

## **PART 3 PERFORMANCE OF THE HIGHWAY NETWORK IN THE FUTURE YEAR**

*Part 3 of the Transport Assessment contains the following sections:*

**Section 11 - Construction Traffic**

**Section 12 - Summary of the Supporting Modelling Work**

**Section 13 - Development Trip Generation**

**Section 14 - 2021 Key Phase 1 – Trip Impact Analysis**

**Section 15 - 2031 Full Development – Trip Impact Analysis**

# 11 Construction Traffic

## 11.1 Introduction

11.1.1 This section identifies the potential peak movements associated with the construction of the Development, and assesses the effects of these movements on the surrounding highway network.

## 11.2 Assessment of the peak Construction movements

11.2.1 The assessment of the peak construction movements is contained in Appendix 11.1.

11.2.2 The assumed Peak Daily Construction traffic flows are summarised in Table 11.1:

Table 11.1 – Peak Daily Construction Movements

Activity	Max Light Vehicle Movts / day			Max Heavy Vehicle Movts / day			Max Total Vehicle Movts / day		
	In	Out	Tot	In	Out	Tot	In	Out	Tot
Earthworks	10	10	20	82	82	164	92	92	184
On-Site Drainage	4	4	8	4	4	8	8	8	16
Carriageway construction	6	6	12	60	60	120	66	66	132
Building construction	10	10	20	0	0	0	10	10	20
<b>Total</b>	<b>30</b>	<b>30</b>	<b>60</b>	<b>146</b>	<b>146</b>	<b>292</b>	<b>176</b>	<b>176</b>	<b>352</b>

11.2.3 These flows are used to assess the impact of the Development on the surrounding highway network.

## 11.3 Assessment of the peak Construction impact

11.3.1 Of the Construction flows summarised above, only a limited number of car and HGV movements would typically occur during the peak hours: the working hours of most operatives would not coincide with the network peak, and construction processes would be programmed to avoid reliance on deliveries of concrete and bituminous materials during the more congested periods. As there would be only a limited number of Construction movements in the peak hours, no peak hour assessment has been made.

11.3.2 The following assumptions are made with respect to the assignment of these construction trips:

- i. no heavy vehicle will be permitted to access the Development from the east through the City of Cambridge – all movements will be from the M11 or A1303;
- ii. the operatives are assumed to be resident locally, and would arrive from the following destinations:

- Madingley Road (East) - 30%
- A14 (North West) - 25% (reassigning via Madingley Road)
- M11 (South) - 10%
- A14 (East) - 25% (reassigning via Madingley Road)
- A1303 / A428 - 10%

iii. reflecting the potential supplier locations, it is assumed that material deliveries will arrive from the following destinations:

- Madingley Road (East) - 0%
- A14 (North West) - 35% (reassigning via M11 Junction 12)
- M11 (South) - 25%
- A14 (East) - 25% (reassigning via M11 Junction 12)
- A1303 / A428 - 15%

11.3.3 On the basis of this worst-case assessment of the construction activity trip generation, a worst-case assessment of the likely impact on daily flow is shown in Table 11.2 with respect to the 2019 Base Year flows. The flows in this table assume that all access will be from M11 Junction 13 and Madingley Road:

Table 11.2: Construction traffic impacts – Pre-Opening

Link No	Link	Base 2019 Daily Flow (24hr, 7 day 1-way flows)		Estimated Daily Construction Traffic (1-way)		Increase		
		All Vehs	Heavy Vehs	Light Vehs	Heavy Vehs	All Vehs	All Vehs	Heavy Vehs
1.0	M11 - J12 - J13 - Nbd	46,169	7,170	3	124	127	0.3%	1.7%
1.0	M11 - J12 - J13 - Sbd	46,168	7,170	3	124	127	0.3%	1.7%
1.1	M11 J13 -J14 - Nbd	34,193	5,310	0	88	88	0.3%	1.7%
1.1	M11 J13 -J14 - Sbd	33,653	5,226	0	88	88	0.3%	1.7%
1.3	M11 J13 off-slip - Nbd	13,615	2,114	3	124	127	0.9%	5.9%
1.3	M11 J13 on-slip - Sbd	9,634	1,496	3	124	127	1.3%	8.3%
2.0	A14 West of J30 (Bar Hill) - Ebd	39,106	7,166	8	51	59	0.2%	0.7%
2.0	A14 West of J30 (Bar Hill) - Wbd	40,642	7,448	8	51	59	0.1%	0.7%
2.1	A14 North East of M11 J14 - Ebd	38,641	7,081	8	51	59	0.2%	0.7%

Link No	Link	Base 2019 Daily Flow (24hr, 7 day 1-way flows)		Estimated Daily Construction Traffic (1-way)		Increase		
		All Vehs	Heavy Vehs	Light Vehs	Heavy Vehs	All Vehs	All Vehs	Heavy Vehs
2.1	A14 North East M11 J14 – Wbd	38,527	7,060	8	51	59	0.2%	0.7%
2.2	A14 West of J32 Interchange - Ebd	40,733	7,465	8	37	44	0.1%	0.5%
2.2	A14 West of J32 Interchange - Wbd	40,733	7,465	8	37	44	0.1%	0.5%
3.0	A1303 East of Madingley Mulch Rbt Ebd	6,949	380	3	22	25	0.4%	5.8%
3.0	A1303 East of Madingley Mulch Rbt Wbd	12,013	658	3	22	25	0.2%	3.3%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	15,718	861	3	22	25	0.2%	2.6%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	11,295	618	3	22	25	0.2%	3.6%
3.2	Madingley Rd on Over Bridge M11 Ebd	18,065	989	6	146	152	0.8%	14.8%
3.2	Madingley Rd on Over Bridge M11 Wbd	8,148	446	3	22	25	0.3%	4.9%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	12,534	426	6	146	152	1.2%	34.3%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	12,742	433	6	146	152	1.2%	33.7%
3.4	Madingley Rd - West of P&R Access Wbd	12,952	440	6	146	152	1.2%	33.2%
3.4	Madingley Rd - West of P&R Access Ebd	12,713	432	6	146	152	1.2%	33.8%
3.5	Madingley Rd - East of P&R Access Wbd	12,161	413	6	146	152	1.2%	35.4%
3.5	Madingley Rd - East of P&R Access Ebd	12,119	412	6	146	152	1.3%	35.4%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	9,705	330	6	146	152	1.6%	44.2%

Link No	Link	Base 2019 Daily Flow (24hr, 7 day 1-way flows)		Estimated Daily Construction Traffic (1-way)		Increase		
		All Vehs	Heavy Vehs	Light Vehs	Heavy Vehs	All Vehs	All Vehs	Heavy Vehs
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	10,069	342	6	146	152	1.5%	42.7%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	8,360	284	24	0	24	0.3%	0.0%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	8,945	304	24	0	24	0.3%	0.0%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	8,140	277	24	0	24	0.3%	0.0%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	8,732	297	24	0	24	0.3%	0.0%

(Links with minimal impact have not been reported)

- 11.3.4 In terms of impact due to the construction of the Development, the largest increase in existing flows would be the increase of heavy vehicles on Madingley Road between the M11 and the Site Access, where there would be a circa 40% increase in existing heavy vehicles. Nevertheless, this would remain well within the overall capacity of the road – and subsumed within the negligible 1.5% all vehicle increase.
- 11.3.5 On all other routes, the increase in general traffic resulting from the construction activity is considered to be negligible.

