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A428 Black Cat to Caxton Gibbet improvements

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9.124 Madingley Mulch Roundabout and A1303 Study

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1 Introduction

1.1 Task background and purpose

1.1.1 AECOM was commissioned in April 2017 by National Highways (NH) to undertake PCF Stage 3 and 4 works associated with the proposed A428 Black Cat to Caxton Gibbet Improvements Scheme (referred to as the 'Scheme'). The Stage 3 Strategic Traffic Model (based on the Uncertainty Log of 2018) was developed (using SATURN software) to test the impacts of the Scheme and indicated flow changes at several locations including M11 Junction 13 in Cambridgeshire, which required further detailed assessment.

1.1.2 To test the impacts of the Scheme, AECOM has developed a Vissim model of the A1303 corridor which covers the section between the A428 Madingley Mulch roundabout to the west and the A1303/JJ Thompson Avenue junction to the east, including M11 Junction 13. A Vissim model was developed, since Vissim is capable of replicating the congested traffic conditions and junction interactions along the A1303 corridor.

1.1.3 The base model was developed using observed traffic count data and the forecast scenarios were developed from the base model by applying predicted changes in demand from the Strategic Traffic Model. There is a , predicted increase in traffic flows, leading to an increase in congestion along the A1303 in both the eastbound and westbound directions in the modelled opening year (2025) but more significantly in the modelled design year (2040). The A1303 is already congested in the base year in the eastbound direction, particularly during the AM peak, and this poses a risk to the operation of the wider network, as the future year queues are likely to impact the A428 mainline carriageway.

1.1.4 The purpose of this study is to identify and review the existing eastbound traffic congestion problems along the A1303 corridor and assess the impacts of future developments and proposed schemes on the corridor with and without the A428 Scheme.

1.1.5 There is a particular focus on the eastbound direction because there is a risk that future problems on the A1303 will impact the Madingley Mulch roundabout/ A428 off-slip, with potential impact on the A428 which is part of the Strategic Road Network (SRN). This Technical Note involves a review of the various planned interventions and an assessment of the impact on the travel patterns in the corridor.

1.1.6 This Technical Note should be read alongside Technical Note 9.102 'Results of additional VISSIM modelling at M11 Junction 13' **[REP8-019]**, which describes the updated A1303/M1 Junction 13 Vissim modelling which was extended to include the A428 main carriageway.

1.1.7 This Technical Note identifies the existing and future problems along the corridor, the expected impact of the Scheme, and possible short-term and long-term mitigation measures. For the purposes of this note, short-term measures are those that can potentially be implemented when the A428 Scheme opens (2026) and long-term are those which could be implemented before the A428 Scheme design year (2040).

1.1.8 **Table 1-1** outlines the data sources that have been used to inform the A1303 Corridor Study.

Table 1-1 Data Sources

Purpose	Data Sources
Determining existing and forecast problems	Greater Cambridge Local Plan: Transport Existing Conditions Report (Cambridgeshire County Council, 2020)
	A428 2018 Uncertainty Log
	A1303/M11 J13 Vissim models: 2019 base year and forecast year (2025, 2040, 2051) models based on the 2018 Uncertainty Log Strategic Traffic Models and extended to include the A428 at Madingley Mulch roundabout
	Technical Note 78 – Stage 3 – Assessment of Traffic at A428 Madingley Mulch Off-slip (AECOM, 2021)
	Technical Note 80 - M11 J13 Vissim Model Extension (AECOM, 2021)
	A428 Black Cat to Caxton Gibbet Strategic Traffic Model: 2015 base year and forecast year (2025, 2040, 2051) models
	Greater Cambridge Local Plan – First Proposals (Greater Cambridge Shared Planning, 2021)[1]
	Transport Assessments for planned developments near the A1303 corridor
	Current bus routes and schedules
Identifying A1303 Mitigation Measures	Cambourne to Cambridge Better Public Transport Project (Greater Cambridge Partnership, 2018)[2] and Cambourne to Cambridge Better Public Transport Project: Non-technical Summary (Mott MacDonald, 2019)[3]

[1] [redacted]

Purpose	Data Sources
	Transport Strategy for Cambridge and South Cambridgeshire (Cambridgeshire County Council, 2014)[4]
	Making Meaningful Connections: Consultation Document (East West Rail, 2021)[5]
	Comberton Greenway (Greater Cambridge Partnership, 2021)[6]
	Madingley Road (Greater Cambridge Partnership, 2021)[7]
	Making Connections Brochure[8]
	Transport Assessments for planned developments near the A1303 corridor

1.2 Technical note structure

1.2.1 Following this introductory section, the note is structured as follows:

a. Section 2 outlines the current eastbound conditions along the A1303 corridor, including existing problems.

b. Section 3 outlines the future eastbound conditions along the corridor, including planned developments, forecast traffic conditions and the expected impact of the A428 Scheme.

c. Section 4 discusses identified interventions that could be implemented in the short and long term to mitigate the predicted congestion issues along the A1303 corridor.

d. Section 5 summarises the findings and recommends the next steps for finding solutions for the potential eastbound congestion on the A1303, which has potential to impact the A428.

[4] https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Transport-strategy-and-high-level-programme-for-Cambridge-and-South-Cambridgeshire-March-2014.pdf
[5] https://eastwestrail-production.s3.eu-west-2.amazonaws.com/public/Consultation-Document.pdf
[6] [redacted]
[7] [redacted]
[8] [redacted]

2 Current conditions

2.1 Study area

2.1.1 As shown in **Figure 2-1** the A1303 Madingley Road is a major route connecting M11 Junction 13 with central Cambridge. It also enables movements to and from the A428 west of Cambridge and the M11 south of J13, as these movements are not possible at the M11 Junction 14 Girton Interchange. The A1303 is a single-carriageway road with a speed limit of 50mph between Madingley Mulch roundabout and Cambridge Road, 40mph between Cambridge Road and Conduit Head Road and 30mph to the east of Conduit Head Road.

2.1.2 The Madingley Road Park & Ride is located between the M11 and Eddington Avenue, with access provided via a signalised junction. It is operated by Stagecoach with a bus frequency of every 10 minutes on weekdays and Saturdays, and every 15 minutes on Sundays. The car park has a capacity of 930 parking spaces[9].

2.1.3 A dedicated bus lane is provided along a short section of the A1303 corridor, in the eastbound direction between the Lodge Tyre Company and just after the M11 off-slip at M11 Junction 13. There are seven and eight bus stops along the A1303 corridor in the eastbound and westbound directions, respectively, which are served by the following bus services:

a. The Whippet Express X2 and X3 services between Huntingdon and Addenbrooke's Hospital, which serve Cambourne and central Cambridge with daily services every 30 minutes[10].

b. The Whippet Express Universal (U) service between Eddington and Cambridge, with buses every 15 minutes on weekdays and every 20 and 30 minutes on Saturday and Sundays, respectively[11].

c. The Stagecoach Citi 4 service between Cambourne and Cambridge, with buses approximately every 10 minutes during the day[12].

d. The Stagecoach Park & Ride service between central Cambridge and the Madingley Road Park & Ride, with a 10-minute frequency during the day[13].

[9] Greater Cambridge Local Plan: Transport Existing Conditions Report (Cambridgeshire County Council, 2020) [redacted]

[10] Cambridgeshire & Northamptonshire Buses (Whippet, 2021) [redacted]

[11] Services via The Busway (Whippet, 2021) [redacted]

[12] 4 Bus Route & Timetable: Cambourne – Cambridge (Stagecoach, 2021) [redacted]

[13] Cambridge Park & Ride: Madingley Road (Stagecoach, 2021) [redacted]

2.1.4 Given that there are no east-west rail links in the wider area around the A1303, there are currently no direct rail alternatives available for key movements which are likely to travel on the A1303, such as trips between Bedford and Cambridge.

2.1.5 There are either cycle lanes or off-carriageway pedestrian/cycle routes along the A1303 corridor east of the Park and Ride, however the existing provision is of varying quality and is either shared with pedestrians or on-road with traffic. To the west, between Madingley Mulch and Cambridge Road there is a shared path for pedestrians/cyclists on the southern side of the A1303 and between Cambridge Road and the Park and Ride, there is a narrow, shared path on the northern side of the A1303.

