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Transport Business Case

Technical Report

for

Western Way Development

West Suffolk Council

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1.0 Introduction

Four junctions were surveyed and modelled in Bury St Edmunds in the immediate vicinity of the Western Way development project for the purpose of informing the extent of need for and the feasibility of junction improvement works, in order to inform the business case for the development. A number of different base scenarios were tested at this business case stage, prior to more detailed knowledge of the exact proposed development occupiers being known.

The results of the modelling of the junctions as their layout currently exists, with the committed and proposed Western Way development traffic added for the future modelled year, 2030, were reviewed to identify the particular junction approaches that would need addressing with regard to capacity and queuing. Attention was then directed to the need to find junction improvement solutions that would address these issues. Various improvement options were tested before settling on a final junction improvement proposal recommended for the business case.

This report discusses the initial junction modelling findings for the existing junction layouts, explains what alternative options were tested and why they were rejected or carried forward for further consideration, and concludes with the final recommended junction improvement arrangement.

Also discussed in this report is a review of the preliminary parking assessment carried out for the development and options for parking management.

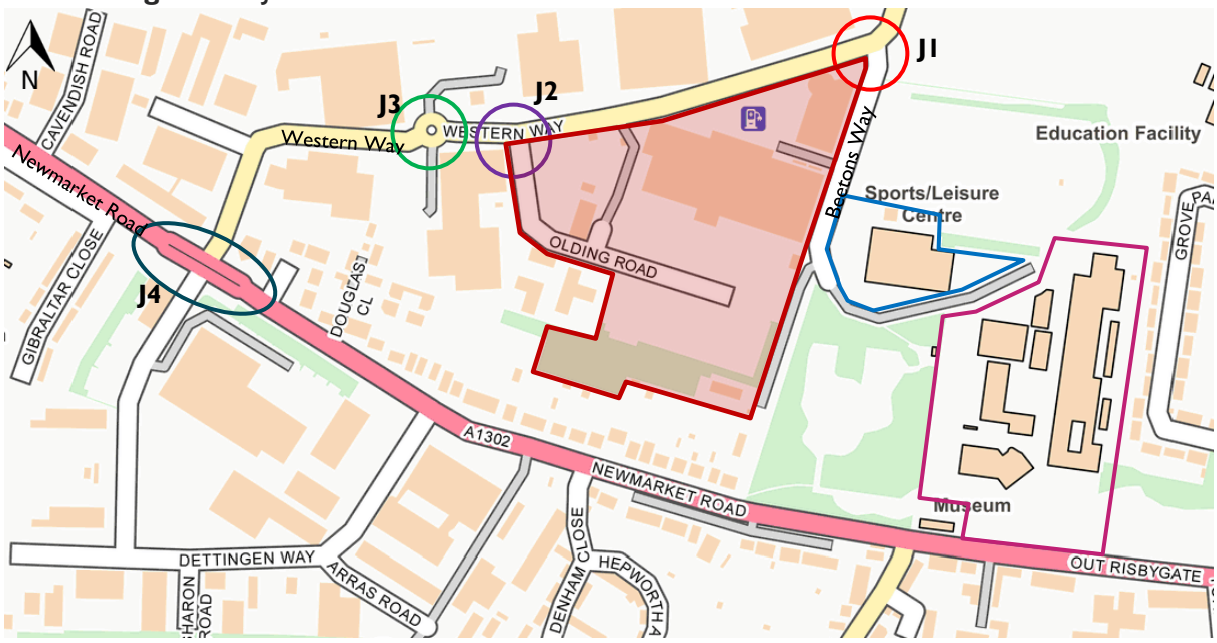
This report goes on to review the current accessibility of the development site by sustainable modes of transport and considers the potential for further opportunities for development users to use these modes, some of which may require physical works, some of which may require consultation and agreement with local bus operators, and some of which will need to be implemented and managed by means of a very proactive Travel Plan.

2.0 The junctions modelled

The 4 modelled junctions are as follows and as illustrated in **Figure 2.1**:

- **Junction 1**: Western Way/Beetons Way (currently a mini-roundabout)
- **Junction 2**: Western Way/Olding Road (currently a priority T-junction)
- **Junction 3**: Western Way/ASDA access/retail park access (currently a small roundabout)
- **Junction 4**: Western Way/A1302 Newmarket Road (currently a traffic signal controlled crossroads junction)

Figure 2.1 Junctions modelled



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KEY:

- Junction 1
- Junction 2
- Junction 3
- Junction 4
- Western Way development site area
- West Suffolk College
- Existing Bury St Edmunds Leisure Centre

3.0 Committed development

Abbeygate Sixth Form College has consent to be built on land at the north eastern corner of Junction 1. As part of the sixth form development works this junction will be upgraded from a mini-roundabout to a signalised crossroads with a new access off the east of the junction leading into the development. The expected traffic generation of this committed development has been added to all junction model scenarios **except** the initial modelling of the existing junction layout and traffic conditions.

A Transport Assessment (TA) was completed for this committed development in February 2018 and the existing (2018) traffic survey base data was taken from this TA for the purpose of modelling Junction 1 (factored up to the required modelling years as necessary). The sixth form development traffic generation and distribution were also taken from this TA for input into the junction models for the Western Way development.

4.0 Peak times

Typical weekday manual classified count traffic surveys (MCCs) were undertaken at the remaining junctions (Junctions 2, 3 and 4) in February 2019. The overall morning and evening peak hours of the network of the 4 junctions were established after reviewing the results of the traffic survey data for all 4 junctions. These were established to be 08:15 to 09:15 and 16:30 to 17:30.

The Abbeygate Sixth Form College TA junction modelling considered a morning peak hour of 08:00 to 09:00 and two evening peak periods, 'college peak' and 'network peak'. As the modelled morning peak hour was so close to that modelled for the Western Way development (08:15 to 09:15), the proposed sixth form college traffic expected between 08:00 and 09:00, as presented in the sixth form TA, was applied to the Western Way morning peak hour junction models. The two evening peak hour periods modelled in the sixth form TA represented the peak evening traffic period for the proposed college (16:00 to 17:00) and the peak evening hour for the local highway network generally as established by the sixth form TA 2017 traffic surveys (17:00 to 18:00). For the purposes of modelling the single evening peak hour for the Western Way development (16:30 to 17:30), half of the proposed 6th form traffic that had been allocated in the sixth form TA to the 16:00 to 17:00 period and to the 17:00 to 18:00 period were combined to offer a full hour of sixth form traffic appropriate to the Western Way modelled evening peak hour.

5.0 Trip generation and distributions

For the proposed three general development occupation use options modelled at this Final Business Case (FBC) stage for the Western Way development site (office, health and leisure), TRICS data was used to determine the amount of arriving and departing traffic by gross floor area (GFA) for the modelled peak times that each use would generate.

The proportion of this traffic that would be directed along routes through the modelled junctions to enter and leave the proposed Western Way development car parks was determined by applying the proportion of development traffic to each car park in accordance with the proportion of the total proposed development car parking spaces proposed to be accommodated in each car park. For example, if a proposed Western Way development car park was to accommodate 50% of the total number of parking spaces proposed for the development, 50% of the expected development traffic to be generated at peak times would be directed to and from that car park.

The development traffic was then distributed on the local network, through the modelled junctions, to enter and leave the network, arriving at and departing from the development car parks. Where the development traffic would have a choice of which direction it would travel at a junction, for example at the Western Way/Olding Road junction, the traffic was apportioned in each appropriate direction according to the current proportional split of traffic using that junction (identified from the traffic surveys).

6.0 Modelled scenarios

A number of 'situations' which include a combination of scenarios and distribution arrangements were set up to model the various combinations of resultant traffic impact upon the 4 junctions.

6.1 Scenario years and situations

2019 and 2030 years were modelled, as agreed with the Local Highway Authority. The existing traffic data results for the committed development were factored up from 2018 to 2019. 2019 traffic figures for existing traffic were then factored to 2030 levels. Local traffic growth factors were derived from TEMPro.

The following situations were modelled for the morning and evening peak hours (the various Development Scenarios and traffic distributions included are discussed in **Section 6.2**):

1. Existing 2019 traffic flows (Junction 1 modelled as the existing mini-roundabout)

Note: all of the following modelled situations included Junction 1 modelled as being the proposed committed signal controlled junction.

2. Existing 2019 traffic flows with committed sixth form traffic added
3. Existing traffic flows factored to 2030 with committed sixth form traffic added
4. Existing 2019 traffic flows with committed sixth form traffic added and Western Way Development Scenario 1 with Distribution A
5. Existing 2019 traffic flows with committed sixth form traffic added and Western Way Development Scenario 1 with Distribution B
6. Existing 2019 traffic flows with committed sixth form traffic added and Western Way Development Scenario 2 with Distribution A
7. Existing 2019 traffic flows with committed sixth form traffic added and Western Way Development Scenario 2 with Distribution B
8. Existing 2019 traffic flows with committed sixth form traffic added and Western Way Development Scenario 3 with Distribution A
9. Existing 2019 traffic flows with committed sixth form traffic added and Western Way Development Scenario 3 with Distribution B
10. Existing traffic flows factored to 2030 with committed sixth form traffic added and Western Way Development Scenario 1 with Distribution A
11. Existing traffic flows factored to 2030 with committed sixth form traffic added and Western Way Development Scenario 1 with Distribution B
12. Existing traffic flows factored to 2030 with committed sixth form traffic added and Western Way Development Scenario 2 with Distribution A
13. Existing traffic flows factored to 2030 with committed sixth form traffic added and Western Way Development Scenario 2 with Distribution B
14. Existing traffic flows factored to 2030 with committed sixth form traffic added and Western Way Development Scenario 3 with Distribution A
15. Existing traffic flows factored to 2030 with committed sixth form traffic added and Western Way Development Scenario 3 with Distribution B

All situations except the two existing 2019 situations for the morning and evening peak hours include the committed development traffic figures for the proposed Abbeygate Sixth Form College.

6.2 Development scenario inclusions

For the purposes of informing the Final Business Case for the Western Way development, three development traffic test scenarios have been modelled for each situation listed in **Section 6.1**, based on general potential occupation uses of the Western Way development. Each of these scenarios has been modelled for two traffic distribution arrangements, A and B, which relate to the proposed car parking provision options as mentioned in **Section 5.0** and described in more detail in further in this **Section 6.2**. These are modelled together in different combinations. The scenarios are as follows:

- **Development Scenario 1**: potential use as office space only
- **Development Scenario 2**: potential use combination as office space and health facility
- **Development Scenario 3**: potential use combination of office space, health facility and new leisure centre.

Each scenario offers different floor areas (GFAs) for each potential occupation use which therefore results in differing arrival and departure vehicle trip rates (calculated from TRICS data for similar development use types).

It should be noted that any proposal to provide student accommodation car parking as part of this development has not been included in the assessment. A test scenario that included student accommodation parking was not one that was agreed in the scope of this business case study. However, any proposed student parking would not impact on the peak hour development traffic flows used in the junction modelling as the student accommodation that this parking would serve is on or adjacent to the West Suffolk College campus which the resident students would attend. Therefore, the students will not be using their cars in the morning or evening peak periods as they will simply walk between the College and their accommodation.

The traffic distribution arrangements applied to each scenario tested relate to alternative proposed car parking options for the Western Way development (current in April 2019[1]) and therefore the distribution of traffic differs with each potential car parking arrangement.

The alternative traffic distribution arrangements modelled are as follows:

- **Distribution A**: 526 parking spaces accessed off Olding Road, 547 parking spaces accessed off Beetons Way (south) (including a parking deck over the main proposed car park and excluding the proposed operational parking at West Suffolk House), 250 spaces accessed off Beetons Way (north).
- **Distribution B**: 526 parking spaces accessed off Olding Road, 286 parking spaces accessed off Beetons Way (south) (excluding the proposed operational parking at West Suffolk House), 500 spaces accessed off Beetons Way (north) (including a parking deck).