## 12 Summary of the Supporting Modelling work

### 12.1 Introduction

- 12.1.1 This section summarises the modelling work undertaken to support the West Cambridge outline planning application.
- 12.1.2 Within the context of an assessment of Key Phase 1 in 2021 with relatively small development impact, it was agreed that a more local approach to the assessment of impact was appropriate. The following methodology was therefore agreed with the Joint Authorities, based upon Stantec's first-principles modelling approach.
- 12.1.3 To understand the potential traffic impact and assignment of the Full Phase of the Proposed Development in 2031, the analysis has been continued to consider a later scenario – acknowledging that West Cambridge is being brought forward within the context of some considerable uncertainty, including:
- i. the scale of local residential development identified in the Cambridge Local Plan 2018;
  - ii. the impact of the A14 Huntingdon – Cambridge Improvement Scheme granted a Development Consent Order by the Secretary of State in May 2016, with construction due to be completed in a phased manner to the end of 2020;
  - iii. the A428 Black Cat to Caxton Gibbet Enhancement Scheme, with options having recently been issued for consultation;
  - iv. the on-going deliberations and uncertainty surrounding the Greater Cambridge Partnerships and Long Term Transport Strategies;
  - v. Highways England's need to consider measures along the M11 - and the inclusion within the Department for Transport's March 2020 Road Investment Strategy 2 statement that the M11 Junction 13 is a "RIS3 Pipeline" Scheme for 2025 - 2030; and
  - vi. the impact of a series of other transport schemes – including - inter alia – the Oxford – Cambridge Expressway, and East-West Rail.
- 12.1.4 As such, the information provided within this Transport Assessment is to inform the likely future development impacts and the assessment of the Transport Cap - to finance the necessary development mitigation. The detail included within this assessment will be reviewed subsequently in the context of the applications for later phases in the context of further clarity being reached.

### 12.2 The Stantec Transport Model

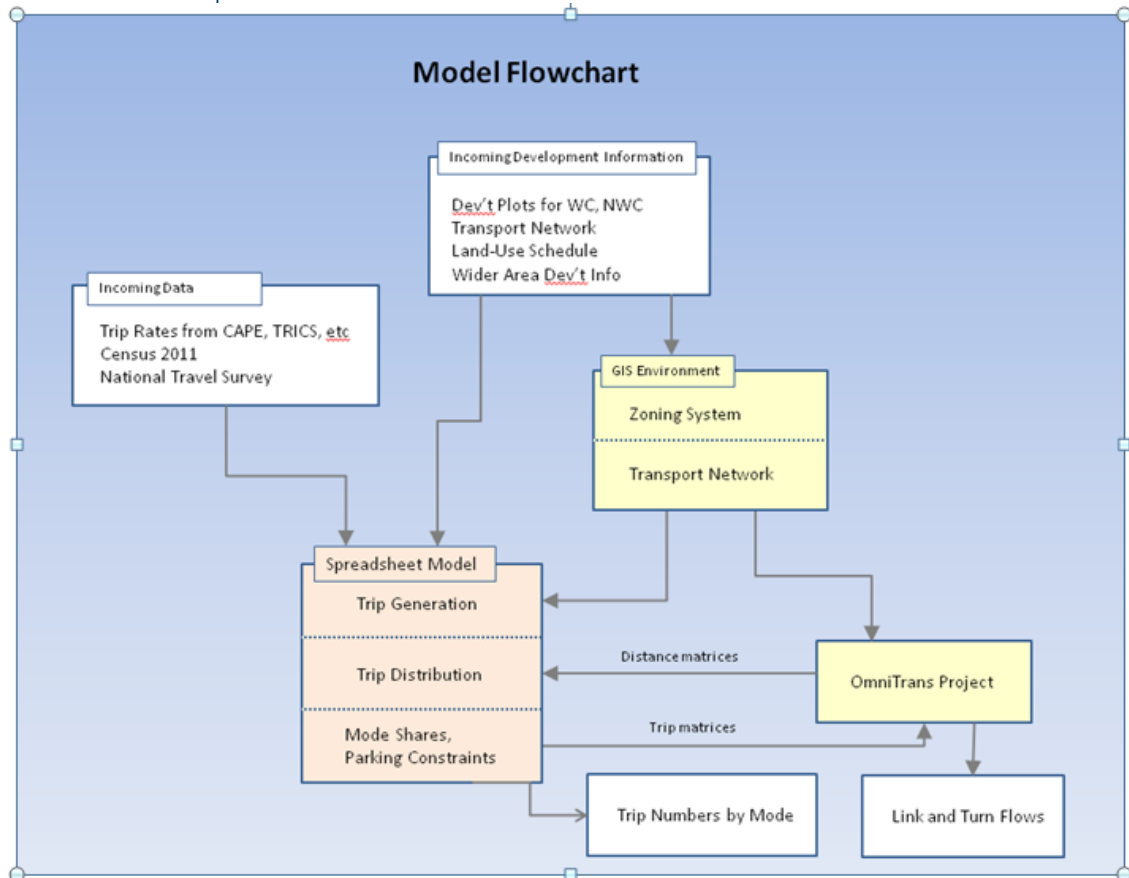
- 12.2.1 Stantec's Transport Model was originally developed in conjunction with the Highway Authorities – Cambridgeshire County Council and the Highways Agency (now operating as Highways England) - to assess development trips resulting from the adjacent North West Cambridge Development.
- 12.2.2 The Stantec Transport Model has since been subjected to detailed review by Cambridgeshire County Council, and has been expanded to include the West Cambridge site - as well as the additional modelling zones for other Local Plan allocations within in the wider Cambridge area.
- 12.2.3 The modelling process estimated all trip numbers generated by the West Cambridge Development and other developments in the Cambridge area by combining a series of processes:

- the spreadsheet-based part of the modelling process produced trip matrices for different scenarios, transport modes and time periods;
- these trip matrices are then assigned on the transport network using the transport model software.

12.2.4 The main features of the Transport Model structure, shown in Plate 12.1 are:

- i. Spreadsheet Model, comprising of the various elements to assess:
  - the Development Land-Use Data - The assembly and calculation of land use data for all the development zones in the model for Housing, and for 'Other Uses' - for non-housing land uses;
  - trip generation by land-use types, using a series of agreed data sources – including TRICS data and person trip surveys undertaken at West Cambridge;
  - distribution by land-use types, using a Gravity Model, calibrated with reference to available data (such as the Census, and journey-to-work survey data);
  - the trip matrices – created by mode, by land-use;
  - adjustments to account for deterrence to car travel – such as car parking constraints;
- ii. the Network and Zoning System:
  - transport network - a detailed road network was developed for the wider Cambridge area, including all of South Cambridgeshire and parts of Essex and Hertfordshire. The existing road network was extracted from a national digital road network (Navteq data) which included measured link speeds from GPS systems for individual links in the network, enabling network distances and travel times to be calculated;
  - zoning system – all development is loaded onto the network by a series of zones. These zones were devised in GIS, based on Census single and multiple output areas in and around Cambridge. Outside of Cambridge, these areas broaden to single and multiple wards, with larger zones representing local authorities on the periphery of the zoning system. In addition to the Census-based zones around the periphery of the model, a series of smaller zones were introduced for development areas, with multiple zones used for North West Cambridge and West Cambridge so that relatively short trips can be modelled sufficiently - typically by foot or bicycle;
- iii. Post-Processing of Trip Matrices - the matrices of development trips by mode, output from the Spreadsheet Model for each scenario, are imported into OmniTrans, the transport model software, and assigned to the appropriate network by journey time.

Plate 12 1: The Transport Model Process



12.2.5 Further details of the Stantec Spreadsheet Model are contained in Technical Note 7A, contained in Appendix 12.1.

## 12.3 Local Model Amendments

12.3.1 The 2021 and 2031 Do Something results from the more strategic Spreadsheet Model were then adjusted to reflect more accurately local conditions and influences. Details are provided in this section.

### Reflecting Potential On-site Car Parking Locations

12.3.2 The modelled West Cambridge Development total inbound and outbound flows have been adjusted locally along Madingley Road between the Western Access Road and Clerk Maxwell Road, to:

- i. reflect the likely assignment of these trips to the potential on-site car parking availability. The modelled car parking choice reflected:
  - the origin / destination of the arriving / departing trips;
  - the car parking in each phase considered;
  - the likely total number of car parking spaces likely to be accessed via these junctions; and



- ii. include for the additional existing Park and Cycle patronage being included within the Estate car parking provision.