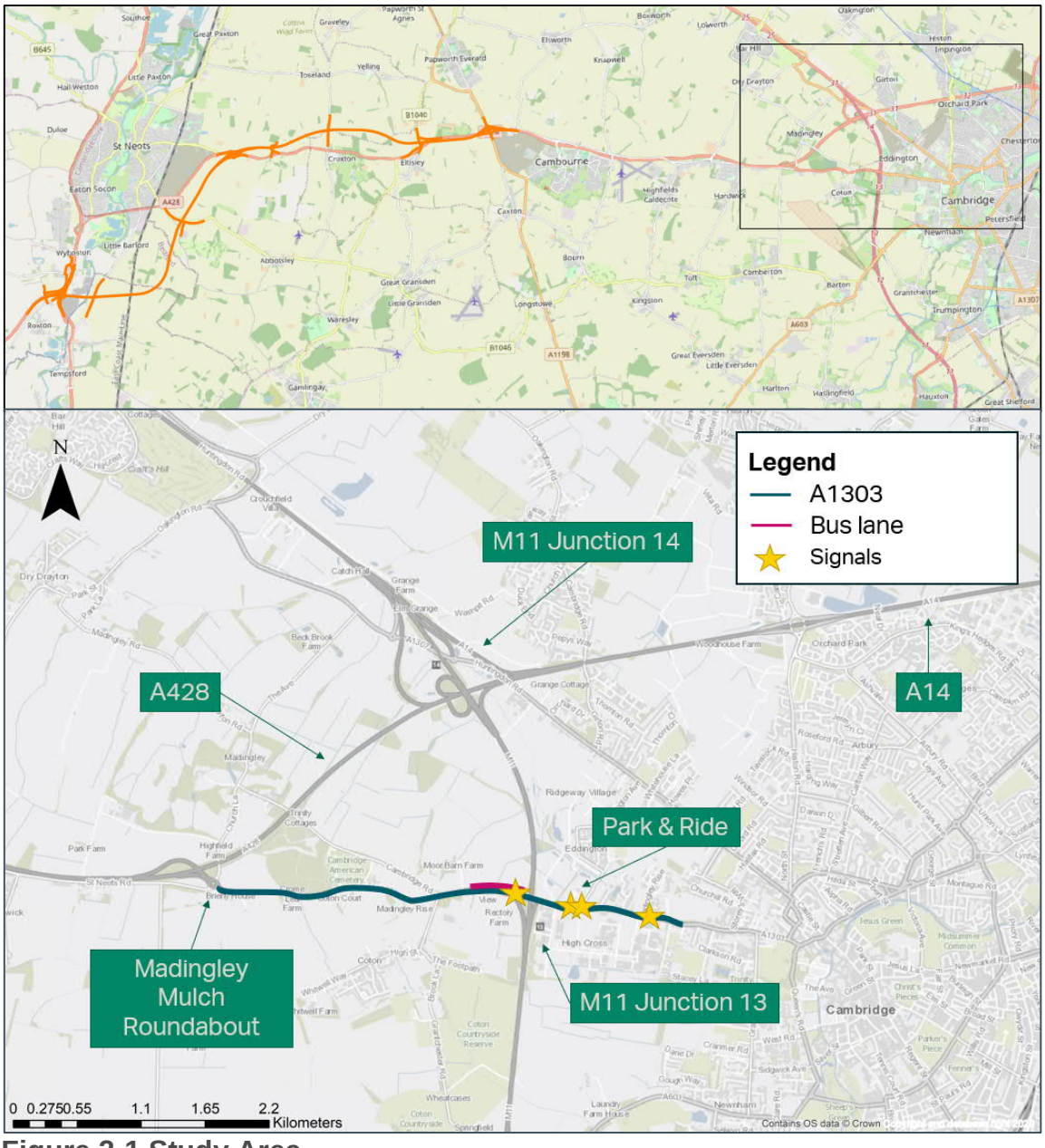

Figure 2-1 Study Area

2.2 Existing traffic conditions

2.2.1 **Figure 2-2** presents an overview of the level of traffic and vehicle composition along the A1303 corridor west of the M11 using two-way Average Annual Daily Flow (AADF) data from 2019[14]. Out of the total 19,485 trips, a vast majority of the trips were made by private motorised vehicles: 81% of trips were by Cars or Taxis, and 13% were LGVs.

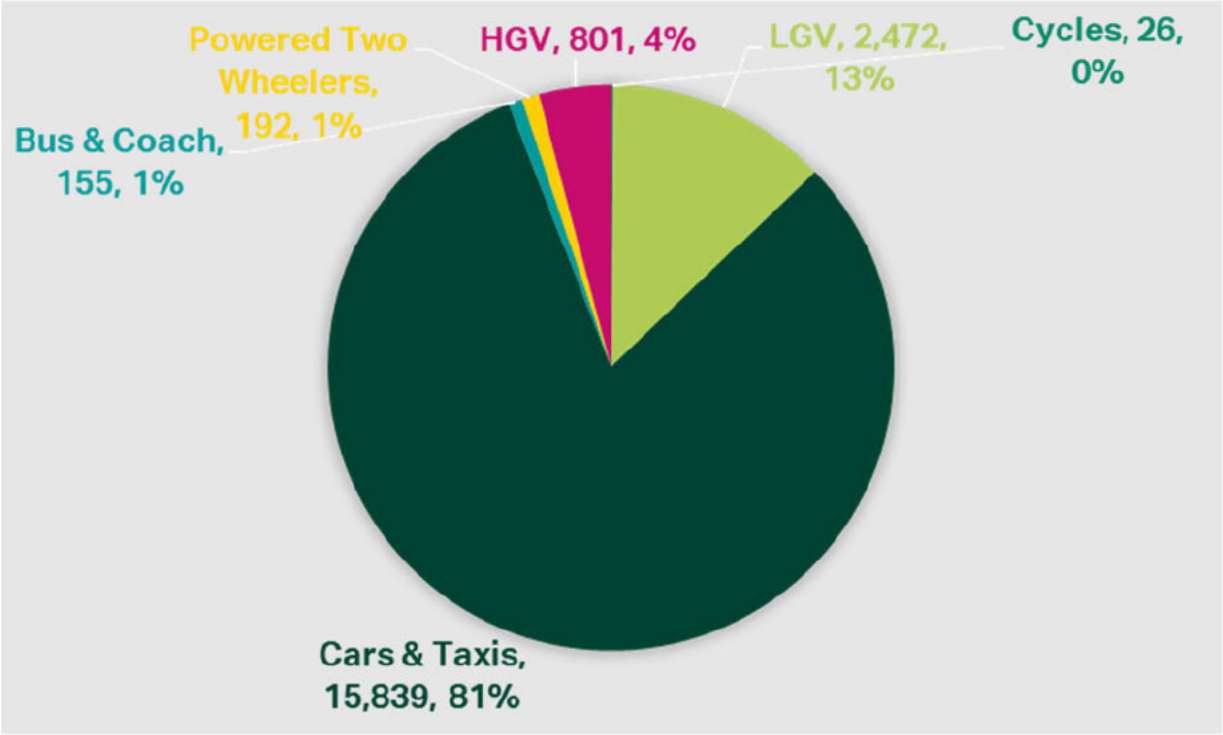

Figure 2-2 2019 Two-way Annual Average Daily Traffic Flows

Source: DfT Count Site (2019) – located on A1303 between Madingley Mulch and Cambridge Road

2.2.2 The A1303 corridor is a key radial route for traffic heading into Cambridge. The Greater Cambridge Local Plan: Transport Existing Conditions report[15] states that modelling undertaken for the Greater Cambridge Partnership has shown that the corridor has experienced a significant increase in traffic over the last decade.

[14] [redacted]
[15] Greater Cambridge Local Plan: Transport Existing Conditions Report (Cambridgeshire County Council, 2020) [redacted]

2.2.3 The increase in traffic has created congestion during peak periods, particularly at M11 Junction 13. Users experience long delays on the eastbound A1303 up to the M11 Junction 13, A1303/Park and Ride junction and A1303/Eddington Avenue/High Cross junction, as well as significant journey time variability along the corridor in the eastbound direction. The existing congestion has been found to mainly stem from the signalised junctions (Park & Ride access, A1303/Eddington Avenue/High Cross junction) to the east of the M11 Junction 13.

2.2.4 While the existing Park & Ride on Madingley Road (A1303) is considered to be successful, having shown consistent growth in patronage, it is currently at or near capacity. Additionally, passengers are increasingly finding it difficult to access the Park & Ride site given the existing congestion issues on the A1303 and the M11[16].

[redacted]

3 Future network conditions

3.1 Future development

3.1.1 A significant amount of new housing and employment is planned in the Greater Cambridge area (Cambridge City and South Cambs) which is expected to affect travel patterns along the A1303 and elsewhere.

3.1.2 The key development proposals are summarised in **Table 3-1**, that highlights which developments have been included in the Strategic Traffic Model. These developments have outline planning consent, but full planning permission would be subject to planning conditions being met and further Transport Assessments being approved.