7.0 Junction modelling results and test options

The junctions were modelled using LinSig software (for traffic signal controlled junctions) and Junctions 9 software; PICADY (for priority T-junctions) and ARCADY (for non-signalised roundabouts), and using. In the first instance, for the purposes of initially testing the junctions, Standard PICADY and ARCADY models were prepared for the non-signal controlled junctions. More detailed Simulation models were undertaken further into the analysis and discussed in later sections of this report. Standard models offer a value for RFC (Ratio of Flow to Capacity) which gives an indication of the overall operation of the junction, useful for the initial assessment of the junctions. Simulation models do not

[1] Parking arrangements continue to evolve. For the purposes of the analysis undertaken for the Final Business Case for the Western Way development, the parking proposals that were current on 11th April 2019 have been used. Since then (June 2019) consideration has been given to increasing the proposed parking provision. A summary of the impact that this level of increase is likely to have on the junction analysis is provided in **Appendix A**. The impact, and therefore the implications of such an increase in parking provision regarding the recommendations of this Transport Business Case Technical Report, is minimal.

provide RFC results but can be expected to provide more realistic queue and delay results, useful for the more detailed analysis when developing and assessing the design of mitigation options.

The maximum preferred Ratio of Flow to Capacity (RFC) for the arms of a priority junction or non-signalised roundabout is 0.85 (85%). For signal controlled junctions the maximum preferred Degree of Saturation (DoS) is 90%. These are the indicative levels at which a junction is working at optimum efficiency. A lower RFC or DoS means that there is capacity to spare for further traffic on the junction. As results represent a typical operation, and as typical operation is subject to fluctuation, RFCs above 0.85 (85%) or DoSs of above 90% and up to 1.00 (100%) suggest that the junction is likely to be operating within or at capacity for much of the time but, with fluctuations, may well be operating over capacity at times, therefore efficiency is reduced and queues are starting to form. RFCs and DoSs above 1.00 (100%) identify a junction that is oversaturated.

Each result offered in tables in the following sections of this report is listed by the situation modelled and the development scenario and distribution used where applicable for each morning (AM) and evening (PM) peak hour with the junction arm (stream) movements identified.

7.1 Existing junction layouts

7.1.1 Junction 1 – existing layout

Junction 1 was modelled for its existing mini-roundabout layout for the Existing 2019 situation. A further model was run for this junction for the future year 2030 in order to understand how this junction is likely to operate in the future assessment year if no improvements were made to the junction and if neither the Abbeygate Sixth Form College development nor the proposed Western Way development were implemented. Therefore this additional model only includes the existing traffic factored up to the year 2030 using DfT TEMPro growth factors for this local area. No development traffic has been added to this model.

For all remaining situations discussed in **Section 6.0**, all of which will include the existence of the committed sixth form college, this junction was modelled relating to the signal controlled operation and layout that will be in place as a result of the occupation of the new sixth form development (refer to **Section 7.2** for results and discussion relating to the proposed layout). The summary results of the Existing 2019 and 2030 models, extracted from the ARCADY output files, are given in **Table 7.1**. The results of the proposed junction layout and all future scenarios are discussed and shown in **Section 7.2**.

Table 7.1 Results for Junction 1 (existing mini-roundabout layout), 'do nothing'

	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (min)	RFC	Queue (PCU)	Delay (min)	RFC
	Existing 2019					
A - Beetons Way N	269.7	23.49	1.55	1.0	0.17	0.49
B - Beetons Way S	0.3	0.13	0.24	0.8	0.14	0.44
C - Western Way	6.1	0.61	0.87	205.6	17.12	1.44
	Existing factored up to 2030					
A - Beetons Way N	464.5	39.92	1.80	1.3	0.19	0.56
B - Beetons Way S	0.4	0.14	0.27	1.0	0.17	0.51
C - Western Way	20.5	1.69	1.01	373.1	31.62	1.68

As can be seen from these results that the junction is currently considerably oversaturated on Beetons Way (north) in the 2019 morning peak hour and on Western Way in the evening peak hour, with RFCs well in excess of the required maximum of 0.85, being 1.55 (155%) and 1.44 (144%) respectively, resulting in average queue lengths of 270 vehicles and 206 vehicles respectively.

By 2030, if no junction improvements or development takes place, these RFC values are expected to increase to 1.80 (180%) on Beetons Way (north) in the morning peak hour and to 1.68 (168%) on Western Way in the evening peak hour, with average queue lengths of 465 and 373 respectively.

It is clear that this existing junction layout does not have the capacity to accommodate traffic that would be generated by any further development either now or in the future.

7.1.2 Junction 2 – existing layout

The results summary for the existing priority T-junction layout of Junction 2 are shown in **Table 7.2**. This has been extracted from the PICADY output files.

The traffic streams referred to in the table relate to the following traffic movements:

- **Stream B-C**: Left turn from Olding Road to Western Way (west)
- **Stream B-A**: Right turn from Olding Road to Western Way (east)
- **Stream C-AB**: Traffic from Western Way (west) travelling straight ahead to Western Way (east) and turning right into Olding Road.

With just the committed 6th form traffic added to existing traffic flows, this junction will continue to operate within the required parameters i.e. with a Ratio of Flow to Capacity (RFC) not exceeding 0.85 (85%) for the morning and evening peak hours in the modelled years of 2019 and 2030. The maximum RFC recorded is 0.84 which relates to the right turn movement from Western Way into Olding Road in the morning peak hour of the year 2030. This therefore offers no spare capacity for the Western Way development traffic.

As soon as the anticipated Western Way development traffic is added to the junction under any of the scenarios tested, the RFC of this right turn movement in the morning peak hour significantly exceeds the 0.85 threshold with a minimum of 1.09 recorded in 2019 and a maximum of 1.36 recorded in 2030. As a result of these RFCs, the expected queues predicted for this movement in the morning peak hour range from 66 cars to 210 cars backing up towards and through the Asda roundabout (Junction 3). In the evening peak hour this movement remains below the 0.85 RFC threshold for all scenarios in all modelled years.

The left and right turning movements out of Olding Road show lots of spare capacity by the year 2030 after the committed 6th form traffic is added and before the Western Way development traffic is added (RFCs of 0.03 and 0.04 in the morning peak hour and 0.40 and 0.35 in the evening peak hour respectively). However, the modelling demonstrates that this available capacity is not nearly enough to accommodate the proposed Western Way development traffic that will use the proposed new car park accessed via Olding Road. In particular, it is the addition of the traffic movements expected to be generated by the proposed health centre in the 2030 scenarios that has the most significant detrimental impact on the operation of the junction. Whilst this traffic could be readily accommodated in the morning peak hour in 2019, this use adds a significant number of departure movements in the morning peak hour which will struggle to exit the junction onto Western Way given the large amount of through traffic along Western Way at this time by 2030 and given the significant number of arriving vehicles that will require to turn right into Olding

Road. Furthermore, when the health centre use is added to 2019 scenarios, the RFCs on Olding Road in the evening peak hour reach 0.98, above the required 0.85 threshold, although expected average queue lengths up to 9 vehicles are not excessive.

Before the health centre is added (Scenarios 2 and 3) i.e. assuming that the whole development is general office space (Scenario 1), by 2030 for the morning peak hour, the extent of background traffic and the traffic generated by the different development scenarios results in RFCs for Olding Road that are quantifiable but significantly in excess of the required 0.85 threshold. The RFCs are up to a maximum of 1.52 although maximum expected average queue lengths only extend to 4 vehicles. However, once the health centre is added, the development traffic becomes far too much for Olding Road to accommodate in any way at all given the current junction layout, such that the model completely collapses giving RFC readings of 9999999999.00, which is the default 'overload' and no longer quantifiable reading. In the evening peak hour the RFC values for these movements out of Olding Road for all 2030 Scenarios remain quantifiable but high, ranging from 0.98 to 1.38, with queue lengths ranging from 7 to 52 vehicles.

It is clear from the modelling results of the existing junction layout that this junction will need to be completely redesigned if it is to accommodate the traffic movements expected to be generated by the proposed Western Way development.

Table 7.2 Results for Junction 2 (existing priority T-junction)

	AM Peak hour			PM Peak hour		
	Queue (PCU)	**Delay (s)**	**RFC**	**Queue (PCU)**	**Delay (s)**	**RFC**
	Existing 2019					
Stream B-C	0.0	8.34	0.02	0.5	9.56	0.31
Stream B-A	0.0	19.28	0.02	0.3	17.04	0.25
Stream C-AB	2.6	9.02	0.58	0.1	3.95	0.04
	Existing 2019 incl. 6th form					
Stream B-C	0.0	8.40	0.03	0.5	9.85	0.32
Stream B-A	0.0	20.56	0.02	0.4	17.95	0.26
Stream C-AB	3.1	9.52	0.61	0.1	3.93	0.04
	Existing 2030 incl. 6th form					
Stream B-C	0.0	9.02	0.03	0.7	12.05	0.40
Stream B-A	0.0	29.02	0.04	0.5	23.76	0.35
Stream C-AB	9.3	22.92	0.84	0.1	3.77	0.05
	Existing 2019 incl. 6th form and WW - Scenario 1 Distribution A					
Stream B-C	0.1	8.25	0.06	2.5	32.32	0.73
Stream B-A	0.1	47.11	0.12	1.7	54.34	0.66
Stream C-AB	65.9	187.43	1.10	0.2	3.97	0.08
	Existing 2019 incl. 6th form and WW - Scenario 1 Distribution B					
Stream B-C	0.1	8.24	0.06	2.4	31.09	0.72
Stream B-A	0.1	45.55	0.11	1.7	52.10	0.65
Stream C-AB	62.9	180.98	1.09	0.2	3.96	0.08
	Existing 2019 incl. 6th form and WW - Scenario 2 Distribution A					
Stream B-C	0.2	10.41	0.16	9.5	110.93	0.98
Stream B-A	0.5	92.83	0.39	5.6	163.64	0.94
Stream C-AB	89.3	255.37	1.15	0.9	4.30	0.26
	Existing 2019 incl. 6th form and WW - Scenario 2 Distribution B					
Stream B-C	0.2	10.32	0.16	9.3	108.28	0.98
Stream B-A	0.5	88.48	0.37	5.6	160.43	0.94
Stream C-AB	85.9	245.70	1.14	0.9	4.30	0.26
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A					
Stream B-C	0.3	15.44	0.25	23.4	240.24	1.13
Stream B-A	1.1	171.50	0.62	10.9	292.82	1.09
Stream C-AB	108.9	335.24	1.19	1.4	4.92	0.36
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B					
Stream B-C	0.3	15.49	0.25	23.1	235.75	1.12
Stream B-A	1.1	165.00	0.62	10.8	288.18	1.08
Stream C-AB	105.3	324.58	1.19	1.4	4.92	0.37
	Existing 2030 incl. 6th form and WW - Scenario 1 Distribution A					
Stream B-C	3.9	336.09	1.52	13.2	148.74	1.02
Stream B-A	1.7	555.85	1.43	7.1	201.90	0.98
Stream C-AB	145.0	469.51	1.25	0.2	3.83	0.11
	Existing 2030 incl. 6th form and WW - Scenario 1 Distribution B					
Stream B-C	2.7	256.83	1.07	12.6	141.84	1.01
Stream B-A	1.3	453.58	1.00	6.9	195.24	0.98
Stream C-AB	140.7	456.08	1.25	0.2	3.82	0.11
	Existing 2030 incl. 6th form and WW - Scenario 2 Distribution A					
Stream B-C	30.8	1451.76	9999999999.00	32.5	331.15	1.22
Stream B-A	11.5	1532.56	9999999999.00	14.4	380.25	1.18
Stream C-AB	178.4	601.38	1.31	1.2	4.39	0.32
	Existing 2030 incl. 6th form and WW - Scenario 2 Distribution B					
Stream B-C	28.4	1308.94	9999999999.00	32.0	324.89	1.21
Stream B-A	10.6	1411.64	9999999999.00	14.3	373.76	1.17
Stream C-AB	173.1	589.36	1.31	1.2	4.40	0.32
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A					
Stream B-C	43.6	2062.05	9999999999.00	52.3	544.29	1.38
Stream B-A	15.4	2187.81	9999999999.00	22.3	575.25	1.35
Stream C-AB	209.9	702.12	1.36	2.0	5.30	0.44
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B					
Stream B-C	44.0	2001.45	9999999999.00	51.9	535.52	1.37
Stream B-A	15.9	2113.76	9999999999.00	22.2	566.47	1.34
Stream C-AB	204.1	690.68	1.35	2.0	5.32	0.45

7.1.3 Junction 3 – existing layout

The summary results for the existing small roundabout of Junction 3 are shown in **Table 7.3**. This has been extracted from the ARCADY output files.

