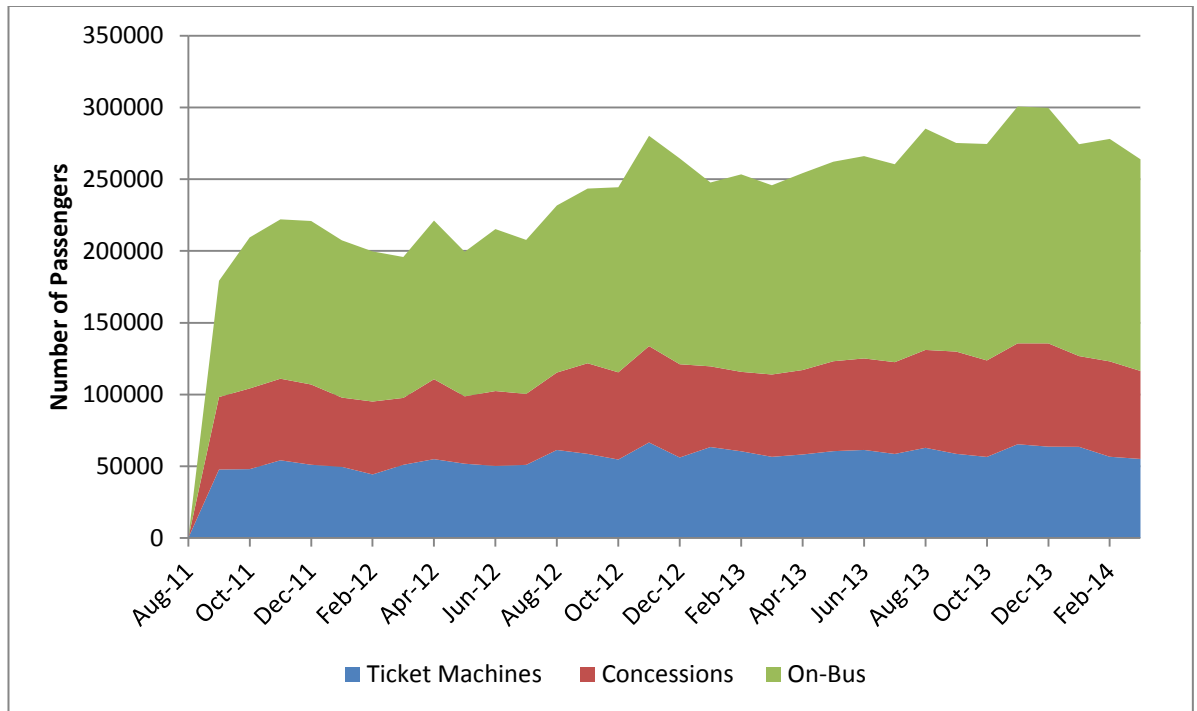


### 2.3.2 CGB Usage

The Cambridgeshire Guided Busway opened in August 2011 and usage has grown year on year from the commencement of services, and is said to have been greater than forecasted demand. Data on total usage by month has been supplied by Cambridgeshire County Council and is displayed in Figure 2.6. Monthly usage grew by 26% from October 2011 to October 2012 and rose a further 7.3% to October 2013.

Anecdotal evidence suggests that the CGB services are operating at capacity at peak times, giving difficulties for people accessing the services as they are full before Longstanton. Stagecoach has stated that additional buses are planned to be provided by the end of 2014 to provide additional capacity.

**Figure 2.6: Growth in CGB Usage by Ticket Type**



Source: Cambridgeshire County Council, June 2014

### 2.3.3 Rail Services

Cambridge Rail Station is located approximately 11km to the southeast of the Phase 2 development. Guided busway services A and C route to the station, which provides frequent services to a range of regional destinations such as London, Birmingham, Norwich and Ipswich. The journey time from Cambridge to London is around 50 minutes.

A new rail station is being developed, known as Cambridge Science Park Station which is located in the north of Cambridge, close to the Science Park, St John's Innovation Centre and Cambridge Business Park. This is located approximately 8 km to the south east of Northstowe and will be situated on the Ely to Cambridge line. Planning permission has been granted to build the railway station, a direct bus link from the Busway to the station and foot and cycleways to nearby roads. The Science Park CGB stop is only 10 minutes from Longstanton Park and Ride by bus, thus Northstowe will be within a short journey of the proposed new station.

The plans will provide a transport interchange to link to the CGB which will provide additional access options to London from Northstowe, without the requirement to travel to the city centre by road / CGB. The new station will provide a choice of three trains an hour to either King's Cross or Liverpool Street. The journey times to London would be similar to the existing journey times between Cambridge and London with the services stopping at Cambridge Rail Station. The station would be attractive for use by Northstowe residents as it is likely to reduce journey times via the CGB to Cambridge Rail Station, although it is recognised that users would be required to interchange twice to access Cambridge Rail Station. As such, this station provides additional travel options for Northstowe residents and has the potential to reduce journey times for some users. An image of the proposed station and links is shown below as Figure 2.7.

Figure 2.7: Proposed Cambridge Science Park Station



Source: [http://www.cambridgeshire.gov.uk/info/20051/transport\\_projects/62/cambridge\\_science\\_park\\_station](http://www.cambridgeshire.gov.uk/info/20051/transport_projects/62/cambridge_science_park_station)

The indicative timescales show that the construction is due for completion in March 2015 before the construction period for Northstowe Phase 2 commences (although these may be subject to change).

## 2.4 Summary

The Northstowe Phase 2 development is reasonably well located close to existing walking and cycle routes and CGB and local bus services. In particular, connections by CGB to Cambridge from Longstanton and Oakington are very strong. Connections to some adjacent communities for cyclists are in need of improvement (such as to Bar Hill) and bus services to villages such as Swavesey, Over and Willingham are limited, but are proposed to be improved as part of Northstowe Phase 1 with improved links alongside the B1050. The existing networks and services provide a strong basis on which to provide good connectivity to and from Northstowe Phase 2 by sustainable travel modes.

## 3 Baseline Highways and Traffic

### 3.1 Highway Network

#### 3.1.1 B1050 Hatton's Road

The B1050 Hatton's Road will form the main access to the Phase 2 development from the A14. The B1050 forms a grade separated junction with the A14 at its southern end (Junction 29 Bar Hill) and broadly routes from north to south linking to Longstanton (via Hatton's Road) and Willingham to the north (via Station Road). Figure 3.1 shows the key highway links as well as traffic survey locations referred to later in this section.

The B1050 Hatton's Road between Longstanton (Hatton's Road roundabout) and the A14 is a single carriageway road of approximately 7.3 metres in width, with no street lighting or footways on either side and is subject to national speed restrictions. The B1050 Hatton's Road forms a bypass around Longstanton with three roundabouts forming junctions with Hatton's Road, Ramper Road and Station Road broadly to the west and northwest of Longstanton. The B1050 Station Road provides a north-south link to Willingham in the north and extends to Bar Hill to the South.

Photo 3.1 – B1050 Hatton's Road



Photo 3.2 - B1050 Hatton's Road



#### 3.1.2 B1050 Station Road

The B1050 Station Road commences at a roundabout junction with High Street at the northern end of Longstanton and is approximately 7.3 metres in width and is subject to a speed restriction of 40mph. Station Road provides an access route between Longstanton and Willingham and has a shared footway / cycleway on its eastern side linking Longstanton and the busway Park and Ride. The approved Phase 1 Northstowe Development proposes a new access along this section of the B1050 which will be a priority junction and two linked traffic signalised junctions.



Photo 3.3 – B1050 Station Road



Photo 3.4 - B1050 Station Road



### 3.1.3 Dry Drayton Road

Dry Drayton Road currently forms a route from the A14 to Oakington, routing to the south east of the Phase 2 development. Dry Drayton Road forms an at-grade junction (Junction 30) with the A14 (with a bridge connection over the A14) at its south-western end and broadly routes from northeast to southwest linking to Oakington in the north and Junction 30 of the A14. Dry Drayton is a single carriageway road of approximately 7.3 metres in width, subject to national speed restrictions and with no street lighting or footways. Dry Drayton Road forms one arm of a four arm signal controlled junction with Cambridge Road, Longstanton Road and Water Lane at its northern end in the village of Oakington.

Photo 3.5 – Dry Drayton Road



### 3.1.4 Longstanton Road (Airfield Road)

Longstanton Road links Dry Drayton Road to School Lane in Longstanton. Although through movements for vehicles are prohibited (apart from access, taxis, mopeds and buses) general traffic does use the route particularly in the peak hours to avoid congestion elsewhere. Within Oakington the carriageway varies in width between approximately 6 metres and 7.3 metres, with frontage access to a number of residential properties. Within Oakington the road is a narrow single carriageway with a speed

restriction of 30mph, providing access to a number of further residential roads and provides street lighting and a footway on each side of the carriageway.

Between Oakington and Longstanton the carriageway narrows to around 5.5 metres with no footways or street lighting. Within Longstanton, the carriageway increases in width up to around 7 metres and there is frontage access to a number of residential properties as well as a narrow footway on the east side of the carriageway.

**Photo 3.6 – Longstanton Road (Airfield Road)**



**Photo 3.7 – Longstanton Road (Airfield Road)**



### 3.1.5 Cambridge Road / Oakington Road

Cambridge Road routes from Dry Drayton Lane to the south east becoming Oakington Road to the south and providing a route into Cambridge via the A1307 Huntingdon Road. Within the vicinity of Oakington, Cambridge Road is approximately 6 metres in width, has a shared footway/ cycleway on its eastern side, street lighting and is subject to a 30 mph speed restriction. The speed limit increases to 40mph between Oakington and Girton before reducing to 30 mph within the vicinity of Girton and remaining at this level until the priority junction with the A1307.

**Photo 3.8 – Oakington Road**



**Photo 3.9 – Cambridge Road**



### 3.1.6 High Street, Longstanton

High Street is the main access road through Longstanton, linking the B1050 Station Road to the north and School Lane to the south and has a speed restriction of 30mph and street lighting along its length. High Street is approximately 6 metres in width and

provides frontage access to a number of residential properties as well as Hatton Park Primary School. Footways are provided on each side of the carriageway of approximately two metres in width and there is a zebra crossing facility towards the northern end. At its southern end High Street forms a staggered crossroads with School Lane and Woodside.

Photo 3.10 – High Street, Longstanton



Photo 3.11 – High Street, Longstanton



### 3.1.7 Rampton Road / School Lane

Rampton Road is a no-through road which broadly routes through the northern part of the main Phase 2 development area and links to a byway which continues to Rampton in the east. Rampton Road becomes School Lane to the west of Woodside which links to Hatton's Road at its western end via a priority junction and forms a route to the A14 at Bar Hill. School Lane is approximately 5.5 metres in width. To the west of Stokes Close it is subject to national speed restrictions and has no street lighting or footways and to the east of this it has a 30 mph speed restriction, footways on the north side of the carriageway and street lighting.

Photo 3.12 – School Lane



Photo 3.13 – Rampton Road



### 3.1.8 Ramper Road

Ramper Road connects the B1050 to Boxworth End at its western end. Ramper Road is approximately 5 metres in width and provides a route from Longstanton to Swavesey in the west and an alternative route to the A14 via Boxworth End. There is no street lighting or footways provided along the route. This also provides access to Over Road /

Gravel Bridge Road which routes northwest from Longstanton to Over and has a road width of around 5.5 to 6 metres.

### 3.1.9 A14

The A14 forms part of the trunk road network maintained and operated by the Highways Agency. The A14 forms the main route from Cambridge to Felixstowe to the east and Birmingham to the west (via the M6). Within the vicinity of the development there are two junctions at Bar Hill (J29) and Dry Drayton (J30) whereby Oakington and Longstanton can be accessed. The A14 is currently three lanes in each direction between the Bar Hill junction and the M11, reducing to two lanes to the north of the Bar Hill junction.

The Highways Agency's proposed improvements to the A14 from Cambridge to Huntingdon will upgrade the A14 in the vicinity of Northstowe to four lanes (in each direction) and provide a parallel single carriageway local access route connecting the Trinity Foot, Bar Hill and Dry Drayton junctions as well as south into Cambridge. This will significantly improve the capacity of the A14 and offer significantly enhanced highway accessibility to Northstowe. The improvements are programmed at present to be starting construction in late 2016 and open to traffic in 2019/20.<sup>2</sup>

Traffic to and from Northstowe will have access onto the A14 at the Bar Hill junction. There have been discussions with the Highways Agency and their consultants J2A to ensure that the Bar Hill junction is designed in the A14 Cambridge to Huntingdon Improvements to accommodate the forecast flows from Northstowe Phases 1 and 2 and it has been confirmed that the junction design will accommodate this traffic. Moreover, the implications of the full 10,000 homes including Phase 3 have also been considered. This has been agreed with the Highways Agency as well as in conjunction with officers from the County and District Council.

From the Bar Hill junction to the junction with the Southern Access Road (West), the B1050 will be upgraded to a dual carriageway to accommodate Northstowe development traffic as well as wider traffic growth on the B1050 corridor in the period to 2031.

## 3.2 Baseline Traffic Flows

Ongoing monitoring of traffic flows is taking place using permanent and temporary counters at 20 cordon sites on the local road network to the Phase 2 Northstowe development. This has been arranged by CCC on behalf of the Northstowe Transport Working Group and supported by the developers for Phase 1. This data has been provided for Phase 2, to give baseline link flows which have been used by CCC's consultants' Atkins to benchmark and review the CSRM base model.

As part of the Phase 2 proposals additional traffic survey data was obtained from an independent specialist survey company (Intelligent Data Ltd) for 14 junctions within the proximity of the Northstowe Phase 2 development, following agreement on the appropriate junctions to be assessed with CCC in the Transport Assessment Scoping Report (contained in Appendix 1).

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<sup>2</sup> <http://www.highways.gov.uk/roads/road-projects/a14-cambridge-to-huntingdon-improvement-scheme/#projecttimetable>

Turning movements have been obtained at each of these junctions for every 15 minute period between 0700 and 1900. Queue length surveys have also been undertaken so that base traffic models can be verified to ensure the validity of the model outputs. The surveys were undertaken by camera on Tuesday 25th February 2014 for junctions 1 to 12 and Thursday 7th November 2013 for the other two junctions (13 and 14).

The junctions where traffic flows have been obtained are summarised below (25<sup>th</sup> February 2014 unless stated):

- 1 Girton Road / Huntingdon Road priority junction
- 2 New Road / Cambridge Road priority junction
- 3 Hatton's Road / B1050 roundabout
- 4 Over Road / Hatton's Road roundabout
- 5 High Street / Over Road mini roundabout
- 6 Station Road / B1050 roundabout
- 7 B1050 / Ramper Road roundabout
- 8 Over Road / Ramper Road priority junction
- 9 Boxworth End / Ramper Road / Middlewatch priority junction
- 10 Boxworth End Road / Rose and Crown priority junction
- 11 Oakington Road / Rampton Road mini roundabout
- 12 High Street / Station Road / Berrycroft Road / Over Road signal controlled junction
- 13 High Street / Rampton Road / Woodside / School Lane staggered crossroads (2013 survey)
- 14 Dry Drayton Road / Longstanton Road signal controlled junction (2013 survey)

The location of these junctions is shown on Figure 3.1.

The traffic flows across the network from all the surveys have been analysed to determine the peak hour in the AM and PM periods and this showed that the peak hours for traffic were between 0800-0900 and 1700-1800 on the surveyed weekdays. Traffic flows across these two peak hours are summarised as turning movements on the network in Appendix 2. The flows and queue lengths have been used to undertake initial base modelling to verify and benchmark the junction models to ensure they appropriately reflect actual conditions. These models can then be used for the future year assessments based on the outputs of the CSRM model. The CSRM model considers the traffic flows obtained for the CCC monitoring sites as well as seasonal variation in traffic flows.

As such, these models have then been used to test the impacts of Northstowe Phase 2 in a future assessment year against a do minimum scenario where the site is not built out in Chapter 8. Full details of all observed traffic flow data and queue length surveys have been provided within Appendix 3.

### 3.3 Base Year 2014 Junction Assessments

Junction assessments have been undertaken at each of the 14 junctions to establish the existing operation of the junctions. The mean maximum queue length outputs have been compared with the observed queue lengths to verify the models, and the models have been adjusted accordingly where they were initially not comparable to ensure that

they are robust for future scenario analysis. The 2013 surveys have not been factored to 2014 levels as the surveys were undertaken less than four months apart and are only being used to set up the base modelling and demonstrate the existing operation. As such the observed flows were considered acceptable for this purpose.

The operational and capacity assessments of the junctions have been undertaken using the TRL computer design programmes PICADY / ARCADY and the JCT signal control modelling software LinSig (V3). The junction geometries have been based on measurements obtained from OS mapping and the signal junction assessments have been based on signal timing plans provided by CCC.

ARCADY / PICADY provide two main measures of junction capacity and operation, namely traffic intensity (Ratio of Flow to Capacity - RFC) and queue length. LinSig provides a number of measures of junction capacity and operation, being traffic intensity (Degree of Saturation – DoS and Practical Reserve Capacity – PRC) as well as queue lengths and delays. These measurements are discussed briefly below:

#### **Traffic Intensity (RFC):**

Within ARCADY / PICADY the RFC (ratio of flow to capacity) provides the primary measure of the capacity within a junction, and is reported for each entry arm. When RFC exceeds 1.0 the arm is considered to be operating over capacity and queuing will occur. As a general rule, a ratio of less than 0.85 provides an acceptable design criterion.

#### **Traffic Intensity (PRC):**

Within LINSIG the PRC (practical reserve capacity) provides a measure of overall capacity, and this is reported for the junction as a whole as a positive or negative value. A Degree of Saturation (DoS) is reported for each junction arm, with a value of less than 90% generally considered acceptable.

#### **Queue Length:**

Queue lengths provide an indication of how the overall junction performance may affect adjacent junctions on the highway network, with the predicted queue lengths being compared against those observed to ensure that the model outputs are robust. The queue lengths are presented as Mean Maximum Queues (MMQ) during a 15 minute period for PICADY / ARCADY and an hourly period for LinSig and these have been compared to the mean maximum queue observed across the peak hourly period.

At some of the junctions the end of the queue went beyond the visible distance of the camera and as such the queues have been estimated during these times by the survey company, however such instances only occurred for a short length of time at Junction 3 (for a 10 minute period from 0710-0720) and Junction 11 (15 minutes during the 0800-0900 AM peak). As such the mean hourly queue, using the estimated value, is considered appropriate for comparison. At Junction 12 the queue length is past the visible distance of the camera for the entire of the AM and PM peaks on at least one of the arms. As such the queue lengths may be underestimated within these periods and this will be considered when benchmarking the model.

It is recognised in the junction modelling software manual that the calculated queues and queuing delays are average values of broad distributions, and considerable variation about these values will be encountered in practice. In fact, day-to-day variations in the queue-lengths and delays can occur at any given time in the peak period. Moreover a difference of a fluctuation of a number of vehicles between

observed and modelled queue lengths are to be expected and do not impact on the robustness of junction model.

The key outputs and constraints at each junction have been summarised within Table 3.1. Full results tables for each junction are shown within Appendix 4.

**Table 3.1: Summary Outputs of Existing Junction Operation**

2014 Base Assessments (2013 where shown in italics)						
Worst Case RFC/ DoS and Queue (may occur on different arms)						
No	Junction	Most Constrained Arm (RFC/ DoS)	Predicted Max RFC/ DoS	Predicted Mean Maximum Queue (vehicles)	Observed Mean Hourly Queue (vehicles)	Key Constraint Period
1	Girton Rd/Huntingdon Rd	Girton Road	0.956	11	12 **	AM Peak
2	New Road/Cambridge Rd	New Road	0.840	5	7	AM Peak
3	Hatton's Road/B1050 rbt	B1050 (n)	0.948	12	6 (28 during busiest 5 mins)	0715-0815 *
4	Over Road/ Hatton's Road rbt	Over Road (nw)	0.176	0	0	AM Peak
5	Longstanton High Street/Over Road mini rbt	Longstanton High St (n)	0.268	0	1	AM Peak
6	Station Rd/ B1050 rbt	B1050 (w)	0.699	2	2	PM Peak
7	B1050/ Ramper Road rbt	B1050 (s)	0.858	6	3	PM Peak
8	Over Rd/ Ramper Rd jct	Over Road	0.308	0	1	AM Peak
9	Boxworth End/ Ramper Rd/ Middlewatch	Ramper Road	0.339	1	2	AM Peak
10	Boxworth End Rd / Rose and Crown jct	Rose and Crown Rd	0.281	0	2	AM Peak
11	Oakington Rd /Rampton Rd mini rbt	Rampton Rd (nw)	0.969	15	6	AM Peak #
12	Willingham High Street/ Station Road/ Berrycroft Rd/ Over Road	Station Rd (s)	100.5%	24	21	PM Peak
13	<i>Longstanton High St/ Rampton Rd/ Woodside/School Ln jct</i>	<i>Longstanton High St</i>	<i>0.309</i>	<i>0</i>	<i>1</i>	<i>AM Peak</i>
14	<i>Dry Drayton Rd/Longstanton Rd</i>	<i>Dry Drayton Rd</i>	<i>91.0%</i>	<i>15</i>	<i>15</i>	<i>AM Peak</i>

\* Undertook sensitivity assessment during network peak period

\*\* Queue on Girton Road as the queue observed on Huntingdon Road east was a result of queuing at the pedestrian crossing to the northwest of the junction

# Modelled as a full roundabout as a proxy as the mini roundabout module did not reflect the observations

The assessments demonstrate that there are six junctions currently operating over their maximum capacity and one junction operating just below its maximum capacity. The

junctions over or at capacity are discussed below along with summary tables of the junction operation.