### **Clerk Maxwell Road**

12.3.3 Clerk Maxwell Road could be used to access a potential enhanced car parking facility located at the park and cycle car park (other access options are being considered). Although access may be provided elsewhere through West Cambridge, it has been assumed that Clerk Maxwell Road is used to ensure a worst-case assessment of this option.

12.3.4 As part of the travel management strategy for West Cambridge reported in Section 6, the University has proposals to remove the existing on-street car parking along Clerk Maxwell Road to improve the environmental conditions: this would affect the vehicle movements along this link.

12.3.5 The changes therefore include:

- i. removal of the existing 292 space Park and Cycle car park accessed off Clerk Maxwell Road;
- ii. removing the existing 85 - 90 on-road car parking spaces on both sides of the carriageway, and replacing them with two advisory cycle lanes; and
- iii. potentially accessing a 450 space multi-storey car park using the old Park and Cycle car park access.

12.3.6 The Base flows on Clerk Maxwell Road have been adjusted to:

- i. remove all the trip generation associated with the on-street car parking;
- ii. account for the predicted trip generation from the Cocks and Hens application, a 25 No. residential units located in The Lawns and Perry Court;
- iii. remove all the trips associated with the Park and Cycle car park; and
- iv. to provide a worst-case assessment, to add all the trips assigning to the 450 space multi-storey car park – acknowledging that the University is still considering alternative access options to this facility.

### **Amendments for a Strategic Transport Scheme on Madingley Road**

12.3.7 The modelling has accounted for the future delivery of an area-wide strategic transport scheme along the A428 – A1303 Corridor to reduce car movements. As requested by the County Council, the University is offering developer contributions to this, to deliver quality bus connectivity between the west, through the Site to the City. Whilst subject to confirmation, as agreed with the County Council this scheme would provide three elements:

- i. a new public transport link from Cambourne to Cambridge;
- ii. a new Park & Ride site off the A428 / A1303; and
- iii. new cycling and walking facilities.

12.3.8 A high-level assessment of the likely number of existing peak hour car-based trips on the Madingley Road Corridor that would re-mode to this strategic bus services was undertaken by Stantec, and agreed with the County Council. This extraction of trips has been assessed along the following two approaches, as conditions on each differ:

- i. to / from Madingley Road west of M11; and
- ii. to / from M11 (South).

12.3.9 The following three conditions have been considered in extracting car-based trips:

- i. those currently travelling along Madingley Road into the City;
- ii. those currently travelling along Madingley Road into the P+R; and
- iii. those currently travelling into West Cambridge.

12.3.10 For the 2031 Mitigated Do Something Assessment, the 2031 Do Something peak hour flows trips have been adjusted to account for the following existing movements re-moded from car to a Cambourne to Cambridge Public Transport Route scheme in the tidal direction of In (AM) and Out (PM):

- i. a total of 353 car-based trips into West Cambridge; and
- ii. a further 211 non-West Cambridge car-based trips assigning to the existing Park and Ride or towards Cambridge.

12.3.11 Any additional future West Cambridge-bound trips are assessed within the West Cambridge Public Transport measures – see below.

12.3.12 Whilst the number of trips in the non-tidal direction would be much lower, these have not been included within the adjustment of the total movements – thus providing a reasonable assessment.

12.3.13 Further details are contained in Appendix 12.2.

### **Amendments for the West Cambridge Public Transport measures**

12.3.14 As identified in Section 7, the University has developed a Public Transport strategy to complement and support CCC's strategic transport scheme, intended to intercept inbound movements on the approach corridors.

12.3.15 For the 2031 Mitigated Do Something Assessment, the 2031 Do Something peak hour flows trips have been adjusted to account for the following existing movements re-moded from car to the West Cambridge public transport services in the tidal direction of In (AM) and Out (PM):

- i. the Citi 4 or CCC strategic transport scheme – for movements from the A428 (West) – 85 / 75
- ii. the Universal – for movements from the east of Cambridge – 100 / 40
- iii. the Arc (North) service – for movements from the A14 (East) and A10 (North) – 120 / 110;
- iv. the Arc (South) service – for movements from the M11 (South) – 190 / 190; and
- v. the Guided Bus service – for movements from the A14 (North-West) – 200 / 170.

12.3.16 As the number of trips in the non-tidal direction is much lower, these have not been included within the adjustment of the total movements.

## **12.4 Options tested**

12.4.1 Reference is made in the Environmental Statement Transport Chapter to the following tests:

- i. the effects of the Construction Phase of Development – this is assessed in the context of the 2019 Base flows;
- ii. the operational effects of completion of Key Phase 1 in 2021 – cumulative impact assessment;
- iii. the operational effects of the Full Development in 2031 – cumulative impact assessment; and
- iv. the operational effects of the Mitigated Full Development in 2031 – cumulative impact assessment.

12.4.2 The results from the modelling option tests are reported within this Transport Assessment for 2019, 2021, and 2031. Reflecting the adopted Monitor and Manage Approach (summarised in Section 2), the detailed assessment of effects of the later phases beyond 2021 would be considered in the context of the emerging planning and transport infrastructure proposals for the area.

12.4.3 The following sections summarise the results of the scenarios.

## 13 Development Vehicular Trip Generation

### 13.1 Introduction

13.1.1 This section summarises the following:

- i. the vehicle trip generation for the Consented West Cambridge Development – the Do Minimum scenario - as reported by Hannah Reed in 1997 in support of the outline planning application; and
- ii. the West Cambridge Development vehicular trip generation arising in the 2021 Do Minimum and 2021 Do Something scenarios;
- iii. the West Cambridge Development vehicular trip generation arising in the 2031 Do Minimum and 2031 Do Something scenarios; and
- iv. the West Cambridge Development vehicular trip generation arising in the 2031 Mitigated Full Development – cumulative impact assessment.

### 13.2 Vehicle trip generation to support the Consented 1999 Application scenario

13.2.1 As reported in Section 2.3, Hannah Reed prepared the Transportation Study to support the University of Cambridge's original 1997 West Cambridge Development planning application. This was subsequently approved by the Joint Authorities – Cambridge City Council, the local planning authority, Cambridgeshire County Council, the local highway authority, and the strategic highway authority, the Highways Agency (now referred to as Highways England).

13.2.2 The vehicle flows accruing to the consented West Cambridge Development were agreed with the Joint Authorities in 1999. These are summarised in Table 13.1.

13.2.3 The vehicle trip generation for the Consented – Do Minimum scenario - has been reassessed, and is reported below.

### 13.3 Predicted West Cambridge Development movements

13.3.1 The peak hour and 12 hour trip generation by mode from West Cambridge has been assessed, using the Stantec Transport Model for the following scenarios:

- i. 2019 Base Year;
- ii. 2021 Do Minimum (i.e., With the 1999 Consented Development – contained in Table 13.1);
- iii. 2021 Do Something (i.e., With the Proposed Key Phase 1 – contained in Table 13.2);
- iv. 2031 Do Minimum (i.e., With the 1999 Consented Development – contained in Table 13.3);
- v. 2031 Do Something (i.e., With the Proposed Full Development – contained in Table 13.4).

13.3.2 A further scenario, the 2031 Mitigated Do Something (i.e., With the Proposed Full Development, and the benefit of a Cambourne to Cambridge and the West Cambridge Public Transport schemes) has been assessed for the peak hours with reference to the 2031 Do Something assessment and is reported in Table 13.5.