3.1.3 **Figure 3-1** shows the development proposals in and around the A1303, where the following key proposals are likely to increase the need to travel along the corridor[17]:

[17] Greater Cambridge Local Plan – First Proposals (Greater Cambridge Shared Planning, 2021)

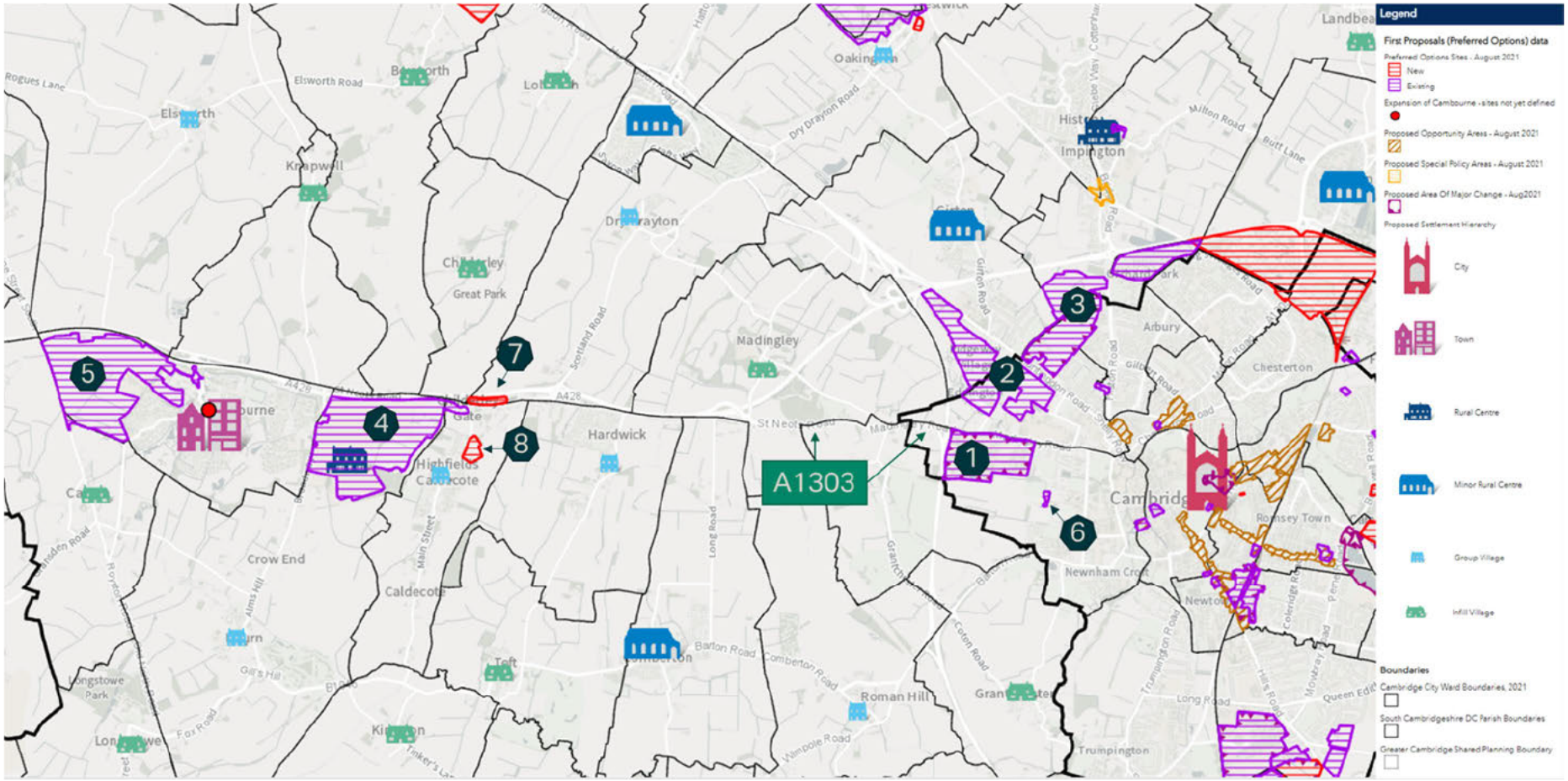

Figure 3-1 Greater Cambridge Development Proposals

Source: Greater Cambridge Local Plan – First Proposals (Greater Cambridge Shared Planning, 2021

Table 3-1 Summary of Greater Cambridge Development Proposals

Number	Name	Location	Description	Expected Impact on A1303	Planned Mitigation	2018 Uncertainty Log
1	West Cambridge	Southern border of the A1303 between M11 Junction 13 and Clerk Maxwell Road	66.9 ha mixed use development	With Mitigation, the developer's Transport Assessment concludes that the development will not worsen traffic conditions on the A1303	Measures proposed to control or limit vehicular trip generation and improve public transport, cycling and pedestrian provision. Highway enhancements to provide access. Contributions to wider GCP proposals for strategic public transport/active mode schemes (C2C or equivalent).	Yes
2	North West Cambridge (Eddington)	Across Eddington and Ridgeway Village	Mixed use development including approx. 3,000 homes and academic uses	The developer's TA concludes development will only result in minimal changes in traffic conditions	Measures proposed to control or limit vehicular trip generation and improve public transport, cycling and pedestrian provision. Some limited highway measures.	Yes
3	Land between Huntingdon Road and Histon Road (Darwin Green and Darwin Green 2/3)	Two sites between Histon Road and Huntingdon Road to the north of the A1303	Mixed use development including approx. 3,000 homes	The developer's TA concludes that there would be no significant impact on A1303	Area Wide Travel Plan and localised accesses	Yes

Number	Name	Location	Description	Expected Impact on A1303	Planned Mitigation	2018 Uncertainty Log
4	Bourn Airfield New Village	Between Cambourne and Highfields Caldecote south of the A428	Mixed use development including 3,500 homes	Sections of the A1303 would operate above capacity following completion of the development with mitigations, especially the junctions between M11 Junction 13 and A1303/Eddington Avenue. However, the TA for the development states that contributions to Greater Cambridge Partnership (GCP) proposals will offset this.	Measures proposed to control or limit vehicular trip generation and improve public transport, cycling and pedestrian provision. The bus lane is proposed to be amended on the A1303, to improve eastbound congestion. Contributions to GCP proposals for strategic public transport/ active mode schemes (C2C or equivalent).	Yes
5	Cambourne West	West of Cambourne and south of the A428	Mixed use development including 2,350 homes	Modelling of Madingley Mulch, as described in the developer's TA, indicates acceptable impact from development with no large change in RFC – no other modelling undertaken of A1303.	Contributions to wider GCP proposals for strategic public transport/ active mode schemes (C2C or equivalent). The developer proposes to improve the A428/ A1198 Caxton Gibbet roundabout to mitigate the impact of the development. If the A428 Scheme goes ahead, further improvements are unlikely to be required, so a financial contribution would be made instead to the Local Highway Authority.	Yes

West Cambridge Development (1)[18]

3.1.4 The West Cambridge development comprises 66.9 ha of mixed-use development, mainly consisting of educational, commercial and employment uses connected to the University of Cambridge. This site is located along the southern border of the A1303 between M11 Junction 13 and Clerk Maxwell Road.

3.1.5 The Transport Assessment (TA) for the development includes assessment of 'Key Phase 1', which includes a Transport Strategy up to 2021, approximately the current time of writing. This assessment concluded that, with the Key Phase 1 mitigation (management of car parking, pedestrian/cycle improvements, enhanced public transport provision and travel demand management), all local junctions would operate either within capacity or no worse than conditions with an existing extant consent.

3.1.6 Vehicular access to the site is currently provided via the following junctions:

a. A1303/Eddington Avenue/High Cross signalised junction:

   i. The development is accessed from High Cross on the southern side of the A1303. The junction also provides access to the North West Cambridge Development on the northern side of the A1303 via Eddington Avenue, so this junction was presumably implemented as part of the North West Cambridge development.

   ii. It is noted that 'during Phase 1' this could be subject to a ban to the right turn into the junction/right turn out of the junction, with these movements transferring to the JJ Thompson junction to the east. However, this has not been built so it is not clear whether it is planned to be implemented.

b. A1303/JJ Thomson Avenue priority-controlled junction to the east.

c. The site is also accessed via the existing priority access at A1303/Clerk Maxwell Road at the eastern end of the site.

3.1.7 The developer's TA includes assessment of a 'Post Phase 1' 2031 scenario, which includes a Transport Strategy up to 2031.

3.1.8 There are further plans for providing access to the development 'Post Phase 1' before 2031:

a. There is a proposed new A1303/Western Access junction at the western end of the site which would be delivered 'post Phase 1'. This access point would be restricted to a right in/left out arrangement. This also ties into some associated proposals from the North West Cambridge development for enhancing the M11 southbound on-slip, which is discussed below. **This access point has not been built and is not included in the forecast Vissim modelling.** The junction would 'intercept strategic traffic movements between the site and the west, including from the M11 – this

[18] [redacted]

early interception would help to maintain conditions at other local junctions – such as High Cross'

b. It is noted that the A1303/JJ Thompson access junction could be subjected during later 'Post - Phase 1' phases to a traffic signal-controlled upgrade. **However, this has not been included in the A1303 forecast Vissim model.**

3.1.9 The developer's TA states that an "appropriate mitigation strategy compatible with the emerging strategic transport solution for Cambridge, with minimal interventions to preserve individual junction capacity, would be required – this would be delivered within the context of the adopted Monitor and Manage Approach" and "As there may be a degree of variability in future projections (which can be attributed to a number of factors including fuel prices, Government policy etc), the traffic management strategy formulated for West Cambridge is pragmatic and resilient to change".