As it stands, the modelling of Junction 3 demonstrates that this junction will operate satisfactorily as a stand alone junction for all scenarios tested including the Western Way development traffic in both 2019 and 2030, with no adjustments to the current layout. The conclusions of these results discount the potential for any interference of traffic backing up across the roundabout from the Western Way/Olding Road junction (Junction 2) or any interference from traffic backing up on the approach to the Western Way/Newmarket Road junction (Junction 4) after Western Way development traffic is added.

The maximum RFCs recorded for the various 2019 scenarios in the morning and evening peak hours respectively are 0.80 and 0.66 (with queues of 4 vehicles and 2 vehicles). These maximum RFCs and queues apply to the approach from Western Way (west) i.e. coming from the Western Way/Newmarket Road junction (Junction 4). The maximum queue backing up towards the Olding Road junction on the Western Way (east) approach is only expected to be 2 vehicles, so will not interfere with the Western Way/Olding Road junction (Junction 2) which is approximately 65m to the east of Junction 3.

The maximum RFCs recorded for the various 2030 scenarios in the morning and evening peak hours respectively are 0.89 and 0.75 (with queues of 7 vehicles and 3 vehicles). Again these maximum RFCs and queues apply to the approach from Western Way (west) i.e. coming from the Western Way/Newmarket Road junction (Junction 4). The maximum queue backing up towards the Western Way/Olding Road junction (Junction 2) on the Western Way (east) approach is only expected to be 2 to 3 vehicles, so again Is not expected to interfere with Junction 2. By 2030 for Scenario 3 only, the RFCs on the Western Way (west) approach just exceed the 0.85 threshold, giving RFC results of up to 0.89. However, the average queue expected as a result of this RFC is only 7 vehicles and so is not considered to be excessive.

Therefore, the initial conclusion regarding this junction is that, discounting any potential impact from traffic at other adjacent junctions and discounting any physical and operational impacts of mitigation works that would be undertaken at adjacent junctions, it would not be necessary to undertake any mitigation works at Junction 3 on capacity grounds. However, it is possible that works may be necessary at Junction 3 if works to complement and co-ordinate with works that may be undertaken at the adjacent junctions (Junctions 2 and 4).

However, despite the above analysis, in light of works that were identified as being required at adjacent junctions, the results of further modelling undertaken in ARCADY Simulation mode, and the consequently identified potential for backing up of vehicles that this would result by 2030 with the development traffic added, it was determined that mitigation works would in fact be necessary at Junction 3. Refer to **Section 10.0** for details of this analysis.

Table 7.3 Results for Junction 3 (existing small roundabout)

	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Existing 2019					
A - ASDA	0.2	3.77	0.16	0.5	4.26	0.32
B - Western Way (E)	0.8	3.81	0.42	0.7	3.77	0.41
C - Western Way Retail Park	0.0	5.00	0.03	0.1	5.72	0.12
D - Western Way (W)	1.4	5.42	0.58	1.1	4.91	0.52
	Existing 2019 incl. 6th form					
A - ASDA	0.2	3.94	0.16	0.5	4.31	0.32
B - Western Way (E)	0.8	3.85	0.42	0.8	3.91	0.43
C - Western Way Retail Park	0.0	5.04	0.03	0.1	5.90	0.13
D - Western Way (W)	1.6	5.95	0.61	1.2	5.02	0.53
	Existing 2030 incl. 6th form					
A - ASDA	0.3	4.44	0.20	0.6	5.03	0.39
B - Western Way (E)	1.0	4.36	0.49	1.0	4.49	0.49
C - Western Way Retail Park	0.0	5.56	0.03	0.2	6.80	0.16
D - Western Way (W)	2.4	7.73	0.70	1.6	6.19	0.62
	Existing 2019 incl. 6th form and WW - Scenario 1 Distribution A					
A - ASDA	0.2	4.79	0.19	0.5	4.42	0.32
B - Western Way (E)	0.8	3.98	0.45	1.3	5.23	0.57
C - Western Way Retail Park	0.0	5.19	0.03	0.2	7.50	0.16
D - Western Way (W)	3.2	9.71	0.77	1.2	5.24	0.55
	Existing 2019 incl. 6th form and WW - Scenario 1 Distribution B					
A - ASDA	0.2	4.73	0.19	0.5	4.42	0.33
B - Western Way (E)	0.8	3.99	0.45	1.3	5.14	0.57
C - Western Way Retail Park	0.0	5.19	0.03	0.2	7.40	0.15
D - Western Way (W)	3.1	9.36	0.76	1.2	5.25	0.55
	Existing 2019 incl. 6th form and WW - Scenario 2 Distribution A					
A - ASDA	0.2	4.37	0.18	0.5	4.37	0.32
B - Western Way (E)	1.0	4.35	0.50	1.5	5.54	0.60
C - Western Way Retail Park	0.0	5.56	0.03	0.2	7.86	0.16
D - Western Way (W)	2.3	7.57	0.70	1.2	5.14	0.55
	Existing 2019 incl. 6th form and WW - Scenario 2 Distribution B					
A - ASDA	0.2	4.34	0.18	0.5	4.37	0.32
B - Western Way (E)	1.0	4.38	0.50	1.4	5.42	0.59
C - Western Way Retail Park	0.0	5.59	0.03	0.2	7.72	0.16
D - Western Way (W)	2.3	7.44	0.69	1.2	5.14	0.55
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A					
A - ASDA	0.2	5.02	0.20	0.6	5.10	0.36
B - Western Way (E)	1.1	4.46	0.51	1.6	5.93	0.62
C - Western Way Retail Park	0.0	5.67	0.03	0.2	8.29	0.17
D - Western Way (W)	3.9	11.22	0.80	1.9	6.84	0.66
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B					
A - ASDA	0.2	4.94	0.20	0.6	5.14	0.36
B - Western Way (E)	1.1	4.50	0.51	1.6	5.77	0.61
C - Western Way Retail Park	0.0	5.70	0.03	0.2	8.12	0.17
D - Western Way (W)	3.6	10.62	0.79	2.0	6.94	0.66
	Existing 2030 incl. 6th form and WW - Scenario 1 Distribution A					
A - ASDA	0.3	5.54	0.24	0.6	5.17	0.39
B - Western Way (E)	1.1	4.53	0.51	1.8	6.32	0.64
C - Western Way Retail Park	0.0	5.73	0.03	0.3	9.02	0.20
D - Western Way (W)	5.6	15.45	0.85	1.8	6.52	0.64
	Existing 2030 incl. 6th form and WW - Scenario 1 Distribution B					
A - ASDA	0.3	5.46	0.24	0.6	5.18	0.39
B - Western Way (E)	1.1	4.54	0.51	1.7	6.19	0.63
C - Western Way Retail Park	0.0	5.74	0.03	0.2	8.87	0.20
D - Western Way (W)	5.3	14.60	0.84	1.8	6.53	0.64
	Existing 2030 incl. 6th form and WW - Scenario 2 Distribution A					
A - ASDA	0.3	4.99	0.22	0.6	5.11	0.39
B - Western Way (E)	1.3	5.03	0.56	2.0	6.78	0.67
C - Western Way Retail Park	0.0	6.19	0.03	0.3	9.53	0.21
D - Western Way (W)	3.6	10.71	0.79	1.7	6.37	0.63
Cont....						

Table 7.3 (cont.…)	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Existing 2030 incl. 6th form and WW - Scenario 2 Distribution B					
A - ASDA	0.3	4.95	0.22	0.6	5.11	0.39
B - Western Way (E)	1.3	5.06	0.56	1.9	6.60	0.66
C - Western Way Retail Park	0.0	6.23	0.03	0.3	9.33	0.21
D - Western Way (W)	3.5	10.45	0.78	1.7	6.37	0.63
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A					
A - ASDA	0.3	5.85	0.25	0.8	6.13	0.43
B - Western Way (E)	1.4	5.17	0.57	2.2	7.37	0.69
C - Western Way Retail Park	0.0	6.33	0.04	0.3	10.17	0.22
D - Western Way (W)	7.3	19.44	0.89	2.9	9.21	0.74
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B					
A - ASDA	0.3	5.73	0.25	0.8	6.18	0.44
B - Western Way (E)	1.4	5.22	0.58	2.1	7.13	0.68
C - Western Way Retail Park	0.0	6.37	0.04	0.3	9.92	0.22
D - Western Way (W)	6.6	17.79	0.87	2.9	9.39	0.75

7.1.4 Junction 4 – existing layout

The summary results the existing traffic signal controlled layout of Junction 4 are shown in **Table 7.4**. In this instance Scenario 3 was identified as the worst case scenario so the results table concentrates on this scenario and does not include results for Scenario 1 and 2.

It is clear from these results that, with the Abbeygate Sixth Form College development traffic added, by 2030 the junction will be operating marginally above the preferred threshold of DoS 90%, both in the morning and evening peak hours with queue lengths of up to 26 cars (PCUs). Therefore there is no capacity to satisfactorily accommodate the proposed Western Way development traffic without resulting in a degree of congestion. The worst case results for 2030, once the Western Way development traffic is added, shows DoS of up to 111% and queue lengths of up to 67 cars (PCUs) which would back up across junctions further along the road.

The results for this junction are not nearly as onerous as those for the existing layout of Junction 2. Never-the less, the Local Highway Authority are likely to consider the impacts severe enough to warrant mitigation works to be carried out as DoS values are significantly higher than would be preferred and these predicted queue lengths will back up past other junctions on the highway network.

Table 7.4 Results for Junction 4 (existing traffic signal controlled layout)

	AM Peak hour		PM Peak hour	
Highest lane result on each approach	Mean Max Queue (PCU)	DoS (%)	Mean Max Queue (PCU)	DoS (%)
	Existing 2019			
Western Way	11.9	75.6	16.5	78.9
Newmarket Road (east)	19.2	76.4	17.3	77.9
Dettingen Way	8.5	73.5	12.5	78.1
Newmarket Road (west)	16.1	76.8	14.3	68.8
	Existing 2019 incl. 6th form			
Western Way	12.6	79.8	17.3	80.3
Newmarket Road (east)	20.8	80.5	17.6	79.9
Dettingen Way	9.0	76.3	12.8	78.9
Newmarket Road (west)	17.5	79.9	14.6	70.5
	Existing 2030 incl. 6th form			
Western Way	16.7	91.3	22.3	91.2
Newmarket Road (east)	26.0	89.7	22.9	91.5
Dettingen Way	12.4	91.3	16.6	30.2
Newmarket Road (west)	22.5	90.7	18.0	80.8
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A			
Western Way	23.3	100.7	32.5	97.8
Newmarket Road (east)	42.2	101.4	28.5	98.9
Dettingen Way	15.9	99.3	20.2	99.2
Newmarket Road (west)	36.0	101.8	24.3	96.6
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B			
Western Way	23.3	100.7	32.6	98.7
Newmarket Road (east)	37.3	99.1	26.4	96.5
Dettingen Way	15.3	98.4	17.9	95.3
Newmarket Road (west)	31.9	99.6	24.6	96.8
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A			
Western Way	38.3	111.1	48.1	106.1
Newmarket Road (east)	64.8	109.1	43.4	106.7
Dettingen Way	25.2	109.2	31.2	107.5
Newmarket Road (west)	54.4	109.6	39.9	106.8
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B			
Western Way	34.0	107.7	49.9	107.2
Newmarket Road (east)	67.1	110.2	44.9	107.3
Dettingen Way	24.2	108.4	30.8	107.5
Newmarket Road (west)	51.3	108.4	36.4	104.5

7.2 Junction 1 – mitigation proposal

For all future situations this junction has been modelled in accordance with the signal controlled design developed by Peter Brett Associates, working on behalf of the committed Abbeygate Sixth Form College developers, in consultation with the Western Way development client and designers, and the Local Highway Authority (LHA) officers in order to ensure that it will satisfactorily accommodate the expected Western Way development traffic. The LHA requirement is that the design of this junction results in its operation being no worse overall in the future year scenarios with both the Sixth Form and Western Way development traffic added than it would have been had the developments never been undertaken and no junction improvements were installed i.e. the 'do-nothing, no development scenario'.