Table 13.1: 2021 Do Minimum All Mode Movements

Land Use source	Bus		Rail		Vehicles		Cycling		Walking		Total	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Academic Research												
AM	19	2	8	1	165	20	165	20	33	4	390	47
PM	3	25	1	11	28	219	28	220	6	43	66	518
12 Hour	156	144	70	65	1373	1271	1373	1275	277	248	3249	3003
Commercial												
AM	116	25	57	8	1252	237	135	78	161	47	1721	395
PM	27	123	7	45	217	1016	118	463	60	199	429	1846
12 Hour	641	605	176	173	4155	4103	2954	2643	1,192	1,084	9118	8608
<b>Total</b>												
AM	135	27	65	9	1,417	257	480	98	194	51	2291	442
PM	30	148	8	56	245	1,235	146	683	66	242	495	2364
12 Hour	797	749	246	238	5,528	5,374	4,327	3,918	1,469	1,3321	12,367	11,611
<b>12 hour Mode Share</b>	6%		2%		45%		34%		12%		100%	

Table 13.2: 2021 Do Something All Mode Movements

Land Use source	Bus		Rail		Vehicles		Cycling		Walking		Total	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Academic Research												
AM	22	3	11	1	190	23	285	35	51	6	559	68
PM	4	28	2	15	32	252	48	381	9	66	95	742
12 Hour	179	165	96	88	1585	1462	2375	2210	426	384	4661	4309
Commercial												
AM	136	27	69	10	1020	193	666	139	223	57	2114	426
PM	28	143	8	54	172	826	174	782	66	260	448	2065
12 Hour	731	694	209	208	3346	3323	4498	4088	1509	1374	10293	9687
<b>Total</b>												
AM	158	30	80	11	1210	216	951	174	274	63	2673	494
PM	32	171	10	69	204	1078	222	1,163	75	326	543	2807
12 Hour	910	859	305	296	4931	4785	6873	6298	1935	1758	14,954	13,996
<b>12 hour Mode Share</b>	6%		2%		34%		45%		13%		100%	

Table 13.3: 2031 Do Minimum All Mode Movements

Land Use source	Bus		Rail		Vehicles		Cycling		Walking		Total	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Academic Research												
AM	19	2	8	1	165	20	164	20	33	4	389	47
PM	3	25	1	11	28	220	28	220	6	43	66	519
12 Hour	155	144	69	64	1374	1273	1372	1272	279	250	3249	3003
Commercial												
AM	115	25	54	8	1242	236	318	78	179	51	1908	398
PM	27	122	7	43	217	1007	119	463	66	216	436	1851
12 Hour	640	602	167	164	4126	4074	2963	2653	1271	1159	9167	8652
<b>Total</b>												
AM	134	27	62	9	1,407	256	482	98	212	55	2297	445
PM	30	147	8	54	245	1,227	147	683	72	259	502	2370
12 Hour	795	746	236	228	5500	5347	4335	3925	1550	1409	12,416	11,655
<b>12 hour Mode Share</b>	6%		2%		45%		34%		12%		100%	

Table 13.4: 2031 Do Something All Mode Movements

Land Use and Use source	Bus		Rail		Vehicles		Cycling		Walking		Total	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Academic Research												
AM	33	4	17	2	291	36	437	54	78	9	856	105
PM	6	44	3	23	49	389	74	583	13	100	145	1139
12 Hour	261	254	136	133	2305	2253	3456	3374	614	580	6772	6594
Commercial												
AM	282	50	139	19	1887	351	1360	248	488	100	4156	768
PM	52	289	15	110	307	1524	308	1505	121	526	803	3954
12 Hour	1447	1371	422	417	6113	6073	8340	7603	2846	2618	19168	18082
<b>Total</b>												
AM	315	58	156	21	2,178	387	1,797	302	566	109	5012	877
PM	54	333	18	133	356	1,913	382	2,088	134	626	944	5093
12 Hour	1708	1625	558	550	8418	8326	11796	10977	3460	3198	25,940	24,676
<b>12 hour Mode Share</b>	7%		2%		33%		45%		13%		100%	

Table 13.5: 2031 Mitigated Do Something All Mode Movements

and Use source	Bus		Rail		Vehicles		Cycling		Walking		Total	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
<b>Total</b>												
AM	1,363	58	156	21	1,130	387	1,797	302	566	109	5012	877
PM	54	1,381	18	133	356	866	382	2,088	134	626	944	5093
Peak Hour Mode Share	24%		3%		23%		38%		12%		100%	

13.3.3 The peak hour vehicle trip generation from West Cambridge from the Stantec Transport Model is summarised in Table 13.6 for the following scenarios:

- i. 2019 Base Year (contained in Appendix 3.5);
- ii. 2021 Do Minimum (i.e., With the 1999 Consented Development – contained in Appendix 13.1);
- iii. 2021 Do Something (i.e., With the Proposed Key Phase 1 – contained in Appendix 13.2);
- iv. 2031 Do Minimum (i.e., With the 1999 Consented Development – contained in Appendix 13.3);
- v. 2031 Do Something (i.e., With the Proposed Full Development – contained in Appendix 13.4);
- vi. 2031 Mitigated Do Something (i.e., With the Proposed Full Development, and the benefit of an Area-Wide Strategic Mass Transit route scheme and the West Cambridge Public Transport schemes– contained in Appendix 13.5).

Table 13.6: Comparison of the 2020, 2021 and 2031 Peak Hour vehicle flows – Stantec (2020) and Hannah Reed (1997)

Scenarios		Academic Research Staff		Commercial and Other land uses		Total	
		In	Out	In	Out	In	Out
<b>2025 West Cambridge Consented Devt – Hannah Reed</b>	<b>AM</b>					<b>1,519</b>	<b>163</b>
	<b>PM</b>	-	-	-	-	-	-
2019 Base (Combined)	AM	-	-	-	-	402	329
	PM	-	-	-	-	359	456
2021 Do Minimum – 1999 Consented Devt	AM	165	20	1,253	236	1,418	256
	PM	28	219	218	1,016	246	1,235
2021 Do Something – Key Phase 1	AM	190	23	1,020	192	1,210	215
	PM	32	252	172	827	204	1,079
2031 Do Minimum – 1999 Consented Devt	AM	165	20	1,242	235	1,407	255
	PM	28	220	217	1,007	245	1,227
2031 Do Something – Proposed Devt	AM	291	36	1,887	351	2,178	387
	PM	49	389	307	1,525	356	1,914
<i>- Extraction of Future Car Movements to West Cambridge re-moding to a Cambourne to Cambridge Mass Transit scheme</i>	<i>AM</i>	-	-	-	-	-353	0*
	<i>PM</i>	-	-	-	-	0*	-353
<i>- Extraction of Future Car Movements to West Cambridge re-moding to the WC PT Services</i>	<i>AM</i>	-	-	-	-	-695	0
	<i>PM</i>	-	-	-	-	0	-695
<b>2031 Do Something – Proposed Devt with Mitigation Strategy</b>	<b>AM</b>	-	-	-	-	<b>1,130</b>	<b>387</b>
	<b>PM</b>	-	-	-	-	<b>356</b>	<b>866</b>
<i>- Further Extraction of Car Movements to Other Destinations off Madingley Road re-moding to a Cambourne to Cambridge Mass Transit scheme</i>	<i>AM</i>	-	-	-	-	-211	0*
	<i>PM</i>	-	-	-	-	0*	-211

\* No reverse tidality assumed – hence the above represents a worst case.

13.3.4 The Proposed Mitigation strategy would significantly reduce the 2031 Do Something peak hour vehicle flows to a level lower than the 2031 Do Minimum level.

13.3.5 In addition to the above flows, an allowance has been made for the additional movements that were made to the Park and Cycle facility, and would be accommodated within the general parking facilities at West Cambridge.