3.1.10 The TA states that "further assessments of Development impact beyond Key Phase 1 have been provided to inform the derivation of a Transport Cap to finance future mitigations. The proposed Transport Strategy will be reviewed and supported by additional assessments of the future emerging conditions on the network, and mitigation strategies will be refined and agreed for these phases".

3.1.11 The 2031 mitigation strategies proposed for the West Cambridge development include the following:

a. Contributions to Cambourne to Cambridge Better Public Transport (C2C) project, which is likely to be aligned through the West Cambridge site.

b. Contributions to West Cambridge public transport strategy.

c. Provision of appropriate car parking and management of this onsite/ offsite.

d. Contributions to Madingley Road Cycle Scheme.

e. Enhanced bus services.

f. Travel demand management/Travel Plan.

g. Provide localised highway enhancement to provide new Western Access Road junction (as described above).

North West Cambridge Development (2)[19]

3.1.12 The North West Cambridge (Eddington): mixed use development includes planned delivery of 3,000 homes as well as employment, academic, educational and community uses. This site is located across Eddington and Ridgeway Village and was anticipated to be developed over 12-14 years from 2012 onwards. Phase 1 (1,400 homes and associated employment, academic, educational and community development) is complete.

[19] [redacted]

3.1.13 The vehicular accesses are as follows (site plan shown in **Figure 3-2**):

a. Access onto the A1303 is provided along Eddington Avenue, at the signalised Eddington Avenue/A1303/High Cross junction, and via Madingley Rise at a priority-controlled junction (there are proposals to upgrade this to a signalised junction, but it is unclear when this would occur).

b. Access onto Huntingdon Road is provided at the signalised Eddington Avenue/ Huntingdon Road (East Access) junction, which has been built, and at a proposed signalised access further northwest on Huntingdon Road (West Access) which has yet to be built.

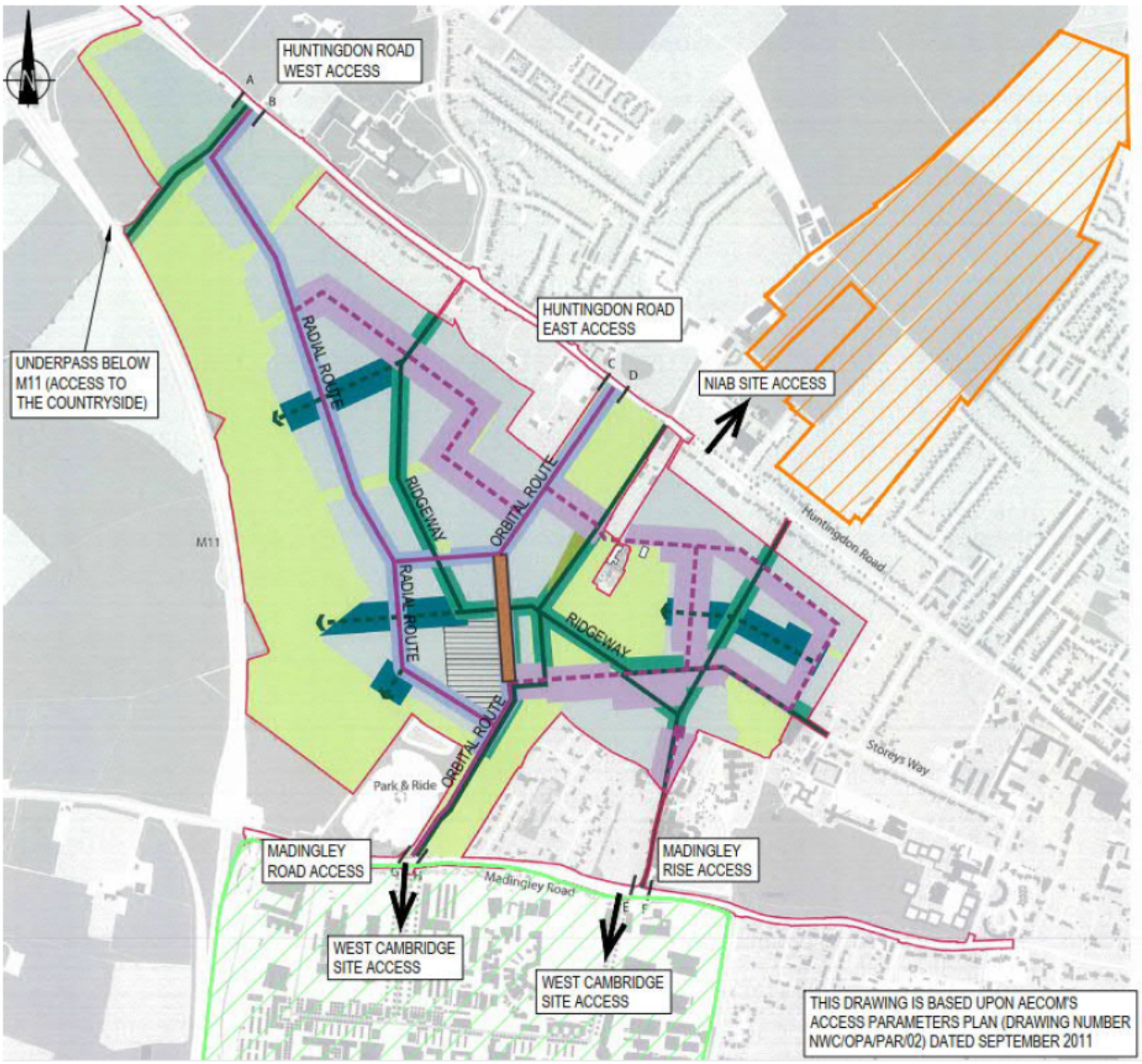

Figure 3-2 North West Cambridge Site Access Locations (source: North West Cambridge Transport Assessment September 2011)

3.1.14 The developer's Transport Assessment (TA) for the site states that the development would only have a minimal impact on traffic conditions, compared to the without development forecast scenario (2026). The TA states that the proposed mitigation measures would further minimise the forecast impact on the highway network.

3.1.15 The measures proposed as part of the University's Site-Wide Travel Plan are:

a. A reduction in the car parking provision across the Development.

b. the funding of a promotional campaign for the guided busway, to increase the patronage from communities along the route and the extraction of vehicle trips from the A14 and M11 to the Park and Ride sites.

c. A capacity enhancement scheme to the M11 Junction 13 Southbound Slip road, possibly including ramp metering.

d. Minor local highway measures at the Queen Street/Madingley Road/ Northampton Street junction.

e. A monitoring scheme, potentially with further traffic calming measures at the Oxford Road/Windsor Road link.

f. Measures to improve conditions for pedestrian and cyclists on Huntingdon Road.

g. Potential further measures directed at vehicle trip reduction from the University's facilities across the City, to improve conditions on the strategic and local highway network. This therefore includes the introduction of co-ordinated Travel Plan measures for the University's facilities across the whole of the City.

Huntingdon Road and Histon Road - Darwin Green 1/2 3 (3)

3.1.16 Land between Huntingdon Road and Histon Road (known as the 'NIAB Site' or Darwin Green and Darwin Green 2/3): mixed use developments including planned delivery of approximately 3,000 homes between 2020-2041. The development is split into a first phase (Darwin Green 1, 1,780 dwellings, primary school and community centre) some of which is delivered and two further phases (Darwin Green 2/3 1,200 dwellings and a secondary school).

3.1.17 The developments are allocated across two sites between Histon Road and Huntingdon Road. Huntingdon Road is another radial route in/out of Cambridge which is to the northeast of the A1303.

3.1.18 The developer's Transport Assessment sets out proposals for public transport enhancements, walking and cycling improvements and an Area Wide Travel Plan to limit trips by car. The modelling undertaken concluded that the only significant impacts were at the access locations on Huntingdon Road and Histon Road, which were mitigated by appropriately designed accesses.

Bourn Airfield New Village (4)[20]

3.1.19 Bourn Airfield New Village: the construction of a new village consisting of mixed-use development, including delivery of approximately 3,500 dwellings, mixed uses comprising employment, retail, hotel, leisure, residential institutions; education and community facilities. The development was planned to be constructed between 2021 and 2045, but construction has not yet started.

3.1.20 The development will be accessed from the existing Highfields Road/St Neots Road roundabout to the east. To the west, the development will be accessed via a new access junction on the Broadway to the east of Cambourne. The western access includes a dedicated bus and cycle link to Cambourne, which links to a Dedicated Strategic Public Transport Route, running through the site from west to east.

3.1.21 The Transport Assessment (TA) for this development concludes that sections of the A1303 would operate above capacity in 2031. It states that operation of the network improves when the proposed mitigation measures (proposed bus lane alteration below) are included in the modelling, however sections of the corridor still operate above capacity.