### 3.3.1 Junction 1: Girton Rd / Huntingdon Rd

This junction operates above the generally accepted maximum RFC of 0.85 in the AM peak on the Girton Road minor arm. The model predicts that this arm would have an RFC of 0.956 and a mean maximum queue (MMQ) length of 11 vehicles, this is against the observed MMQ across the hourly period of 12 vehicles and as such the model is considered robust. In the PM peak period, the RFC is highest on Huntingdon Road (right turn) with a MMQ of 3 vehicles, although the RFC is below the theoretical maximum of 0.85.

**Table 3.2: Summary outputs of Girton Road / Huntingdon Road – 2014 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	MMQ	Observed	RFC	MMQ	Observed
			Hourly MMQ			Hourly MMQ
Girton Road	0.956	11	12	0.558	1	2
Huntingdon Road (right turn)	0.301	0	1	0.738	3	3

### 3.3.2 Junction 2: New Road / Cambridge Rd

The junction operates slightly below the maximum RFC of 0.85 in the AM peak on New Road (minor arm) (at 0.84) with a predicted MMQ of 5 vehicles against an observed queue of 7 vehicles. There is predicted to be no queue on Oakington Road, although in the AM peak the observed MMQ is 2 vehicles. The junction model is considered robust given that the variation is a small number of vehicles.

**Table 3.3: Summary outputs of New Road / Cambridge Road – 2014 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	MMQ	Observed	RFC	MMQ	Observed
			Hourly MMQ			Hourly MMQ
New Road	0.840	5	7	0.699	2	5
Oakington Rd (right turn)	0.238	0	2	0.157	0	0

### 3.3.3 Junction 3: Hatton's Road / B1050 roundabout

This junction operates just below the maximum capacity in the AM and PM peaks with a maximum RFC of 0.820 and a mean maximum queue (MMQ) length in a 15 minute period of four vehicles in the AM peak on the B1050 north.

A sensitivity analysis was undertaken based on flows in the 0715-0815 period which were higher at this junction than the 0800-0900 period. This demonstrated that the roundabout operated over capacity in this hourly period with an RFC of 0.948 and a modelled MMQ of 12 vehicles. The observed queue lengths were higher than during the 0800-0900 period. The highest observed MMQ was 6 vehicles from 0715 to 0815 compared to 3 vehicles. The observed queues are sufficiently similar to the modelled queues for the junction model to be considered robust. It should be noted that across



the network the peak hourly period was 0800-0900 and this junction was the only one with significantly different flows and higher queue lengths in an alternative morning peak hour.

**Table 3.4: Summary outputs of Hatton’s Road / B1050 roundabout – 2014 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)			Sensitivity AM Peak (0715-0815)		
	RFC	MMQ	Observed Hourly	RFC	MMQ	Observed Hourly	RFC	MMQ	Observed Hourly
			MMQ			MMQ			MMQ
B1050 North	0.820	4	2	0.396	1	2	0.948	12	6
Hatton’s Road	0.457	1	3	0.207	0	0	0.750	3	5
B1050 South	0.188	0	0	0.619	2	1	0.145	0	0

### 3.3.4 Junction 7: B1050 / Ramper Road roundabout

This junction operates at around capacity on the B1050 (s) arm in the PM peak period with an RFC of 0.858 and a MMQ of 6 vehicles. The observed hourly MMQ was 3 vehicles on the B1050 (e) arm which demonstrates the robustness of the model.

**Table 3.5: Summary outputs of B1050 / Ramper Road roundabout – 2014 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	MMQ	Observed Hourly	RFC	MMQ	Observed Hourly
			MMQ			MMQ
B1050 (e)	0.712	2	3	0.314	1	0
B1050 (s)	0.245	0	1	0.858	6	2
Ramper Road	0.253	0	1	0.237	0	2

### 3.3.5 Junction 11: Oakington Rd / Rampton Rd / mini roundabout

This junction over its maximum capacity in the AM peak period with an RFC of 0.969 and a MMQ of 15 vehicles. This junction was modelled in a number of scenarios using the mini roundabout module and a normal roundabout module within the Arcady software. The best fit normal roundabout model showed the outputs as set out below, however although the total queues on all arms are broadly similar across both periods the model does not accurately reflect the observed queues on each arm. This is due to the different operation of a mini roundabout, whereby vehicles do not typically follow a pattern of giving way at a stop line compared with a normal roundabout whereby vehicles at the stop line give way to circulatory vehicles. The model below is considered to reflect the constraints at the roundabout and that the existing layout is operating over its maximum theoretical capacity (albeit that the queues may be spread more evenly across each arm).

**Table 3.6: Summary outputs of Oakington Road / Ramper Road roundabout – 2014 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	MMQ	Observed Hourly MMQ	RFC	MMQ	Observed Hourly MMQ
Rampton Rd (NW)	0.969	15	5	0.252	0	2
Rampton Rd (East)	0.533	1	3	0.796	4	3
Oakington Rd	0.350	1	2	0.587	1	6

### 3.3.6 Junction 12: Willingham High Street / Station Road / Berrycroft Rd / Over Road

The signal controlled junction in Willingham is operating over its maximum capacity in the PM peak, whereby there is a degree of saturation in excess of 100% on two of the arms with associated lengthy queues. This accurately reflects the operation of the junction as the observed hourly MMQ is closely matched to the modelled MMQ.. It is noted that the observed queue lengths at Junction 12 have been estimated on some of the arms as the queue continued in excess of the camera view during the AM peak on Willingham High Street and in the PM peak on Station Road. The model shows higher queue lengths than the mean maximum observed queues on these two arms. The queue lengths went sporadically past the camera view on the other arms during these periods, although they have been estimated by the survey company, and generally the model overestimates the queue compared to observations. As such, the observed queues are sufficiently similar to the modelled queues for the junction model to be considered robust.

**Table 3.7: Summary outputs of Willingham High Street / Station Road / Berrycroft Rd / Over Road – 2014 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)		
	DoS	MMQ	Observed Hourly MMQ	DoS	MMQ	Observed Hourly MMQ
Willingham High Street	86.9%	18	17	100.1%	15	12
Berrycroft	83.5%	8	8	95.1%	11	11
Station Road	42.4%	5	9	95.4%	24	21
Over Road	89.1%	8	7	100.5%	14	11
PRC		1			-11.6	
Cycle Time		90			90	

### 3.3.7 Junction 14: Dry Drayton Rd / Longstanton Rd

The signal controlled junction in Oakington is operating over its maximum capacity in the AM peak, whereby there is a degree of saturation in excess of 90% on Dry Drayton

Road with associated lengthy queues. The observed queues are sufficiently similar to the modelled queues for the junction model to be considered robust.

**Table 3.8: Summary outputs of Dry Drayton Rd / Longstanton Rd – 2013 Observed flows**

Road	AM Peak (0800-0900)			PM Peak (1700-1800)		
	DoS	MMQ	Observed Hourly MMQ	DoS	MMQ	Observed Hourly MMQ
Water Lane	67.4%	13	12	34.7%	5	4
Cambridge Road	86.3%	10	9	63.5%	9	2
Dry Drayton Road	91.0%	15	15	62.1%	10	7
Longstanton Road	65.1%	6	7	15.7%	2	7
PRC		-1.1			41.8	
Cycle Time		90			90	

### 3.3.8 Overview of Base Year Junction Modelling

The base traffic flows and modelling have been undertaken to establish verified and robust traffic models for use in a future assessment utilising the traffic flows obtained from the strategic model. The modelling demonstrates that currently there are a number of junctions which operate over or at capacity, although the changes to the highway network which would occur as part of the Northstowe and A14 developments would change the distribution and routing of traffic flows and as such any mitigation will assess the future traffic flow scenarios obtained from the strategic model.

## 3.4 Road Safety

Personal Injury Accident (PIA) data has been obtained for the most recent five year period available between 1<sup>st</sup> December 2008 and 30<sup>th</sup> November 2013 from Cambridgeshire County Council. This has been used to assess the level of injury accidents occurring on the proposed route to the Northstowe Phase 2 development. Within the study area (not including the A14) there were a total of 126 collisions of which 109 were classified as slight injury accidents and 17 were classified as serious injury accidents. There were no fatal injury accidents during the assessed five year period.

The accident data showed that during the study period 24 accidents involved cyclists, 17 involved motorcyclists, five involved pedestrians, three involved buses and two involved a heavy goods vehicle (HGV).

In addition to the above, accident data was obtained on the A14 between the Swavesey junction and Girton, with the data showing 129 accidents occurring on this link during the study period. These accidents are not considered further as the A14 is subject to the separate study and upgrade scheme being undertaken by the Highways Agency which will give full consideration to road safety impacts.

A plot of all accidents within the study area (outside the A14) is provided within Figure 3.2. Appendix 5 provides full details of all accidents (including the Hyder reference numbers used to identify accidents within the 5 year period in the relevant area).

As shown within Figure 3.2, the accidents are spread across the network with clusters of four or more accidents occurring in a number of locations. The locations (not including the A14) have been summarised within Table 3.9. Where an accident has occurred within 25 metres of a junction it is assumed to have occurred at the junction.

**Table 3.9 – Summary of accident cluster locations**

Location	Accidents / Severity	Number of accidents involving vulnerable Road users / HGVs / Buses
B1050 Hatton's Road / Over Road roundabout	5 accidents (1 serious, 4 slight)	None
B1050 Station Road (just east of B1050 Station Road roundabout)	6 accidents (1 serious, 5 slight)	1 motorcycle
Rampton Road (between Cottenham and Rampton)	6 accidents (1 serious, 5 slight)	1 motorcycle
Oakington crossroads	4 accidents (all slight)	1 motorcycle, 2 cyclists
New Road / Cambridge Road junction	4 accidents (all slight)	1 motorcycle, 1 cyclist
Girton Road / Huntingdon Road junction	7 accidents (all slight)	2 motorcycle, 4 cyclist, 2 bus, 1 pedestrian

More detailed analysis of these accidents by cluster location has been set out in the sections below.

### 3.4.1 B1050 Hatton's Road/ Over Roundabout

The accident data for the B1050 Hatton's Road/ Over roundabout is set out in Figure 3.3 and Table 3.10. The data does not indicate a common causality or pattern of accidents at the junction. Whilst all accidents are regrettable, it is considered that across a five year period the level of accidents is typical of a priority roundabout junction and there is no safety issue at the roundabout which would require junction improvements.

**Figure 3.3 – Accident locations at Hatton’s Road / Over Road roundabout**



**Table 3.10 – Accident summary at Hatton’s Road / Over Road roundabout**

Accident Ref	Severity	Involving	Causation
14	Slight	2 Cars	Car entering roundabout from Hatton’s Road (east arm) collided with circulatory vehicle
23	Slight	2 Cars	Rear end shunt at stop line (B1050 southern arm)
74	Serious	1 Car	Vehicle left roundabout in fine and dry conditions (no other vehicles involved)
90	Slight	2 Cars	Car entering roundabout from B1050 (northern arm) collided with circulatory vehicle
94	Slight	1 Car and 1 MGW	Head on collision between two vehicles just to the north of the roundabout

### 3.4.2 B1050 Station Road

The accident data for the B1050 Station Road is shown in Figure 3.4 and Table 3.11. The data indicates that all accidents involve vehicles travelling in a southbound direction which either collide with objects / leave the carriageway without another vehicle being involved, or collide head on with vehicles travelling in the other direction. As such this could suggest a deficiency with the carriageway markings or speeding at this location. As part of the Phase 1 application, a number of new access points are being provided at approximately this location and the carriageway will be upgraded. The traffic signal arrangement is likely to reduce speeds on the link. Due to the

changes on the highway network being implemented as a result of the Phase 1 development, it is considered that the safety issues which are identified on this stretch of the highway would be improved. As such there are no specific highway improvements which would be required for the Phase 2 development at this location.

**Figure 3.4 – Accident locations on B1050 Station Road (just east of B1050 Station Road roundabout)**



**Table 3.11 – Accident summary at B1050 Station Road (just east of B1050 Station Road roundabout)**

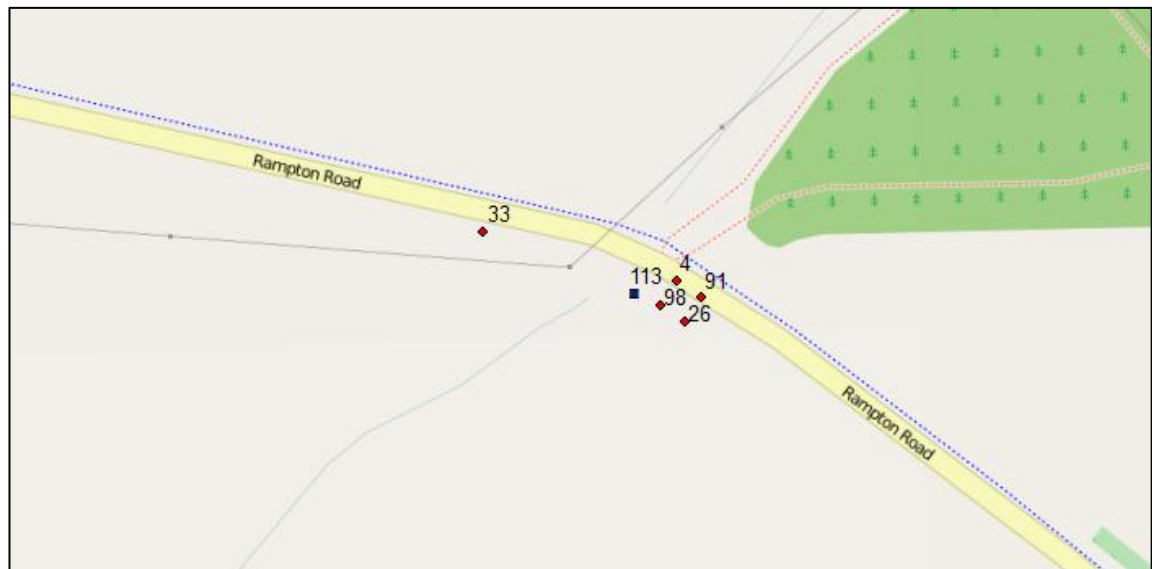
Accident Ref	Severity	Involving	Causation
11	Slight	Motorcycle	Motorcycle travelling southbound collides with an unknown object or leaves the carriageway (dry conditions)
36	Slight	2 Cars	Head on collision between vehicles travelling in opposite directions in wet conditions
45	Serious	2 Cars and LGV	Head on collision between a vehicle travelling southbound and 2 vehicles travelling in the opposite direction (wet conditions)
49	Slight	Car	Near side of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in a southbound direction (wet conditions)
72	Slight	LGV	Near side of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in a southbound direction (dry conditions)

Accident Ref	Severity	Involving	Causation
80	Slight	Car	Near side of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in a southbound direction (wet conditions)

### 3.4.3 Rampton Road

The accidents on Rampton Road are shown on Figure 3.5 and in Table 3.12. The data demonstrates a pattern of single vehicle accidents, whereby vehicles have left the carriageway and/or struck an unknown object at a corner, with all accidents occurring in rainy, snowy or icy conditions. This suggests that there may be an issue with vehicle speeds at this location. This is considered as part of the development mitigation in Chapter 8.

**Figure 3.5 – Accident locations on Rampton Road (between Cottenham and Rampton)**



**Table 3.12 – Accident summary at Rampton Road (between Cottenham and Rampton)**

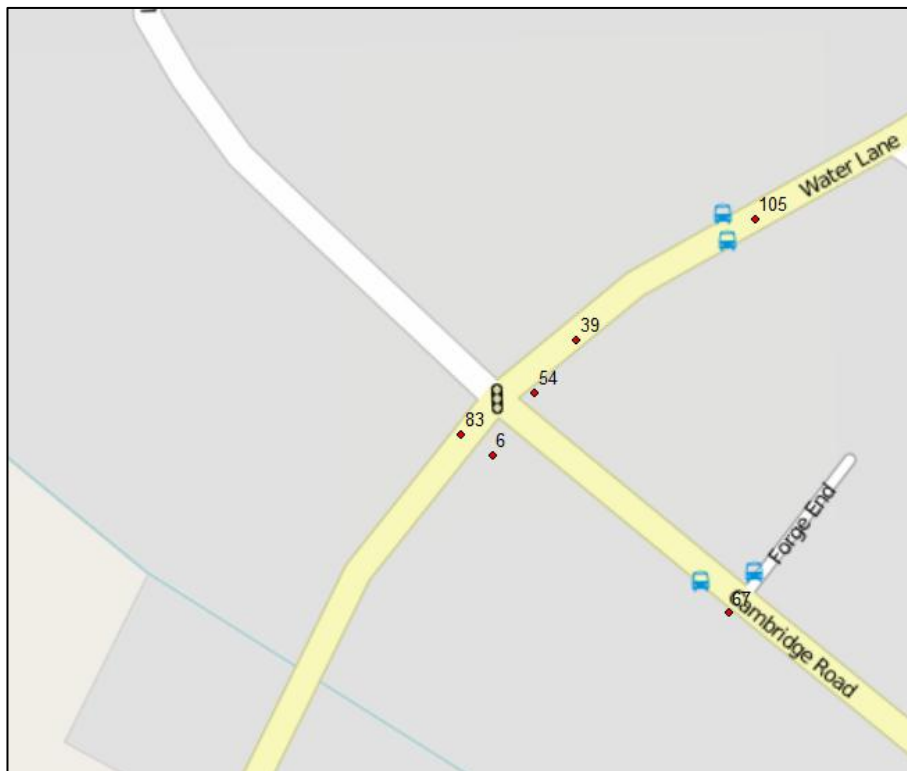
Accident Ref	Severity	Involving	Causation
4	Slight	Car	Near side of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in an eastbound direction (wet conditions)
26	Slight	Car	Front of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in an eastbound direction (snow conditions)
33	Slight	Car	Near side of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in a westbound direction (frost / ice conditions)

91	Slight	Car	Front of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in an eastbound direction (wet conditions)
98	Slight	Motorcycle	Near side of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in a westbound direction (wet conditions)
113	Serious	Car	Front of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was travelling in a westbound direction (wet conditions)

### 3.4.4 Oakington Crossroads

The accident data for Oakington Crossroads is set out in Figure 3.6 and Table 3.13. The data does not indicate a common cause or pattern of accidents at the junction. Whilst all accidents are regrettable, it is considered that across a five year period the level of accidents is typical of a signal controlled junction and there is no safety issue which would require junction improvements.

**Figure 3.6 – Accident locations at Oakington Crossroads**





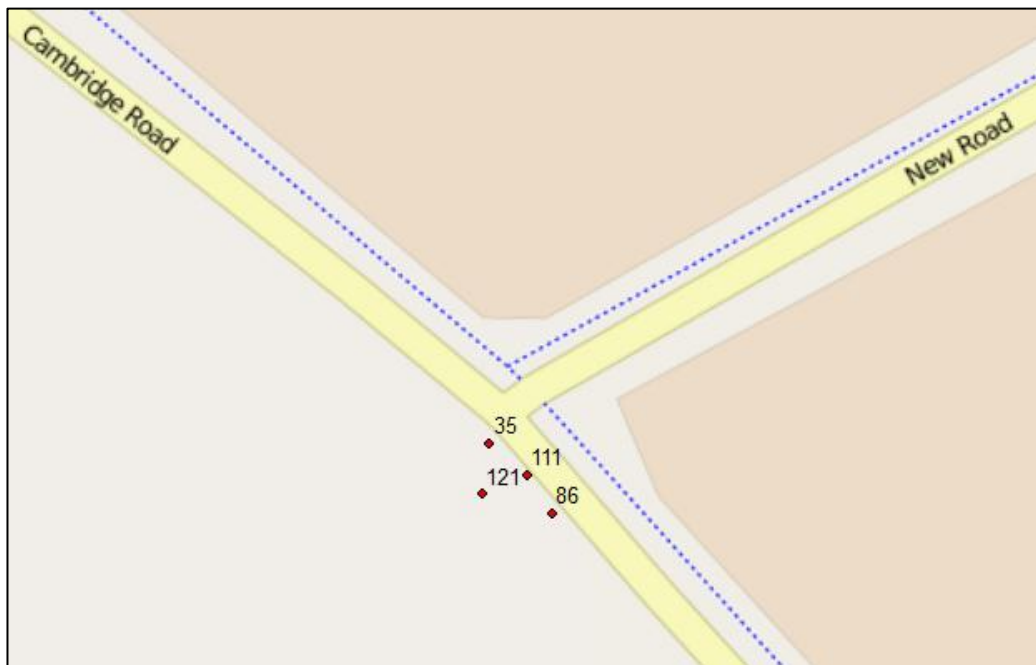
**Table 3.13 – Accident summary at Oakington Crossroads**

Accident Ref	Severity	Involving	Causation
6	Slight	2 Cars	Vehicle turning right from southern arm collided with ongoing vehicle from the northern arm (snow conditions)
39	Slight	Cycle	Cycle collided with an unknown object or left the carriageway whilst travelling in a southbound direction approximately 20 metres north of the junction (dry conditions)
54	Slight	Car and Motorcycle	Vehicle turning right from eastern arm collided with ongoing vehicle from the western arm (dry conditions)
83	Slight	Car and Cycle	Vehicle turning right from southern arm collided with ongoing pedal cycle from the northern arm (dry conditions)

### 3.4.5 New Road/ Cambridge Road Junction

The accident data for the New Road/ Cambridge junction is shown in Figure 3.7 and Table 3.14. The data does not indicate a common causality or pattern of accidents at the junction. It is considered that across a five year period the level of accidents is typical of a priority junction and there is no safety issue at the roundabout and the weather conditions were also a factor in some of the accidents.

**Figure 3.7 – Accident locations at New Road / Cambridge Road junction**



**Table 3.14 – Accident summary at New Road / Cambridge Road junction**

Accident Ref	Severity	Involving	Causation
35	Slight	2 Cars	Vehicle turning left out of the junction collided within an ongoing vehicle travelling from southeast to northwest in icy conditions
86	Slight	Car and Cycle	Vehicle turning right out of the junction collided within an ongoing pedal cycle travelling from northwest to southeast
111	Slight	2 Cars	Vehicle turning right out of the junction collided within an ongoing vehicle travelling from northwest to southeast
121	Slight	Motorcycle	Vehicle turning right into junction had an impact on the offside in wet conditions.