## 13.4 Conclusions

### 13.4.1 It is noted that:

- i. the Hannah Reed inbound vehicle trip generation assessment used to inform the original 1997 application – upon which the delivered highway mitigation was derived - is 7% higher than the equivalent 2021 and 2031 Do Minimum scenarios inbound trip generation derived from the Stantec analysis – highlighting that travel patterns have changed since 1997, with less car driver movements;
- ii. the future year predicted vehicle trip generation from West Cambridge increases from the 2019 Base in both 2021 scenarios, as further quanta of development would be completed;
- iii. the scale of future vehicle trip generation increase in the proposed Unmitigated Full Development is higher than anticipated due to the application of observed historic travel patterns to future movement without consideration of travel changes;
- iv. the Travel Plan, the improved public transport and the travel demand management measures – in conjunction with a reduction in car parking provision within the 2021 Do Something Key Phase 1 proposals - result in a reduced trip generation from West Cambridge when compared to the Do Minimum scenario;
- v. the 2031 Do Something scenario results in a further increase in the car movements to West Cambridge when compared to the 2031 Do Minimum scenario; and
- vi. the Proposed Transport mitigation measures that the University would support to mitigate West Cambridge – including Section 106 contributions offered towards an area-wide strategic Cambourne to Cambridge mass transit scheme, to the West Cambridge Public Transport strategy - would reduce the total 2031 Do Something peak hour vehicle trip generation to a level lower than the 2031 Do Minimum level – i.e., to below that used to inform the original 1997 application.

## 14 2021 Key Phase 1 – Trip Impact Analysis

### 14.1 Introduction

14.1.1 This section summarises the impact of Key Phase 1 in 2021 in terms of link impacts, and the capacity of the local junctions.

14.1.2 This section reports the following:

- i. an assessment of the link flow differences between the 2019 and 2021 Do Minimum scenarios;
- ii. an assessment of the link flow differences between the 2021 Do Minimum and 2021 Do Something scenarios; and
- iii. the capacity assessments of local junctions along Madingley Road.

### 14.2 Differences between 2019 Base and 2021 Do Minimum

14.2.1 The 2019 Base Year and 2021 Do Minimum peak hour flows are compared in Table 14.1 in Appendix 14.1. The percentage differences are also reported.

14.2.2 From this comparison between the 2019 and 2021 Do Minimum peak hour flows, it is apparent that:

- i. most links experience increases in the peak hour flows, reflecting the additional flow assumed to be generated by surrounding development and the Local Plan allocations;
- ii. the links with higher increases reflect the location of emerging development – including the completion of the Extant West Cambridge Development, and other assumed development – including at North West Cambridge, West Cambourne and Bourn Airfield;
- iii. as these additional flows have been assessed without reference to the link and junction capacity of the network, these increases may be considered to be worst case, and not necessarily achievable; and
- iv. the highest link flow impact observed on the West Cambridge Development site accesses reflects the relatively low 2019 Base flow.

### 14.3 Differences between 2021 Do Minimum and 2021 Do Something

14.3.1 Whilst acknowledging the above matters regarding the 2021 Do Minimum flow scenarios, this Do Minimum scenario reflects the future year baseline against which the traffic impact from the Proposed Development should be considered.

14.3.2 The 2021 Do Minimum and 2021 Do Something (i.e., with Key Phase 1 of the Proposed Development) peak hour flows are compared in Table 14.2 in Appendix 14.1. The percentage differences are also reported.

14.3.3 From this comparison between the 2021 Do Minimum and 2021 Do Something peak hour flows, it is apparent that:

- i. many off-site links experience decreases, reflecting the reductions in trip generation from West Cambridge;

- ii. some local links on Madingley Road experience decreases in flow – demonstrating the success of the adopted West Cambridge car parking access strategy intercepting many movements at the first available opportunity.

#### **14.4 2021 Junction Capacity Assessments**

14.4.1 This section summarises the impact of an indicative Key Phase 1 on the existing Madingley Road Corridor, assessed with reference to the 2021 Do Minimum and 2021 Do Something scenario flows for the following existing junctions:

- i. the M11 Off Slip traffic signal-controlled junction;
- ii. the M11 On Slip priority junction;
- iii. the Park and Ride / High Cross traffic signal-controlled junctions;
- iv. Madingley Road / JJ Thomson Avenue priority junction;
- v. Madingley Road / Madingley Rise priority junction; and
- vi. Madingley Road / Clerk Maxwell Road priority junction.

14.4.2 The capacity of the junctions surrounding the Site have been assessed assuming the future year flows, and using appropriate modelling software including:

- JCT Consultancy's LinSig computer program - utilised to model the traffic signal controlled junctions along the Madingley Road Corridor; and
- TRL's PICADY program, the Priority Junction Assessment Module within the Junctions9 computer suite – utilised to model the priority junctions along the Madingley Road Corridor.

14.4.3 The 2019 Base models have been reviewed and approved by Cambridgeshire County Council and their consultants, Green Signals Consulting Ltd for use in assessing the Proposed Development flows for the signalised junctions. This approval is contained in an email included in Appendix 3.7.

14.4.4 The junction capacity assessment outputs are contained within Appendix 14.2 and are summarised in Appendix 14.3. It is concluded that in 2021:

##### **M11 J13 Off Slip Signalised Junction**

- with the 2021 Do Minimum flows, the existing junction is forecast to operate above practical capacity in both peak periods – the Madingley Road (W) and M11 J13 Off Slip (Right) lanes operate above capacity;
- when the benefit of an area-wide Cambourne to Cambridge Mass Transit scheme is incorporated with the 2021 Do Something flows, this junction operates better in the AM peak, reflecting the reductions in vehicles on the network, and the reduced trip movements to West Cambridge. Some minor deterioration in conditions occur in the PM peak due to the reassignment of movements due to this Cambourne to Cambridge Mass Transit scheme;
- whilst the deterioration in conditions here in part reflects the additional flow from the strategic developments to the west of Cambridge – and that mitigation measures could be expected to be provided by these developments - a minor non-physical mitigation has been considered. This consists of an amendment to the stage sequencing, enabling the M11 J13 Off Slip (Left) to operate concurrently with the Madingley Road (W) movement;

- with this amendment, this junction operates within capacity in both peaks.

#### **M11 J13 On Slip Junction**

- with the 2021 Do Minimum flows, the existing junction is forecast to operate above practical capacity in the PM peak period. The deterioration in conditions here in part reflects the additional flow from the strategic developments to the west of Cambridge – and that mitigation measures could be expected to be provided by these developments;
- conditions improve with the 2021 Do Something scenario, albeit this junction would still operate over capacity;
- when the benefit of a Cambourne to Cambridge Mass Transit scheme is incorporated with the 2021 Do Something flows, further deterioration occurs in the PM peak due to the reassignment of movements due to this Mass Transit scheme – i.e., a higher level of flows is predicted to assign through this junction from the west, turning right to the M11;
- a simple signalised scheme has been tested, with the inbound and outbound traffic flows controlled in separate phases. With this amendment, this junction operates within capacity in the AM peak and marginally over capacity in the PM peak – however this offers betterment in terms of queuing and delays when compared to conditions with the existing priority junction and the 2021 Do Minimum flows.

#### **Madingley Road / Park and Ride / High Cross Signalised Junctions**

- as required by the Highway Authority, these two junctions have been assessed within a single LinSig model, to respond to the proximity and interaction issues;
- with the 2021 Do Minimum flows, the existing junction is forecast to operate above practical capacity in both peak periods. The deterioration in conditions here possibly reflects a combination of the conservative manner of future year traffic flow assessment, and in part the additional movement from the strategic developments to the west of Cambridge. If required, mitigation measures would be expected to be provided by these developments;
- this junction would operate better in the both peak periods in the Do Something scenario, reflecting the reductions in trip generation at West Cambridge.