3.1.22 The TA also states that the operation of the junctions on the A1303 are impacted as a result of downstream queuing from the junctions to the east on the A1303 Madingley Road, which will be '*relieved by Phase 1 of the Greater Cambridgeshire Partnerships proposals'*. It goes on to say that '*the modal share adjustment required for the network to operate with more capacity than is required through the NPPF is comfortably within the projections prepared on behalf of the GCP'*.

3.1.23 The TA states that the developer contributes to the GCP proposals (previously known as 'City Deal') which are a general programme of sustainable transport measures, such as public transport improvement schemes and investment in cycling and bus priority. This is proposed to take the form of the Cambourne to Cambridge Better Public Transport (C2C) project.

3.1.24 The measures outlined in the TA for the Bourn airfield development are listed below and shown in **Figure 3-3** :

a. Delivery of the Dedicated Strategic Public Transport Route within the Bourn Airfield.

b. Master Plan area or Safeguarding of land to enable the delivery of the CCC proposed Eastern Route.

c. Monitoring of traffic in the surrounding villages and the set-up of a 'Local Mitigation Fund' to implement measures (such as traffic calming/speed restraint measures) if required.

[20] [redacted]

d. Contribution towards the delivery of the wider Dedicated Strategic Public Transport Route scheme in accordance with the traffic impacts of the development.

e. Delivery of off-site pedestrian and cycle improvements.

f. Delivery of a Bus Strategy.

g. Implementation of Travel Plans (smarter choices package).

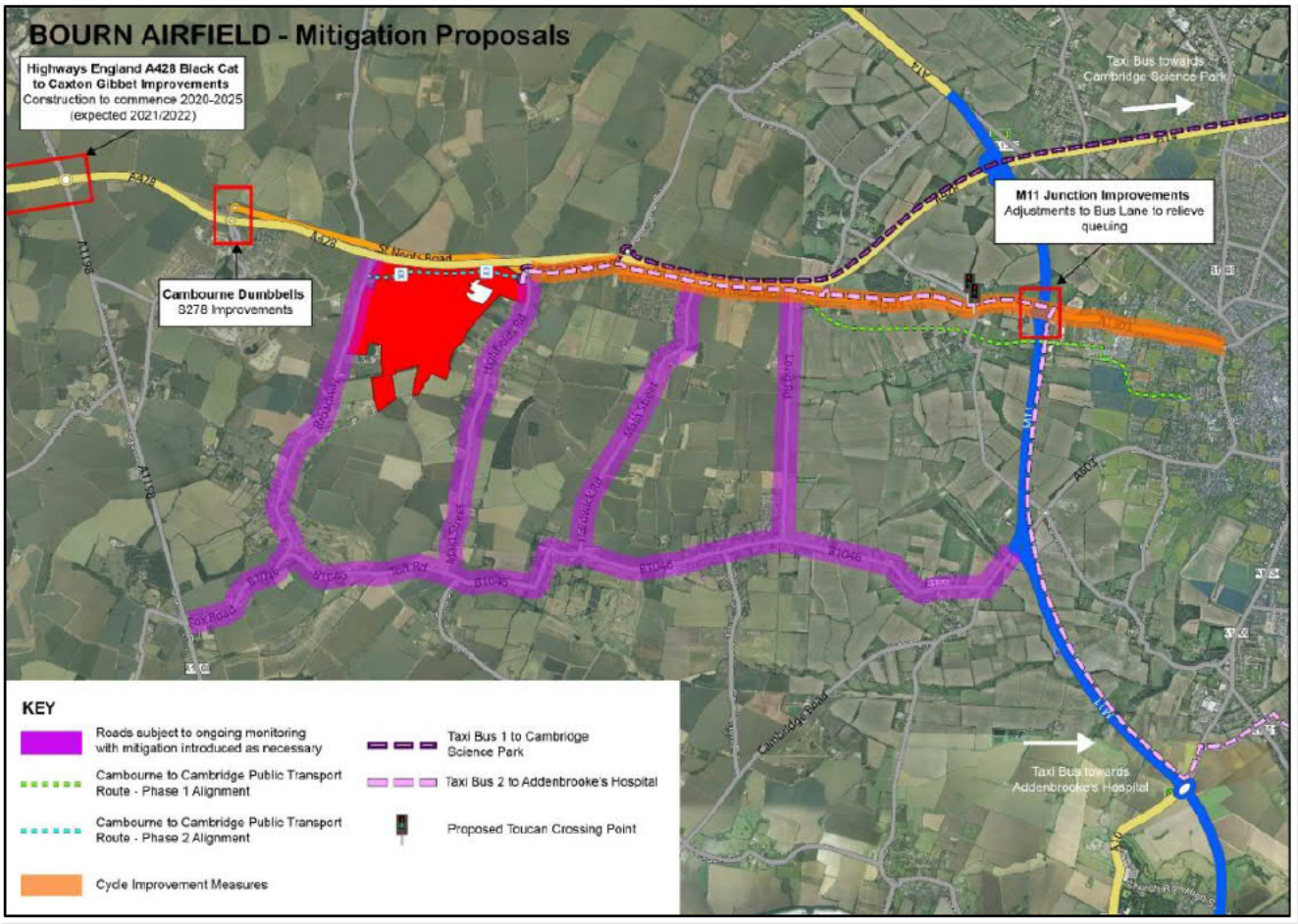

Figure 3-4 Summary of Mitigation Proposals (source: Bourn Airfield Transport Assessment September 2019 Update)

3.1.25 The developer's TA tested the repositioning of the existing Bus Lane to the west of the M11 junction, to provide two lanes of all-vehicle traffic at the signals, which would be delivered by 2026/2027. This is predicted to reduce the queue along the A1303 eastbound, which allows buses to move faster through the corridor. The end of the bus lane may be signalised, to address concerns regarding merging of buses. In addition, the GCP has identified 'quick win' bus-priority measures that can be delivered within the highway boundary.

Figure 3-5 Proposed Bus Lane Alterations (source: Bourn Airfield INTERIM TRANSPORT MEASURES September 2020)[21]

Cambourne West (5)

3.1.26 Cambourne West is a mixed-use development including delivery of 2,350 dwellings, two primary schools, a secondary school and a range of other land uses including community and sport facilities, retail and employment. The site would be developed between 2020-2040.

3.1.27 This site is located to the west of Cambourne and south of the A428. Access to the site is provided from Cambourne Road/Sheepfold Lane priority junction and a realigned A1198/Ermine Street roundabout to the southwest of the development.

3.1.28 The Madingley Mulch roundabout was modelled as part of the developer's Transport Assessment (TA)[22] using ARCADY, but no other junctions along the A1303 were modelled. The capacity assessment concluded the junction would not be adversely impacted by the development in 2031.

3.1.29 The developer's TA does not propose any highway mitigations in the wider area/ relevant to the A1303, although some significant increases in traffic are forecast on this route.

3.1.30 The following measures are proposed as part of the developer's Transport Strategy[23]

a. Highway:

i. Accesses to the site from Cambourne Road/Sheepfold Lane and A1198 Ermine Street.

[redacted]

ii. Improvements to the Caxton Gibbet roundabout to mitigate for the impact of the development. If the A428 Black Cat to Caxton Gibbet Scheme is delivered, then further improvements are unlikely to be required, so a financial contribution would be made instead to the Local Highway Authority.

b. Public Transport:

i. Suitable highway infrastructure for a bus route/bus infrastructure on site.

ii. Enhanced or new bus services accessing the site.

iii. Either the provision of an inbound bus lane between the A1303/A428 Junction and the M11/A1303 junction or an equivalent financial contribution towards the delivery of bus priority measures along the A428 corridor as part of the wider Cambridge and South Cambridgeshire Transport Strategy.

c. Cycling/Walking:

i. Provision of on-site cycle/pedestrian infrastructure.

ii. Provision of a cycle safety scheme on St Neots Road between the Broadway and Highfield Road.

iii. Contributions towards improving off-site pedestrian and cycle routes to assist CCC in delivering a county wide cycle network especially routes connecting to Caxton, Papworth Everard, Bourne, Knapwell and Elsworth.

iv. Improvements to the section of the bridleway between Lower Cambourne and Cambourne West.

3.2 Future year traffic conditions

3.2.1 This section summarises the future traffic conditions along the A1303 corridor and interaction with the off-slip from the A428 at Madingley Mulch roundabout. The analysis is informed by the modelling that has been undertaken, including the Strategic Traffic Model and the A1303/M11 Junction 13 Vissim model (as described in TN 9.102 **[REP8-019]**). The analysis focusses on eastbound traffic conditions on the A1303, since the Vissim modelling has indicated a future risk of queues on the A1303 blocking back onto the A428 off-slip and A428.

Future Year Traffic Flows

3.2.2 The future year traffic flows, as predicted by the Strategic Traffic Model are presented in the Traffic Forecasting Report **[APP-253]**.