### 3.4.6 Girton Road/ Huntingdon Road Junction

Accidents at the Girton Road/ Huntingdon Road junction are shown in Figure 3.8 and Table 3.15. There is no main pattern of accident occurrence at this junction, however four accidents involved cyclists (all in differing circumstances and manoeuvres). As this junction is located on the fringe of Cambridge it is likely that there are a high level of cyclist movements and therefore a higher than normal incidence of accidents involving cyclists. There is no common causality of accidents which suggests that the geometry of the junction is deficient at this location.

**Figure 3.8 – Accident locations at Girton Road / Huntingdon Road junction**



**Table 3.15 – Accident summary at Girton Road / Huntingdon Road junction**

Accident Ref	Severity	Involving	Causation
24	Slight	Car	Front of vehicle collided with an unknown object or the vehicle left the carriageway whilst vehicle was turning right from Huntingdon Road (wet conditions)
59	Slight	Bus and Cycle	The nearside of a bus collided with the offside of a cyclist as they were both travelling in an eastbound direction on Huntingdon Road
68	Slight	Motorcycle and Pedestrian	A westbound motorcyclist collided with a pedestrian crossing the carriageway at a crossing in wet conditions around 50 metres north of the junction
76	Slight	Bus and Cycle	A cyclist turning left from Girton Road collided with an ongoing bus travelling in an eastbound direction
92	Slight	Car and Cycle	A cyclist turning right from Huntingdon Road collided with an ongoing vehicle travelling in an eastbound direction
100	Slight	Motorcycle and Cycle	A cyclist turning right from Huntingdon Road collided with an ongoing motorcycle travelling in an eastbound direction
102	Slight	2 Cars	A vehicle turning right from Girton Road collides with an oncoming vehicle travelling westbound in wet conditions

### 3.4.7 Road Safety Overview

Based on the number and frequency of accidents within the study area, it is considered that there is a potential issue with speeding on the tight bend between Rampton and Cottenham and there is a high percentage of accidents involving cyclists at the Girton Road/ Huntingdon Road junction. These have been considered further in Chapter 8 within this report in conjunction with the impacts of traffic flows at these locations as a result of the proposed development.

Whilst all PIAs are regrettable, the overall accident record in the entire study area over a five year period does not give undue cause for concern. Aside from the above noted issues, the evidence does not suggest any specific safety deficiencies on the local highway network in the vicinity of the Phase 2 development that may be exacerbated as a result of the proposed scheme.

## 4 Policy Context

### 4.1 National Policy and Guidance

#### 4.1.1 Government White Paper

A Government White Paper *Creating Growth, Cutting Carbon*<sup>3</sup> was released in 2011 which outlines a vision for a transport system that is an engine for economic growth, and one which is greener and safer. The White Paper states that by improving transport links and targeting projects that promote green growth, a dynamic, low carbon economy can be created.

#### 4.1.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) came into force on 27th March 2012. It aims to make the planning system less complex and more accessible, and to promote sustainable growth. The NPPF replaces all the previous Planning Policy Statements (PPSs) and Planning Policy Guidance (PPGs) including PPG13 (Transport).

The NPPF sets out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

The NPPF introduces 12 core planning principles, which of relevance to transport suggest that planning should:

- Actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.

Section 4 of the NPPF covers 'Promoting sustainable transport'. Relevant elements of this section are summarised below.

Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. However, the Government recognises that different policies and measures will be required in different communities and opportunities to maximise sustainable transport solutions will vary from urban to rural areas.

The NPPF states that all developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment.

Planning decisions should take account of whether improvements can be undertaken within the transport network that cost effectively limits the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe (subject to certain provisos).

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<sup>3</sup> Department for Transport. *Creating Growth, Cutting Carbon White Paper* (2011) Available at: <http://www.dft.gov.uk/pgr/regional/sustainabletransport/pdf/whitepaper.pdf>

Planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities.

National Planning Policy Guidance was updated on Travel plans, transport assessments and statements in decision-taking in March 2014 and this gives detailed advice on when transport assessments are required and what they should contain.

### 4.1.3 The Strategic Road Network and the Delivery of Sustainable Development - DfT Circular 02/13

The DfT Circular explains how the HA will participate in all stages of the planning process with Government Offices, regional and local planning authorities, local highway/transport authorities, public transport providers and developers to ensure national and regional aims and objectives can be aligned and met.

The Circular sets out that proposals should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

It is identified that a robust travel plan that promotes use of sustainable modes is an effective means of managing the impact of development on the road network and reducing the need for major transport infrastructure. The Highways Agency expects the promoters of development to put forward initiatives that manage down the traffic impact of proposals to support the promotion of sustainable transport and the development of accessible sites.

### 4.1.4 Manual for Streets 2

Manual for Streets 2<sup>4</sup> (MfS2) was published in September 2010. It provides guidance for planning and designing new residential streets. It aims to increase the quality of life through good design, which creates more people-orientated streets. The guidance contains principles in the design of suitable pedestrian and cyclist facilities to encourage and facilitate travel via these modes. Making the local environment convenient and attractive to walk in can help enhance the vibrancy of a community and reduce reliance on motor transport.

### 4.1.5 Guidance on Transport Assessment, Department for Transport, (March 2007)

Government guidance on the assessment of development proposals is set out in the Guidelines for Transport Assessment: March 2007 (GTA). Reflecting the desire to build sustainable communities both in terms of the consumption of natural resources in providing new transport infrastructure and the on-going resource and environmental demands of those travelling, the core principles of GTA are set out in paragraph 1.19 of the document and are summarised below:

Managing the existing network through:

- Making best possible use of existing transport infrastructure; and
- Managing access to the highway network

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<sup>4</sup> Department for Transport. *Manual for Streets 2: Wider Application of the Principles* (2010).

Mitigating residual impacts through:

- Demand management;
- Improvements to the local public transport network, and walking and cycling facilities;
- Minor physical improvements to existing roads; and
- Provision of new or expanded roads.

## 4.2 Local Policy

### 4.2.1 Local Transport Plan 3 (LTP3) March 2011

Cambridgeshire's Third Local Transport Plan (LTP3) sets out Cambridgeshire County Councils' existing and future transport issues and how they will seek to address these. LTP3 covers the period 2011-2026 and was adopted in March 2011.

The majority of new development is being focused on extensions to Cambridge and Northstowe, with the remaining growth being accommodated in the county's market towns. The LTP seeks to encourage environmentally friendly forms of transport including walking, cycling and public transport. CCC will also seek to make it easier for people to interchange between different modes of transport. Measures within LTP3 will seek to raise awareness about the different transport choices available to people. CCC will also apply parking controls or charges where appropriate to help reduce congestion, and encourage wider use of sustainable modes of transport.

### 4.2.2 Transport Strategy for Cambridge and South Cambridgeshire, April 2014

The purpose of this strategy is to provide a detailed policy framework and programme of schemes for the area, addressing current problems and consistent with LTP3. In addition it will support the Cambridge and South Cambridgeshire Local Plans, and take account of committed and predicted levels of growth as well as detailing the transport infrastructure and services necessary to deliver this growth. The strategy covers the district of South Cambridgeshire and the City of Cambridge, but also considers the transport corridors beyond the district boundaries from the ring of towns around Cambridge. In addition to the detailed consideration of the Local Plan period to 2031, the strategy looks beyond this, and considers how the transport network and trip making patterns may develop in the longer term.

The Transport Strategy has an Action Plan which contains an outline programme to 2031 and details of key major schemes proposed to deliver the Transport Strategy for Cambridge and South Cambridgeshire in the short, medium and longer term. These are in the emerging strategy and may not all be committed and funded at present. The list of those transport schemes included as committed in the assessment is included in section 6.3.

For the Alconbury, Wyton, Huntingdon and St Ives to Cambridge Corridor which includes Northstowe, the strategic interventions are stated as two-fold. The Busway will be extended to form a loop through Northstowe and its principles will be extended to provide segregated bus facilities - either through bus lane or guided busway – between St Ives, Wyton, Huntingdon, Alconbury Weald and Great Haddon. The second element of the strategic interventions on this corridor is the upgrade of the A14, which will be

undertaken in two phases. An additional lane in each direction on the Girton to Histon stretch will be provided initially, with the upgrade of the Ellington to Milton stretch being undertaken by 2019. The interventions listed are as follows:

- Northstowe busway loop;
- Longstanton Park and Ride expansion (to 1,000 spaces);
- A14 junctions 31 to 32 improvements;
- A14 Ellington to Milton improvement;
- Northstowe access roads;
- Rural pedestrian, cycle network development; and
- Interurban cycle network.

### 4.2.3 South Cambridgeshire Local Development Framework

The Local Development Framework (LDF) is a suite of documents which together will guide development within South Cambridgeshire. The LDF replaces the South Cambridgeshire Local Plan which was adopted in February 2004. The LDF includes a vision for the future of South Cambridgeshire and objectives and targets, which planning applications and other decisions will be made in accordance with it. The key documents from the LDF have been summarised below.

#### South Cambridgeshire Core Strategy (2007)

The Core Strategy sets out the overall approach to development in the district. It reflects the strategy in the Cambridgeshire & Peterborough Structure Plan 2003 with the focus on locating new development in the most sustainable locations, in this case close to Cambridge and in the proposed new town of Northstowe.

A key objective is to ensure that development is accessible by public transport, cycling and walking, thus reducing the need to travel by less sustainable modes, such as private car. The strategic objectives also outline the need for high quality public transport and other non-motorised modes of transport to link new sustainable communities (such as Northstowe) and Cambridge city centre; in order to preserve the special character of the city and its setting.

#### Northstowe Area Action Plan (2007)

The Area Action Plan for Northstowe establishes an overall vision for the new town including its relationship with surrounding villages and its countryside setting. It also sets out the policies and proposals to guide all the phases of the 10,000 dwelling development and associated off-site infrastructure needed to deliver and serve the town.

A number of transport objectives have been outlined within the Northstowe Area Action Plan, which include; a sustainable transport network to connect Northstowe with neighbouring villages, services and the countryside, whilst reducing the impact of additional traffic; a safe, convenient and permeable network of streets, connecting principal land uses within the town; encouraging cycling within the town via safe and (where appropriate) segregated cycleways; and, an accessible guided bus route through the town along with appropriate levels of car parking.

## Development Control Policies DPD

The Development Control Policies DPD policies govern development in the areas of major change, covered by separate Area Action Plan documents (such as the Northstowe AAP), except where those documents include a policy or policies which vary the requirements.

The parking standards against which developments should comply are included within Appendix 1 of the DPD and these have been applied to the development within Chapter 5 of this Transport Assessment.

### 4.2.4 Northstowe Development Framework Document (2012)

The Northstowe Development Framework document provides an updated master plan for the whole Northstowe development area which was endorsed by the Northstowe Joint Development Committee in October 2012, taking account of changes in economic circumstances. The document defines the rationale and structure for Northstowe's planning and delivery as a comprehensive development whilst providing place making principles and guidance for individual phases of development.

As part of the documents key guiding principles - 'Connectivity' sets out the documents vision for Northstowe to implement a dedicated public busway which will provide a direct link to Huntington and Cambridge that runs through the town. Pedestrians, cyclists and buses should be given priority within the development, supported by an effective walking and cycling network which connects Northstowe with adjoining settlements. The document also plans for southern access roads to provide vehicular access to the A14 at Bar Hill and Dry Drayton, as well as from the B1050 at the northern end of the Phase 2 development.

### 4.2.5 Emerging Local Plan - South Cambridgeshire Local Plan – Proposed Submission (July 2013)

The proposed South Cambridgeshire Local Plan will update and replace the South Cambridgeshire Local Development Framework (LDF). The proposed Local Plan covers a period extending from 2011 to 2031. Details in relation to Transport are provided from page 220. In relation to transport it is stated that:

- Development must be located and designed to reduce the need to travel, particularly by car, and promote sustainable travel appropriate to its location.
- Planning permission will only be granted for development likely to give rise to increased travel demands, where the sites have (or will attain) sufficient integration and accessibility by walking, cycling or public and community transport, including:
  - Provision of safe, direct routes within permeable layouts that facilitate and encourage short distance trips by walking and cycling between home and nearby centres of attraction, and to bus stops or railway stations, to provide real travel choice for some or all of the journey, in accordance with Policy HQ/1;
  - Provision of new cycle and walking routes that connect to existing networks, including the wider Rights of Way network, to strengthen connections between villages, Northstowe, Cambridge, market towns, and the wider countryside;



- Protection and improvement of existing cycle and walking routes, including the Rights of Way network, to ensure the effectiveness and amenity of these routes is maintained, including through maintenance, crossings, signposting and way marking, and, where appropriate, widening and lighting;
  - Provision of secure, accessible and convenient cycle parking in accordance with Policy TI/3;
  - Securing appropriate improvements to public and community transport (including infrastructure requirements) in accordance with the aims of the Cambridgeshire Local Transport Plan and South Cambridgeshire Community Transport Strategy.
- Developers will be required to demonstrate that they will make adequate provision to mitigate the likely impacts (including cumulative impacts) of their proposal. This will be achieved through direct improvements and Section 106 contributions and/or the Community Infrastructure Levy (CIL), to address transport infrastructure in the wider area including across the district boundary.
  - Developers of 'larger developments' will be required to demonstrate they have maximised opportunities for sustainable travel and will make adequate provision to mitigate the likely impacts through provision of a Transport Assessment and Travel Plan.
  - Travel Plans must have measurable outputs, be related to the aims and objectives in the Local Transport Plan and provide monitoring and enforcement arrangements. Planning obligations may be an appropriate means of securing the provision of some or all of a Travel Plan, including the requirement for an annual monitoring and progress report. Submission of area-wide Travel Plans will be considered in appropriate situations. Outline planning applications are required to submit a framework for the preparation of a Travel Plan.

## 4.3 Policy Summary

With regards to the above transport policies, development should:

- Promote sustainable growth;
- Facilitate sustainable economic development;
- Make best possible use of existing transport infrastructure and the most effective use of the highway system;
- Encourage safe, efficient and easy movement of people and goods;
- Promote and encourage new roads and road improvements where these will assist economic regeneration, improve road safety, enhance transport efficiency and satisfactorily address environmental impacts;
- Improve traffic flow and reliability of movement; and
- Incorporate pedestrian and cyclist movements within the design of new schemes.

The proposed development is consistent with the above policies and guidance. Moreover it helps to deliver a number of actions in the Transport Strategy for South Cambridgeshire and Cambridge:

- Northstowe busway loop;
- Northstowe access roads;
- Rural pedestrian, cycle network development; and

- Interurban cycle network.

# 5 The Proposed Development

## 5.1 Land Use

The Phase 2 development comprises the following quantum of development, as set out in Table 5.1. The Land Use Parameter Plan is included in the submission as Plan 6.

**Table 5.1: Phase 2 Development Quantum**

Land Use	Phase 2
Residential	3,500 homes
Convenience retail (foodstore)	10,000 m <sup>2</sup>
Comparison/ service retail	25,000 m <sup>2</sup>
Primary Schools	840 pupils
Secondary School	1,250 pupils
B1 Office	16,200 m <sup>2</sup>
Light Industry	5,000 m <sup>2</sup>
Leisure	10,000 m <sup>2</sup>
Health, Community and Fitness Centre	6,000 m <sup>2</sup>
Youth Facility	2,000 m <sup>2</sup>
Place of worship	1,000 m <sup>2</sup>

Source: Arup Land Use Quantum 4/6/14

### 5.1.1 Residential

The residential land use comprises up to 3,500 new dwellings within the Phase 2 development. The area of residential development land is approximately 44 hectares (49 hectares including town centre residential), the location of which is shown on the Land Use Parameter Plan. The development will comprise a variety of house types and sizes and will be provided broadly in accordance with the mix of 15% apartments and 85% houses.

Affordable housing will be provided as part of the development. The proportion of affordable housing to be provided will be determined as a part of a process of negotiation with the local planning authority on planning obligations.

### 5.1.2 Town Centre

Phase 2 includes the delivery of the town centre for Northstowe. The area identified for the town centre is 6.96 hectares, the location of which is shown on the Land Use Parameter Plan. Non-residential floorspace within the town centre comprises of approximately 57,500 sqm (GIA). The precise use and layout of this area will be determined by subsequent reserved matters applications should outline planning permission be granted.

Provision has been made for the following types of uses to be located within the town centre: retail, food and drink, health centre, civic hub, community meeting space, place of worship, youth facilities, crèche, library and residential.

### 5.1.3 Employment

Employment will be provided within the town centre, the location of which is shown on the Land Use Parameter Plan. Employment floorspace will comprise a total of approximately 21,200 m<sup>2</sup> of GIA. Employment uses in Phase 2 will comprise those uses included in Use Class B1 Business (i.e. offices, research and development, and light industry).

### 5.1.4 Education

Provision has been made for two primary schools and one secondary school in the Phase 2 development. The transport modelling is based on two 2FE entry primary schools although this has now changed to one 3FE and one 2FE (this will have limited impact on the robustness of the assessment as the CSRM forecasts pupil numbers rather than uses school class numbers). The schools will be designed, built and operated by third parties (Swavesey Village College Trust for the secondary school, with the primary school providers to be determined through a competition process).

The secondary school that is included within the Phase 2 development will eventually serve the complete Northstowe development and surrounding villages. This requires 12FE for years 11 to 16. In addition the Phase 2 development makes provision for eventual provision of Special Education Needs (SEN) and sixth form. For the purposes of Phase 2 it has been assumed that a total of 7FE (11 to 16 including any SEN) and 2 FE (sixth form) is required.

### 5.1.5 Play, Sport and Recreation

Provision has been made for an eastern sports hub and the remainder of the western sports hub (alongside provision in Phase 1), as well as play space.

## 5.2 Internal Movement and Access

The Movement and Access Parameter Plan (Plan 8 in the submission) illustrates the provision of access for pedestrians, cyclists and vehicles within the development.

### 5.2.1 Walking and Cycling Network

There will be a comprehensive, permeable network of walking routes throughout the development and segregated cycleways will follow the corridor of primary and secondary roads. There will be a number of important connections within the development, which are:

- North to south following the busway through the centre of the development;
- Following the Busway on the eastern and northern side to connect to the CGB walking, cycling and bridleway route via a proposed new signalised crossing (with longer term options under discussion to route cyclists through the Phase 3 land);
- On Rampton Drift from Longstanton Village Centre;
- Alongside the water park on the eastern side;
- Crossing west to east through the development in a number of locations, connecting homes to the town centre, schools and sports facilities;
- Alongside the east and west Primary Roads;

- Connecting to Woodside in the west.

The provision of a comprehensive, direct network of segregated walking and cycling routes aims to make journeys on foot or cycle the most convenient modes for short journeys within the development in order to minimise the number of vehicle trips between on-site origins and destinations. The network also provides the connections to the edge of the development to enable good connectivity with the adjacent communities and to longer distance walking and cycling routes.

## 5.2.2 Northstowe Busway

A busway is proposed through the heart of Northstowe town centre which will link from the CGB route in the south-east (where there is a junction provided west of Oakington) through Phase 1 to the Longstanton Park and Ride in the north-west.

The busway will join the primary access road from the south for a short section and for Phase 2 this will be a shared route to the southern end of the town centre where primary routes on the east and west will diverge taking general traffic to the other parts of the Phase 2 development and connect to the Phase 1 Primary Roads. From this point the busway will be a bus only corridor. The busway is a strategic investment into public transport, giving buses significant priority over general traffic in the core of Northstowe.

The proposal for a section of the busway to be shared with general traffic (for a length of approximately 700 metres) is due to the phasing of the development and the need to ensure that the town centre can develop from a central spine road in the Phase 2 years (a 15 year period). Without the shared section there would be a requirement for primary routes to both the east and west through the Phase 3 area, i.e. three transport corridors instead of one plus a construction route. This additional infrastructure would represent an unviable and unnecessary investment, detracting from the other priorities for the development. Moreover it will be difficult to create a vibrant town centre initially if there is very limited access. The intention is that when Phase 3 comes forward, alternative routes to the east and west are provided from a point to the south of the shared section. The section north to the town centre from this point will be busway only.

The busway will be used by Guided Buses as well as local bus services (such as the Citi 5). As such it will be a standard carriageway construction generally of 6.5 metres width within a movement corridor as set out fully in the Design and Access Statement (not a Guided route) with measures to prevent other vehicles from using it. This is likely to use an automatic number plate recognition system (ANPR) with enforcement by the County Council as highway authority.

Bus stops will be provided along the busway at intervals of no more than 800 metres for all services and stops at closer intervals will be planned for local bus routes where walking distances to the edge of the development are furthest. The aim is that the majority of residents are within 400 metres of a bus stop. It is proposed that there will be three Busway stops within the complete Northstowe development.

Bus stops will be provided with a shelter with seating, real time information and appropriate kerbing (likely to be 1700mm high) to allow both access for local buses and Guided buses (which require a higher kerb height).

## 5.2.3 Internal Road Access

The development will have internal road access via two Primary Roads (shown on Plan 8). Each Primary Road is proposed to be 7.3 metres in width plus segregated footways/ cycleways and will be connected to the Phase 1 Primary Roads in the north and the access road and busway arriving at Northstowe from the south. The two routes will comprise an:

- Eastern Primary Road: serving the eastern side of the town centre, secondary school, eastern primary school, sports facilities and residential areas to the east of the bus way;
- Western Primary Road: serving the existing residential area of Rampton Drift, housing to the west of the Busway, the western side of the town centre and the western primary school.

The Primary Roads will be designed as 30 mph roads with changes in alignment to discourage traffic speeding and provide access, without making journeys by car significantly advantageous over other modes.