The results summary of the LinSig modelling for the proposed signal controlled junction layout of Junction 1 for the future situations and scenarios are shown in **Table 7.5**. Signal timings have been optimised to achieve the most efficient results. It should be noted that, whilst existing traffic has been accounted for in the model and factored up as required to the expected 2030 traffic flows using TEMPro factors for this local area, for Scenario 3 a

reduction in the existing traffic flows has been applied. This is because the addition of the Leisure Centre in this scenario is a relocation of the existing Leisure Centre. The new Leisure Centre in this scenario will be located to the west of the Western Way development site, whereas the existing Leisure Centre and its car park are located off Beetons Way (south). The new Leisure Centre traffic and its distribution through the highway network forms part of the development traffic model for Scenario 3. If the base traffic model remained unadjusted the Leisure Centre traffic would be accounted for twice within the model. The existing Leisure Centre traffic, assumed to be the same number of arrivals and departures at peak times as that derived for the proposed Leisure Centre, has therefore been removed from the baseline traffic model for Scenario 3 in accordance with the distribution that would be appropriate for all existing Leisure Centre traffic parking on Beetons Way (south).

Table 7.5 Results for Junction 1 (proposed signal controlled layout), future situations

	AM Peak hour		PM Peak hour	
Highest lane result on each approach	Mean Max Queue (PCU)	DoS (%)	Mean Max Queue (PCU)	DoS (%)
	Existing 2019 incl. 6th form			
Western Way	7.9	74.8	12.4	66.2
Beetons Way (north)	20.7	77.0	4.2	28.3
New college Access	0.9	9.4	1.7	22.7
Beetons Way (south)	4.4	75.3	8.0	65.0
	Existing 2030 incl. 6th form			
Western Way	11.8	86.0	16.0	75.8
Beetons Way (north)	29.0	87.2	5.0	31.3
New college Access	0.9	9.0	1.8	28.5
Beetons Way (south)	5.8	86.0	9.4	74.4
	Existing 2019 incl. 6th form and WW - Scenario 1 Distribution A			
Western Way	14.8	89.7	17.5	75.3
Beetons Way (north)	31.0	89.8	5.0	33.2
New college Access	0.9	8.2	1.7	26.1
Beetons Way (south)	6.2	88.4	12.1	74.9
	Existing 2019 incl. 6th form and WW - Scenario 1 Distribution B			
Western Way	12.5	89.5	15.9	73.3
Beetons Way (north)	29.4	86.6	5.1	32.6
New college Access	0.9	9.4	2.0	32.6
Beetons Way (south)	5.3	82.4	10.2	71.4
	Existing 2019 incl. 6th form and WW - Scenario 2 Distribution A			
Western Way	18.0	93.4	18.8	78.7
Beetons Way (north)	37.3	94.7	5.7	35.4
New college Access	0.9	7.5	1.9	28.9
Beetons Way (south)	7.6	88.7	13.0	79.0
	Existing 2019 incl. 6th form and WW - Scenario 2 Distribution B			
Western Way	14.4	90.9	17.3	77.3
Beetons Way (north)	34.5	90.4	5.1	34.8
New college Access	1.0	9.9	2.0	34.5
Beetons Way (south)	6.6	88.2	10.8	76.9
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A (minus existing Leisure Centre)			
Western Way	17.1	93.0	18.5	78.4
Beetons Way (north)	39.1	93.1	5.6	35.3
New college Access	1.0	9.9	1.9	31.8
Beetons Way (south)	6.8	87.0	12.0	77.1
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B (minus existing Leisure Centre)			
Western Way	12.6	88.6	16.8	76.9
Beetons Way (north)	33.0	90.0	5.5	35.8
New college Access	0.9	9.4	2.0	35.6
Beetons Way (south)	5.3	82.4	9.4	74.4
cont.....				

Table 7.5 (cont.….)	**AM Peak hour**		**PM Peak hour**	
Highest lane result on each approach	**Mean Max Queue (PCU)**	**DoS (%)**	**Mean Max Queue (PCU)**	**DoS (%)**
	Existing 2030 incl. 6th form and WW - Scenario 1 Distribution A			
Western Way	20.2	97.7	23.4	84.8
Beetons Way (north)	55.5	100.4	5.6	35.3
New college Access	1.0	12.5	1.9	31.6
Beetons Way (south)	8.5	99.2	14.3	84.6
	Existing 2030 incl. 6th form and WW - Scenario 1 Distribution B			
Western Way	19.0	95.5	20.3	82.5
Beetons Way (north)	48.7	97.7	5.6	36.2
New college Access	0.9	9.4	1.9	33.7
Beetons Way (south)	7.1	93.2	12.1	82.4
	Existing 2030 incl. 6th form and WW - Scenario 2 Distribution A			
Western Way	35.2	103.6	26.4	88.2
Beetons Way (north)	81.8	104.6	5.6	37.8
New college Access	1.0	12.5	2.0	33.6
Beetons Way (south)	9.7	96.8	15.7	88.8
	Existing 2030 incl. 6th form and WW - Scenario 2 Distribution B			
Western Way	24.0	99.3	23.8	87.1
Beetons Way (north)	64.3	101.4	6.0	38.9
New college Access	1.0	11.1	2.0	35.5
Beetons Way (south)	8.8	97.8	12.9	85.2
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A (minus existing Leisure Centre)			
Western Way	32.4	103.0	25.5	87.7
Beetons Way (north)	77.7	103.7	5.6	37.6
New college Access	1.0	12.5	2.0	36.4
Beetons Way (south)	8.9	95.8	14.4	87.5
	Existing 2030 incl. 6th form and WW – Scenario 3 Distribution B (minus existing Leisure Centre)			
Western Way	27.2	100.7	23.0	86.4
Beetons Way (north)	58.9	99.9	5.7	38.4
New college Access	1.0	10.5	2.1	38.3
Beetons Way (south)	7.1	93.2	11.4	83.8

RFCs at priority junctions and roundabouts is generally comparable to DoS at signal controlled junctions. By 2030, with no junction improvements and neither the sixth form college development nor the Western Way development implemented, an RFC of 1.80 (180%) can be expected to occur on Beetons Way (north) and an RFC of 1.01 (101%) can be expected to occur on Western Way in the morning peak hour with queues of 456 and 21 vehicles respectively. Under the same conditions, by 2030 an RFC of 1.68 (168%) can be expected to occur on Western Way in the evening peak hour with queues of 373 vehicles (refer to **Table 7.1**). By comparison, the worst case Western Way development scenario tested for the proposed traffic signal controlled junction by 2030 gives a DoS of 104.6% on Beetons Way (north) and of 103.6% on Western Way in the morning peak hour, with mean maximum queues of 82 and 35 respectively. Also in the morning peak hour in the worst case scenario tested, the signal control junction results in a DoS of 97.8% on Beetons Way (south) with a mean maximum queue of 9 (refer to **Table 7.5**).

Comparing the expected 'do nothing' results with the worst case tested Western Way scenario results for the proposed traffic signal controlled junction in 2030, it can be seen that very considerable betterment is achieved on Beetons Way (north) in the morning peak hour in terms of both capacity and queues. On Western Way in the morning peak hour the results for the signal controlled junction are very slightly higher than the 'do nothing' results but the difference is very small so would not be considered severe, especially considering that the expected mean maximum queue of 35 vehicles would not back up and interfere with any other junctions along Western Way (the length of Western Way between the junctions with Beetons Way and Olding Road can accommodate approximately 55 cars (PCUs). The expected DoS of 97.8% on Beetons Way (south) in the

morning peak hour of 2030 is a significant increase on the expected 'do nothing' situation. However this results in queues of only 9 PCU which is not considered to be severe.

Making the comparison for the 2030 evening peak hour, it can be seen that, the proposed signal controlled junction offers results that are all below the preferred threshold of 90% DoS on all approaches for all tested Western Way development scenarios. Whilst the results give longer queues than for the 'do nothing' situation on Beetons Way (north and south), in the worst case these queues are no more than 16 vehicles (on Beetons Way (south)) which is not considered to be severe (the queuing capacity of each lane of the proposed two-lane approach on this arm of the junction is approximately 17 cars (PCUs) after which the approach reverts to a single lane). Very considerable betterment is achieved for Western Way where an average queue of 373 PCU is reduced to a mean maximum queue of only 26 PCU in the worst case scenario tested for the traffic signal controlled junction.

It is clear from these results that, despite some minor increases in queues in some scenarios on some approaches, the proposed signal controlled junction will offer an overall improvement in the operation of the junction in the future. In some cases this improvement will be very considerable in terms of capacity and queue lengths, even with both the Abbeygate Sixth Form College development traffic added and the traffic associated with all of the tested potential Western Way development scenarios added, through to 2030 and beyond, even though, for some scenarios degrees of saturation above the preferred threshold of 90% are likely to occur.

As this junction modelling and layout arrangement has been consulted on with the Local Highway Authority officers it is not proposed to attempt to make any further changes to the design of this junction. It is considered that this is the best operation achievable at this location given the constraints of the site and the development traffic numbers and distributions modelled.

7.3 Junction 2 – test mitigation options

Four test mitigation options were explored in order to identify a potential junction arrangement that might accommodate the Western Way development traffic through to 2030 at the junction of Western Way/Olding Road (Junction 2):

- **Test a**: A ghost island T-junction with separate left and right turning lanes out of Olding Road as well as a dedicated right turn lane from Western Way (west) into Olding Road.
- **Test b**: A mini-roundabout
- **Test c**: A priority ghost island T-junction with priority changed from the existing layout – the priority movement being in both directions between Western Way (west) and Olding Road (with short dedicated right turn lane in to Western Way (east)), and the approach giving way to all traffic streams being Western Way (east) with 2 right turn lanes (to Western Way (west)) and 1 left turn lane (to Olding Road).
- **Test d**: A standard roundabout.
- **Test e**: A traffic signal controlled T-junction

An option for a signal controlled junction was not initially tested as it was made clear at a previous meeting with the Local Highway Authority (LHA) that proposals for a signal controlled junction would not be looked upon favourably. However, after a further pre-

planning meeting held on Friday, 24th May 2019, at which the results of the previous tests were discussed, the LHA requested that a signal controlled option be tested after all.

It should be noted that the following discussions relating to the modelling of the test mitigation options a to d relate to car parking numbers and arrangements previously considered for the Western Way development, as were current at the time that modelling was undertaken, but that are slightly different to those later proposed in April 2019 (the April 2019 numbers and arrangements being those that have been used for the modelling of Junction 2 test option e and of all existing junction layouts for Junctions 3 and 4, and the proposed mitigation layouts for Junctions 1, 2 and 4). The April 2019 proposed numbers and arrangements had not been determined at the time of undertaking the other tests for Junction 2. However, the scale and location of the parking arrangements tested are very similar to those proposed in April 2019 such that the conclusions of the test modelling will remain valid in determining whether or not an option is appropriate to pursue regarding its potential to provide the required mitigation. A comparison of the traffic distribution arrangements used for the test modelling of Junction 2 options compared to the April 2019 proposed distribution arrangements as a result of the slightly different car parking arrangements used is as shown in **Table 7.6**.