#### **Madingley Road / JJ Thomson Avenue Priority Junction**

- with the 2021 Do Minimum flows, the existing junction is forecast to operate within capacity in the AM period. The Eastbound Development exit is forecast to operate above practical capacity in the PM peak period;
- this junction would operate within capacity in both peak periods in the Do Something scenario, reflecting the reductions in trip generation at West Cambridge;

#### **Madingley Road / Madingley Rise Priority Junction**

- the existing junction is forecast to operate within capacity in both peak 2021 Do Minimum and Do Something periods;

#### **Madingley Road / Clerk Maxwell Priority Junction**

- with the 2021 Do Minimum flows, the existing junction is forecast to operate within practical capacity in both peak periods;

- assuming the proposed multi-storey car park is accessed off Clerk Maxwell Road, the existing junction is forecast to operate within capacity in the 2021 Do Something AM period. The Clerk Maxwell Road exits are forecast to operate above practical capacity in the PM peak period;
- when the 2021 Do Something scenario is reassessed with the vehicle reduction along Madingley Road from a Cambourne to Cambridge Mass Transit scheme, the Clerk Maxwell Road exits would operate marginally above practical capacity (a ratio of flow to capacity of 0.89). This does not reflect the existing situation - where traffic on Madingley Road was seen stopping to allow vehicles exiting Clerk Maxwell Road to exit, and the toucan crossings improving conditions by stopping traffic. Further, a minor change in the exit flow of 8 vehicles an hour would be sufficient to resolve this.

Table 14.3 – Summary of 2021 Junction Capacity Assessments

Junction	Operating within capacity in 2019		Operating within capacity in 2021 Do Minimum		Operating within capacity in 2021 Do Something		Operating within capacity in 2021 Do Something Mitigated	
	AM	PM	AM	PM	AM	PM	AM	PM
M11 J13 Off Slip Signalised Junction	X	X	X	X	X	X	✓	✓
M11 J13 On Slip Signalised Junction	✓	X	✓	X	✓	X	✓	○
Western Access Road	-	-	-	-	-	-	-	-
Madingley Road / Park and Ride / High Cross Signalised Junctions	X	X	X	X	○	○	-	-
Madingley Road / JJ Thomson Avenue Priority Junction	✓	✓	✓	X	✓	✓	-	-
Madingley Road / Madingley Rise Priority Junction	✓	✓	✓	✓	✓	✓	-	-
Madingley Road / Clerk Maxwell Priority Junction	✓	✓	✓	✓	✓	X	✓	✓

**Key:**

- ✓ - Junction operates within capacity
- - Junction operates over-capacity, but better than the Do Minimum scenario
- X - Junction operates over capacity

## 14.5 Conclusions

- 14.5.1 This section considers conditions in 2021, representing the completion of Key Phase 1.
- 14.5.2 This 2021 Do Minimum scenario reflects the future year baseline against which the traffic impact from the Proposed Development should be considered. This scenario includes the additional flow generated by emerging development – including the completion of the Extant West Cambridge Development, North West Cambridge, West Cambourne and Bourn Airfield Developments.
- 14.5.3 The comparison between the 2019 and 2021 Do Minimum model peak hour flows (i.e., without any of the additional trips generated by the Proposed Development) identifies that most links would experience increases in the peak hour flows..
- 14.5.4 The comparison between the 2021 Do Minimum and 2021 Do Something model peak hour flows (i.e., the direct comparison of the network Without then With the Proposed Development) indicates that there are no significant increases in traffic as a direct result of the proposed development along the network in the future year of 2021, with most off-site links experiencing decreases – reflecting the reductions in trip generation from West Cambridge.
- 14.5.5 Whilst most junctions on the Madingley Road Corridor are predicted to operate better in the Do Something Scenario than the equivalent Do Minimum, most are still operating above capacity.
- 14.5.6 As outlined in Section 4, an area-wide Cambourne to Cambridge Mass Transit scheme is a strategic solution to reduce trips along Madingley Road. For junctions which operated worse in the Do Something scenario, the benefit of this scheme has been assessed and further non-physical mitigation measures have been proposed to ensure nil detriment.
- 14.5.7 It is considered that the first-principles Transport Modelling assessment methodology sought by the Highway Authority represents a conservative case – it does not assess likely reassignment effects across the network, and any mitigation measures provided by others have not been considered within this Assessment.

## 15 2031 Full Development – Trip Impact Analysis

### 15.1 Introduction

15.1.1 This section summarises the impact of the Full Development in 2031 in terms of link impacts, and the capacity of local and strategic junctions.

15.1.2 Any conclusions derived from this process are affected by the predicted future year flows. The first-principles Transport Modelling assessment adopted for this development represent a traditional, conservative, assessment for as identified previously:

- i. the increased flows reflect all the emerging Local Plan development – including the completion of all other ongoing development such as North West Cambridge, West Cambourne and Bourn Airfield;
- ii. the methodology adopted to assess the future year additional flows would not respond to the link and junction capacity of the network - hence reassignment effects have not been considered. As such, the scale of these increases may not be physically achievable; and
- iii. assuming the above, physical mitigation would be required to accommodate other developments. As no details are known, this mitigation cannot be included for within the West Cambridge assessment.

15.1.3 Emerging advice – such as that contained in the CIHT “Better planning, better transport, better places” (August 2019) - is quite clear that this approach is out-dated and flawed. Amongst other comments his document unequivocally states:

- *“Far too many examples still exist where the long since discredited approach of ‘predict and provide’ is used to the detriment of planning better places”;*
- *“We must fully abandon predict and provide models of transport planning”; and that*
- *“Development proposals should assess alternative land-use and transport options to define the optimum sustainable transport strategy. They should also present evidence to demonstrate a reasonable prospect that the preferred option can be delivered.”*

15.1.4 Notwithstanding, this section reports the following:

- i. an assessment of the link flow differences between the 2019 and 2031 Do Minimum scenarios;
- ii. an assessment of the link flow differences between the 2031 Do Minimum and 2031 Do Something scenarios;
- iii. an assessment of the link flow differences between the 2031 Do Minimum and 2031 Mitigated Do Something scenarios; and
- iv. the capacities of a series of junctions in the area.

15.1.5 Whilst the 2031 Assessment information has been provided as requested, this has to be read within the context of the aspirations of the costed proposed West Cambridge Transport Strategy, but with the knowledge that uncertainty in the future year assessment has been responded to by the adopted Monitor and Manage Approach to maximise flexibility. Indeed, the above CIHT guidance concludes that "...local highway authorities should not 'double count' the level of transport provision expected from development. It is not appropriate to seek high levels of highway-based mitigation based on worst-case transport model forecasts and also seek high levels of sustainable transport provision as, once the highway capacity is delivered, sustainable travel targets are unlikely to be met."

## 15.2 Differences between 2019 Base and 2031 Do Minimum

15.2.1 The 2019 Base Year and 2031 Do Minimum (i.e., with the 1999 Consented Development) peak hour flows are compared in Table 15.1 in Appendix 15.1. The percentage differences are also reported.

15.2.2 From this comparison between the 2019 and 2031 Do Minimum peak hour flows, it is apparent that:

- i. links experience increases in the peak hour flows, reflecting the additional flow assumed to be generated by surrounding development and the Local Plan allocations;
- ii. the links with higher increases reflect the emerging development – including the completion of the Extant West Cambridge Development, and ongoing development – including at North West Cambridge, West Cambourne and Bourn Airfield;
- iii. as these additional flows have been assessed without reference to the link and junction capacity of the network, these increases are conservative, and are not necessarily achievable – reflecting the earlier discussions with the Joint Authorities this assessment approach was adopted to identify the key corridors for movement; and
- iv. the highest link flow impact observed on the West Cambridge Development site accesses reflects the relatively low 2019 Base flow.

## 15.3 Differences between 2031 Do Minimum and 2031 Do Something

15.3.1 Whilst acknowledging the above matters regarding the 2031 Do Minimum, this Do Minimum scenario reflects the future year baseline against which the traffic impact from the Proposed Development should be considered.

15.3.2 The 2031 Do Minimum and the 2031 Do Something (i.e., with the Full Development) peak hour flows are compared in Table 15.2 in Appendix 15.1. The percentage differences are also reported.

15.3.3 From this comparison between the 2031 Do Minimum and 2031 Do Something peak hour flows, it is apparent that:

- i. the percentage link flow changes across the network reflect the assignment of additional trips generated by West Cambridge; and
- ii. most off-site links experience relatively controlled increases as a consequence of the Development.