The junctions of the Primary Roads with the shared general traffic/ Busway route in the south of the Development will be critical points on the network. These will be designed to accommodate the anticipated traffic flows with priority given to walkers and cyclists. The junctions may be signalised. Details will be agreed as part of reserved matters for Phase 2.

There will be a network of secondary roads internal to the development and there are proposed to be four locations where routes will cross the Busway, requiring appropriate junction layouts to ensure buses are not subject to undue delay, as well as giving priority to walking and cycling movements.

## 5.3 Car Parking

### 5.3.1 Residential

The overall provision of parking for residential units will average 1.5 spaces per dwelling, in line with the adopted SCDC standards for the district average (with a maximum of 2 per dwelling allowed in less accessible areas). Table 5.2 sets out the indicative provision of parking for each type of unit (based on assumptions about the number of units that will be provided in each type), equating to an average of 1.5 with the proposed unit mix. Allocated spaces will be in garages or on plot parking. Unallocated spaces will be on street or in parking courts. In addition to the provision for each dwelling, there will be on-street provision for visitors.

It is noted that the emerging Local Plan gives an indicative provision of two spaces per dwelling. The parking provision needs to be a careful balance between providing sufficient parking and achieving the required development density and use of sustainable modes of travel. The average for Northstowe Phase 2 is therefore set at 1.5, whilst it is recognised that parking levels will be determined in detail as part of detailed applications when considering housing densities and typologies in each area.

**Table 5.2: Residential Parking Provision**

Dwellings		Provision		Total	
Unit Type	Number	Allocated space	Unallocated	Allocated space	Unallocated
1b flat	275	1	0	275	0
2b flat	417	1	0	417	0
2b house	441	1	0.3	441	133
3b house	1447	1	0.5	1447	724
4b house	832	2	0	1664	0
5b house	88	2	0	176	0
<b>Total</b>	<b>3500</b>			<b>4420</b>	<b>857</b>
				<b>5277 (Average 1.5)</b>	

### 5.3.2 Non-Residential Uses

The level of proposed car parking for the town centre, employment and education is based on a calculation of the likely accumulation of parking demand in the context of the SCDC standards. The full methodology and analysis is set out in a Memorandum dated 24 June 2014 and contained in Appendix 6.

The provision of parking for the town centre, employment and education is based on the following principles:

- Provision will not be more than the adopted maximum SCDC standard;
- There needs to be an allowance over and above maximum accumulation to enable the town centre to function at busier times. Guidelines for town centre parking recommend that demand should represent no more than 85% of supply<sup>5</sup>;
- Parking for education uses and employment will be provided as part of the school and employment developments and managed by those occupants;
- Parking for town centre uses will be provided in public car parks and shared across the different uses. It is possible that they would be managed by the food stores and made available for other uses, as happens in many retail centres.
- The town centre uses will be introduced over the build out of the development to 2031. There is a need for an evolving and flexible approach to parking space provision, beginning with surface car parks with the opportunity to deck them to increase provision in the medium and longer term. This also enables parking demand to be monitored so that less provision can be made in the later sub-phases of the town centre if it is not required.
- It is assumed that the overall provision will include at least 5% of spaces designated for disabled users in line with parking standards. Provision of parent and child spaces and motorcycle parking will also be required.

<sup>5</sup> CIHT Parking Strategies and Management 2005

**Table 5.3: Non-Residential Parking Provision**

Land Use	Suggested Provision	Commentary
Education (2 Primary schools and the secondary school)	105 spaces plus drop off/pick up zones	The total demand for education parking is estimated as in the range of 125 to 151 spaces, including drop off and pick up. The drop off area for a 3FE school should be no more than 20 spaces in line with CCC agreements for Phase 1. Provision of 105 spaces is however the maximum standard. This is based on a broad estimate of class rooms and the actual provision will be calculated as detailed proposals for the schools are developed. Parking standards for schools tend to anticipate a reasonable proportion of staff to travel by non car means and car sharing is often common. School travel plan measures will be necessary to achieve the target mode share and minimise the demand for parking over and above the provision.
Town Centre (retail, leisure, community and health)	1050-1270 spaces	The demand for retail and leisure uses is estimated as in the range of 894 to 1081. Standards allow for substantially more parking as they are intended to address parking needs for individual developments rather than town centres.  The provision has been factored so that demand is no more than 85% of supply.
Employment Uses (office and light industry)	748 spaces	Standards allow for a maximum of 748 spaces. Demand is estimated as in the range of 760 to 919 spaces depending on mode share. Provision of the standards means that travel plan measures for workplaces will be required to achieve the target mode share or below to minimise any parking overspill issues into adjacent areas.

The details of parking locations, layout and management will form part of future detailed/ reserved matters applications.

## 5.4 Cycle Parking

The provision for cycle parking will be detailed in future reserved matters applications, but an indicative provision is set out in Table 5.4 below. The aim for the development is to provide a higher level of cycle parking and storage provision than the standards to promote cycling as a main mode of travel for residents, shoppers, students and employees at Northstowe.

**Table 5.4: Cycle Parking Provision**

Land Use	Quantum	SCDC Standard	Standard Provision	Suggested Provision
Residential	3,500 units	1 secure cycle space to be provided, within the curtilage where possible.	3500	5867



Land Use	Quantum	SCDC Standard	Standard Provision	Suggested Provision
Primary School	Each 420 pupils	Secure cycle parking at a rate of 30% for pupils over 5 years of age	126	150
Secondary School	1,250 pupils	Secure cycle parking at a rate of 60% for pupils over 12 years of age	750	750
Town Centre	54,000 m <sup>2</sup>	1 space per 25m <sup>2</sup> . Assume 50% of trips are linked across town centre uses	1080	1080
B1 employment	16,200 m <sup>2</sup>	1 secure cycle space per 30m <sup>2</sup> gross floor area.	540	600
Light industrial employment	5,000 m <sup>2</sup>	1 secure cycle space per 40m <sup>2</sup> gross floor area.	125	150

With respect to residential development, it is proposed that at least one space will be provided per 1 or 2 bedroom dwellings and at least 2 spaces for 3 or more bedroom dwellings. This gives an average of at least 1.68 spaces per dwelling across the development.

It is anticipated that residential spaces will be provided within secure communal areas in apartment blocks and within garages/ cycle stores or sheds within the curtilage of houses.

The town centre cycle stands would be provided in locations 'pepper-potted' throughout the development to enable these to be very convenient to access shops and services.

It is envisaged that the utilisation of cycle parking in the town centre will be monitored during build out of the development to assess the appropriateness of standards and more cycle stands will be provided if demand consistently exceeds the supply.

## 5.5 Access for those with Mobility Problems

The development will be designed to be accessible to all members of the community and in accordance with the Equality Act 2010. This is relevant to the provision of facilities for the disabled, including those with visual and hearing impairments, those with limited mobility, the elderly, those with pushchairs or small children and other vulnerable users. Examples of the areas that will be subject to these considerations are:

- Creation of legible and permeable built environment for all users through the creation of a clear hierarchy of street and spaces and careful detailing of the public realm.
- Main entrances to buildings with level thresholds or suitable provision for wheelchairs;
- Limiting the gradient of ramps to acceptable levels and providing level rest areas to enable wheelchair access;
- Dropped kerbs at all crossings;

- High quality bus facilities that allow a step-free access to vehicles;
- Provision of disabled parking spaces at the appropriate levels and dimensions, located in preferential locations close to the main entrances of residential, commercial and employment developments; and
- Equal and consistent access to be provided for all potential residents including those with visual and hearing impairments, those with limited mobility, the elderly, children and other vulnerable users.

## 5.6 Servicing

The town centre uses would be serviced from the secondary roads to the east and west of the busway. Deliveries will predominately take place in designated rear service yards for the retail uses. Heavy goods vehicles will be routed through the development using the Primary Roads with the secondary roads only used to gain access to destinations.

# 6 Transport Modelling

## 6.1 Introduction

The Cambridge Sub-Regional Model (CSRM) has been used to assist in confirming the Access and Travel Strategy and assess the transport impacts of the Northstowe Phase 2 development on the transport network. CSRM is a multi-modal land use and transport interaction model for the County, developed and validated with a base year of 2006 and forecast years at five-year intervals to 2031. The model year of 2011 now forms the 'base year'.

The CSRM highway network model has been reviewed and updated by the Highways Agency to form the basis for the A14 Cambridge to Huntingdon study. The updated Highways Agency highway network aspect of the model is now referred to as the Cambridge Huntingdon A14 Road Model (CHARM).

In order to review whether CSRM is sufficiently robust at representing the baseline transport situation and can therefore be used to predict the impacts of Northstowe, the following was undertaken:

- A benchmarking and review exercise to check how closely the model validates against baseline traffic data followed by agreed updates to the model with the Highways Agency's consultants; and
- A sense check of the trip generation and modal share results by Hyder using the National Travel Survey, TRICS database and land use assumptions.

This chapter sets out how the CSRM was used and presents the results for Northstowe Phase 2. The results are then compared to estimates of trip generation by Hyder.

## 6.2 Benchmarking and Review

Atkins consultants undertook a benchmarking and review exercise on behalf of the HCA in March 2014. This sets out the performance of the CHARM assignments provided by the Highways Agency's consultants J2A, both against the Northstowe-specific traffic counts provided by Cambridgeshire County Council (CCC), as collected on behalf of the Transport Working Group, and against the more general set of data being used to monitor the model for A14 purposes. The technical note is included in Appendix 7.

The main criterion for the Northstowe model was that it should achieve an 80% pass rate against the Northstowe traffic counts in the AM and PM peak periods, in line with other similar "benchmarking" studies carried out for CCC. It was also considered desirable that the overall flow based network statistics being monitored for the wider A14 project should not deteriorate in comparison with those already provided by J2A.

A number of potential modifications to the model were identified to improve the overall pass rates against the benchmarking criteria. This included modelling the Airfield Road in the network which was not previously allowed for as it is not open to through traffic but nonetheless has a reasonably high usage.

With the incorporation of the various changes, the final benchmarking results for the updated model compare favourably with the initial results, exceeding the desired 80% pass rate by achieving 90% in the AM peak and 85%-90% in the PM peak. The modifications made to the model to improve the validation against the Northstowe

count data also did not have any overall negative impact on the validation of the count sets and journey time routes being monitored by J2A for the HA A14 study.

The changes were agreed with the Highways Agency's consultants and have been incorporated into the latest version of the CSRМ for Northstowe Phase 2 and also used for the Base Year 2011 for the A14 scheme.

On the basis of the model updates and the validation results it was agreed between Hyder and CCC that CSRМ was appropriate to use for the assessment of Northstowe Phase 2.

## 6.3 Land Use and Transport Assumptions

The HCA commissioned the County Council's consultants, WSP (who run the land use aspects of the CSRМ) to model the Northstowe Phase 2 development. Firstly land use assumptions for the County were updated with confirmation from each district of land use proposals in the Local Plans. The assumptions on housing and employment and wider transport proposals within the CSRМ area over the model period to 2031 were agreed with each of the local authorities and have been used consistently for Northstowe and the A14 scheme. The level of growth was adjusted to match the National Trip End Model forecasts (NTEM 6.2).

A detailed technical note on the land use and transport modelling is included as Appendix 8. This includes a full list of committed developments and committed transport schemes, as detailed in the appendix to the technical note, as well as the assumptions used and the results. In particular, the following transport proposals are included in the Do Minimum and Do Something scenarios:

- A14 Cambridge to Huntingdon Improvements;
- Improvements forming part of the Northstowe Phase 1 development;
- Cambridge Science Park Station and associated linkages;
- Guided Bus services to Alconbury;
- New Alconbury Weald Railway Station;
- Access control close to Cambridge Ring Road to enhance public transport operations and discourage cross city movements in the built up area;
- A wide range of bus priority measures in Cambridge and on major routes to/from Cambridge;
- A major increase in dedicated cycle provision in Cambridge and South Cambridgeshire;
- Additional Park and Ride sites on the A428, the A1307 and at Hauxton on the A10 and the relocation of Newmarket Road P&R to Airport Way;
- Improvements in rail services, speed and capacity, including the Thameslink upgrade and improved rolling stock; and
- A busway from Waterbeach to Cambridge implemented ahead of development of Waterbeach New Town.

The Northstowe development land use assumptions are set out in Table 6.1 below by model year. The details of the anticipated land uses access arrangements and the busway were provided to WSP in a Hyder note dated 16 February 2014. This provides

outputs of anticipated total trips, trips by mode, internal and external trips and trips for different time periods and journey purpose.

In the absence of a detailed profile of development build out, the numbers of dwellings and floorspace of other land uses were pro-rated over the years from 2019 to 2031 for the purposes of the CSRM modelling.

**Table 6.1: Phase 1 and 2 Floorspace and Dwelling Growth as modelled in CSRM**

<b>Northstowe Phase 1 Floor Space Growth</b>			
<b>Key</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>
Manufacturing	3657	0	0
Warehouse	4033	0	0
Retail	1950	0	0
Office	4559	0	0
Other: leisure&health	0	0	0

<b>Northstowe Phase 2 Floor Space Growth</b>			
<b>Key</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>
Manufacturing	1269	2115	2115
Warehouse	0	0	0
Retail	8885	14808	14808
Office	4112	6854	6854
Other: leisure&health	5712	9519	9519

<b>Dwelling Growth</b>			
	<b>2021</b>	<b>2026</b>	<b>2031</b>
Phase 1	1500	0	0
Phase 2	815	1358	1358

The assumptions regarding school pupils are included in Table 6.2 below. The development quantum provided indicated 630 primary pupils in the Northstowe Phase 1 development. Following discussions between WSP and Hyder this was reduced to 350 to provide a more acceptable ratio of pupils living locally. The balance of 280 places was included in the Phase 2 scenario in order to keep the number of children per household consistent between the do minimum and do something.

**Table 6.2: Phase 1 and 2 Pupil Numbers as modelled in CSRM**

<b>Northstowe Phase 1</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>
Primary School	0	350	0	0
Secondary School	0	0	0	0
Sixth form	0	0	0	0

Northstowe Phase 2	2016	2021	2026	2031
Primary School	0	0	700	420
Secondary School	0	0	0	1050
Sixth form	0	0	0	200

The secondary school has been modelled as present by 2031 whilst it will be open from 2018. This will not materially impact on the analysis which focusses in the Transport Assessment on impacts in 2031.

It should be noted that the town centre land uses are 10% higher in terms of floorspace in the CSRМ assumptions than the proposed Northstowe Phase 2 development (included in Table 5.1). The modelling work was undertaken at an early point in time and it was considered a robust approach to ensure the transport modelling was based on a worst case level of development.

Assumptions were also agreed in terms of provision of bus services and walking and cycling access to represent the development. Bus services through Northstowe are shown as improved in the Do Something scenario by providing a more accessible bus access link and increasing the bus frequency, as shown in Table 6.3.

**Table 6.3: Bus Services Changes as modelled in CSRМ**

Scenario	Northstowe	Bus service	Bus service frequency
Do Minimum	Phase 1	The length of the bus access link has been increased to actual distance	2 or 3/ hour
Do Something 1	Phase 1+2	The length of the bus access link has been reduced by 300 metres	7/hour
Do Something 2	Phase 1+2	The length of the bus access link has been reduced by 300 metres	7/hour

## 6.4 Scenarios

The following scenarios have been assessed using the CSRМ, noting that in each case all of the committed and planned developments and transport improvements are included in the Do Minimum and Do Something scenarios. The scenarios were agreed with CCC as the most appropriate years to assess the impacts of the Phase 2 development (the Opening Year once full development is complete and an interim year for the purposes of air and noise assessments):

- Base Year 2011;
- Do Minimum 2031 – A14 scheme improvement with Phase 1 Northstowe only;
- Do Something 1 2026 – Phase 2 development + A14 scheme + Southern Access Road (West);
- Do Something 1 2031 – Phase 2 development + A14 scheme + Southern Access Road (West);
- Do Something 2 2031 – Phase 2 development + A14 scheme + Southern Access Road (West) + Southern Access Road (East).

For clarification, all of the Do Something scenarios also include the Do Minimum of the A14 scheme improvement and Northstowe Phase 1.

## 6.5 Trip Generation, Mode Share and Containment

### 6.5.1 Trip Generation

The land use modelling results give outputs on the number of trips to and from the Northstowe Phase 2 development in different time periods by each mode. The number of trips is the difference of Phase 2 over the Do Minimum in 2031 (i.e. over and above Phase 1).

Table 6.4 shows the total trips by each mode. The time periods shown are AM (7am to 10am), IP (Inter-peak 10am to 4pm) and PM (4pm to 7pm). The total trips are for the 12 hour period of 7am to 7pm.

The results show a total of approximately **70,850** trips to and from the development over a 12 hour period, of which 69% are forecast to be by car and 33% of trips are forecast to be internal to the development (67% external). The mode share percentage is said by WSP (see the technical note in Appendix 8) to be consistent with the outer fringe of Cambridge.

### 6.5.2 Mode Share

Figure 6.1 shows the forecast mode share for Phase 2 from CSRM. The car mode includes car passenger trips within the total. The forecasts are very similar to those produced for Northstowe Phase 1 from CSRM (68% car use).

The forecasts of mode share include only 4% of trips by bus or Guided Bus. It is considered that this is likely to be an under-estimate of potential bus and CGB trips, given the anticipated provision of services for the development, bus usage levels in other communities (for example 10% of journeys to work from Bar Hill are made by bus) and that the CGB has outperformed forecasts in terms of usage. The CSRM model is therefore likely to represent the worst case for traffic modelling by estimating traffic based on a high car mode share.

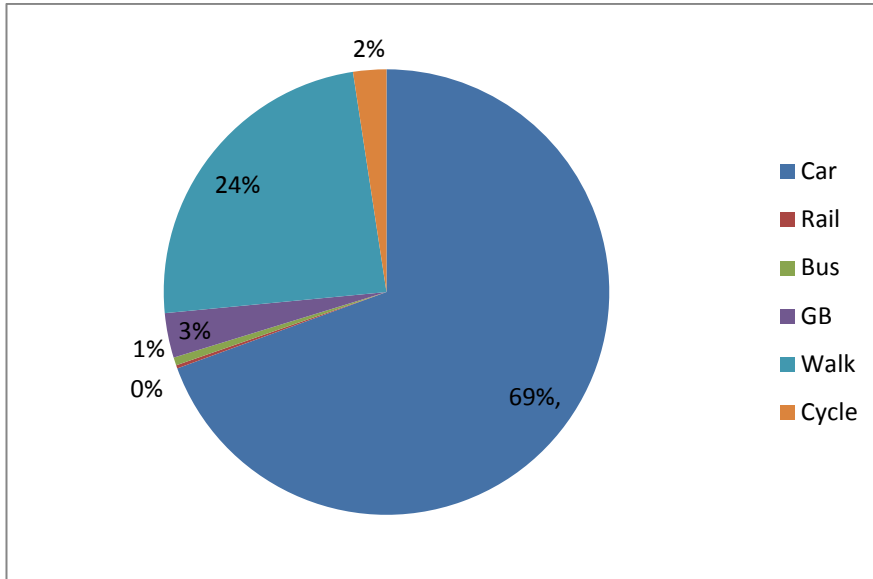
**Table 6.4: CSRM Transport Demand Results – All Trips to/ from Northstowe Phase 2**

Mode	Trips by Mode and Time Period				% of Trips by Mode				Internal Trips (All Day)	% of Trips Internal	Internal Trips		
	AM	IP	PM	Total	AM	IP	PM	Total			AM	IP	PM
Car	9,647	27,205	12,318	49,170	60%	72%	72%	69%	9,576	19%	1,603	5,541	2,432
Rail	58	56	53	167	0%	0%	0%	0%	0	0%	0	0	0
Bus	212	113	84	409	1%	0%	0%	1%	0	0%	0	0	0
GB	808	837	653	2,298	5%	2%	4%	3%	0	0%	0	0	0
Walk	4,819	8,713	3,538	17,070	30%	23%	21%	24%	13,410	79%	3,748	6,934	2,728
Cycle	455	827	424	1,706	3%	2%	2%	2%	727	43%	213	356	158
<b>Total</b>	<b>15,998</b>	<b>37,751</b>	<b>17,070</b>	<b>70,820</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>23,714</b>	<b>33%</b>	<b>5,564</b>	<b>12,832</b>	<b>5,318</b>

Journey Purpose	Trips by Purpose and Time Period				% of Trips by Purpose				Internal Trips (All Day)	% of Trips Internal	Internal Trips		
	AM	IP	PM	Total	AM	IP	PM	Total			AM	IP	PM
Employment and Business	3,196	2,304	2,477	7,977	20%	6%	14%	11%	1,926	24%	787	574	565
Education	4,738	3,496	1,631	9,865	30%	9%	10%	14%	5,468	55%	2,579	2,076	813
Other	8,067	31,966	12,977	53,010	50%	85%	76%	75%	16,319	31%	2,199	10,181	3,940
<b>Total</b>	<b>16,001</b>	<b>37,766</b>	<b>17,085</b>	<b>70,852</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>23,714</b>	<b>33%</b>	<b>5,564</b>	<b>12,832</b>	<b>5,318</b>



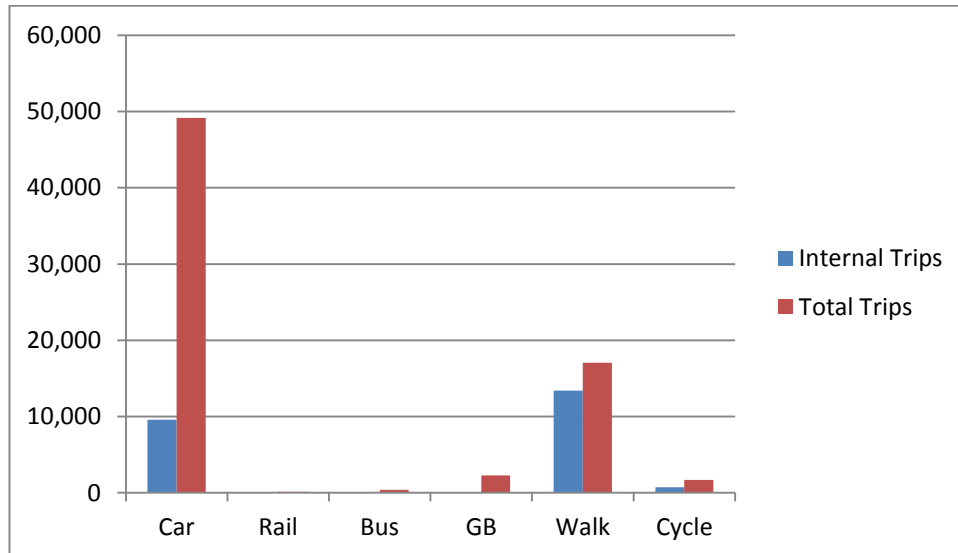
Figure 6.1: Phase 2 Total Trips Forecast Mode Share 2031



### 6.5.3 Containment of Trips and Journey Purpose

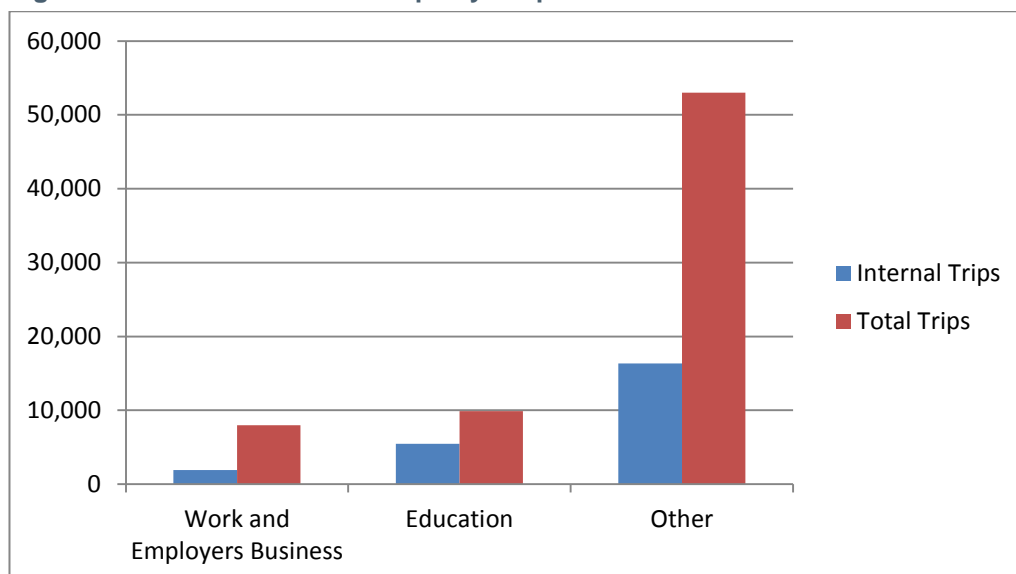
Figure 6.2 shows the total trips and internal trips for comparison by mode. CSRM forecasts that 19% of all car trips will be internal to the development (it is these trips which the travel plan will seek to minimise) and it can be seen that the majority of walking trips (79%) are internal.