Table 7.6 Comparison of traffic distribution arrangements used in the test modelling for Junction 2 options and that used for modelling of existing junction layouts for Junctions 1, 2, 3 and 4.

	Accessed from:	**Distribution A**	**Distribution B**
		Number of proposed car parking spaces modelled	
Test model mitigation options – Junction 2 tests a - d.*	Olding Road	526	526
	Beetons Way (south)	481	220
	Beetons Way (north)	250	500
Junction 2 test e and Existing layout models – Junctions 2, 3, 4. Proposed layout – Junctions 1, 2, 4.**	Olding Road	526	526
	Beetons Way (south)	547	286
	Beetons Way (north)	250	500

*Previously proposed development car parking arrangements.
**April 2019 proposed development car parking arrangements.

7.3.1 Test a – Ghost island T-junction

This test junction model demonstrated that very excessive RFCs and queueing would be reached in the 2019 models that included the Western Way development traffic scenarios (RFCs of up to 1.64 on Olding Road with associated average queues of up to 122 vehicles). These results would increase further by 2030 (quantifiable RFCs of up to 3.43 and average queues of up to 169 vehicles on Olding Road, with RFCs beyond this being unquantifiable i.e. 9999999999.00, and excessive results also occurring on Western Way (east)).

It was concluded that this junction arrangement was not appropriate to progress to more detailed design.

7.3.2 Test b – Mini-roundabout

This test junction model demonstrated that all approaches in all years and all scenarios resulted in excessive RFCs and long queueing either in the morning or the evening peak

hours or in both time periods. By 2030 the worst scenarios resulted in RFCs of up to 1.60 and queues of up to 326 vehicles. However, all results were quantifiable.

It was concluded that this junction arrangement was not appropriate to progress to more detailed design.

7.3.3 Test c – Ghost island T-junction with changed priority

This test junction model demonstrated that, in all years and all scenarios, the Olding Road approach would operate comfortably within capacity. However, this was very much at the expense of the operation of Western Way (east) which resulted in very excessive RFCs for all years and all scenarios in both the morning and evening peak hours, with a maximum RFC of 2.33 and associated average queue of 443 vehicles by 2030.

It was concluded that this junction arrangement was not appropriate to progress to more detailed design.

7.3.4 Test d – Standard roundabout

The initial sketch layout for this test junction (sketch 01) demonstrated that, for all years and all scenarios, the Western Way (east) and the Olding Road approaches would operate comfortably within capacity. For the Western Way (west) approach all years and scenarios that included the Western Way development traffic resulted in RFCs a little over 0.85 during the morning peak hour and, in the evening peak hour, one scenario with both distribution options in 2030 also resulted in RFCs a little over 0.85 (Scenario 3, Distributions A and B). The highest RFC result was 1.00 (100%) which occurred in the morning peak hour in 2030 for Scenario 3, Distribution A, with an associated longest average queue of 25 vehicles. This queue length would back up across the existing roundabout at Junction 3, which is located approximately 65m to the west of Junction 2, and would result in a cumulative queue at Junction 3 of 21 vehicles that would extend towards the 90 degree bend in the carriageway of Western Way but not quite as far as this.

This initial sketch layout and model was undertaken to test whether or not it would be appropriate to pursue the option in more detail. The results of this model test were very favourable compared to the other options tested, resulting in no RFCs exceeding 1.00 (100%) in any scenario through to 2030. It was therefore concluded that this standard roundabout option would be appropriate to develop further, in consultation with the Local Highway Authority.

7.3.5 Test e – Traffic signal controlled T-junction

In the first instance this junction option was tested with traffic signal control added to the existing layout of the existing T-junction. As the existing junction layout only has a single lane approach on each arm, with no room for right turners travelling from Western Way to Olding Road to wait without obstructing straight ahead traffic, the only appropriate signal stage sequence would be to show a green light to each approach individually in turn followed by a pedestrian stage which was also included in the test model. This results in long waiting times on each approach which consequently results in long queues on the Western Way approaches in both directions, backing up past the ASDA roundabout to the west (Junction 3) in the peak hours even in the 2019 model without any proposed Sixth Form traffic or Western Way development traffic added. By 2030, with the traffic expected from the Sixth Form development added to the junction, DoS of approximately 140% is reached on each of the Western Way approaches resulting in mean maximum queues of approximately 180 PCU. This is clearly not acceptable. When the Western Way

development traffic is added to the junction these results obviously become much worse, with DoS on Western Way reaching approximately 175% and mean maximum queues on Western Way reaching approximately 300 PCU.

An alternative theoretical traffic signal controlled junction layout was tested which would offer a small amount of right turning waiting capacity for vehicles travelling from Western Way into Olding Road. This would require the junction to be relocated several metres to the east in order that a short right turn lane could be incorporated on the Western Way (west) approach utilising land within the highway boundary and land associated with the development site. The short right turn lane and accompanying right turning storage within the junction allow the possibility of both Western Way approaches (west and east) being shown a green light at the same time as straight ahead traffic would not be obstructed by right turning traffic to the same extent as in the first test. This would allow the stages to circulate more efficiently and waiting times on each approach would be reduced, even with the pedestrian stage included. With this test arrangement by 2030, with both the Sixth Form development traffic and the Western Way development traffic added to the junction, DoS of approximately 135% and mean maximum queues of approximately 200 PCU were reached. This shows little significant improvement from the previous test with no right turn storage capacity.

Given the above results it is considered that it would not be appropriate to pursue development of a traffic signal controlled junction design option to mitigate the development traffic.

7.4 Junction 4 – test mitigation options

Three test mitigation options were explored in order to identify a potential junction arrangement that might accommodate the Western Way development traffic through to 2030 at the junction of Western Way/Newmarket Road (Junction 4):

- **Test a:** Increasing the capacity at the signal controlled junction by increasing lane widths, installing an additional exit lane on Western Way and installing an additional right turn Lane on Newmarket Road (east).
- **Test b:** Replacing the existing traffic signal controlled junction with a roundabout without the requirement to alter existing kerb lines and without traffic signals other than on pedestrian crossings.
- **Test b:** Installing a segregated left turn slip off from Newmarket Road (west) within the confines of the existing highway boundary to give way at Western Way, and all other junction approaches to remain as existing.

7.4.1 Test a – Widened lanes and additional lanes

Options to offer mitigation at the existing traffic signal controlled junction of Western Way/Newmarket Road (Junction 4) by increasing lane widths and installing additional lanes were tested in steps, with one step building up from the previous, until the required results in terms of capacity and queues through to 2030 could be achieved:

- **Test a, step 1:** Install two exit lanes from the junction onto Western Way rather than the existing one lane to accommodate the additional Western Way development traffic requiring to enter Western Way from this end of the road, and reassign existing straight ahead lanes from Newmarket Road to also allow turning movements into Western Way so that two lanes of traffic are entering Western Way from each approach.

- **Test a, step 2:** Maintain two exit lanes on Western Way and reassignment of movements on Newmarket Road (west) from Step 1. Widen the approach lanes at the junction from both directions on Newmarket Road to improve the flow of vehicles over the stop line (increase saturation flows).
- **Test a, step 3:** Maintain wider lanes on Newmarket Lane (west) from Step 2 and maintain two exit lanes on Western Way and reassignment of movements on Newmarket Road (west) from Step 1. Maintain existing assignment of movements on Newmarket Road (east) and install an additional right turn lane from Newmarket Lane (east) into Western Way, resulting in two right turn lanes from this approach.

The traffic distributions relating to the April 2019 car parking arrangements were used in the test modelling for this junction.

7.4.1.1 Test step 1 – additional exit lane on Western Way and reassignment of movements from Newmarket Road

This test model provided for an additional exit lane into Western Way with a capacity 6 PCU before merging back into 1 lane.

The results of this test model demonstrated a reduction in the worst case 2030 scenario with Western Way development and the Sixth Form development traffic added from approximately 110% DoS across all arms for the existing layout to approximately 97% DoS for this mitigation layout in the morning peak hour. The longest queue in the morning peak hour would be significantly reduced to 29 PCU. However no discernible improvement was demonstrated in the evening peak hour when results remained in the region of 107% DoS with queue lengths of up to 48 PCU.

This model clearly showed that the notion of allowing two lanes of traffic to enter Western Way had the potential to offer improvements to the future year capacity of the junction to accommodate the Western Way development traffic but the step 1 mitigation measures were not sufficient alone, particularly in respect of the evening peak hour situation. It was therefore considered appropriate to continue with this mitigation design concept but to move on to test step 2 which would develop this two lane exit solution further.

It is acknowledged that, in order to install a second exit lane on Western Way, it is highly likely that it will be necessary to purchase a strip of land beyond the highway boundary on the north west corner of the junction.

7.4.1.2 Test step 2 – widening of approach lanes from Newmarket Road

This test model maintained the additional exit lane on Western Way from test step 1 as well as the reassignment of movements and progressed to increase the width of the approach lanes from each direction along Newmarket Road. Widening the lanes has the effect of increasing the saturation flow of each approach i.e. the number of vehicles that will pass over the stop line over a period of time, thereby increasing the capacity to accommodate an increased flow of traffic through the junction. For the purposes of the test model the lanes were increased in width as follows:

Newmarket Road (west)

- Left turn lane to Western Way – 3.13m to 3.5m
- Ahead lane to Newmarket Road (east) – 2.98m to 3.5m (lane to be reassigned to also permit left turn to Western Way)
- Right turn lane to Dettingen Way – no change

Newmarket Road (east)

- Right turn lane to Western Way lane – 3.38m to 3.7m
- Ahead and left turn lane to Newmarket Road (west) and Dettingen Way – 3.21m to 3.5m

The results of this test model demonstrated further improvement from test step 1, reducing DoS to between approximately 93% and approximately 97% for 2030 in the morning peak hour and to between approximately 97% and approximately 105% in the evening peak hour, with a very small improvement in queue lengths from those demonstrated in test step 1 for both peak hours.

This model demonstrated that the addition of widened lanes would offer some slight improvement so this should be pursued further in test step 3. However, the improvement offered by test step 2 is not sufficient to offer the required mitigation that would result in an impact relating to the Western Way development traffic that would not be considered severe, particularly in the evening peak hour, considering that, without the development, DoS on all arms in both peak hours is not expected to exceed 92% with mean maximum queues of no longer than 26 PCU by 2030.

7.4.1.3 Test step 3 – additional right turn lane from Newmarket Road (east)

This test model maintained the additional exit lane on Western Way from test step 1 as well as the reassignment of traffic movements from Newmarket Road (west), and also maintained the increased width of approach lanes on Newmarket Road (west) from test step 2. However, this test model did not maintain the reassignment of traffic movements from test step 1 or the increased approach lane widths from test step 2 on Newmarket Lane (east). Instead, this test model provided an additional right turn lane from Newmarket Road (east) into Western Way, maintaining the existing traffic movement assignment of the existing lanes on this approach. The test was to see if the extra capacity to move traffic through the junction to make this movement would clear this approach more quickly and so offer more opportunity of green time to the Western Way approach, which would particularly assist the evening peak hour situation.

The results of this test model demonstrated a negligible change from test step 2 for 2030 during the morning peak hour with DoS not exceeding 95%, but a significant improvement, as hoped, for the evening peak hour with DoS between approximately 89% and approximately 94% and mean maximum queues not exceeding 29 PCU.