## 15.4 Differences between 2031 Do Minimum and 2031 Mitigated Do Something

15.4.1 A pragmatic and strategic management strategy has been formulated for West Cambridge. This strategy would:



- i. encourage greater use of walking, cycling, and public transport;
- ii. control and reduce vehicular trips across the network;
- iii. where necessary, provide measures to preserve and / or enhance capacity on particular links;
- iv. manage Development impact on some sensitive strategic links; and
- v. improve pedestrian and cyclist movement across the network.

15.4.2 The benefit of the proposed Mitigation Strategy (summarised in Section 18) is assessed in this section. The strategy includes for:

- the University's contributions to the area-wide strategic solutions – including the Cambourne to Cambridge Mass Transit scheme , and the Madingley Road Cycle Scheme. As summarised in Section 12.3, the 2031 Do Something peak hour flows trips have been adjusted to account for the following existing movements re-moded from car to this Cambourne to Cambridge Mass Transit scheme in the tidal direction of In (AM) and Out (PM):
  - a total of 353 car-based trips into West Cambridge; and
  - a further 211 non-West Cambridge car-based trips currently assigning to the existing Park and Ride site, or towards Cambridge.
- the University's proposed Public Transport strategy to intercept inbound movements on the approach corridors. As summarised in Section 12.3, the 2031 Do Something peak hour flows trips have been reduced to account for the following existing movements re-moded from car to the West Cambridge public transport services in the AM peak:
  - the Citi 4 or a Mass Transit scheme – for movements from the A428 (West) – 85
  - the Universal – for movements from the east of Cambridge – 100
  - the Arc (North) service – for movements from the A14 (East) and A10 (North) – 120;
  - the Arc (South) service – for movements from the M11 (South) – 190; and
  - the Guided Bus service – for movements from the A14 (North-West) – 200.

15.4.3 The 2031 Do Minimum and the 2031 Mitigated Do Something (i.e., with the Full Development) peak hour flows are compared in Table 15.3 in Appendix 15.1. The percentage differences are also reported.

15.4.4 From this comparison between the 2031 Do Minimum and 2031 Mitigated Do Something peak hour flows, it is apparent that:

- i. links experience increases in the peak hour flows, reflecting the assignment of additional trips generated by West Cambridge;
- ii. as these additional flows have been assessed without reference to the link and junction capacity of the network, these increases are worst case, and not necessarily achievable – reflecting the earlier discussions with the Joint Authorities this assessment approach was adopted to identify the key corridors for movement;
- iii. multiple links experience decreases in flow reflecting the transport strategy intercepting trips off the network; and

- iv. the highest link flow impact observed on the West Cambridge Development site accesses reflects the relatively low 2031 Do Minimum flow.

## 15.5 2031 Junction Capacity Assessments

15.5.1 Since the West Cambridge Transport Assessment work started, Highways England published the Road Investment Strategy 2020 – 2025. This highlighted that the M11 Junction 13 is a “RIS3 Pipeline” Scheme for 2025 – 2030. Should this come forward, conditions would change materially – especially on the section of the network the west of this assessment. This supports the application of the more flexible adopted Monitor and Manage strategy for future year assessment and derivation of mitigation.

15.5.2 This section summarises the impact of the Full Development on the junction capacity along the Madingley Road Corridor when assessed with the 2031 Do Minimum, 2031 Do Something and 2031 Mitigated Do Something scenario flows:

- i. the M11 Off Slip traffic signal-controlled junction;
- ii. the M11 On Slip priority junction;
- iii. the proposed Western Access Road junction;
- iv. the Park and Ride / High Cross traffic signal-controlled junction;
- v. Madingley Road / JJ Thomson Avenue priority junction;
- vi. Madingley Road / Madingley Rise priority junction; and
- vii. Madingley Road / Clerk Maxwell Road priority junction.

15.5.3 The capacity of the junctions surrounding the Site have been assessed assuming the future year flows, and using appropriate modelling software including:

- JCT Consultancy’s LinSig computer program - utilised to model the traffic signal controlled junctions along the Madingley Road Corridor; and
- TRL’s PICADY program, the Priority Junction Assessment Module within the Junctions9 computer suite – utilised to model the priority junctions along the Madingley Road Corridor.

15.5.4 As reported previously, the 2019 Base models have been reviewed and approved by Cambridgeshire County Council and their consultants, Green Signals Consulting Ltd, for use in assessing the Proposed Development flows for the signalised junctions. This approval is contained in an email included in Appendix 3.7.

15.5.5 The junction capacity assessment outputs are contained within Appendix 14.2 and are summarised in Appendix 15.2. It is concluded that in 2031:

### M11 J13 Off Slip Signalised Junction

- the existing junction is forecast to operate above practical capacity in both peak periods with the 2031 Do Minimum flows;
- an additional circa 300 trips in each peak hour have been assessed in the 2031 Do Minimum scenario reflecting additional trips from other developments. Whilst this junction is shown to be operating above capacity, no physical mitigation measures offered by others have been assumed;

- when the benefit of a Cambourne to Cambridge Mass Transit scheme is incorporated with the 2031 Do Something flows, this junction operates better in the AM peak, reflecting the reductions in trip generation. Deterioration occurs in the PM peak due to the reassignment of movements to the a new Park and Ride in the Madingley Mulch area;
- a minor non-physical mitigation has been considered – an amendment to the stage sequencing, enabling the M11 J13 Off Slip (Left) to operate concurrently with the Madingley Road (W) movement. This results in a more efficient use of this junction;
- with this amendment, this junction operates within capacity in both peaks in the 2031 Mitigated Do Something scenario.

### **M11 J13 On Slip Junction**

- with the 2031 Do Minimum flows, the existing junction is forecast to operate significantly above practical capacity in the PM peak period. The deterioration in conditions here in part reflects the additional movement from the strategic developments to the west of Cambridge;
- as these conditions would affect the operation of the whole of the M11 Junction 13 – including the queue of traffic on the Off Slip - mitigation measures could be expected to be provided by these developments to accommodate the further circa 300 peak hour movements;
- when the benefit of the a Cambourne to Cambridge Mass Transit scheme is incorporated with the 2031 Do Something flows, further deterioration occurs in the PM peak due to the reassignment of movements to the a new Park and Ride – i.e., a higher level of flows is predicted to assign through this junction from the west, turning right to the M11;
- a simple signalised scheme has been tested, should this level of flows be generated. This scheme has the inbound and outbound traffic flows controlled in separate phases. With this amendment, this junction operates within capacity in the AM peak and marginally over capacity in the PM peak – however this offers betterment in terms of queuing and delays when compared to conditions with the existing priority junction and the 2031 Do Minimum flows.

### **Western Access Road**

- with the 2031 Do Something flows, the proposed junction is forecast to operate within practical capacity in both peak periods.

### **Madingley Road / Park and Ride / High Cross Signalised Junctions**

- these two junctions have been assessed within a single LinSig, to respond to the proximity and interaction issues;
- with the 2031 Do Minimum flows, the existing junction is forecast to operate significantly above practical capacity in both peak periods. The deterioration in conditions here reflects a combination of the conservative manner of future year traffic flow assessment, and the additional movement from the strategic developments to the west of Cambridge;
- mitigation measures would be expected to be provided by these developments to accommodate the further circa 300 peak hour movements;
- conditions at these existing junctions are forecast to deteriorate further in both peak periods with the 2031 Do Something flows;

- whilst this junction would operate significantly better with the 2031 Mitigated Do Something scenario than the Do Something in the both peak periods, reflecting the reductions in trip generation at West Cambridge due to the Transport Strategy, it still operates worse than the 2031 Do Minimum scenario and therefore further mitigation has been considered;
- a mitigation scheme would include the widening the westbound approach on Madingley Road to three lanes and a two to one lane merge on the eastern arm. The results for the assessment of the mitigated junction show that there is significant betterment at this junction when compared to the 2031 Do Minimum scenario;
- whilst this mitigation scheme would provide the required additional theoretical capacity, it has been developed within significant levels of uncertainty – including within this assessment timescale matters such as the future of the Madingley Road Park and Ride site. Whilst this level of flow increase is unlikely to materialise, this uncertainty in the future year assessment supports use of the adopted Monitor and Manage Approach, maximising flexibility for all parties to respond to the emerging reality.