**Figure 6.2: Internal and Total Trips by Mode**



With regard to journey purpose, the results predict that 'other trips' (i.e. trips to and from shopping, leisure, health and community, services and visiting friends and family) represent the largest proportion of trips: 75% of 12 hour total trips. This illustrates that Northstowe is functioning as a town centre within the model with a significant draw of trips to non-residential and employment uses. Of the other trips, it is forecast that 31% would be internal to the development and 69% external. The number of trips that are internal compared to total trips by journey purpose is shown in Figure 6.3.

**Figure 6.3: Internal and Total Trips by Purpose**



## 6.6 Land Use Modelling Results Summary

The following key points have been identified by WSP as emerging from the land use modelling with respect to land use and demographics:

- Between the Do Something and the Do Minimum there is a rise in Northstowe dwellings with no significant changes elsewhere;
- The increase in population at Northstowe is in line with dwellings provided, with some relocation out of Cambridge. There is some increase in Huntingdonshire and East Cambs in DS1 due to increased jobs in area, or Guided Bus improvements;
- There is an overall rise in employed residents available due to the rise in housing in the sub-region, concentrated at Northstowe Phase 2 with some shifts from Cambridge and South Cambs;
- There is also a rise in workers living in Hunts and East Cambs, most likely due to the increased accessibility of jobs in Northstowe Phase 2 and demand for services;
- The slight rise in jobs overall is due to services demanded by the increased population;
- As expected, the DS1 run demonstrates a significant increase of dwellings, employed residents, total jobs and population due to the introduction of Northstowe Phase 2 from 2021-2031;
- In each district, the number the dwellings, employed residents, total jobs and persons is similar in each scenario. Northstowe Phase 2 has the most significant increase of dwelling, employed residents, total jobs and persons; and
- DS1 and DS2 show a consistent increase since these use the same land use assumptions, with very little variation caused by the improved road accessibility.

The results of modelling Northstowe Phase 2 development show in terms of travel:

- a fall in 'external' trip origins due to the reduction in in-commuting (more employed residents within the region);
- The trip changes between Do Something 2 (DS2) and Do Something 1 (DS1) in 2031 are very small. There is a small rise in the number of car trips originating/terminating in Northstowe Phase 2 due to the addition of the Southern Access Road (East) in the DS2 making car journeys marginally more attractive.
- The Origin and Destination comparison shows the increase in trips in Northstowe and decrease in trips in many areas due to the shift of activity to Northstowe.
- Guided Bus trips forecast from the development are quite low. The proportion of Northstowe-Cambridge trips using the CGB is 14%. The reasons are likely to include: the presence of the town centre which will attract trips from the surrounding area not using the CGB; the dispersed pattern of journeys to work in South Cambridgeshire, with Northstowe being attractive to residents who work in various locations around the district; and potentially an under-estimate of trips by the model..

## 6.7 Comparison to TRICS and NTS Analysis

### 6.7.1 Total Trips

The CSRМ land use model provides a forecast of total trips across a 12 hour period by mode and by three main journey purposes (employment/ business, education and other). To provide a comparison check on the CSRМ trip generations for Northstowe Phase 2, Hyder has used TRICS outputs of total person trips for each land use, the journey purpose for residents from the National Travel Survey and Hyder assumptions regarding internal/ external trips. The TRICS outputs used are contained in Appendix 9.

Trips have been estimated for each individual land use and combined into the following main categories:

- Residents – for all resident trip purposes (education, employment/ business, shopping etc.);
- Education – primary and secondary;
- Retail and Leisure – convenience, comparison and mixed leisure uses;
- Employment - B1 office and light industry; and
- Community and Health – community centre, health centre, place of worship and youth centre.

It is recognised that there is a degree of double counting between non-residential land use trips and those calculated separately as made by residents. There will also be a degree of linked trips, meaning that the total number of journeys will be less. Assumptions have therefore been made to account for double counting and linked trips.

The key assumptions used by Hyder are set out below:

- Resident trips are split by different purposes in line with the National Travel Survey (July 2013)<sup>6</sup>;
- Of resident trips, the proportions of trips internal and external to the development have been estimated and are shown in Table 6.5.

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<sup>6</sup> [National Travel Survey](#)

**Table 6.5: Resident Internal and External Trip Proportions by Journey Purpose**

Journey Purpose	Internal Trips in NS (%)	External Trips to NS (%)
Commuting	10	90
Business	10	90
Education	75	25
Shopping	40	60
Other services	40	60
Visiting friends and relatives	10	90

- It is assumed that 85% of primary school trips and 75% of secondary school trips will come from within the development and these are double counted with resident trips;
- 10% of employment trips will be from residents of the development and are double counted with resident trips;
- 25% of trips to retail and leisure facilities are assumed to be from residents and 50% of trips are linked (i.e. a shopper going to two shops or a leisure use and shop). This is in line with typical linked trips in consented developments (such as Bicester Town Centre redevelopment);
- 50% of trips to community and health facilities are assumed to be from residents and 25% are linked to other destinations within the development (i.e. a user of a community facility also visiting a shop).

The use of this methodology gives a total trip generation from the development of **72,133** trips across a 12 hour period for the same development quantum tested using the CSRМ. This compares to the CSRМ results of **70,852** trips, representing a variation of only 1.81% from the CSRМ results. Thus, via two methods, a similar total trip generation has been arrived at. Using the proposed development quantum as of June 2014 (which is lower than tested in CSRМ) gives a total of 68,716 trips (4.7% less trips).

In conclusion, the CSRМ results overall give a total trip generation from the development which can also be arrived at using an alternative methodology using TRICS, the National Travel Survey and assumptions for each land use. The results from the CSRМ land use modelling are therefore considered sufficiently robust to be used to assess the impact of the development.

## 6.8 Traffic Modelling of Scenarios

### 6.8.1 Saturn Modelling

The CSRМ derived trip generation by car from the development has been assigned to the highway network in each scenario by the County Council's consultant Atkins using the Saturn model. Appendix 10 provides the technical note on the modelling work undertaken.

The results give link flows, junction turning movements, ratios of volume over capacity and journey times across the network for each scenario. Differences between the various scenarios are also provided on Saturn network plans enabling changes to be clearly seen for the following:

- Reference Case (without Northstowe Phase 2) in 2031 compared to the Base Year 2011;
- DS1 2031 (with Northstowe Phase 2) compared to the Reference Case 2031; and
- DS 2 2031 (with both the SW and SE southern access roads) compared to the DS1 (SW link only).

Hyder has undertaken analysis of the scenario results in order to confirm the Phase 2 Highway Access Strategy. A detailed Memorandum on the Traffic Modelling and Highway Access Implications is included in Appendix 11. This includes the difference plots listed above.

In addition to the scenarios modelled for Phase 2, the Highways Agency consultants' J2A have modelled the full Northstowe development of 10,000 homes in 2035 to inform the design and impact assessment of the A14 improvements. Link flow data from this scenario has been made available to Hyder. This has enabled the forecast traffic flows associated with the full development to be considered in designing the access arrangements for Phase 2.

## 6.8.2 Traffic Modelling Implications

In summary the analysis of the results for the various scenarios showed that:

- The Phase 2 development main impacts compared to the Reference Case in 2031 (A14 scheme and Phase 1) are mainly seen on the A14 towards Cambridge and Local Access Roads, as well as increases on the B1050 from Willingham through to the Ramper Road junction on the Longstanton By pass and on Ramper Road to Boxworth and the Swavesey A14 junction.
- Providing a second link (Southern Access Road SE) does not bring significant benefits for Phase 2, in fact it leads to additional traffic generation and mainly draws traffic from the Southern Access Road SW and the A14 local access roads. It would reduce some traffic from some local roads (e.g. towards Swavesey) but lead to an increase compared to the 2031 Do Minimum/Reference Case on the Longstanton By pass. There would be a decrease in some journey times given the reduced distance from the south into the Phase 2 development.

On the above basis the results were presented to CCC, SCDC and the HA at a meeting on the 7th May 2014 and further analysis regarding junction capacity and resilience issues were presented in the Memorandum dated 9th June 2014 (Appendix 11). The decision was made as a result of these discussions that the Access Strategy for Northstowe Phase 2 would comprise the Southern Access Road SW and all subsequent assessment work has therefore been based on the Do Something 1 (DS1) Scenario.

The analysis demonstrated that the Southern Access Road (West) could be provided as a single carriageway rather than a dual carriageway for Phase 2 as the forecast flows are significantly lower than both the capacity of a dual and single carriageway road. The planning application is for a dual carriageway Southern Access Road (West) in order that the long term deliverability of the link is confirmed in planning. However, as part of the delivery of Phase 2 it is intended that the link would be constructed as a single carriageway with a hard shoulder (to reduce the chance of vehicles blocking the carriageway). This represents a phased approach to the provision of infrastructure with the dual carriageway and the Southern Access Road (East) assumed to be required for future phases beyond Phase 2.

With regards to the primary routes through the development, the analysis indicates that the two routes modelled are not necessary in terms of link capacity for Phase 2. With respect to resilience of a single link, it is recommended that it is designed to accommodate a hard shoulder/ margin for vehicles to pull over. In the event of a major incident, the construction route could also be made available to diverted traffic. This would be monitored and an additional link would need to be brought forward if the single link became unduly congested during Phase 2.

The Access Strategy is set out in Chapter 7 and the results for the link flows and junction turning movements are analysed in detail in Chapter 8.

## 6.9 Traffic Generation

The traffic generation of the model sector comprising Northstowe Phase 2 has been provided by Atkins for the AM and PM peak hours (see Appendix 10, Table 7). Table 6.6 below shows the traffic generation to and from Northstowe Phase 2 in the Do Minimum and Do Something (the Do Minimum will include existing homes within the zone). The CSRSM Sector 1 does not include the Northstowe Phase 1 development which appears in the Do Minimum in the rest of the CSRSM area.

**Table 6.6: 2031 Highway Trip Totals to/from Sector 1 Northstowe Phase 2**

Peak Hour	To and From Sector	Do Minimum	Do Something
<b>AM (0800-0900)</b>	To Northstowe	11	1,336
	From Northstowe	65	1,166
<b>PM (1700-1800)</b>	To Northstowe	53	1,598
	From Northstowe	19	1,413

In 2031 with Do Something 1, the net increase in traffic over and above Phase 2 to and from Northstowe is forecast as 2,426 trips in the AM peak hour and 2,939 trips in the PM peak hour. This equates to a trip rate per dwelling (whilst recognising that there are a range of other land uses at Northstowe) of 0.693 in the AM peak hour and 0.840 in the PM peak hour. This is substantially higher than might be expected from TRICS for residential only, showing the impact of the other land uses.

In comparison to the analysis undertaken using TRICS, there were a smaller proportion of trips taking place in the peak hours with the CSRSM results. It is considered that this is due to the substantial town centre which attracts a large number of trips outside of the peaks.

It should be reiterated that the trip and traffic generation set out in this chapter relates to a higher amount of town centre development than proposed in the Phase 2 development. It therefore represents a worst case situation for assessment. The level of development would generate an estimated 4.7% less traffic than that modelled using the TRICS/ NTS approach.

## 6.10 Walking, Cycling and Public Transport Trips

The CSRSM results indicate forecast movements on foot, bicycle and bus in the different time periods. The number of walking and cycling trips within the development and to or from off-site locations is shown in Table 6.7.

**Table 6.7: Forecast Walking and Cycling Trips**

Mode	Trips by Mode and Time Period				Internal Trips (12 Hour)	External Trips (12 Hour)	Average Hourly Number of External Trips
	AM Trips	Inter Peak Trips	PM Trips	Total			
Walking	4,819	8,713	3,538	17,070	13,410	3660	305
Cycling	455	827	424	1,706	727	979	82

Note that the time periods are AM = 7am to 10am, Inter-peak = 10am to 4pm and PM = 4pm to 7pm.

Table 6.8 indicates the potential bus patronage and equivalent number of buses from the modelling results. It is assumed that all local bus services are provided by single decker, low floor buses with a typical capacity of 42 seated passengers and the Guided Bus services are provided by double decker buses with a typical seated capacity of 64.

It should be noted that these calculations are a guide to the number of buses that might be required to meet the CSRМ modal share by bus and Guided Bus. Moreover, if the Guided Buses provide more than an average of 64 seats then the number of buses required would be lower.

**Table 6.8: Forecast Bus Trips**

Mode	Trips by Mode and Time Period				Number of Buses (one direction)				Typical Frequency
	AM	IP	PM	Total	AM	IP	PM	Total	
Local Bus	212	113	84	409	5.1	2.7	2	9.8	1 every 50 minutes
Guided Bus	808	837	653	2,298	12.6	13.1	10.2	35.9	1 every 20 minutes

Note that the time periods are AM = 7am to 10am, Inter-peak = 10am to 4pm and PM = 4pm to 7pm.

## 6.11 Summary

Extensive transport modelling work has been commissioned by the HCA to assess the impact of Northstowe Phase 2 and inform the Access and Travel Strategy for the development.

Initial benchmarking and review of the CSRМ model compared to baseline traffic data was undertaken to see whether it provided a robust tool for the assessment. The results were also compared to a bespoke methodology for calculating trip generation using TRICS and the National Travel Survey and local assumptions. The outcome was that CSRМ was considered to appropriately represent the development and was therefore considered to be the best available tool for the assessment for a submission in August 2014.

The CSRМ work has been undertaken alongside the Highways Agency's consultants J2A to ensure there is a consistent approach and modelling of Northstowe and the A14 improvement scheme. WSP and Atkins consultants have undertaken the land use and highway modelling for both schemes.



Results have also been provided on traffic generations and numbers of trips on foot, bicycle and using public transport which inform the provision of infrastructure and services as set out in Chapter 7.

The modelling has informed decisions as to the appropriate access strategy for Phase 2, which is discussed further in the following chapter. Modelling results for the full 10,000 home Northstowe development have also been made available by J2A and have enabled the highway link and junction designs to take account of traffic levels with the full development in 2035 (see Chapter 8).

# 7 Access and Travel Strategy

## 7.1 Introduction

Chapter 5 sets out the details of the proposed development including the internal movement and access arrangements, car parking, cycle parking and servicing. Chapter 6 has provided an overview of the transport modelling results. This provides the basis for developing the Access and Travel Strategy.

The Access and Travel Strategy focusses on connectivity to and from the Northstowe Phase 2 development. Responding to the vision for Northstowe in the DFD, the strategy seeks to create a development where sustainable travel use reflects comparable areas of Cambridge and the impact of traffic on the road network is minimised. This requires high quality infrastructure for walking, cycling and public transport, travel plan measures to encourage the use of sustainable modes and appropriate highways infrastructure to provide for vehicle access.

The strategy takes into account the transport proposals for Phase 1 of Northstowe, the Highways Agency's A14 improvements and the wider policy and strategy context.

## 7.2 Target Mode Share

The CSRSM results forecast a mode share based on 69% car use for Northstowe Phase 2. It is the aim of the Access and Travel Strategy to work towards a target mode share with significantly less car use, recognising that an appropriate package of infrastructure, services and smarter choices measures can bring about an increase in use of sustainable modes and reduction in vehicle trips. This will help to create an accessible and attractive place to live, work, study and visit for shopping and leisure as well as minimise negative impacts of the development on the adjacent communities and wider road network.

The Draft Transport Strategy for Cambridge and South Cambridgeshire highlights that in South Cambridgeshire, the proportion of residents using the car to travel to and from work was 4% less in 2011 compared to 2001. The proportion of people travelling to and from work by cycling, bus and rail have all increased as has the proportion of people working at home. The proportion of people working from home rose from 11.1% in 2001 to 13.6% in 2011. These trends point to an increasing potential to reduce overall trips through home working, and achieving higher numbers of cyclists and bus users over time.

Moreover, the 2011 Census data for journeys to work from Bar Hill, where there is a good bus service provided (as proposed for Northstowe Phase 2) shows that more than 10% of people take the bus to work. Across the South Cambridgeshire district, 8.5% of work journeys are by bicycle. This suggests that the location of Northstowe adjacent to the CGB with good bus provision, and strong cycling connections at reasonable cycling distance towards main employment centres (Bar Hill, Cambridge Science Park for example) mean that higher sustainable mode share should be aimed at. In addition, Northstowe Phase 2 will provide a range of land uses including a town centre with shopping, services and employment thus encouraging locally based trips.

The Phase 1 development Residential and Workplace Framework Travel Plans contain proposed targets as shown in Table 7.1.

**Table 7.1: Northstowe Phase 1 Future Target Mode Share**

Mode	Future Target Mode Share
Car Driver	58%
Guided Bus	8%
Bus	5%
Train	1%
Bicycle	5%
Walk	23%
<b>Total</b>	<b>100%</b>

A proposed target mode share for Northstowe Phase 2 is given in Table 7.2. A separate target is provided for internal trips as minimising short journeys by car will be a focus of the travel strategy. The differences to the Phase 1 targets are that:

- The Phase 2 targets do not include rail, as these journeys are not a main mode to and from the development;
- A separate target for car sharing is included as these trips will be encouraged by the Framework Travel Plan as a means of reducing single occupancy car use;
- The overall share by CGB services and local bus is less than proposed for Phase 1 in recognition that the town centre included in Phase 2 will draw trips from the surrounding communities (not as accessible by CGB) and the model results suggest that residents will take up job opportunities throughout the South Cambridgeshire district.
- The higher target for walking recognises that Phase 2 includes more opportunities for local trips with the secondary school and town centre.

Further details of how the targets will be achieved are set out in the Framework Travel Plan.

**Table 7.2: Phase 2 Target Mode Share**

	2031 Target Mode Share All Trips		2031 Target Mode Share Internal Trips	
	% by mode	Total Car/ Non Car	% by mode	Total Car/ Non Car
<b>Car driver</b>	58%	63%	20%	25%
<b>Car passenger</b>	5%		5%	
<b>CGB</b>	5%	37%	0%	75%
<b>Local Bus</b>	2.5%		0%	
<b>Bicycle</b>	5%		15%	
<b>Walk</b>	24.5%		60%	
<b>Total</b>	100%	100%	100%	100%

Applying the target mode share to the total trips generated by the Phase 2 Development over the 12 hour period as forecast by the CSRSM could lead to a reduction in the number of vehicle trips of 16.5%.

## 7.3 Public Transport Connectivity

The Busway through the heart of Northstowe town centre will link from the CGB route in the south-east (where there is a junction provided west of Oakington) through Phase 1, to the Longstanton Park and Ride in the north-west.

Local bus services will have access to Phase 2 via the Southern Access Road if required as well as the Primary Roads/ Busway through Phase 1, and potentially from Oakington via the Airfield Road/ Longstanton Road if required in the longer term.