The results of test step 3 for this junction are considered to demonstrate a mitigation improvement option sufficient that the impacts of the proposed Western Way development would not be considered severe as illustrated in **Table 7.7**. Existing 2030 traffic is the existing 2019 traffic factored up to 2030 using TEMPro growth factors for the local area.

As can be seen from the table, increases in DoS from the 2030 existing junction layout model without the Western Way development to the 2030 proposed junction layout model with the Western Way development are very small, with no DoS exceeding 95% in the proposed junction layout model with the Western Way development. Differences in

queue lengths between the two situations is minimal, with no queue exceeding 29 PCU in the 2030 proposed junction layout model with the Western Way development.

As the results of this model test were favourable it was concluded that this mitigation option would be appropriate to develop further.

Table 7.7 Comparison between 2030 Junction 4 situation without and with Western Way development traffic – Test a, step 3

	AM Peak hour		PM Peak hour	
Highest lane result on each approach	**Mean Max Queue (PCU)**	**DoS (%)**	**Mean Max Queue (PCU)**	**DoS (%)**
Existing 2030 including 6th form, existing junction layout				
Western Way	16.7	91.3	22.3	91.2
Newmarket Road (east)	26.0	89.7	22.9	91.5
Dettingen Way	12.4	91.3	16.6	30.2
Newmarket Road (west)	22.5	90.7	18.0	80.8
Existing 2030 including 6th form and WW – Scenario 3 Distribution A, test junction layout				
Western Way	20.2	93.7	28.9	92.3
Newmarket Road (east)	26.1	94.5	23.4	93.5
Dettingen Way	14.1	92.7	18.3	92.5
Newmarket Road (west)	27.5	94.2	21.6	89.1

7.4.2 Test b – Replace traffic signal junction with non-signalised roundabout

After developing the Test a option further it became apparent that the requirement to purchase land was likely to be a significant risk to this option being able to be pursued (refer to **Section 9.1**). It was therefore decided to concentrate on determining whether or not a satisfactory mitigation option could be found that would not require the purchase of land beyond the existing highway boundary. Therefore, for Test b, the existing kerb lines of the junction were maintained and the assignment of the approach lanes from each arm was also maintained.

A test island was placed within the central area of the junction of a size and location that would, in theory, provide the appropriate requirement for vehicle deflection across the junction whilst also offering the carriageway width required around the island. The existing splitter islands/pedestrian refuges in the centre of each approach were adjusted as required to suit the test island layout. As a result it was determined that the central refuge on the Newmarket Road (west) approach was unlikely to be able to continue to offer sufficient safe width to accommodate pedestrians crossing the road. The existing signal controlled junction arrangement offers signal controlled pedestrian crossing facilities across Newmarket Road (west), Newmarket Road (east) and Dettingen Way. It was therefore necessary to reassign pedestrians around the test roundabout to offer controlled crossings (pelican or zebra) across Newmarket Road (east), Dettingen Way and Western Way so as to maintain the current level of pedestrian crossing facility and access.

The redistribution of pedestrian movements was carried out as follows:

1. Determine the existing peak hour pedestrian flows across each arm of the junction from the pedestrian survey undertaken on Tuesday, 26th February 2019, including those who cross Western Way where a formal signal controlled crossing facility is not currently provided (refer to **Figure 7.1**).
2. Identify the routes that pedestrians would currently take through the junction to travel between diagonally opposite corners in each direction. Determine the alternative equivalent pedestrian routes through the proposed new pedestrian crossing arrangement and reassign the existing pedestrians to these routes as appropriate (refer to **Figure 7.2**).

Key to **Figures 7.1 to 7.3**

Junction 4
A: Western Way
B: Newmarket Road (E)
C: Dettingen Way
D: Newmarket Road (W)

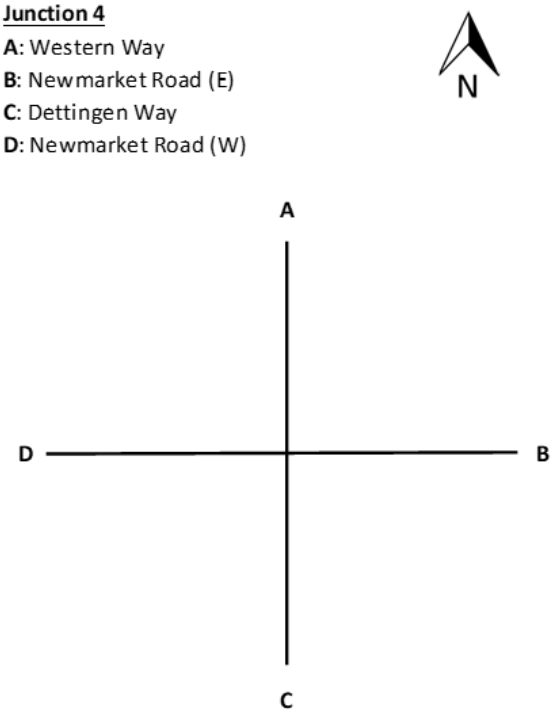


Figure 7.1 Existing peak hour pedestrian movements at existing signal controlled junction layout

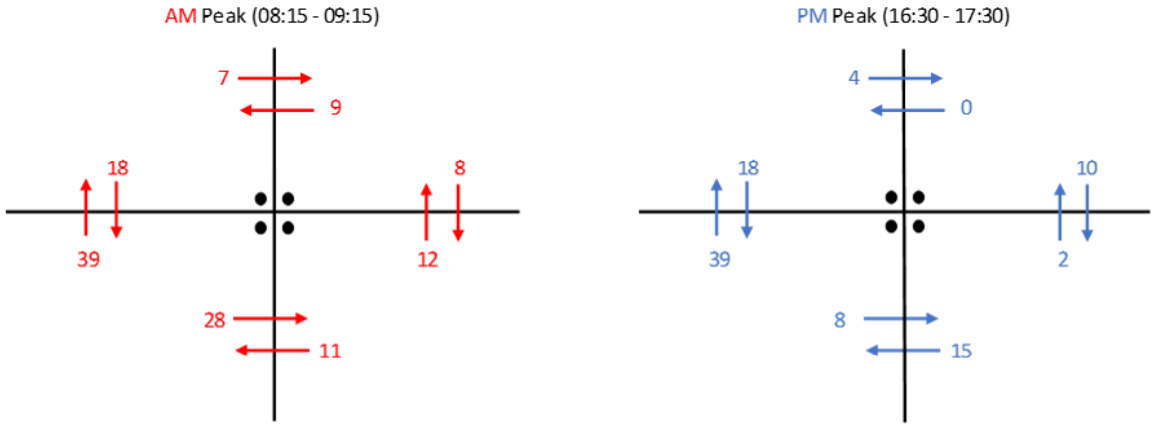
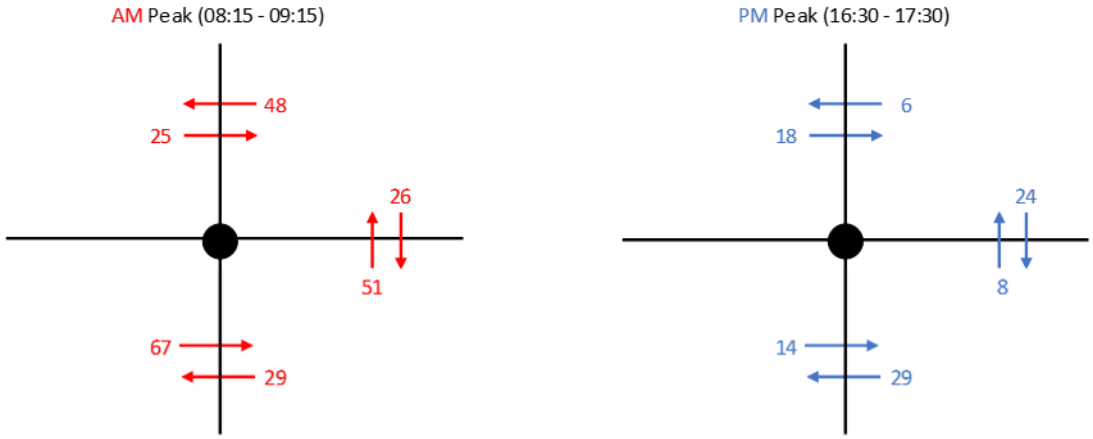


Figure 7.2 Existing peak hour pedestrian movements reassigned for test roundabout option



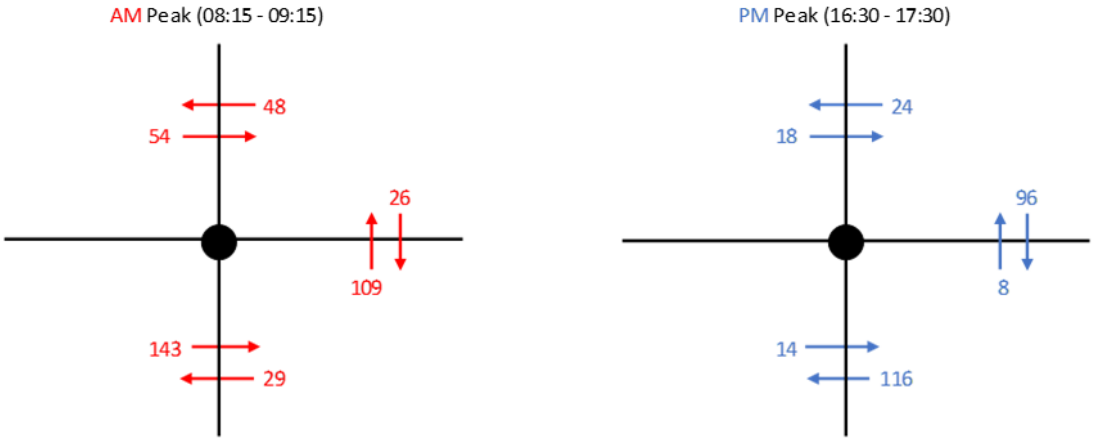
It was necessary to calculate an estimation of the number of additional pedestrian trips that might take place through this junction at peak hours as a result of the proposed Western Way development. 2011 UK Census data states that 11.3% of people walk to work in the immediate area of the development site. Therefore a ballpark estimation of the number of people who might be employed at the Western Way development site for Scenario 3 (office, health facility and leisure centre) was undertaken as follows:

1. It was established from known parameters that the existing West Suffolk House offers 22.5sqm of floor space per existing member of staff. Given a GFA of 11,470sqm for the proposed offices relating to Scenario 3, it was therefore estimated that the proposed offices would accommodate approximately 511 additional members of staff.
2. The proposed health facility is to offer 421 desk spaces. Therefore, as a worst case scenario, a figure of 421 additional members of staff has been assumed for this facility for the purposes of this pedestrian calculation.
3. It has been assumed that there will be no additional members of staff working on the site as a result of the construction of the proposed new Leisure Centre as this will be a replacement for the existing adjacent Leisure Centre, so these staff trips are already accounted for in the surveys.
4. Therefore, for the purposes of this pedestrian calculation, it has been assumed that there will be 932 additional members of staff travelling to the site (511 + 421) and that 11.3% of these will walk to work resulting in 105 additional members of staff walking.

The most robust scenario for potential additional pedestrian movements has been modelled as the extent to which pedestrians will activate the controlled crossings at the junction will have an impact on the operation of the junction. If the model shows that the test roundabout will operate satisfactorily with the worst case number of additional pedestrians accounted for, then the model will offer confidence that the use of the pedestrian crossings will not detrimentally impact on the operation of the junction. Therefore it has been assumed that all 105 additional pedestrians estimated to result from the Western Way development will arrive at the site during the morning peak hour and will leave the site during the evening peak hour.