3.2.3 **Table 3-4** outlines the modelled flow increases between the 2015 base scenario and the 2025 and 2040 forecast year scenarios on the A1303. The table presents the predicted flow increases on the A1303 eastbound between Madingley Mulch roundabout and Cambridge Road, since this is the main queuing issue with potential to impact the A428.

3.2.4 As can be seen, higher levels of traffic are forecast along the A1303 in the 2025 and 2040 Do Minimum, compared to the 2015 base model. There are higher forecast flows in the Do Something scenarios compared to the Do Minimum. The Do Something scenarios experience consistently higher flow increases in the identified locations across all forecast scenarios.

Table 3-4 Modelled Flow Increases on A1303 eastbound - SATURN forecast year flows minus 2015 base flows

Forecast Scenario	Peak Period	Madingley Mulch roundabout to A1303 / Cambridge Road junction	Main Origins/Destinations
2025 Do Minimum	AM	61	Origins: St Neots, residential areas to the north and south of the A428, and areas to the south of Cambridge Destinations: Cambridge, the developments along the A1303, and areas to the south of Cambridge
	PM	15	
2040 Do Minimum	AM	145	
	PM	127	
2025 Do Something	AM	208	Origins: St Neots, residential areas to the north and south of the A428, areas to the south of Cambridge, and areas to the southwest of St Neots Destinations: Cambridge, the developments along the A1303, and areas to the south of Cambridge
	PM	103	
2040 Do Something	AM	323	
	PM	232	

Future Year Vissim Modelling

3.2.5 The future year traffic conditions, as predicted by the A1303/M1 Junction 13 Vissim model are presented in detail in TN 9.102 **[REP8-019]**. The assessment shows the following:

a. In 2025, with the A428 Scheme in place, congestion is predicted to increase along the A1303. The queues are predicted to extend along the A428 off-slip to the Madingley Mulch roundabout and the models predict that the operation of the eastbound A428 would be impacted.

b. In 2040, without the A428 Scheme in place, congestion is predicted to worsen in the AM peak hour along the A1303 due to the predicted traffic growth/development traffic. The predicted queues exceed the length of the A428 off slip and the model predicts that the operation of the A428 eastbound main carriageway will be impacted.

c. In 2040, with the A428 Scheme in place, extensive eastbound queues are predicted along the A428 in the AM peak hour. In the 2040 PM peak hour, some disruption is also predicted to the A428 eastbound.

4 Mitigation potential

4.1.1 This chapter discusses the identified interventions and schemes that will potentially be implemented in the short and long term to mitigate for the impacts of increases in traffic volumes predicted on the A1303 corridor as a result of LPA consented developments. Short-term measures are those which have potential to be implemented before or shortly after the planned opening of the A428 Scheme in 2025, whereas long-term measures could potentially be implemented after 2025, but before 2040.

4.1.2 **Figure 4-1** outlines the location of some of the schemes expected to come forward in the wider area around the A1303, including C2C, East West Rail (see Section 4.5) and Comberton Greenway (referred to as “Cambridge Greenway” in the figure). These schemes are discussed in more detail in the section below.

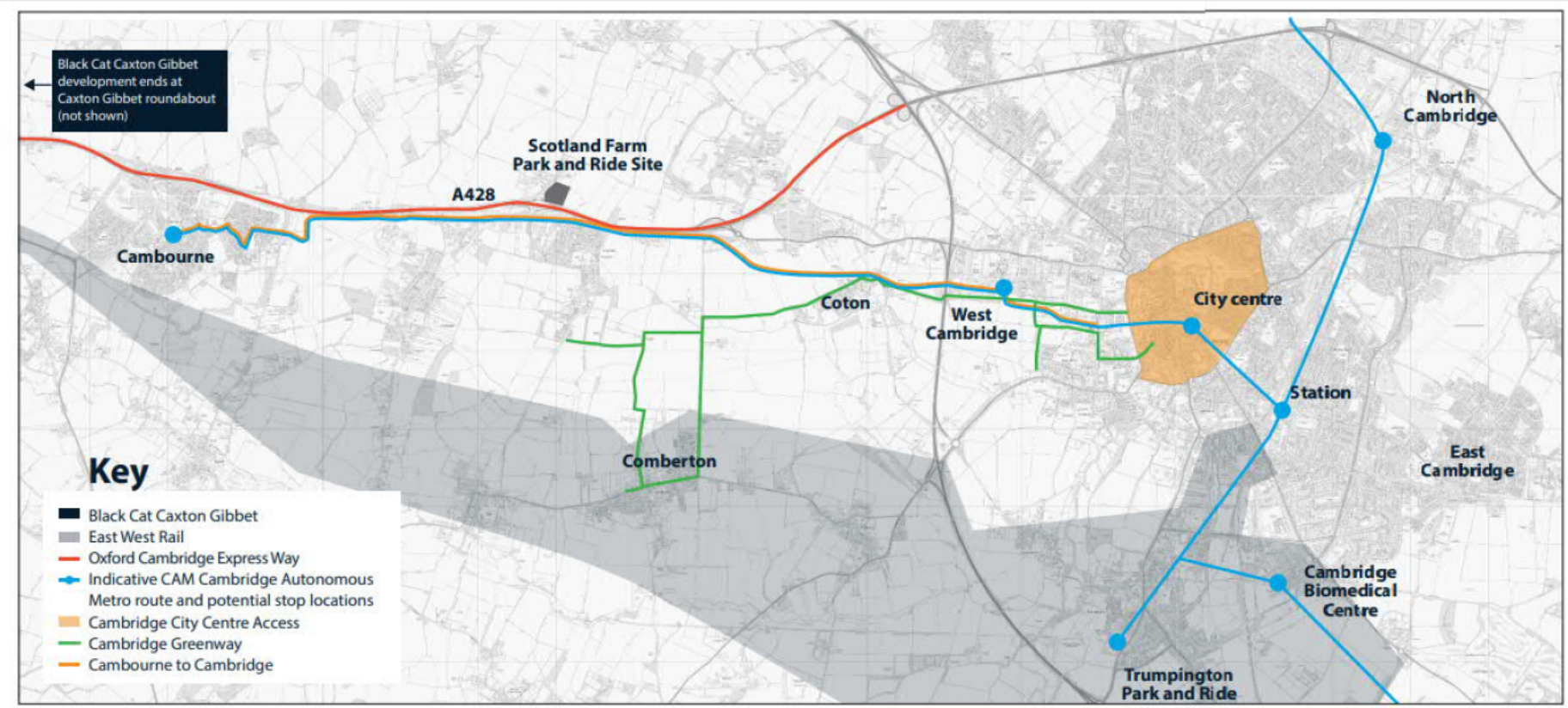

Figure 4-1 Planned Schemes (Indicative)

Source: Cambourne to Cambridge Better Public Transport Project: Non-technical Summary (Mott MacDonald, 2019)[24]

[24] The information in the figure is based on the information available at the time of the C2C Non-technical Summary. It should be noted that the Oxford Cambridge Expressway is no longer going ahead so is not considered further within this Technical Note..

4.2 Transport Strategy for Cambridge and South Cambridgeshire

4.2.1 The Transport Strategy for Cambridge and South Cambridgeshire (2014) considers the A428 Black Cat to Caxton Gibbet Scheme, along with other mitigations, as part of the strategy for the St Neots to Cambridge corridor. The A428 Scheme is listed as a key intervention, since it will remove capacity constraints in the western part of the corridor, which currently cause delay to buses and general traffic, particularly the A428/A1198 Caxton Gibbet roundabout.

4.2.2 The Transport Strategy states that '*a busway or HQPT bus infrastructure will be introduced along the A1303 section of the corridor to completely segregate buses from other traffic. It will service a second Park & Ride site between Cambourne and the A1303, which will intercept traffic further out from Cambridge and free up more capacity at the existing Madingley Road site which would then be used principally for traffic coming off the M11'.*

4.2.3 The Transport Strategy includes a series of planning obligations for the Bourn Airfield and Cambourne West sites, which include:

a. Busway between West Cambourne site and the junction of the A1303/A428.

b. Segregated bus links between the A428 and the M11.

c. A1303/A428 outer Park & Ride capacity.

4.3 Greater Cambridge Partnership (GCP) – Making Connections and Network Hierarchy Review

4.3.1 The Making Connections proposals seek to increase walking and cycling, improve public transport journeys, reduce congestion, improve air quality, reduce carbon emissions, and improve the local environment. The Combined Authority wishes to reduce car travel by 15% across Cambridgeshire and Peterborough, by providing attractive alternatives to the private car, whilst managing demand for private vehicles through parking charges, road charging or pollution charges.

4.3.2 The Greater Cambridge Partnership (GCP) has consulted on the proposals for public transport improvements and walking and cycling improvements. The consultation, which finished in December 2021, also sought the public's views on options for raising money to pay for the improvements which would manage demand for private car travel. These options include: Parking charges (5-10% reduction in congestion), Flexible charge for travelling in an area (15-20% reduction in congestion) and a Pollution charge (10-15% reduction in congestion, but this may reduce by 2030 as more people switch to low/ zero emission cars).