The proposed bus services for Phase 2 are part of an on-going dialogue with the County Council and bus operators. The initial proposal (subject to viability calculations and negotiations) is for the following for the full build out of Phase 2:

- **Northstowe Guided Bus Service** – the provision of an additional dedicated CGB service from Longstanton Park and Ride to Cambridge City Centre and the Rail Station via Northstowe town centre. This would give additional capacity on the CGB for the movement of passengers between Longstanton, Northstowe and Cambridge. A frequency of every 20 minutes would reflect forecast passenger numbers for the full build out of the Phase 2 development as set out in Table 6.8. The way that this service is put in place as the development is occupied will be subject to further discussion but it is recognised that providing CGB services from the Development will be a key factor for people and businesses to decide to live and locate in Northstowe. It is possible that duplicate peak hour services through Northstowe will be one option for early provision;
- **An extension of the Citi 5 service** from Northstowe Phase 1 to Northstowe town centre. The Citi 5 service is being extended in frequency for Phase 1 and this would provide the connection into the town centre for surrounding communities of Bar Hill, Longstanton, Willingham, Over and Swavesey. This may be at a 20 minute frequency as with the rest of the Citi 5 service and will be the subject of further discussion. Initially a shuttle service between Bar Hill, Northstowe and Longstanton Park and Ride could be provided, increasing to the full service as Phase 2 develops.

The possible routes are shown on Figure 7.1. In addition there will be access to the existing CGB services at the Longstanton P&R and Oakington stops with services to St Ives, Huntingdon and Peterborough.

Walking distances have been calculated from possible CGB stops in Northstowe Phase 2 and from an extension to the Citi 5. Figure 7.2 shows the area of the Phase 2 development within 400m and 600m (a five minute and 7-8 minutes' walk respectively). It can be seen that the majority of the Phase 2 Development is within 400m of a CGB stop and it is all within 600m. The extension to the Citi 5 would provide access within 400m to all of the Phase 2 development. The Northstowe Area Action Plan sets the criteria to be met for "All development will be within 600m easy walking distance of a stop on the dedicated local busway or within 400m walking distance of other local bus stops." (Policy NS/11.4)<sup>7</sup> The proposed services would meet this requirement.

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<https://www.scambs.gov.uk/sites/www.scambs.gov.uk/files/documents/Northstowe%20AAP%20for%20Adoption%20July%202007.pdf>

The Citi 6 service serves Oakington from Cambridge via Girton at a frequency of every 20 minutes. At present the service loops through Mill Road and High Street before returning to Cambridge. The service is approximately 300m distant from the CGB stop at the nearest bus stop on the route. A turning area close to the Oakington CGB stop could offer the opportunity for interchange between services, as well as improve operations for the Citi 6. The HCA will work with the County Council to examine opportunities to achieve a bus turning area with improved pedestrian connections to the CGB stop. This could be considered alongside longer term suggestions for cycle routes from and through the Northstowe development.

The design of the Primary Route through Phase 3 would allow for a connection for buses using the Airfield Road/ Longstanton Road from Oakington to join the route. A bus only section (together with walkers, cyclists and the bridleway) could be established to the NW of Oakington if there proves to be a demand for a connecting bus service from Oakington to Northstowe in the long term. During Phase 2, the Oakington CGB stop would provide access to the services into Northstowe town centre.

It is envisaged that the triggers for the introduction of services (occupation levels of homes and provision of town centre/ employment uses) will be agreed through the final Framework Travel Plan and the s106 agreement. There will be a need to balance early provision of services, to establish high levels of bus use, with requiring revenue support for long periods when services are not viable.

## 7.4 Walking, Cycling and Equestrian Connectivity

A Memorandum discussing which walking, cycling and equestrian connections might form part of the Northstowe Phase 2 development is included in Appendix 12, in response to a range of ideas coming forward from the County Council. In determining which improvements might be included for Phase 2, priority has been given to those suggestions which:

- Enable residents trips to be made on foot or cycle to and from Northstowe;
- Enable trips to the town centre from existing communities (Cottenham, Oakington, Longstanton, Willingham, Over, Swavesey, Bar Hill) to be made on foot or cycle; and
- Provide opportunities for leisure walking, cycling and horse riding to be made to and from Northstowe and the wider communities and countryside.

The strategy for cycle routes is to have three different categories of routes:

- **Commuter Routes** – on segregated cycleways alongside highways. These should be safe and attractive for use at all times of the day and evening;
- **Leisure Routes** – off-road cycleways through the countryside. In addition to providing pleasant routes for leisure trips, these may provide the most direct connections, suitable for work or school trips, but are not likely to be subject to natural surveillance nor lit. These will often be shared by walkers and equestrians; and
- **Quiet Roads** – routes or sections of routes which use quieter roads and cyclists and potentially equestrians share the carriageway with traffic.

The proposed walking, cycling and equestrian links that form part of the Phase 2 Development are set out below:

- A commuter route alongside the Southern Access Road (West) and the B1050 (eastern side) from the Phase 2 development to connect to the Non-Motorised Users (NMU) crossing of the A14 and routes alongside the A14 Local Access Roads, as included in the HA scheme;
- A commuter route alongside the Busway connecting to the CGB route via a new signalised crossing north of the Busway/ CGB junction;
- Longstanton Road will be closed to vehicles except for emergency access (and potentially buses in the long term) on the SE section and be dedicated to walkers, cyclists and equestrians along its length from Longstanton to Oakington. There will be Pegasus crossings provided where Longstanton Road meets the Primary Road through Phase 3;
- Rampton Road will provide a greenway into the centre of the development from Longstanton village for cyclists, pedestrians and equestrians;
- Improvement to the bridleway from Woodside in Longstanton SW towards the A14 including a crossing of the SW Link;

Other possible improvements for discussion to provide a high level of walking, cycling and equestrian connectivity to and from Northstowe Phase 2 are as follows and the proposed and possible improvements are shown in Figure 7.3:

- Consideration of an improved crossing of the CGB on Rampton Drift potentially involving a warning system for pedestrians and cyclists of the approach of buses to the location;
- Resurfacing of the existing bridleway to Rampton and widening of the existing cycle path alongside the carriageway between Rampton and Cottenham;
- Resurfacing of the existing footway between the CGB crossing at Rampton Drift and Rampton Road and a new cycleway/ footway alongside Rampton Road.
- A commuter route alongside Cambridge Road between Oakington and Girton (requiring an upgrade of the existing footway to accommodate cyclists);
- An upgrade of the footpath to bridleway status to allow off-road access from Northstowe to Over via the Guided Bus Way maintenance track or alternatively an upgrade of the informally used path from Longstanton Road, Over and crossing of the CGB route;
- Minor improvements to the byway to Aldreth, which may include minor physical works and historical interpretation signs, this would improve a leisure trail/ connection from Northstowe.

In addition to the walking and cycling routes there is likely to be a need to provide additional cycle stand capacity at the Longstanton Park and Ride and Oakington stop as part of the Phase 2 development. Northstowe residents may cycle to Longstanton P&R to access CGB services to Huntingdon and St Ives, or to the Oakington stop to take advantage of more frequent services from this location into Cambridge.

The connections and improvements to be provided as part of Phase 2 will be the subject of further discussions with the County Council for potential inclusion in a s106 agreement.

## 7.5 Sustainable Travel Measures

The Framework Travel Plan which is a supporting document to the Phase 2 application sets out a range of measures for sustainable travel, in addition to the infrastructure and service enhancements set out in the sections above. These include marketing, promotional and awareness initiatives as well as proposals to put in place a car club and support electric vehicle use. Initiatives are set out as overarching measures together with workplace, schools and residential initiatives and a management framework is identified and action plan put forward.

## 7.6 Highway Connectivity

The proposed improvements by the Highways Agency will upgrade the A14 in the vicinity of Northstowe to four lanes (in each direction) and provide a parallel single carriageway local access route connecting the Trinity Foot, Bar Hill and Dry Drayton junctions as well as south into Cambridge. This will significantly improve the capacity of the A14 and offer significantly enhanced highway accessibility to Northstowe.

Traffic to and from Northstowe will have access onto the A14 at the Bar Hill junction. There have been discussions with the Highways Agency and their consultants J2A to ensure that the Bar Hill junction is designed in the A14 Cambridge to Huntingdon Improvements to accommodate the forecast flows from Northstowe Phases 1 and 2. Moreover, the implications of the full 10,000 homes have also been considered. This has been agreed with the Highways Agency as well as in conjunction with officers from the County and District Council.

From the Bar Hill junction to the junction with the Southern Access Road (West), the B1050 will be upgraded to a dual carriageway to accommodate the full 10,000 home Northstowe development traffic as well as wider traffic growth on the B1050 corridor in the period to 2031.

A new roundabout will be provided as the junction between the B1050 and the Southern Access Road (West). This is proposed to have a straight ahead lane (diverging before the roundabout and merging after the roundabout) south to north for the B1050, in order to separate through traffic from that turning onto the link road to Northstowe. The roundabout has been designed to accommodate future traffic arising from the full Northstowe development including Phase 3, but there would also be the potential to signalise the roundabout should traffic movements be higher than forecast.

The Southern Access Road (West) will be a single carriageway link with hard shoulder from the B1050 junction to the southern access roundabout. This will include two lanes on approach and exit to the B1050 roundabout. The analysis demonstrated that the Southern Access Road (West) could be provided as a single carriageway rather than a dual carriageway for Phase 2 as the forecast flows are significantly lower than both the capacity of a dual and single carriageway road. The planning submission for the Southern Access Road (West) is for a dual carriageway in order that the long term deliverability of the link is confirmed in planning. However, as part of the delivery of Phase 2 it is intended that the link would be constructed as a single carriageway with a hard shoulder (to reduce the chance of vehicles blocking the carriageway). This represents a phased approach to the provision of infrastructure with the dual carriageway and the Southern Access Road (East) assumed to be required for future phases beyond Phase 2.

A single carriageway with hard shoulder will be provided from the southern access roundabout to connect to the Busway and into the Phase 2 development. The analysis indicated that one link would be sufficient in terms of link capacity for Phase 2. With respect to resilience of a single link, it is recommended that it is designed to accommodate a hard shoulder for vehicles to pull over. In the event of a major incident, the construction route could also be made available to diverted traffic. This would be monitored and an additional link would need to be brought forward if the single link became unduly congested during Phase 2.

The northern access junctions to Phase 1 will also be available for use by Phase 2 traffic with no changes proposed, in the same way that a significant proportion of Phase 1 traffic will enter and leave the development using the southern access road.

The Airfield Road/ Longstanton Road will be fully closed to traffic on the section north-west of properties in Oakington and south-east of properties in Longstanton, except for emergency vehicles providing a bridleway, footpath and cycleway and potentially for buses if it proves to be required for Phase 3.

The Highway Access Strategy is shown in Figure 7.4.

## 7.7 Construction

The construction of Northstowe Phase 2 can be divided into a number of proposed sub-phases. These are listed in Table 7.3 and shown in Figure 7.5. Sub-phases A and B are anticipated to take place prior to the completion of the Southern Access Road (West). Sub Phase B includes the construction of the Southern Access Road (West) and Primary Road through Phase 3. It is envisaged that construction works will commence in 2016 and be completed in 2031. First occupancy is expected in 2019. Non-residential buildings are expected to come forward post 2019.

**Table 7.3 Proposed construction sub-phases of Northstowe Phase 2**

<b>Sub-Phase</b>	<b>Start</b>	<b>End</b>
A	2016	2018
B	2017	2019
C	2019	2021
D	2021	2023
E	2023	2026
F	2026	2028
Town Centre / Phase 2 complete		2031



Figure 7.5: Location of proposed construction sub-phases of Northstowe Phase 2



Construction vehicles will access the Phase 2 development initially through Phase 1 (to construct the Secondary School and initial homes) during the period of time until the Southern Access Road (West) and Primary Road through Phase 3 is complete.

Once the Southern Access Road (West) is complete, all construction vehicles will access the development from the A14 at Bar Hill, and the Southern Access Road (West).

With regards to construction vehicle movements, it has been estimated that 45,132 tonnes (83,973 m<sup>3</sup>) of waste will arise from the construction phase associated with materials in relation to buildings (2019 – 2031). This would result in a total of 5,506 HGV departures (one way) based on collections of 20 yards (15.25 m<sup>3</sup>) skips. This is equivalent to less than two HGV departures per day on average throughout the construction phase (or four two-way HGV trips assuming each vehicle returns back to the site).

In addition, there would be 3,200 tonnes (3,574m<sup>3</sup>) of waste generated from infrastructure. This would equate to a total of 234 vehicles assuming loads of 15.25 m<sup>3</sup>. Across the entire construction period this would equate to less than one HGV every two weeks on average.

It has been assumed that all excavation waste will be re-used on the site and it has been estimated that there would be 1,408,773 tonnes (1,124,183 m<sup>3</sup>) of waste arising from the excavation phase. This would result in 74,945 HGV departures being avoided, based on collections of 15 m<sup>3</sup> HGVs (or 149,890 two-way HGV movements). This is

equivalent to a reduction of 22 HGV departures per day over the entire construction phase (44 two-way HGV movements).

It has been estimated that 47,526 HGV arrivals onto site (one way) will be needed during construction transporting construction materials to the site, based on the 2011 UK Industry Performance Report Key Performance Indicators (KPI). This is equivalent to nine HGV arrivals per day, on average, throughout the construction phase (or 18 two-way movements).

The construction HGV movements in each Sub Phase are summarised in Table 7.4.

**Table 7.4: HGV movements for construction materials and waste by sub-phase**

	Sub-Phases					
	A	B	C	D	E	F
<b>Construction Material HGVs</b>	717	7,203	8,366	11,473	14,848	4,919
<b>Building Waste HGVs</b>	87	809	1,240	1,243	1,566	561
<b>Infrastructure waste HGVs</b>	4	34	53	53	67	24
<b>Total one-way HGV movements per day (average)</b>	2	11	14	18	16	8
<b>Total two-way HGV movements per day (average)</b>	4	22	28	36	32	16

It can be seen that the peak time period for construction is Sub Phase E (2023 to 2026) with a daily average of 18 construction vehicle arrivals / departures (36 two-way movements). This will add a negligible amount of additional HGV traffic to the road network and is prior to the full traffic generation of the Phase 2 development. Construction workers would also generate light vehicle movements onto the network (less movements than when the development is built out), however these movements would not be generated once the site is fully built out. As such the assessment of the 2031 operational phase of the full build-out of Phase 2 is considered a worst case and no further assessment of traffic impact has been undertaken of the construction phase.

Moreover, the new Southern Access Road (West) link will be developed during Sub Phase B by 2019 and from this time all construction vehicles will be routed to and from the Northstowe site via this link and the new B1050 dual carriageway to access the A14. The effects of construction vehicles on the highway network are therefore considered to be negligible.

From the roundabout junction of the Southern Access Road (West) and the Primary Road through Phase 3 (to the south of Longstanton Road), a construction haul route will be provided using the existing eastern perimeter road. This will be only for construction vehicles and will enable a separation of construction and operational traffic during the build out of the development.

For the construction of the Southern Access Road (West) it is assumed that construction will begin from the western end near the B1050 and a construction

compound will be provided on the eastern side of the B1050. The means of temporary access will be agreed with the Highway Authority but is likely to require temporary traffic signals on the B1050 or use of an existing access point within the land in HCA control.

A CTMP will be prepared prior to construction, which will set out the appropriate route to the site for construction vehicles and contain management measures to mitigate the effects of vehicles on the highway network. This will also include measures for construction worker vehicles including a construction worker travel plan to manage the vehicle generation of the construction, and construction worker parking.

## 7.8 Emergency Access

The Northstowe Area Action Plan requires that an emergency access into Northstowe is provided from the direction of Cottenham (the location of the nearest fire station). For Phase 2 it is proposed that Longstanton Road from Oakington will be used by emergency vehicles in addition to buses, cyclists and equestrians. Emergency vehicles would then be able to access the Phase 2 development from this route using the Primary Route through Phase 3.

# 8 Traffic Impact and Mitigation

## 8.1 Introduction

This chapter considers the impact of the forecast traffic flows from the Northstowe Phase 2 development on the operation of the highway network and junctions. The traffic junction turning movements and link flows have been provided from the CSRM for the Do Minimum and Do Something 1 scenarios (with and without Northstowe Phase 2).

The chapter firstly discusses the capacity and impact of proposed new highway infrastructure and junctions and then impacts on the existing road network are assessed and mitigation is discussed where appropriate.

## 8.2 Northstowe Southern Access

The access strategy for Northstowe Phase 2 was set out in Chapter 7. This section assesses the capacity of the proposed links and junctions to accommodate the Phase 2 development as well as considering the future impact of the full Northstowe 10,000 homes.

### 8.2.1 Link Capacity

The capacity of the various links has been assessed in relation to DMRB Vol 5.1 TD 79/99 road types. It is considered that each of the links below would be a **UAP1** High standard single or dual carriageway carrying predominately through traffic with limited access and a 40 to 60mph speed limit.<sup>8</sup> The analysis confirms that each of the road types would provide sufficient link capacity to accommodate the forecast traffic flows for DS1 according to the DMRB guidelines.

**Table 8.1: Link Capacity and Forecast Traffic Flow Phase 2**

Link	Road Description	Capacity of Road Type	2031 DS1 Forecast AM Peak Hour Traffic Flow (total, % main direction)	2031 DS1 Forecast PM Peak Hour Traffic Flow (total, % main direction)
B1050 Bar Hill to proposed Hatton's Link roundabout	Dual carriageway	3600 peak hour vehicles in each direction. 7200 two way flow.	3208 two way flow (1397 NB, 1811 SB)	3818 two way flow (2173 NB, 1645 SB)
Southern Access Road (West)	7.3m Single carriageway with hard shoulder and dual lane approach to B1050	1590 peak hour vehicles in main direction. 2650 two way flow.	1596 two way flow (main flow 850, 53%)	1956 two way flow (main flow 1062, 54%)

<sup>8</sup> <http://www.dft.gov.uk/ha/standards/dmrb/vol5/section1/ta7999.pdf>

Central Primary Route through Phase 3	7.3m Single carriageway with hard shoulder	1590 peak hour vehicles in main direction. 2650 two way flow.	1595 two way flow (main flow 850, 53%)	1956 two way flow (main flow 1062, 54%)
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## 8.2.2 Link Capacity for 10,000 Homes

The forecast 2035 link flows for the full 10,000 homes (provided by the Highways Agency's consultant J2A) are provided below in comparison to the proposed link capacity.

**Table 8.2: Link Capacity and Forecast Traffic Flow Full Northstowe Development**

Link	Road Description	Capacity of Road Type	2035 Full Development AM Peak Hour Traffic Flow (total, % main direction)	2035 Full Development PM Peak Hour Traffic Flow (total, % main direction)
B1050 Bar Hill to proposed Hatton's Link roundabout	Dual carriageway	3600 peak hour vehicles in each direction. 7200 two way flow.	3830 (1379 NB, 2451 SB)	4142 (2143 NB, 1999 SB)
Southern Access Road (West)	Dual carriageway	3600 peak hour vehicles in each direction. 7200 two way flow.	2326 (main flow 1426, 61%)	2708 (main flow 1420, 52%)
Southern Access Road (East)	7.3m Single carriageway	1590 peak hour vehicles in main direction. 2650 two way flow.	1534 (main flow 883, 58%)	1698 (main flow 995, 59%)
Primary Routes from south through Phase 3	Each 7.3m Single carriageway	1590 peak hour vehicles in main direction for each. 2650 two way flow.	3797 total (main flow 2039, 54%) Requires minimum of 2 links	4349 (main flow 2366, 54%) Requires minimum of 2 links

The analysis indicates that each of the road types would provide sufficient link capacity to accommodate the forecast traffic flows for the full Northstowe Development according to the DMRB guidelines.

The Southern Access Road (West) is currently proposed as a dual carriageway for Phase 3 (single in Phase 2) but the traffic forecasts indicate that for Phase 2 a single carriageway would only be marginally over capacity even with full development, given the provision of the second link to Dry Drayton Road included in this scenario. This raises the question as to whether two single carriageways or one dual carriageway would be sufficient for the full development. This issue can be reviewed and determined as Phase 3 comes forward.

The dual carriageway Southern Access Road (West) could in theory accommodate all of the traffic from Northstowe (SW + SE link traffic) but this is not considered an appropriate overall access strategy for such a large development and would have impacts on the B1050 and Bar Hill junctions, as well as accessibility to and from the town of Northstowe. This is emphasised by the junction modelling results set out in the next section.

With regards to the primary routes through the development, the analysis indicates that at least two single carriageway routes would be required for the full development. The provision can be finally determined during the planning of Phase 3.

## 8.3 Southern Access Road/ B1050 Roundabout

### 8.3.1 Phase 2

The proposed new roundabout design which would provide an access to Northstowe via the Southern Access Road (West) from the B1050 has been designed on an iterative basis, whereby the design has been modelled based on the CSRM traffic flows and then amended so that the design of the junction can accommodate the future traffic flows on the network. The results of the junction modelling for the proposed design in a 2031 Do Something Scenario including Phases 1 and 2 have been summarised in Table 8.3 to demonstrate its suitability for accommodating Northstowe and changes to future travel patterns. Full outputs have been provided within Appendix 13.

**Table 8.3: Proposed Northstowe Southern Access Road (West)/ B1050 Roundabout: Phase 2**

Road	2031 DS			
	AM Peak (0800-0900)		PM Peak (1700-1800)	
	RFC	MMQ	RFC	MMQ
B1050 north	0.803	4	0.617	2
Northstowe access	0.516	1	0.551	1
Farm Access	0.018	0	0.014	0
B1050 south	0.513	1	0.765	3

The table above demonstrates that the proposed roundabout access to Northstowe would operate within its maximum theoretical capacity and the queue lengths are minimal and can be accommodated without blocking back to upstream junctions.