It was identified that pedestrian movements in the same direction across Western Way and across Dettingen Way will be mutually exclusive whereas pedestrian movements across Western Way (east) will include a significant number of pedestrians who also crossed either Western Way or Dettingen Way. Therefore the potential additional 105 pedestrians were assigned to the proposed crossings on Western Way and Dettingen Way in accordance with the proportion of existing pedestrians that had been reassigned to use these two crossings. The number of additional pedestrians who would use the crossing across Newmarket Road (east) was then determined from the number of additional pedestrians who would use the Western Way and Dettingen Way crossings, in accordance with the proportion of existing pedestrians that had been reassigned to the Newmarket Road (east) crossing compared to those who had been reassigned to use the Western Way or Dettingen Way crossing (as appropriate for the morning and evening peak hour routes) (refer to **Figure 7.3**). The number of pedestrians travelling away from the Western Way development site in the morning peak hour and travelling towards the development site in the evening peak hour have been assumed to remain unchanged from the existing reassigned pedestrian trips for the test additional pedestrian scenario.

Figure 7.3 Existing peak hour pedestrian movements reassigned for test roundabout option with potential additional Western Way development pedestrians added



This test roundabout option with additional pedestrians was modelled in Junctions 9 (ARCADY). The morning peak hour results suggest that this test junction and crossing arrangement will operate significantly better by 2030 with both the Sixth Form and the Western Way development traffic added than the existing junction arrangement would operate with only the Sixth Form traffic added. With the Sixth Form traffic added the existing junction would result in a maximum DoS of 91% and mean maximum queues of up to 26 PCU in the morning peak hour by 2030. For this test roundabout junction arrangement these would be reduced to a maximum RFC of 0.72 (72%), comfortably below the preferred maximum of 0.85, and a maximum average queue of up to 3 PCU (refer to **Table 7.8**).

In the evening peak hour, whilst the RFCs for the test roundabout by 2030 with the Western Way development traffic added are generally higher than the DoS of the existing junction layout with just the Sixth Form traffic added, the maximum RFC is 0.94 (94%) with all other RFCs being below the preferred threshold of 0.85 (85%). Also the resulting queues for the test roundabout layout are significantly shorter on all approaches than would occur with the existing layout despite the higher RFC, not exceeding 9 PCU for the test roundabout compared to up to 23 PCU for the existing junction layout (refer to **Table 7.8**).

Table 7.8 Comparison between 2030 Junction 4 situation without and with Western Way development traffic – roundabout Test b

	AM Peak hour		**PM Peak hour**	
Existing 2030 including 6th form, existing junction layout				
Highest lane result on each approach	**Mean Max Queue (PCU)**	**DoS**	**Mean Max Queue (PCU)**	**DoS**
Western Way	16.7	91.3%	22.3	91.2%
Newmarket Road (east)	26.0	89.7%	22.9	91.5%
Dettingen Way	12.4	91.3%	16.6	30.2%
Newmarket Road (west)	22.5	90.7%	18.0	80.8%
Existing 2030 including 6th form and WW – Scenario 3 Distribution A, test roundabout layout				
	Queue (PCU)	**RFC**	**Queue (PCU)**	**RFC**
Western Way	2.3	0.69 (69%)	5.1	0.84 (84%)
Newmarket Road (east)	2.6	0.72 (72%)	2.2	0.69 (69%)
Dettingen Way	1.1	0.52 (52%)	8.2	0.94 (94%)
Newmarket Road (west)	1.3	0.56 (52%)	0.8	0.43 (43%)

7.4.3 Test c – Left turn give way onto Western Way

This option was tested in order to determine if this arrangement could be installed within the confines of the existing highway boundary and provide a betterment to the future operation of the junction, aiding the flow of additional Western Way development traffic. A test layout was prepared that confirmed that it may be possible to fit an appropriate layout in within the boundary constraints that would take up the currently existing verge on the north western corner of the junction. All other kerb lines and lane assignments would remain unchanged.

This layout requires a complete rearrangement of the pedestrian crossing facilities across the Newmarket Road (west) approach which will result in the direction of pedestrian flow necessarily being contrary to the preferred direction i.e. pedestrians will not be facing the oncoming traffic as they approach the crossings on the central refuges. The crossing point across the left turn give way approach would be uncontrolled but would have dropped kerbs and tactile paving. A preliminary calculation comparing expected pedestrian flows to vehicles flows has suggested that this uncontrolled arrangement would be satisfactory. However, if this option was to be pursued, the feasibility of this theoretical layout would need to be formally drawn up to ensure that it can be accommodated whilst meeting all required highway design standards.

The junction modelling results for this test option are shown in **Table 7.9**.

Table 7.9 Comparison between 2030 Junction 4 situation without and with Western Way development traffic – left turn give way Test c

	AM Peak hour		**PM Peak hour**	
Existing 2030 including 6th form, existing junction layout				
Highest lane result on each approach	**Mean Max Queue (PCU)**	**DoS (%)**	**Mean Max Queue (PCU)**	**DoS (%)**
Western Way	16.7	91.3	22.3	91.2
Newmarket Road (east)	26.0	89.7	22.9	91.5
Dettingen Way	12.4	91.3	16.6	30.2
Newmarket Road (west)	22.5	90.7	18.0	80.8
Existing 2030 including 6th form and WW – Scenario 3 Distribution A, test left turn give way option				
Western Way	18.8	90.9	48.1	106.1
Newmarket Road (east)	31.0	90.6	40.6	105.1
Dettingen Way	12.9	88.4	26.2	103.4
Newmarket Road (west) signal approach	7.5	76.6	20.9	91.2
Newmarket Road (west) left turn give way approach	11.2	61.9	4.6	36.9

It can be seen from these results that the proposed left turn give way approach from Newmarket Road (west) to Western Way appears to operate well in both the morning and evening peak hours by 2030 with the Western Way development traffic added. In the morning peak hour the results demonstrate very comparable operation of the junction compared to how the existing junction arrangement would operate with only the Sixth Form traffic added. However, in the 2030 evening peak hour the results offer almost no improvement for this scenario to those that would occur with both the Sixth Form traffic and the Western Way development traffic added with no change at all to the existing junction layout (refer to **Table 7.4**). Therefore no betterment has been achieved for the evening peak hour by installing the left turn give way approach, resulting in a significant and unacceptable worsening of the operation of the junction from the operation that would have occurred if only the Sixth Form traffic was added and no changes were made to the junction (a maximum RFC of 106.1% and mean maximum queue of 48.1 PCU).

Therefore, despite the improvement offered during the morning peak hour, due to the unacceptable results for the evening peak hour it has been decided that this junction layout option is not appropriate to pursue further to formal outline design.

8.0 Development of Junction 2 mitigation proposal

The initial sketch layout (sketch 01) was further developed resulting in an outline design which sought to address the issues of improving deflection of vehicles through the roundabout and reducing queues along Western Way (west) so as to avoid vehicles backing up through Junction 3 if possible.

Initial modelling results for this outline layout were extremely favourable (refer to **Table 8.1**). The traffic distributions relating to the April 2019 proposed car parking arrangements were used in the modelling. Undertaking a Standard ARCADY model, across all years and all scenarios that included the Western Way development traffic no RFC exceeded the threshold of 0.85 and queue lengths on all approaches did not exceed 2 vehicles. It would therefore be expected that this roundabout arrangement would not cause queueing back along Western Way (west) that would impact on the adjacent Junction 3.

However, the traffic flows that would be using each approach lane at the junction are not at all evenly distributed due to the required lane assignment, as is assumed by the Standard model. In order to take account of the uneven traffic flows on each approach relating to the lane assignment, for example the much higher traffic flows travelling from Western Way (west) to Western Way (east) compared to the traffic flows travelling from Western Way (west) to Olding Road, a Simulation ARCADY model was run. This type of model uses the Standard model as a base and then allows the specific amount of traffic relating to each approach lane to be defined.

In the first instance the Simulation model was run for the initially prepared outline design. Notably this initial outline design had two approach lanes from Western Way (west), with the left hand lane being assigned to straight ahead traffic towards Western Way (east) and one corresponding exit lane onto Western Way (east), and the right hand lane being assigned to right turning traffic into Olding Road. Results for a Simulation model cannot provide RFCs, only queues and delays. The Simulation model results for this initial outline design are shown in **Table 8.2**. They show only the results for Scenario 3 as this is the most likely scenario and offers the worst case. It can be seen from these results that, under these traffic flow lane assignment arrangements, queue lengths would be expected to be up to approximately 32 PCUs long on Western Way (west) in the morning peak hour by 2030, and up to approximately 46 PCUs on the same approach in the evening peak hour, backing up through Junction 3 rather further than the original test model suggested. The exact expected length of the queue varies depending on the traffic distribution applied, A or B.

Table 8.1 Results for Junction 2 proposed outline roundabout layout, future situations – Standard ARCADY model

	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Existing 2019 incl. 6th form					
A - Western Way (E)	0.8	3.35	0.43	0.4	2.36	0.26
B - Olding Road	0.0	3.14	0.01	0.2	2.98	0.17
C - Western Way (W)	0.8	3.36	0.45	0.7	3.14	0.41
	Existing 2030 incl. 6th form					
A - Western Way (E)	1.0	3.83	0.49	0.4	2.47	0.29
B - Olding Road	0.0	3.32	0.02	0.2	3.21	0.20
C - Western Way (W)	1.1	3.78	0.51	0.9	3.51	0.47
Existing 2019 incl. 6th form and WW - Scenario 1 Distribution A						
A - Western Way (E)	1.0	3.98	0.50	0.5	2.57	0.32
B - Olding Road	0.0	2.99	0.03	0.4	3.75	0.30
C - Western Way (W)	1.4	4.31	0.57	0.8	3.34	0.43
Existing 2019 incl. 6th form and WW - Scenario 1 Distribution B						
A - Western Way (E)	1.0	3.99	0.50	0.5	2.54	0.31
B - Olding Road	0.0	2.99	0.03	0.4	3.72	0.30
C - Western Way (W)	1.3	4.24	0.57	0.8	3.34	0.43
Existing 2019 incl. 6th form and WW - Scenario 2 Distribution A						
A - Western Way (E)	1.1	4.25	0.53	0.5	2.71	0.34
B - Olding Road	0.1	3.10	0.07	0.5	3.92	0.32
C - Western Way (W)	1.5	4.50	0.59	1.0	3.73	0.49
Existing 2019 incl. 6th form and WW - Scenario 2 Distribution B						
A - Western Way (E)	1.2	4.28	0.53	0.5	2.69	0.34
B - Olding Road	0.1	3.11	0.07	0.5	3.88	0.32
C - Western Way (W)	1.4	4.42	0.58	1.0	3.75	0.49
Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A						
A - Western Way (E)	1.2	4.39	0.54	0.6	2.82	0.36
B - Olding Road	0.1	3.14	0.08	0.5	4.12	0.35
C - Western Way (W)	1.5	4.66	0.60	1.1	3.97	0.52
Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B						
A - Western Way (E)	1.2	4.43	0.54	0.6	2.78	0.35
B - Olding Road	0.1	3.16	0.08	0.5	4.08	0.35
C - Western Way (W)	1.5	4.57	0.60	1.1	4.01	0.53
Existing 2030 incl. 6th form and WW - Scenario 1 Distribution A						
A - Western Way (E)	1.3	4.68	0.57	0.5	2.71	0.35
B - Olding Road	0.0	3.19	0.03	0.5	4.12	0.34
C - Western Way (W)	1.8	5.05	0.64	1.0	3.76	0.50
Existing 2030 incl. 6th form and WW - Scenario 1 Distribution B						
A - Western Way (E)	1.4	4.69	0.57	0.5	2.68	0.35
B - Olding Road	0.0	3.19	0.03	0.5	4.08	0.34
C - Western Way (W)	1.7	4.95	0.63	1.0	3.76	0.50
Existing 2030 incl. 6th form and WW - Scenario 2 Distribution A						
A - Western Way (E)	1.5	5.06	0.60	0.6	2.87	0.38
B - Olding Road	0.1	3.31	0.08	0.6	4.32	0.36
C - Western Way (W)	1.9	5.31	0.65	1.2	4.26	0.55
Existing 2030 incl. 6th form and WW - Scenario 2 Distribution B						
A - Western Way (E)	1.5	5.10	0.60	0.6	2.84	0.37
B - Olding Road	0.1	3.32	0.08	0.6	4.28	0.36
C - Western Way (W)	1.8	5.19	0.64	1.3	4.30	0.56
Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A						
A - Western Way (E)	1.6	5.25	0.61	0.7	2.99	0.40
B - Olding Road	0.1	3.36	0.09	0.6	4.56	0.39
C - Western Way (W)	2.0	5.53	0.67	1.4	4.59	0.58
Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B						
A - Western Way (E)	1.6	5.32	0.61	0.6	2.95	0.39
B - Olding Road	0.1	3.38	0.09	0.6	4.52	0.39
C - Western Way (W)	1.9	5.40	0.66	1.4	4.64	0.59