4.3.3 The proposals aim to encourage non-car travel by providing a 'transformed bus network'. This would include improved bus services to rural villages, higher frequencies (six per hour) and in some cases, express services to market towns/ larger villages. The proposals also include more direct services to employment areas, which would operate on at least a 10-minute frequency. The bus proposals relevant to the A1303 are shown below in **Figure 4-2**.

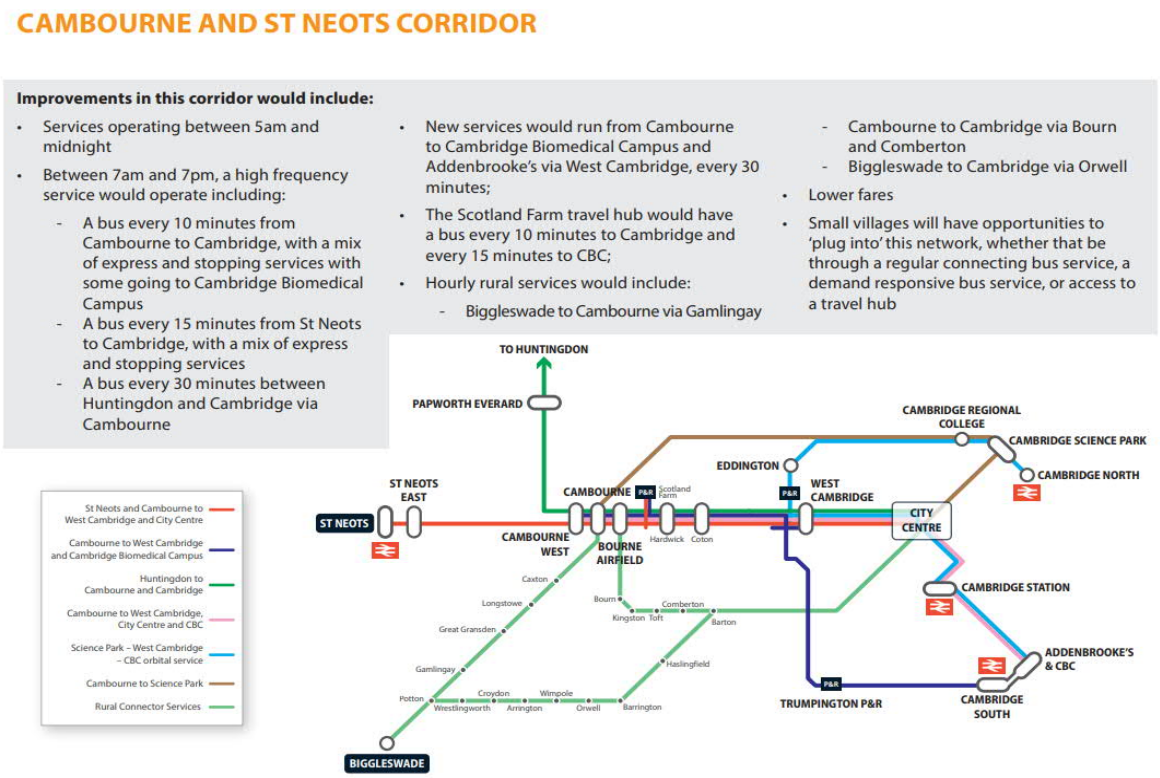

Figure 4-2 Public Transport Proposals (source: Making Connections Consultation)

4.3.4 The proposals aim to deliver better cycling and walking routes, over and above the significant investment in the active travel network, as lower traffic levels will create opportunities for this.

4.3.5 The improved public transport services and cycling/ walking improvements are reliant on a reduction in traffic levels. This is proposed to be achieved through traffic demand management, either road user charging zone or parking charges, freeing up road space.

4.3.6 Greater Cambridge Partnership (GCP) are also undertaking a Network Hierarchy review, which will look at downscaling the highway network, to 'lock-in' modal shift that occurs due to the walking, cycling and public transport proposals. In addition, civil parking enforcement powers are being considered, which would enable more effective management of parking in residential areas.

4.4 Identified short-term measures

Cambourne to Cambridge Better Public Transport (C2C)

4.4.2 The Cambourne to Cambridge Better Public Transport (C2C) project aims to ease congestion along the A1303 corridor and significantly improve the public transport network between Cambourne and Cambridge by providing an off-road bus route from Cambourne to Grange Road, a new Park & Ride facility at Scotland Farm near the A428 Scotland Road, Hardwick junction, and new high-quality cycling and walking facilities by 2026.

4.4.3 The C2C scheme would complement the A428 Scheme: with the proposed new Park & Ride located to the east of the A428 Scheme providing access from areas such as St Neots; trips using the A428 to travel into/out of Cambridge could access this Park & Ride and avoid the predicted congestion on the A1303 corridor by switching to buses. As a result of C2C, bus patronage is forecast to more than double following implementation of the C2C project: from 370 average hourly passengers two-way to the east of the Madingley Mulch roundabout in the AM peak, to 863 passengers with the C2C scheme in place[25].

4.4.4 It is likely that some mode shift away from cars would result from the C2C project, which could alleviate some of the forecast congestion issues along the A1303. The C2C would present an attractive alternative to the significant number of short- to medium-length trips forecast along the A1303 corridor, such as trips between Cambourne and Cambridge, but also to longer trips using the A428 to access Cambridge via the Park & Ride.

4.4.5 The C2C project also provides safe and high-quality cycling facilities which would improve connectivity into Cambridge from areas such as Cambourne, which are a cyclable distance, providing another alternative to private car use.

4.4.6 The C2C scheme has not been included in the modelling for the A428 Black Cat to Caxton Gibbet Scheme because, at the time the traffic forecasting was undertaken, it did not have sufficient certainty associated with it, to include it in the Uncertainty Log. Therefore, any beneficial impact on traffic flows in the A1303 corridor that might arise from the C2C scheme has not been accounted for in the Vissim model of M11 Junction 13/A1303.

4.4.7 The A1303/M11 Junction 13 Vissim modelling is therefore considered to represent a worst-case scenario where no mitigation is provided for planned development.

Madingley Road Cycling and Walking Project

4.4.8 The Greater Cambridge Partnership is in the preliminary design phase of the Madingley Road Cycling and Walking Project. This project aims to improve the active mode provision along the A1303 corridor between the Madingley Road Park & Ride and the Northampton Street roundabout[26]. While no official planned delivery date is available, the project has potential to be delivered before the opening of the A428 Scheme. It is noted that the accesses delivered as part of the West Cambridge/North West Cambridge developments deliver some parts of the planned project.

[25] Cambourne to Cambridge Better Public Transport Project: Non-technical Summary (Mott MacDonald, 2019) https://www.greatercambridge.org.uk/asset-library/Transport/Transport-Projects/C2C/C2C-OBC-Jan-2021/C2C-Jan-2020-App-2-Non-technical-summary-report.pdf
[26] Madingley Road (Greater Cambridge Partnership, 2021)

Comberton Greenway

4.4.9 The Comberton Greenway project aims to provide an active travel route between Comberton, to the south of the A1303, and Cambridge. The proposed route covers parts of the A1303, specifically connecting Coton and Cambridge. Assuming a cycle speed of 10 mph, the route would allow cyclists to travel between Coton and Cambridge (Silver Street) in 17 minutes. The project is currently in the detailed design phase.[27]

Developer Proposals

4.4.10 There are some measures included in the Transport Assessments for development sites, which have not been included in the A1303 Vissim modelling at this stage. The measures were not included since there was insufficient certainty or a lack of information available at the time of modelling.

4.4.11 The Bourn Airfield development includes a proposal to modify the eastbound bus lane at the M11 Junction 13, to allow two eastbound all-traffic lanes. A bus gate is proposed to control merging from the end of the bus lane, further back to the west from the current location. The LInSig modelling has indicated that this could reduce eastbound queues and mean both vehicles and buses are less delayed.

4.4.12 The West Cambridge development proposes a new Western Access off the A1303, which will be delivered 'Post Phase 1'. Phase 1 was planned to be completed by 2021, so it is assumed this new access may be delivered between 2021 and 2031. The new access would be right in/ left out signalised junction, so trips accessing the West Cambridge development from the west could leave the A1303 without passing through the Park and Ride or Eddington Avenue junctions; similarly, trips destined for the west could leave to the west without passing through those signals. It is therefore expected that this additional access point would have a beneficial impact on the A1303 operation.

4.5 Longer-term measures

M11 Junction 13 Cambridge West (RIS 3)

4.5.2 The Road Investment Strategy 3 (RIS3) – which will run from 2025 to 2030 - has identified the M11 Junction 13 for potential junction improvements. Options are currently being generated and considered, mainly to mitigate for the queuing on the M11 off-slip, which impacts the operation of the M11 at times.