### **Madingley Road / JJ Thomson Avenue Priority Junction**

- with the 2031 Do Minimum flows, the existing junction is forecast to operate above capacity - the Eastbound Development exit is forecast to operate above practical capacity in in both peak periods, as are All Movements from the Madingley Road (East) arm in the AM peak. This deterioration in conditions possibly reflects a combination of the conservative manner of future year traffic flow assessment, and in part the additional movement from the strategic developments to the west of Cambridge;
- mitigation measures would be expected to be provided by these developments to accommodate the additional peak hour movements;
- conditions would deteriorate further at this junction in the 2031 Do Something scenario, reflecting the increases in trip generation at West Cambridge;
- with the 2031 Mitigated Do Something flows, conditions would be significantly better than the 2031 Do Something scenario, and would generally reflect the conditions in the 2031 Do Minimum scenario – that the Eastbound Development exit is forecast to operate above practical capacity in in both peak periods, as are All Movements from the Madingley Road (East) arm in the AM peak;
- to deliver the proposed pedestrian and cycling crossing at this junction, a strategic Madingley Road Cycle Scheme previously identified an option to signalise this junction. This would provide benefit to this junction, and would alleviate the issue of vehicles leaving JJ Thomson Avenue by having its own dedicated Phase;
- this signalised form of this junction has been assessed, incorporating Madingley Rise due to its close proximity. This shows betterment in queues and delays at this junction with 2031 Mitigated Do Something scenario flows.

### **Madingley Road / Madingley Rise Priority Junction**

- the existing junction is forecast to operate within capacity in both peak 2031 Do Minimum and Do Something periods;
- However due to the close proximity to JJ Thomson Avenue, this junction has now been incorporated to a large signalised junction as discussed previously. This would provide benefit to the network, as described above.

### Madingley Road / Clerk Maxwell Priority Junction

- with the 2031 Do Minimum flows, the existing junction is forecast to operate significantly above capacity in both peak periods – i.e., before any development occurs;
- conditions deteriorate further in the 2031 Do Something scenario;
- with the 2031 Mitigated Do Something flows, conditions would be significantly better than the 2031 Do Something scenario, and would generally reflect the conditions in the 2031 Do Minimum scenario – that the existing junction is forecast to operate above capacity in both peak periods;
- a simple traffic controlled junction could be delivered at this location in conjunction with a strategic Madingley Road Cycle Scheme, considering a further toucan crossing option. This indicative scheme would provide significant betterment to the 2031 Do Minimum scenario;
- whilst these flows are unlikely to materialise, this uncertainty in the future year assessment supports use of the adopted Monitor and Manage Approach, maximising flexibility for all parties to respond to the emerging reality.

15.5.6 This is summarised in Table 15.4 below.

Table 15.4 – Summary of 2031 Junction Capacity Assessments

Junction	Operating within capacity in 2019		Operating within capacity in 2031 Do Minimum		Operating within capacity in 2031 Do Something		Operating within capacity in 2031 Do Something Mitigated	
	AM	PM	AM	PM	AM	PM	AM	PM
M11 J13 Off Slip Signalised Junction	X	X	X	X	X	X	✓	✓
M11 J13 On Slip Signalised Junction	✓	X	✓	X	✓	X	✓	○
Western Access Road	-	-	-	-	✓	✓	-	-
Madingley Road / Park and Ride / High Cross Signalised Junctions	X	X	X	X	X	X	○	○
Madingley Road / JJ Thomson Avenue Priority Junction	✓	✓	X	X	X	X	○	○
Madingley Road / Madingley Rise Priority Junction	✓	✓	✓	✓	✓	✓	-	-
Madingley Road / Clerk Maxwell Priority Junction	✓	✓	X	X	X	X	○	○

**Key:**

- ✓ - Junction operates within capacity
- - Junction operates over capacity, but better than the Do Minimum
- X - Junction operates over capacity

## 15.6 Conclusions

- 15.6.1 This section considers conditions in 2031, representing the completion of the Full Development.
- 15.6.2 The comparison between the 2019 and 2031 Do Minimum model peak hour flows (i.e., the impact of the background growth on the network without any of the additional trips generated by the Proposed Development) identifies that:
- i. links experience increases in the peak hour flows, reflecting the additional flow assumed to be generated by surrounding development and the Local Plan allocations;
  - ii. the links with higher increases reflect the emerging development – including the completion of the Extant West Cambridge Development, and ongoing development – including at North West Cambridge, West Cambourne and Bourn Airfield;
  - iii. as these additional flows have been assessed without reference to the link and junction capacity of the network, these increases are worst case, and not necessarily achievable – reflecting the earlier discussions with the Joint Authorities this assessment approach was adopted to identify the key corridors for movement; and
  - iv. the highest link flow impact observed on the West Cambridge Development site accesses reflects the relatively low 2019 Base flow.
- 15.6.3 The comparison between the 2031 Do Minimum and the 2031 Do Something (i.e., with the Full Development) peak hour flows are also reported. It is apparent that:
- i. the percentage link flow changes across the network reflect the assignment of additional trips generated by West Cambridge; and
  - ii. most off-site links experience relatively controlled increases as a consequence of the Development.
- 15.6.4 The comparison between the 2031 Do Minimum and the 2031 Mitigated Do Something (i.e., with the Full Development and the Transport Strategy) peak hour flows are also reported. It is apparent that:
- i. links experience increases in the peak hour flows, reflecting the assignment of additional trips generated by West Cambridge;
  - ii. as these additional flows have been assessed without reference to the link and junction capacity of the network, these increases are worst case, and not necessarily achievable – reflecting the earlier discussions with the Joint Authorities this assessment approach was adopted to identify the key corridors for movement;
  - iii. multiple links experience decreases in flow reflecting the transport strategy intercepting trips off the network; and
  - iv. the highest link flow impact observed on the West Cambridge Development site accesses reflects the relatively low 2031 Do Minimum flow.
- 15.6.5 The junction capacity assessments along the Madingley Road Corridor identify that whilst conditions deteriorate at junctions as a consequence of the Development, most impacts are mitigated by the proposed Transport Strategy. Where the impact still remains higher than the 2031 Do Minimum scenario, physical mitigations have been considered.

- 15.6.6 However, as previously mentioned, it is acknowledged that this future year assessment is overly conservative - the first-principles Transport Modelling assessment adopted for this development would represent a worst case, and the methodology adopted to assess the future year flows would not assess likely reassignment effects across the network.
- 15.6.7 Therefore, a strategy to manage completely this level of increased movements along Madingley Road by physical measures should not be developed as:
- i. the necessity for it reflects the University responding to a worst-case assessment - which is unlikely to materialise;
  - ii. such a scheme requiring significant additional infrastructure would be contrary to policy;
  - iii. to increase the physical scale of the Madingley Road carriageway to provide sections of three-lanes width to respond to peak hour conditions would be contrary to any enhanced urban design aspirations for this area; and
  - iv. it would result in a poorer environment for pedestrians and cyclists.
- 15.6.8 As such, the response to junction capacity issues along Madingley Road Corridor should rely upon strategic solutions, within the context of the existing local transport policy identified within Section 4. This reflects the CIHT “Better planning, better transport, better places” guidance that concludes that “...local highway authorities should not ‘double count’ the level of transport provision expected from development. It is not appropriate to seek high levels of highway-based mitigation based on worst-case transport model forecasts and also seek high levels of sustainable transport provision as, once the highway capacity is delivered, sustainable travel targets are unlikely to be met.” The proposed approach to respond is summarised in Section 18.