### 8.3.2 Full Northstowe Development

An assessment has also been undertaken of the proposed roundabout with the full development of Northstowe (10,000 homes) to ensure the infrastructure is capable of accommodating traffic movements of phases beyond the proposed Phase 2. Link flow outputs for the 10,000 homes scenario in 2035 have been provided by the Highways Agency's consultants J2A, having been modelled using the CSRM as part of the analysis work for the A14 improvement scheme. The turning movements have then been factored by Hyder based on the 2031 Do Something scenario turning movements, but balanced to broadly equate to the link in and out flows on each arm. The results of the modelling based on the proposed layout are set out in Table 8.4.

**Table 8.4: Proposed Northstowe Southern Access Road (West)/ B1050 Roundabout: Full Northstowe**

Road	AM Peak (0800-0900)		PM Peak (1700-1800)	
	RFC	MMQ	RFC	MMQ
B1050 north	0.821	4	0.691	2
Northstowe Southern Access Road (West)	0.990	24	0.785	4
Farm Access	0	2	0.029	0
B1050 south	0.546	1	0.853	6

The modelling demonstrates that the roundabout would operate broadly at capacity in the PM peak with queue lengths accommodated on all arms without blocking back.

In the AM peak period the roundabout operates over its maximum capacity on the Northstowe link access with an associated queue length of 24 vehicles. This arm has been modelled as a dual carriageway and as such the queue length can be assumed to be evenly distributed across the two arms (as traffic in both lanes can turn south onto the two lane exit arm). Although the junction is operating over capacity, the queue length can be accommodated on this arm without blocking back to any upstream junctions and a maximum queue of 12 vehicles in each lane during the busiest 15 minute period is not considered to be a significant delay and is broadly comparable to the type of delays which were observed in the junction surveys in 2014 on the B1050. Nonetheless, if there proved to be capacity issues in the long term with the full Northstowe development it would be possible to achieve additional capacity by signalling the roundabout.

The roundabout configuration is therefore considered appropriate to accommodate traffic associated with the full Northstowe development, whilst noting that the modelling has been undertaken on the basis that there would also be a Southern Access Road (East) for the full development. It is considered unlikely that the roundabout junction would be able to cater for all of Northstowe traffic if there was no Southern Access Road (East) proposed.

## 8.4 Southern Access/ Construction Access Roundabout

A roundabout junction is proposed between the Southern Access Road (West) and the Primary Road through Phase 3 and the construction haul road. The roundabout is designed as a large 80metres internal diameter roundabout in order that it can be modified in the long term (beyond Phase 2) to provide a link to an additional roundabout junction to the east and a Southern Access Road (East) and eastern Primary Route. The junction has been tested with the forecast flows in the Do Something Phases 1 and 2, making an assumption about a moderate level of traffic using the construction link to ensure the analysis is robust.

Table 8.5 shows the ARCADY modelling results for the AM and PM peak hours, showing the junction operates well within capacity in the Do Something in 2031.

**Table 8.5: Southern Access Road (West)/ Construction Road Junction Modelling Results**

	AM		PM	
	RFC	RFC	Queue	Queue
Eastern Arm	0.319	0.337	0.5	0.5
Western Arm	0.367	0.458	0.8	0.6
Construction Access	0.028	0.12	0.1	0

## 8.5 A14 and the Bar Hill Junction

As discussed, the Highways Agency are currently progressing proposals for the A14 Cambridge to Huntingdon Scheme with a view to a submission for a Development Consent Order in late 2014.

It has been confirmed by the Highways Agency that the traffic flows forecast with Northstowe Phase 2 with the Southern Link Road (West) to Bar Hill are being used to design the Bar Hill junction to operate with capacity in the future year (2035 for the A14 scheme). It has also been confirmed that the section of B1050 north of Bar Hill will be two lane dual carriageway to connect to the Northstowe improvements south of the new roundabout. As such, it would not be appropriate for Hyder to undertake a separate junction assessment for the Bar Hill junction.

To enable understanding of the impact of Phase 2 on the A14 within this assessment however, traffic flows are provided in Tables 8.6 and 8.7 for the various links, together with the percentage change between the Do Minimum (A14 improvement with Phase 1 Northstowe only) and Do Something (Phase 1 and 2).

It can be seen that in the AM peak, Northstowe Phase 2 brings a very small increase or reduction on six of the links. The largest impacts are on the B1050 approaching Bar Hill (as would be expected as it is the route from the development to the A14 and the Local Access Road), and the Local Access Road east of Bar Hill. There are impacts in the region of 6% on the A14 east of Bar Hill and East of Dry Drayton. In the PM peak the same links see increased traffic, with slightly higher impact than in the AM peak.

The forecast flows have led to confirmation by both the HCA and HA that the B1050 needs to be dualled for the section north of Bar Hill. The Bar Hill junction is being designed to accommodate the turning movements. As such the anticipated flows do not give rise to concern.

It is anticipated that a contribution will be sought by the Highways Agency towards the A14 improvements and this will be subject to discussion.

**Table 8.6: Link Flows on the A14 and associated routes: AM Peak Hour**

Site No.	Description	Direction	2031 DM	2031 DS1	Change in Flow (2 Way)	% Change
21	West of Junction 28 (Swavesey) - Huntingdon Southern Bypass	EB	3423	3460		
		WB	3126	3167	78	1.19%
22	East of Junction 28 (Swavesey)	EB	4773	4768		
		WB	4395	4451	51	0.55%



23	East of Junction 29 (Bar Hill)	EB	5815	6064		
		WB	4972	5321	598	5.54%
24	East of Junction 31 (Girton)	EB	5612	5618		
		WB	4581	4663	87	0.86%
25	East of Junction 32 (Histon)	EB	4813	4773		
		WB	4306	4340	-7	-0.07%
26	Local Access Road west of Bar Hill	EB	282	288		
		WB	222	214	-3	-0.55%
27	Local Access Road east of Bar Hill	EB	491	593		
		WB	636	840	305	27.08%
28	Local Access Road south of Dry Drayton	EB	299	257		
		WB	119	145	-15	-3.70%
29	B1050 North of Bar Hill Junction	NB	654	1397		
		SB	1251	1811	1303	68.40%
36	A14 East of Dry Drayton	EB	5815	6064		
		WB	4977	5345	617	5.72%

**Table 8.7: Link Flows on the A14 and associated routes: PM Peak Hour**

Site No.	Description	Direction	2031 DM	2031 DS1	Change in Flow (2 way)	% Change
21	West of Junction 28 (Swavesey) - Huntingdon Southern Bypass	EB	3830	3865		
		WB	2973	2965	27	0.39%
22	East of Junction 28 (Swavesey)	EB	4961	5006		
		WB	4600	4520	-35	-0.37%
23	East of Junction 29 (Bar Hill)	EB	5762	6048		
		WB	5483	5829	632	5.62%
24	East of Junction 31 (Girton)	EB	4677	4746		
		WB	5274	5316	112	1.12%
25	East of Junction 32 (Histon)	EB	4243	4274		
		WB	5236	5214	9	0.09%
26	Local Access Road west of Bar Hill	EB	379	409		
		WB	225	237	42	6.96%
27	Local Access Road east of Bar Hill	EB	655	846		
		WB	612	796	375	29.58%
28	Local Access Road south of Dry Drayton	EB	137	141		
		WB	205	174	-28	-8.16%

Site No.	Description	Direction	2031 DM	2031 DS1	Change in Flow (2 way)	% Change
29	B1050 North of Bar Hill Junction	NB	1230	2173		
		SB	903	1645	1685	79.00%
36	A14 East of Dry Drayton	EB	5762	6084		
		WB	5487	5823	658	5.85%

## 8.6 Proposed Northern Access Junctions

New junctions are proposed on the B1050 Station Road to serve the Phase 1 development. These comprise two linked signal controlled junctions and a priority junction. Modelling has been undertaken of the signal controlled junctions in 2031 for the Do Minimum with Phase 1 and the Do Something with Phase 1 and 2. In order to assess a worst case, all traffic movements to and from the Northstowe development were placed through the signal controlled junction. The LinSig modelling results are provided in Appendices 14 and 15. Table 8.8 summarises the results.

It can be seen that the junction operates within its maximum capacity in both scenarios, with a Practical Reserve Capacity (PRC) in the Do Minimum AM of 43.4 and PM of 18.1. In the Do Something the PRC reduces but the junction continues to operate within its maximum capacity with a PRC of 10.5 in the AM peak and 5.5 in the PM peak.

In addition, the queue lengths between the junctions on the internal arms would see minimal changes with the maximum queue on the southbound B1050 increasing by one vehicle from 7 to 8 vehicles and the maximum queue reducing on the north arm from 6 vehicles to 4 vehicles. These internal queues can be accommodated at the junction as there is sufficient storage capacity between the stop lines to accommodate at least 9 vehicles (assuming 6 metres per vehicles).

As such the proposed arrangement is appropriate to serve both Phases 1 and 2.

**Table 8.8: Proposed Northern Access Junctions LinSig Modelling Results**

Road	2031 DM				2031 DS			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
B1050 North	62.7%	6	54.1%	10	81.4%	20	85.3%	19
Northstowe Access 2 (north)	56.3%	3	60.2%	3	77.7%	6	84.2%	10
Northstowe Access 1 (south)	62.7%	2	57.6%	5	52.7%	4	61.3%	6
B1050 South	60.6%	3	76.2%	8	59.2%	5	73.0%	7
B1050 Internal Arm NB	41.0%	5	53.2%	7	43.0%	6	62.7%	8
B1050 Internal Arm SB	62.2%	6	50.3%	5	57.3%	4	51.4%	3
PRC	43.4		18.1		10.5		5.5	
Cycle Time	90		90		90		90	

## 8.7 Existing Network Junction Impacts

### 8.7.1 Percentage Change in Junction Flows

An assessment of the change in traffic flows at each of the assessed junctions on the network has been undertaken to provide a broad overview of the effects in terms of traffic flows on all arms of the assessed junctions resulting from the development. The changes in the CSRM traffic flows between the Do Minimum and Do Something scenarios across all arms of the junction (total traffic flows through the junction) during the AM and PM peak periods has been undertaken. This analysis has been set out within Table 8.9 below.

**Table 8.9: Summary of Traffic Flow Changes at Assessed Junctions**

No Junction		Total Flow Do Minimum		Total Flow Do Something		Flow Change		% Change	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
		1	Girton Rd / Huntingdon Rd jct	2047	2071	2147	2216	100	145
2	New Road / Cambridge Rd	1294	1176	1240	1222	-54	46	-4.2%	3.9%
3	Hatton's Road / B1050 rbt	1850	2054	1567	1793	-283	-261	-15.3%	-12.7%
4	Over Road / Hatton's Road rbt	19	28	22	31	3	3	16.8%	9.2%
5	Longstanton High Street / Over Road mini rbt	271	310	185	234	-86	-77	-31.8%	-24.7%
6	Station Rd / B1050 rbt	1818	1999	1727	1915	-91	-84	-5.0%	-4.2%

7	B1050 / Ramper Road rbt	1882	2033	1821	1983	-61	-51	-3.3%	-2.5%
8	Over Rd / Ramper Rd jct	639	632	825	837	186	205	29.1%	32.4%
9	Boxworth End / Ramper Rd / Middlewatch	993	1129	1111	1178	118	49	11.9%	4.4%
11	Oakington Rd / Rampton Rd / mini rbt	1658	1607	1611	1594	-47	-13	-2.8%	-0.8%
12	Willingham High Street / Station Road / Berrycroft Rd / Over Road	1774	1937	1859	2093	85	156	4.8%	8.0%
13	Longstanton High St / Rampton Rd / Woodside / School Ln jct	479	534	282	319	-197	-215	-41.1%	-40.3%
14	Dry Drayton Rd / Longstanton Rd	1874	1883	1858	1978	-17	95	-0.9%	5.0%

The traffic flow comparisons demonstrate that six of the junctions are forecast to experience some reductions in traffic in both the AM and PM peak periods with the Do Something compared to the Do Minimum (due to the re-routing of traffic by provision of the Southern Access Road (West)). Two junctions show decreases in traffic the AM peak and slight increases in the PM peak and the remaining four junctions show increases in flows in both peaks. One of these junctions is the Over Road / Hatton's Road roundabout whereby the percentage increase is a consequence of the low base traffic as there are only predicted to be three additional vehicles in each peak. As such there are only three junctions (Junctions 8, 9 and 12) whereby there is any significance to the traffic flow increases. These are discussed in turn in the following sections.

All junctions have been assessed for capacity within the following section and the combination of the percentage increases as well as the capacity of the junction will be used to analyse the likely impact of the development on the network at these assessed junctions.

## 8.7.2 Junction Assessments and Mitigation

An assessment of the impact of the Northstowe Phase 2 development has been undertaken considering the Do Minimum and Do Something traffic flows across the network. The modelling has been undertaken utilising the models as set up to model the 2014 traffic as described in Chapter 3. The modelling work identifies where the proposed development would have a significant impact that would require mitigation.

The results of the modelling have been summarised within Table 8.10 with the full outputs for each of the junctions for the 2031 Do Minimum set out within Appendix 14 and for the 2031 Do Something (DS1) scenario set out within Appendix 15.

No flow data was able to be provided by Atkins from the CSR for Junction 10 (Boxworth End Rd / Rose and Crown junction) and as such this has been left out of the modelling. It should be noted however that this junction operates well below capacity in 2014 (with an RFC of 0.281) and therefore capacity issues at the junction with Development are considered unlikely.

Table 8.10 demonstrates that in the Do Something scenario the Northstowe Phase 2 development has a minimum impact on the majority of junctions, with improvements on the maximum queue lengths and maximum capacity at seven of the junctions (being junctions 2,3,5,6,7,11 and 13). Increases in capacity are seen at six of the junctions due to reductions in traffic movements with Phase 2 as traffic re-routes to use the new Southern Access Road (West). Four of these junctions still operating well within their maximum capacity (junctions 4, 8 and 9) and the remaining three junctions operating over their maximum capacity (junctions 1, 12 and 14).

The three junctions operating over the maximum capacity are considered in more detail below. The development would not have a material impact on traffic flows or capacity at the other 10 junctions as either during the peak periods the traffic flows reduce due to changes in travel patterns and distribution or the junction continues to operate well within its maximum capacity.

**Table 8.10: Summary of Do Minimum and Do Something Modelling Results**

No	Junction	2031 Do Minimum			2031 Do Something			Net Change	
		Key Constraint Arm	Predicted Max (RFC) / Degree of Saturation (DoS)	Highest Predicted Mean Max Queue (vehicles)	Key Constraint Arm	Predicted Max (RFC) / Degree of Saturation (DoS)	Highest Predicted Mean Max Queue (vehicles)	Max Capacity Difference	Max Queue Difference
1	Girton Rd/ Huntingdon Rd jct	Girton Road	1.926	184	Girton Road	2.038	190	0.112	6
2	New Road/ Cambridge Rd	New Road	1.123	32	New Road	1.093	26	-0.030	-6
3	Hatton's Road/ B1050 rbt	B1050 (n)	1.086	52	B1050 (n)	0.917	9	-0.169	-43
4	Over Road/ Hatton's Road rbt	Over Road (e)	0.093	0	Over Road (e)	0.095	0	0.002	0
5	Longstanton High Street/ Over Road mini rbt	High St (s)	0.207	0	High St (n)	0.158	0	-0.049	0
6	Station Rd/ B1050 rbt	B1050 (w)	1.029	33	Station Road (e)	0.940	11	-0.089	-22
7	B1050/ Ramper Road rbt	B1050 (e & s)	1.045	36	B1050 (s)	1.001	21	-0.044	-15
8	Over Rd/ Ramper Rd jct	Over Road	0.606	1	Over Road	0.704	2	0.098	1
9	Boxworth End/ Ramper Rd/ Middlewatch	Ramper Road	0.490	1	Ramper Road	0.711	2	0.221	1
11	Oakington Rd/ Rampton Rd mini rbt	Rampton Rd (East)	1.190	94	Rampton Rd (East)	1.175	86	-0.015	-8
12	Willingham High Street// Station Road/ Berrycroft Rd/ Over Road	All	112%	63	All	116%	90	4%	27
13	Longstanton High St_ Rampton Rd/ Woodside/ School Lane jct	High St	0.532	1	High St	0.337	1	-0.195	0
14	Dry Drayton Rd/ Longstanton Rd	Dry Drayton Rd	95%	24	Cambridge Road	97%	24	2%	0

## Junction 1 - Huntingdon Road / Girton Road

At the priority junction of Huntingdon Road/ Girton Road, in the Do Minimum the minor arm operates significantly over capacity in the AM peak with a queue length of 184 vehicles and an RFC of 1.926 (as shown in Table 8.11). In the Do Something scenario the queue length increases marginally to 190 vehicles and the RFC increases to 2.038. The junction is already significantly over capacity and the addition of the development traffic would not be perceptible at this junction. The junction is located in an area of Cambridge experiencing significant future development and the A14 Local Access Road joins Huntingdon Road to the north-west. Whilst there is some increase in traffic from Northstowe Phase 2, it is considered that the development would not have a material impact at this junction and no further measures at this junction have been considered.

**Table 8.11: Junction 1 – Huntingdon Road / Girton Road 2031 Junction Assessments**

Road	2031 DM				2031 DS			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
Girton Road (n)	1.926	184	1.041	15	2.038	190	1.2	31
Huntingdon Road (e)	0.018	0	0.108	0	0.041	0	0.151	0

### 8.7.3 Junction 12 – Willingham High Street / Station Road / Berrycroft Rd / Over Road

This junction operates significantly over its maximum capacity in the Do Minimum scenario and the development increases the queue lengths and capacity issues during both peak periods.

The development is not the cause of the capacity issues as this junction is already over capacity in 2014, however it does exacerbate the situation and increase queue lengths and delay to drivers and as such measures to mitigate the impact of the development traffic at this location have been considered.

**Table 8.12: Junction 12 – Willingham High Street / Station Road / Berrycroft Rd / Over Road Junction 2031 Junction Assessments**

Road	2031 DM				2031 DS			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
Willingham High Street	108.60%	63	112.30%	61	116.1%	90	97.7%	28
Berrycroft	103.90%	18	105.30%	20	113.4%	33	107.4%	23
Station Road	67.80%	11	101.40%	34	70.1%	12	113.6%	79
Over Road	72.20%	4	108.90%	21	79.4%	5	111.1%	20
PRC	-20.6		-24.8		-29		-26.2	
Cycle Time	90		90		90		90	

Measures to improve capacity at the junction were considered and the most appropriate have been modelled in order to improve capacity at the junction, involving a revised layout and changes to the staging at the signals. These suggested changes are set out below:

- Pedestrian stage (all red traffic stage) has been assumed to be called every other cycle;
- Movements from Over Road and Berrycroft could run in the same stage, with right turning movements giving way to ahead/left movements and appropriate lane markings provided;
- Additional pedestrian crossings could be provided to the north and south of the junction to mitigate any impact on pedestrian delay / amenity as a result of the reduction in pedestrian green time. This would also improve pedestrian facilities on High Street and Station Road.

The above changes have been modelled within LinSig to ascertain the changes in capacity as a result of the possible revisions. The results and a comparison with the Do Minimum situation have been summarised below. Full modelling results are provided within Appendix 16.

**Table 8.13 Willingham High Street / Station Road / Berrycroft Rd / Over Road Junction Assessments with Possible Mitigation, 2031**

Road	2031 DM				2031 DS – with mitigation			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
Willingham High Street	108.60%	63	112.30%	61	87.1%	24	74.6%	17
Berrycroft	103.90%	18	105.30%	20	85.0%	11	86.3%	10



Station Road	67.80%	11	101.40%	34	53.9%	10	87.0%	24
Over Road	72.20%	4	108.90%	21	31.4%	3	46.0%	5
PRC	-20.6		-24.8		3.4		3.5	
Cycle Time	90		90		180 (2 x 90)		180 (2 x 90)	

The assessment demonstrates that if the suggested mitigation measures were in place the junction would operate within its maximum capacity and at a significantly improved level than the Do Minimum scenario.

As such it is considered that the mitigation suggested above could appropriately accommodate the Do Something (Phase 1 and 2) traffic flows.

In addition, the junction does not currently operate with a Microprocessor Optimised Vehicle Actuation (MOVA) which can provide operational efficiency benefits in terms of queuing and delays at the junction. Within Traffic Advisory Leaflet 2/03 (March 2003) it is stated that:

*“MOVA maintains the green whilst the flow is maintained at, or above, saturation flow rate as determined by the standard MOVA detector layout; once the end of saturation flow has been detected a delay optimisation process begins. If one or more lanes are oversaturated, MOVA uses a capacity-maximising algorithm instead of the delay-optimising process.”*

Within Traffic Advisory Leaflet 3/97 (March 1997) the Transport Research Laboratory (TRL) and the Department for Transport (DfT) estimate that MOVA can reduce delays at a junction by approximately 13% compared to a vehicle actuated system.

As such, the implementation of MOVA control at the junction could provide efficiency benefits which would assist the junction to operate within capacity. Therefore the implementation of this system could mitigate the capacity issues at this junction, without the requirement for any changes to the layout or staging. The measures above are suggestions subject to further discussion and development in terms of design and feasibility with CCC. The measures could be provided as part of the Phase 2 development off-site improvements or an equivalent sum placed with CCC to implement other solutions to address the issues in this area of the network.

## 8.7.4 Junction 14 – Dry Drayton Rd / Longstanton Rd Junction

At this signal controlled crossroad junction the Do Minimum Scenario shows that the junction operates over its maximum Degree of Saturation of 90% in the PM peak on the Cambridge Road and Dry Drayton Road arms. This capacity is reduced further in the Do Something scenario, although the maximum queue lengths on these arms only increase slightly. The junction is already over capacity (although not over a capacity of 100%) and the addition of the development traffic would not be perceptible at this junction.