4.5.3 Although the capacity issues along the A1303 mainly stem from the signalised junctions to the east of M11 Junction 13, the current operation of the M11 Junction 13 contributes to the eastbound congestion issues on the A1303, so it is likely that a new junction which is likely to be larger, will also provide benefits for the A1303.

[27] Comberton Greenway (Greater Cambridge Partnership, 2021)

East West Rail

4.5.4 The East West Rail (EWR) scheme aims to increase public transport patronage, support growth and reduce congestion along the strategic link between Oxford and Cambridge. EWR is a proposed new rail link, connecting communities between Oxford, Milton Keynes, Bedford and Cambridge. The project will be delivered in three connection stages - the last section of the network between Bedford and Cambridge is planned to be delivered in the last stage, by the end of the decade.

4.5.5 The section between Bedford and Cambridge is planned to include stops at St Neots or Sandy and Cambourne[28]. As there is currently no direct rail link between Cambridge and Bedford, EWR is expected to significantly reduce rail journey times along this route and thereby provide an alternative to the private car for a proportion of trips along the A1303.

Development Sites – Mitigation Measures

4.5.6 As discussed in Section 3.1, several of the forthcoming development sites along or near the A1303 propose measures to mitigate for/reduce the trips generated by the developments, following the A428 Scheme opening. However, there is a level of uncertainty regarding what is proposed and when this would be delivered, since the planning applications are at an outline stage.

4.5.7 The developments include measures for limiting trip generation by private car, such as constraining parking provision, enhancement of bus services, providing cycle and pedestrian links and travel plans with ambitious trip reduction targets. The developments which impact the A1303 have been approved on the basis that their build out is dependent on future travel behaviour and traffic conditions, so the funding contributions have therefore been agreed, but the precise detail of the longer-term packages of mitigation measures are yet to be determined. The development proposals all conclude that the additional trip generation will not result in a severe impact on the A1303; this is not consistent with the resulting impacts from the Strategic Traffic Model (as reported in the Traffic Forecasting Report **[APP-253]**), which cannot include these measures as they are too uncertain/have not been defined at this stage.

[28] Making Meaningful Connections: Consultation Document (East West Rail, 2021)

5 Conclusion

5.1 Summary

5.1.1 This study has identified the existing traffic congestion problems along the A1303 corridor and assessed the impacts of future developments and proposed schemes on the corridor with and without the proposed A428 Scheme.

5.1.2 The study has focussed on the eastbound congestion problems on the A1303, which have the potential to be exacerbated in future as a result of the A428 Scheme with a risk of queuing back onto the A428. The majority of the predicted congestion is attributable to the background traffic growth and the new trips generated from the planned new developments.

5.2 Modelling Summary

5.2.1 The 2025 Strategic Traffic Model predicts that there will be higher eastbound traffic flows on the A1303 in the 2025 AM as a result of the Scheme. The 2025 Vissim model (based on the Strategic Traffic Model demand changes) predicts that queues along the A1303 will extend through the Madingley Mulch roundabout and along the A428 off-slip, potentially impacting the operation of the A428 in the AM.

5.2.2 The 2040 Do Minimum Strategic Traffic Model predicts that, due to planned development and infrastructure changes, there will be higher eastbound flows on the A1303 in the 2040 AM (145 PCUs), compared to the 2025 Do Minimum. The 2040 Do Minimum Vissim models (based on Strategic Traffic Model demand changes) show that queues on the A1303 are likely to extend far enough to impact the A428 in 2040, without the A428 Scheme in place.

5.2.3 The 2040 Do Something Strategic Traffic Model predicts an eastbound increase of approximately 180 PCUs in the 2040 AM peak hour, due to the A428 Scheme. As there are predicted to be queuing problems on the A428, without the Scheme in place, the additional traffic is predicted to result in longer queues on the A428.

5.2.4 In the PM peak hour, the 2040 Do Minimum models predict much longer queues than 2025, but these are not predicted to extend to the A428. However, in the 2040 PM there is a significant increase in eastbound traffic flows (100 PCUs) due to the A428 Scheme, which is predicted to cause queues to become long enough to impact the operation of the A428, although significant queueing is not predicted on the A428.

5.2.5 It should be noted that the Strategic Traffic Model (which informs the demand changes modelled in the A1303/M11 Junction 13 Vissim model) includes the major development sites at West Cambridge, Bourn Airfield and Cambourne West, and the traffic likely to be generated by these sites.

5.2.6 However, no allowance has been made for proposed strategic improvements to public transport and cycle facilities between Cambridge and developments in the A1303 and A428 corridors to the west. This is because no specific proposals were sufficiently certain to be included at the time of modelling.

5.2.7 As described in Section 3.1 above, the developments have been approved on the basis that this strategic public transport infrastructure will be provided. The A1303/M11 Junction 13 Vissim modelling therefore represents a worst-case scenario where no mitigation is provided for the planned development which has been included in the model.

5.3 Mitigations

5.3.1 C2C (Cambourne to Cambridge) Better Public Transport scheme, planned for delivery before 2025, is likely to reduce car trips along the A1303 through provision of an off-road bus route, if delivered. The additional traffic predicted to use the A1303 in future is likely to be well suited to transfer to buses, using the proposed Park & Ride facility at Scotland Farm, to the west of the A1303. There is likely to be a reduction in car trips along the A1303; however, as advised by Cambridgeshire County Council, the estimated numbers of car trips which would transfer and use the C2C scheme is not available at this time.

5.3.2 The Madingley Road scheme would improve cycle facilities along the A1303. Along with developer proposals, delivered through S106 commitments, to improve cycle infrastructure to/from Madingley Mulch roundabout from the west, there is potential for the A1303 to be significantly more attractive to cycling.

5.3.3 There are some developer proposals which may improve eastbound operation of the A1303, and which may be implemented a few years after the A428 Scheme, which were not included in the Vissim models:

a. Modifications to the eastbound bus lane at M11 Junction 13, to provide two eastbound traffic lanes, which has been predicted to reduce eastbound queueing on the A1303.

b. Provision of a Western Access junction on the A1303, providing access to the West Cambridge development. This access has potential to improve the operation of the A1303, by intercepting trips between the development and the west, so vehicles do not need to pass through the Park and Ride/ Eddington Avenue junctions.

5.3.4 Although the schemes are at an early stage and therefore detailed proposals are not available, the following schemes are in the pipeline:

a. East-West Rail: which is expected to be delivered by the end of the next decade, may include stops at St Neots/Sandy and Cambourne, providing an attractive alternative to car use into Cambridge.

b. M11 Junction 13 West Cambridge (RIS3) junction improvements, which is in the pipeline of schemes being considered for implementation before 2030 and may improve eastbound operation of the A1303.

5.3.5 The extent to which existing traffic conditions on the A1303 corridor will be exacerbated by the proposed future developments is uncertain and can only be determined once the next phases of the developments come forward.

5.3.6 While several proposals identified in this paper have the potential to improve conditions along the A1303 corridor, there is currently no certainty with regards timescales and delivery. However, notwithstanding the uncertainty regarding specific proposals, there are clear commitments and policies in place to deliver strategic public transport improvements and cycling infrastructure to reduce car trips on the A1303, for developers to meet their planning obligations. The quantity of development that can be built out will be restricted until these improvements are delivered.

5.4 Recommendations

5.4.1 Based on the findings of this study and noting the high level of uncertainty with regards to predictions of future conditions within the A1303 corridor, traffic conditions on the A428 off-slip and A1303 east of Madingley Mulch roundabout will be monitored prior to the scheme opening for traffic and this location will be recommended for monitoring as part of National Highway's post opening project evaluation of the Scheme. It is envisaged that monitoring of the A428 off-slip would be undertaken by National Highways to complement any monitoring of the A1303 undertaken by Cambridgeshire County Council (CCC) and both parties would share results.

5.4.2 It should be noted that the modelled 2040 design year is in eighteen years' time and there is therefore a significant amount of time to monitor and plan, with opportunities to fund potential solutions. In the Scheme opening year, the modelling has identified a potential issue, whereby queues on the A1303/ A428 off-slip have potential to impact the operation of the A428. However, there are interventions proposed by the Local Authority and developers which may mean this issue does not occur in practice, and significant uncertainty regarding future conditions on the A1303, so it would be inappropriate to propose specific measures at this time. National Highways has the powers and potential funding to manage urgent safety issues if they arise on the Strategic Road Network. The proposed monitoring of the A428 off-slip, pre and post implementation will ensure any potential issue is identified.

5.4.3 In accordance with section 4 of the Infrastructure Act 2015, it is National Highways responsibility to periodically prepare and publish route strategies; as part of this National Highways must consider opportunities for collaborative solutions, including potential interventions off National Highways network. It is therefore proposed, that if monitoring shows it is necessary, measures to address the problems identified could be brought forward in collaboration with the Local Highway Authority.