In addition, the CSRM forecast flows at this junction allow for all turning movements into and out of Oakington (west of Water Lane) to access the village via this junction, whereas these movements would actually access via three alternative junctions. Due to the limitations in the strategic model, these access junctions are not included. As such the model overestimates the level of traffic on the Longstanton Road arm as this is shown to increase in the Do Something period. In reality flows on this arm would

decrease significantly as Longstanton Road would be properly closed to through movements from Longstanton. Although it is currently prohibited for general traffic to use this route, it is well used particularly in the peak hours when there is congestion on the A14.

Table 8.14 therefore sets out a worst case in terms of the operation at the junction and the development would not have a noticeable impact at this junction.

**Table 8.14: Junction 14 - Dry Drayton Rd / Longstanton Rd 2031 Junction Assessments**

Road	2031 DM				2031 DS			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
Water Lane	76.9%	15	63.3%	10	76.6%	15	59.9%	10
Cambridge Road	80.0%	11	91.2%	14	82.2%	11	96.5%	18
Dry Drayton Road	84.8%	14	95.0%	24	91.8%	17	94.4%	24
Longstanton Road	83.6%	11	52.5%	7	88.9%	11	85.5%	9
PRC (Difference from 90%)	6.2		-5.5		-2		-7.2	
Cycle Time	90		90		90		90	

PRC = Practical Reserve Capacity

### 8.7.5 Junction 11 – Oakington Road/ Rampton Road

Although the Do Something scenario demonstrates that the development would not have a detrimental impact at the Oakington Road / Rampton Road mini roundabout compared to the Do Minimum it is recognised that the junction is significantly over capacity in 2031 with or without the Phase 2 Development. Improvements at this junction have therefore been considered to demonstrate that a theoretical signal controlled junction could work in this location with the traffic flows. A signalised junction could operate within capacity, which provides an option for future improvements, although they are not necessitated by Northstowe Phase 2.

## 8.8 Link Flow Assessments

The CSRMs outputs provided link flows across the network at locations as shown in Figure 8.1. These flows have been analysed for both the Do Minimum and Do Something scenarios to assess the percentage change in flows between each scenario and are shown in Table 8.15. Where the flow changes are deemed significant, further detailed link assessments have been undertaken to assess the capacity of the link in accordance with the DMRB methodology (which is set out after the table).

The A14 and its junctions and the new access road were discussed earlier in this chapter and are not considered within this link flow analysis.

**Table 8.15: 2031 Link Flows – Comparison of Do Something to Do Minimum 2031**

No	Link	DM		DS		% Change	
		AM Peak (PCU)	PM Peak (PCU)	AM Peak (PCU)	PM Peak (PCU)	AM %	PM %
1	B1050 Hatton's Road, northeast of A14	1,905	2,132	1,613	1,869	-15.3%	-12.3%
2	Dry Drayton Road, northeast of A14	1,218	1,284	1,306	1,408	7.2%	9.6%
3	Ramper Road, west of Longstanton Bypass roundabout	639	632	825	837	29.1%	32.4%
4	B1050 Station Road, north of Cambridgeshire Guided Busway	1,245	1,378	1,361	1,632	9.3%	18.4%
5	Cambridge Road, Oakington	867	807	820	887	-5.4%	9.9%
6	Rampton Road, between Rampton and Willingham	695	691	683	685	-1.6%	-1.0%
7	B1050 Earith Road, north of Willingham	1,460	1,546	1,551	1,580	6.3%	2.2%
8	A1096 Harrison Way, St. Ives	2,605	2,591	2,602	2,600	-0.1%	0.3%
9	Willingham Road, between Over and Willingham	335	422	307	374	-8.5%	-11.2%
10	Longstanton Road (the airfield road), Oakington	197	214	0	0	-100%	-100%
12	Boxworth End, Swavesey (just north of A14)	912	1,040	995	1,007	9.2%	-3.1%
13	Ramper Road, just east of Swavesey	340	347	495	473	45.5%	36.3%
14	Longstanton High Street	220	238	141	173	-35.7%	-27.1%
15	B1049, North of Cottenham	1,153	874	1,138	926	-1.4%	6.0%
16	Cottenham Road, just south of Cottenham	1,420	1,368	1,395	1,325	-1.8%	-3.2%
17	Bridge Road, Histon (near A14)	2,382	2,353	2,372	2,288	-0.4%	-2.8%
18	Oakington Road, Oakington (busway)	1,035	979	1,022	1,009	-1.3%	3.0%
19	New Road, Histon	849	744	806	705	-5.1%	-5.2%
20	Butt Lane, Milton (west of A10)	352	599	338	593	-3.9%	-1.1%
34	B1050 N of Hatton's Road Roundabout	1,487	1,624	1,231	1,392	-17.2%	-14.3%
35	Hatton's Road E of B1050	363	429	336	401	-7.4%	-6.5%

No	Link	DM		DS		% Change	
		AM Peak (PCU)	PM Peak (PCU)	AM Peak (PCU)	PM Peak (PCU)	AM %	PM %
	and N of School Lane						
37	Cambridge Road, S of Girton	581	474	565	508	-2.8%	7.2%
38	High Street Willingham	1,440	1,570	1,493	1,654	3.7%	5.4%
41	Oakington Road, between Dry Drayton and A14	749	790	767	767	2.4%	-3.0%
42	B1050, between Ramper Road/B1050 roundabout and Station Road	1,675	1,878	1,646	1,646	-1.8%	-12.4%

From the analysis of the peak traffic flows, the two-way link flows reduce in both peak periods in the Do Something scenario on 12 of the assessed links. On a further three links, there are reductions in one peak and less than a 5% increase in the other peak. As such, it is considered that on these 15 links, the development would not have a material impact in terms of traffic flows and congestion.

Of the remaining 10 links, these have been assessed in terms of the capacity of the link based the volume to capacity percentage provided from the CSR for the Do Something scenario. The percentages are shown in Table 8.16.

**Table 8.16: Volume to Capacity Percentage Comparison of Links with Significant Do Something Traffic Increase**

Link	Volume to Capacity % AM		Volume to Capacity % PM	
	E or N	W or S	E or N	W or S
2. Dry Drayton Road, northeast of A14	53	86	76	70
3. Ramper Road, west of Longstanton Bypass roundabout	53	31	38	50
4. B1050 Station Road, north of Cambridgeshire Guided Busway	57	86	92	79
5. Cambridge Road, Oakington	92	51	105	52
7. B1050 Earith Road, north of Willingham	72	109	107	93
12. Boxworth End, Swavesey (just north of A14)	75	73	45	45
13. Ramper Road, just east of Swavesey	47	47	43	54
15. B1049, North of Cottenham	33	65	94	52
37. Cambridge Road, S of Girton	36	61	66	44
38. High Street Willingham	43	94	71	77

The analysis presented in Table 8.16 demonstrates that considering the links where there would be significant increases in traffic flows between the Do Minimum and Do

Something scenarios during the peak period, there are two links which are forecast to be over capacity: Cambridge Road, Oakington northbound in the PM peak and the B1050 Earith Road southbound in the AM peak and northbound in the PM peak. In this context the capacity is measured in terms of how much throughput of traffic the road link can accommodate given the speed and characteristics. A percentage of more than 100 therefore means that the forecast traffic flow demand is higher than the throughput capacity.

In the Do Minimum without Northstowe Phase 2, the volume to capacity percentage on the B1050 Earith Road is forecast to be 101% southbound in the AM peak and 108% northbound in the PM peak, compared to the figures in the Table 8.16 of 109% in the AM peak and 107% in the PM peak. Thus the Phase 2 traffic is not materially altering the congestion issues on this corridor. On Cambridge Road south of Oakington, the volume to capacity percentage is forecast to be 108% northbound in the PM peak in the Do Minimum, thus there is a minor reduction with the Do Something to 105%.

Whilst the proposed development will not have a material impact on the level of congestion on these links, the issues are discussed further below.

The congestion identified on the Cambridge Road link south of Oakington is on northbound movements in the PM peak. The level of congestion on any particular route will impact on route choice and as such, a delay on this link is likely to encourage drivers to use the more appropriate A14 or the A14 Local Access Road. As such, driver delay in this location may not be seen as a disadvantage. However, conditions for other road users would worsen and the proposed improvement to the walking and cycling route alongside Cambridge Road (as identified in section 7.4) would provide mitigation of associated pedestrian amenity/ delay impacts.

Section 8.8 discusses the B1050 corridor, including issues on the B1050 Earith Road.

## 8.9 B1050 Corridor

The B1050 provides a link from Chatteris in the north, through Somersham, Earith to Willingham and the Longstanton bypass to the A14. The baseline traffic assessment for Northstowe Phase 2 shows that there are existing congestion problems at some junctions, namely the signalised cross roads in Willingham and the Hatton's Road/ B1050 roundabout on the Longstanton bypass. The route is a single carriageway road passing through a number of communities.

The Northstowe Phase 1 development includes proposals for mitigation of junctions on the B1050 corridor with an agreed sum of £860k to be spent in areas where an impact of Phase 1 can be proven.

The Phase 2 development is anticipated to have a detrimental impact on the junction in Willingham and possible improvements are suggested in section 8.7.3. There are other junctions that may experience capacity issues with the Do Minimum level of growth, but the provision of the road links with Phase 2 changes travel patterns and provides some relief of these issues.

## 8.10 Ramper Road

The additional traffic on Ramper Road as a result of the Phase 2 Development could lead to adverse impacts on pedestrian amenity and road safety. It is proposed to develop measures to discourage traffic movements and thus reduce the impact of

traffic accessing through this route to Swavesey to the A14, as well as improve conditions for walkers and cyclists. This could include the consideration of;

- Build-outs to narrow the road to one way movements;
- Raised tables to reduce speeds within the settlement of Boxworth End (and thereby increase journey times and the desirability of using the route);
- Improved sections of footpath/ cycleway particularly at the eastern end where there is a long distance footpath designated with no footways.

It should be noted that the above measures would need to go through a successful consultation period in order for physical changes to be made to the highway or for a Traffic Regulation Order. The most appropriate mechanism would be for the applicant to pay a financial contribution towards the installation of traffic calming measures to CCC who would be responsible for developing and undertaking such works in conjunction with the affected community. The implementation of measures, whilst it may not significantly reduce traffic levels, should provide some mitigation of the impact of traffic on road safety and vulnerable road users.

## 8.11 Road Safety Issues

The accident analysis in Chapter 3 identified two locations whereby there are potential safety concerns, one at a specific bend on Rampton Road between Willingham and Rampton and the other at the junction of Girton Road/ Huntingdon Road.

Traffic survey data demonstrates that there is a potential speeding concern on Rampton Road. Although the development generates a decrease in vehicle movements in the peak periods, over a daily period there is an increase in vehicle movements between the Do Minimum (with Phase 1) and Do Something (with Phase 1 and 2) periods. As such, it is recognised that there is a need for some improvements at this location to reduce vehicle speeds and the developer will enter into discussions with CCC to agree the best approach for mitigation at this location.

The traffic flow analysis demonstrated that the development would have a minimal impact on the junction of Girton Road / Huntingdon Road and as such would not have a material impact on accidents and safety at this location. As such any improvements would be provided as part of other major developments which are occurring locally to this development and the Northstowe Phase 2 development would prioritise mitigation measures and contributions elsewhere.

## 8.12 Summary

The assessment in this chapter has identified the following:

- The highway links and junctions being provided for Northstowe Phase 2 provide appropriate capacity to meet the forecast traffic from Phase 2 and the means of accommodating the full development is identified;
- The emerging A14 improvement scheme is taking account of the Phase 1 and 2 traffic forecasts in the design of the Bar Hill junction, the Local Access Road and the section of the B1050 north of Bar Hill;
- The proposed northern access arrangement for Phase 1 is appropriate in terms of capacity to serve both Phases 1 and 2.

- With regards to the Huntingdon Road/ Girton Road junction, whilst there is some increase in traffic from Northstowe Phase 2, it is considered that the development would not have a material impact at this junction and no further measures at this junction have been considered.
- The signalised junction in Willingham operates significantly over its maximum capacity in the Do Minimum scenario and the development increases the queue lengths and capacity issues during both peak periods. As such measures to mitigate the impact of the development traffic at this location have been suggested.
- Although the Do Something scenario demonstrates that the development would not have a detrimental impact at the Oakington Road / Rampton Road mini roundabout compared to the Do Minimum it is recognised that the junction is significantly over capacity in 2031. Modelling work demonstrates that a signalised junction could operate within capacity, which provides an option for future improvements.
- There are junctions and links on the B1050 which may experience capacity issues with the Do Minimum level of growth, but the provision of the road links with Phase 2 changes travel patterns and provides some relief of these issues. Whether there is a need for further improvements to junctions and links on the B1050 is therefore a matter for the County Council to consider and take forward.
- It is proposed that measures to discourage traffic from using Ramper Road, in particular to access the A14, are put in place as well as improve conditions for walkers and cyclists.
- It is also proposed that measures to reduce speeding on Rampton Road between Willingham and Rampton are put in place as part of the Phase 2 development to ensure safety issues are not exacerbated by the development.

## 9 Summary and Conclusions

### 9.1 Overview

This Transport Assessment has considered the baseline conditions for sustainable travel, highways, traffic and road safety; described the proposed development; set out how the Cambridgeshire Sub Regional Model has been used to guide the access strategy and assess impacts; established the Access and Travel Strategy; and assessed the traffic impacts of the developments. Where necessary, mitigation proposals have been identified to address the impacts of development traffic on the surrounding network.

### 9.2 Current Situation

The Northstowe Phase 2 development is reasonably well located close to existing walking and cycle routes and CGB and local bus services. In particular, connections by CGB to Cambridge from Longstanton and Oakington are very strong. Connections to some adjacent communities for cyclists are in need of improvement (such as to Bar Hill) and bus services to villages such as Swavesey, Over and Willingham are limited, but are proposed to be improved as part of Northstowe Phase 1. The existing networks and services provide a strong basis on which to provide good connectivity to and from Northstowe Phase 2 by sustainable travel modes.

Current highway capacity and safety issues have been identified and traffic surveys have been undertaken to make sure that the assessment of future traffic is based on a full understanding of where there are current problems of congestion.

### 9.3 Transport Modelling of Phase 2

Extensive transport modelling work has been commissioned by the HCA to assess the impact of the Northstowe Phase 2 application and inform the Access and Travel Strategy for the development.

Initial benchmarking and review of the CSRM model compared to baseline traffic data was undertaken to see whether it provided a robust tool for the assessment. The results were also compared to a bespoke methodology for calculating trip generation using TRICS and the National Travel Survey and local assumptions. The outcome was that CSRM was considered to appropriately represent the developments and was therefore considered to be the best available tool.

The CSRM modelling work has been undertaken in consultation with the Highways Agency's consultants J2A to ensure there is a consistent approach and modelling of Northstowe and the A14 improvement scheme. The County Council's consultants, WSP and Atkins, have undertaken the land use and highway modelling for both schemes.

The results show a total of approximately 70,850 trips to and from the development over a 12 hour period, of which 69% are forecast to be by car (including car sharing) and 33% of trips are forecast to be internal to the development (67% external). The Phase 2 development is anticipated to generate 2,426 vehicle trips in the AM peak hour and 2,939 vehicle trips in the PM peak hour.



## 9.4 Sustainable Travel

The Phase 2 development will have good quality connections by sustainable modes of travel. A dedicated busway will serve the heart of the development with new CGB services every 20 minutes linking Longstanton Park and Ride, Northstowe and Cambridge. The Citi 5 bus service will be extended into the development.

There will be a network of walking and cycling routes within the development and a series of improvements to existing public rights of way to connect Northstowe to the wider area. A new cycleway will follow the busway to the south to connect to the route next to the CGB as well as follow the Southern Access Road and the B1050 to join proposed walking and cycling improvements at the A14, giving a connection to Bar Hill.

The Airfield Road/ Longstanton Road will be fully closed to traffic on the section north-west of properties in Oakington and south-east of properties in Longstanton, except for emergency vehicles providing a bridleway, footpath and cycleway and potentially for buses if required in the longer term.

## 9.5 Highway Access Strategy

A new Southern Access Road (West) will be provided to link the south of Northstowe to the B1050.

The submission for the Southern Access Road (West) is for a dual carriageway in order that the long term deliverability of the link is confirmed in planning. However, as part of the delivery of Phase 2 it is intended that the link would initially be constructed as a single carriageway with a hard shoulder (to reduce the chance of vehicles blocking the carriageway). The model analysis demonstrated that the Southern Access Road (West) could be provided as a single carriageway rather than a dual carriageway for Phase 2 as the forecast flows are significantly lower than both the capacity of a dual and single carriageway road. This represents a phased approach to the provision of infrastructure with the dual carriageway and the Southern Access Road (East) assumed to be required for future phases beyond Phase 2.

A single carriageway with hard shoulder will be provided from the southern access roundabout to connect to the Busway and into the Phase 2 development. With respect to resilience of a single link, it is recommended that it is designed to accommodate a hard shoulder for vehicles to pull over.

The northern access junctions to Phase 1 will also be available for use by Phase 2 traffic with no changes proposed, in the same way that a significant proportion of Phase 1 traffic will enter and leave the development using the Southern Access Road (West).

The new link not only provides the access for Northstowe Phase 2, but the modelling shows some reductions in traffic on the existing B1050 compared to the 2031 situation without Phase 2, as some Phase 1 traffic is forecast to use the new link. The Southern Access Road (West), alongside the adjoining A14 improvements and Local Access Road, represents a significant investment in the road network meaning that the traffic impacts elsewhere on the network can be minimised.

A separate construction traffic route will be provided from the Southern Access Road (West) so that vehicles do not go through local communities or impact on access into the Development.

## 9.6 A14 Improvement Scheme

The Highways Agency is currently progressing proposals for the A14 Cambridge to Huntingdon Improvement Scheme with a view to a submission for a Development Consent Order in late 2014.

The Highways Agency have confirmed that traffic forecast have been developed which take into account Northstowe Phase 2 with the Southern Link Road (West) to Bar Hill. These forecasts have been used in the design of the proposed new Bar Hill junction with a design year of 2035. The A14 improvement proposals also include widening to dual carriageway the B1050 north of Bar Hill to connect to the dual carriageway as proposed in these Northstowe improvements south of the new roundabout, resulting in the HA and HCA scheme boundaries meeting.

The Highways Agency have also considered the full 10,000 home Northstowe development and can confirm that the layout proposed at Bar Hill junction could easily be adapted to cater for the additional traffic that a full Northstowe development would generate. Earthworks and structures will be incorporated into the A14 improvement scheme at Bar Hill for this future provision.

## 9.7 Traffic Impact

The traffic impacts of Northstowe Phase 2 have been assessed and the conclusions have been drawn as below:

- The highway links and junctions being provided for Northstowe Phase 2 provide appropriate capacity to meet the forecast traffic from Phase 2 and the means of accommodating the full development is identified;
- The emerging A14 improvement scheme is taking account of the Phase 1 and 2 traffic forecasts in the design of the Bar Hill junction, the Local Access Road and the section of the B1050 north of Bar Hill;
- The proposed northern access arrangement for Phase 1 is appropriate in terms of capacity to serve both Phases 1 and 2.
- With regards to the Huntingdon Road/ Girton Road junction, whilst there is some increase in traffic from Northstowe Phase 2, it is considered that the development would not have a material impact at this junction and no further measures at this junction have been considered.
- The signalised junction in Willingham operates significantly over its maximum capacity in the Do Minimum scenario and the development increases the queue lengths and capacity issues during both peak periods. As such measures to mitigate the impact of the development traffic at this location have been suggested.
- Although the Do Something Phase 1 and 2 scenario demonstrates that the development would not have a detrimental impact at the Oakington Road / Rampton Road mini roundabout compared to the Do Minimum it is recognised that the junction is significantly over capacity in 2031. Modelling work demonstrates that a signalised junction could operate within capacity, which provides an option for future improvements.
- There are junctions and links on the B1050 which may experience capacity issues with the Do Minimum level of growth, but the provision of the road links with Phase 2 changes travel patterns and provides some relief of these issues.

Whether there is a need for further improvements to junctions and links on the B1050 is therefore a matter for the County Council to consider and take forward.

- It is proposed that measures to discourage traffic from using Ramper Road, in particular to access the A14, are put in place as well as improved conditions for walkers and cyclists.
- It is also proposed that measures to reduce speeding on Rampton Road between Willingham and Rampton are put in place as part of the Phase 2 development to ensure safety issues are not exacerbated by the development.

Any measures will be subject to further discussion and development in terms of design and feasibility with CCC. The agreed measures could be provided as part of the Phase 2 development off-site improvements or an equivalent sum placed with CCC to implement other solutions to address the issues in this area of the network.

## 9.8 Conclusions

The Transport Assessment identifies that with the land use mix and the permeability of the internal layout for sustainable modes, together with the provision of high quality transport infrastructure and the mitigation of transport impacts, the Northstowe Phase 2 Development does not have a detrimental impact on the transport network that cannot be accommodated compared to the Reference Case (without Phase 2) in 2031. It is therefore concluded that there are no transport reasons why planning permission should not be granted for the proposed developments.

The transport aspects of the Northstowe Phase 2 proposed development have evolved from the analysis and assessment work as well as through working closely with CCC, SCDC and the HA to find appropriate solutions and seek consensus on key aspects. The comments of the public and other stakeholders through consultation have also been taken into account. The proposals take on board the Phase 1 Development and access and travel arrangements. Notably, the Northstowe Phase 2 highway proposals have been co-ordinated with the emerging A14 Cambridge to Huntingdon Scheme to ensure that the Highways Agency proposals take account of the traffic impacts of Phase 2 and the Northstowe Phase 2 proposals respond to the emerging A14 improvements.

The HCA would like to acknowledge the assistance of the transport key stakeholders and their consultants' and all of those who have participated in the transport work prior to the submission for Northstowe Phase 2.



# NORTHSTOWE PHASE 2 PLANNING APPLICATION

Transport Assessment: Figures

August 2014