Table 8.2 Results for Junction 2 initial proposed outline roundabout layout, 1 exit lane on Western Way (east), future situations – Simulation ARCADY model

	AM Peak hour			PM Peak hour	
	Queue (PCU)	Delay (s)		Queue (PCU)	Delay (s)
	[Lane Simulation] - Existing 2019				
A - Western Way (E)	3.1	13.51		0.8	6.60
B - Olding Road	0.0	7.73		0.5	6.60
C - Western Way (W)	2.7	9.61		3.8	17.14
	[Lane Simulation] - Existing 2019 incl. 6th form				
A - Western Way (E)	3.4	14.20		1.2	7.00
B - Olding Road	0.0	7.60		0.6	6.74
C - Western Way (W)	3.7	12.16		3.9	17.18
	[Lane Simulation] - Existing 2030 incl. 6th form				
A - Western Way (E)	5.4	21.14		1.8	8.31
B - Olding Road	0.1	7.46		0.7	7.59
C - Western Way (W)	4.9	18.22		11.5	44.98
[Lane Simulation] - Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A					
A - Western Way (E)	7.6	27.68		1.9	10.19
B - Olding Road	0.2	7.17		1.5	11.64
C - Western Way (W)	10.9	29.31		13.3	44.40
[Lane Simulation] - Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B					
A - Western Way (E)	9.2	28.23		1.7	9.85
B - Olding Road	0.2	7.22		1.5	10.55
C - Western Way (W)	10.6	30.69		15.8	53.63
[Lane Simulation] - Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A					
A - Western Way (E)	21.6	66.24		3.5	15.04
B - Olding Road	0.2	7.33		1.9	12.45
C - Western Way (W)	31.7	74.74		44.4	130.48
[Lane Simulation] - Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B					
A - Western Way (E)	23.9	69.99		2.7	13.02
B - Olding Road	0.3	7.54		1.6	12.69
C - Western Way (W)	23.9	62.76		46.0	130.89

It is apparent from these results, comparing the Standard ARCADY model with the Simulation ARCADY model, that a layout at the proposed roundabout that would be more reflective of the equally distributed traffic flows on the approach arm lanes modelled in the Standard ARCADY model should be aimed for in order to reduce expected queue lengths. The only way of achieving this is to allow vehicles approaching the junction from Western Way (west) that are travelling straight ahead to Western Way (east) to use both approach lanes on Western Way (west). This requires there to be two exit lanes on Western Way (east) to accept this traffic. At the time of writing this report, a new outline design for this arrangement was in the process of being prepared. However, in the meantime a theoretical test Simulation ARCADY model was prepared in order to confirm that such a design layout would provide the betterment required for the operation of the proposed roundabout junction. **Table 8.3** summarises the results of this test model, which will be updated when the actual outline design for this layout is complete. **Figure 8.1** offers an indicative illustration of the proposed lane arrangement at the roundabout. The Figure includes the proposed realigned access to the existing retail park, however the traffic associated with this retail park, which is very minimal during peak hours (no more than 10 vehicles movements in all directions), has not been considered in the test model.

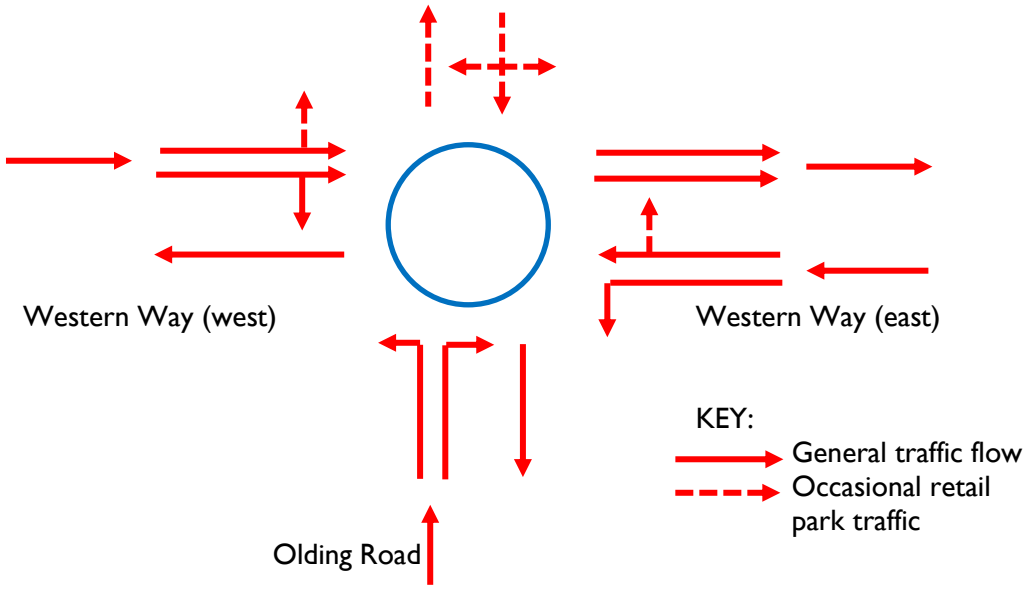
It can be seen from these results that the queues expected on Western Way (west) by 2030 have been significantly reduced, far more in line with those previously resulting from the Standard ARCADY model results, with queues not exceeding 4 PCUs. Queues of this length will not impact on the adjacent Western Way/ASDA roundabout (Junction 3). Queues on Western Way (east) have not reduced from the initial Simulation ARCADY model. In order to reduce these queues it would be necessary to include 2 exit lanes on

Western Way (west). Unfortunately the constraints of the existing highway boundary prevent this from being possible. However, the expected queues of 21 PCUs on Western Way (east), are not long enough to pose an obstruction to any junctions along Western Way to the east of Junction 2 so it is considered that this should be considered acceptable.

Table 8.3 Results for Junction 2 test proposed outline roundabout layout, 2 exit lanes on Western Way (east), future situations – Simulation ARCADY model

	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (s)		Queue (PCU)	Delay (s)	
	[Lane Simulation] - Existing 2019					
A - Western Way (E)	3.3	13.25		0.9	6.79	
B - Olding Road	0.0	7.20		0.5	6.64	
C - Western Way (W)	1.3	5.10		1.1	4.59	
	[Lane Simulation] - Existing 2019 incl. 6th form					
A - Western Way (E)	3.9	13.80		1.0	7.22	
B - Olding Road	0.0	6.97		0.4	7.18	
C - Western Way (W)	1.5	5.22		1.2	4.73	
	[Lane Simulation] - Existing 2030 incl. 6th form					
A - Western Way (E)	6.5	21.84		1.2	8.53	
B - Olding Road	0.0	7.12		0.7	7.63	
C - Western Way (W)	1.9	5.92		1.2	5.10	
[Lane Simulation] - Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A						
A - Western Way (E)	8.7	26.44		2.2	10.51	
B - Olding Road	0.2	7.02		1.5	11.35	
C - Western Way (W)	2.5	7.59		2.2	5.72	
[Lane Simulation] - Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B						
A - Western Way (E)	6.2	24.43		2.2	10.32	
B - Olding Road	0.3	7.09		1.3	11.39	
C - Western Way (W)	2.5	7.10		1.6	5.78	
[Lane Simulation] - Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A						
A - Western Way (E)	21.4	63.14		4.5	13.73	
B - Olding Road	0.3	7.65		2.0	12.93	
C - Western Way (W)	3.6	8.97		2.4	6.68	
[Lane Simulation] - Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B						
A - Western Way (E)	21.7	65.30		3.1	13.26	
B - Olding Road	0.2	7.28		1.9	13.11	
C - Western Way (W)	3.4	8.76		2.1	6.37	

Figure 8.1 Indicative illustration of appropriate lane arrangement at proposed roundabout at Junction 2



Therefore it is recommended that a roundabout be installed at the junction of Western Way/Olding Road of the lane assignment arrangement appropriate to the model relating to the results shown in **Table 8.3** and as illustrated diagrammatically in **Figure 8.1**.

The results illustrated in **Table 8.3** are very satisfactory but the outline layout, when complete, will require to take several metres of land within the Western Way development site that is currently occupied by the northern end of the existing skate park. It is understood that it has been conceded that the skate park will be taken up and redesigned, to be rebuilt in the same location, within the constraints of the boundaries of the proposed highway works.

Furthermore, the layout for the proposed junction, as discussed with the Local Highway Authority officers at the pre-planning meeting held in May 2019, will necessitate the realignment of the access to an existing small retail park that is currently located off Western Way, immediately opposite the current location of Olding Road. It is proposed that this access be located at the north of the roundabout. This will result in the access cutting through the existing small car park to the front of the retail park before tying in with the existing route that leads to the rear of the facility. **Appendix B** offers a very brief discussion relating to the observed extent of use of this car park and the number and type of vehicles that enter and exit the retail park during peak hours. This will offer a basis for consultation with the owners/occupiers of the retail park that will be necessary to gain their acceptance of changes to be made to their access and parking provision. Upon completion of the proposed outline layout of the junction, it will be possible to establish the extent to which the proposed realigned access will impact on parking provision at retail park.

In accordance with the requirements of the Local Highway Authority, as confirmed at the May 2019 pre-planning meeting, the proposed outline layout of Junction 2 will include pedestrian crossing facilities and footways of a minimum width of 2m, and vehicle swept path analysis will be undertaken through the junction for large vehicles as appropriate. Furthermore, it was requested by the LHA that traffic regulation orders (TROs) in the vicinity of Junction 2 be reviewed and applications to amend them should be considered if appropriate. In particular this was in relation to potential issues regarding visibility around the skate park and the potential for vehicles to park on the street close to the skate park. **Appendix C** offers an initial review and recommendations regarding the TROs in this location.

9.0 Development of Junction 4 mitigation proposals

9.1 Test a, step 3 – lane widening, additional exit lane, additional right turn lane

The model Test a, step 3 for mitigation at Junction 4 took into consideration the potential availability of land within the highway boundary along Newmarket Lane that might be utilised for the purposes of installing lane widening and an additional lane. A plan received from the Local Authority depicts the highway boundary relating to this junction. However, adjacent to the southern side of the eastern arm of Newmarket Road, immediately to the east of Dettingen Way, the highway boundary is depicted to be at the back of a footway rather than at the back of an existing segregated cycleway set back from the road with verge between the footway and the cycleway. It would be highly irregular for this segregated cycleway not to be included within the highway boundary, especially as it connects directly with a similar path along Newmarket Road immediately to the west of Dettingen Way that is within the highway boundary. As the segregated cycleway to the east of Dettingen Way is not actually illustrated on the plan on which the highway boundary

is shown, it is concluded that the plan is not up-to-date and that it is highly likely that the existing cycleway and the verge between this path and the footpath are both located within the highway boundary. Land within this verge would be required in order to accommodate the proposed additional right turn lane from Newmarket Road into Western Way.

When modelling test step 3 it was also acknowledged that there was unlikely to be sufficient land within the highway boundary to accommodate the proposed installation of an additional exit lane on Western Way, but observed that the required width could potentially be obtained by encroaching into an area of landscaped land adjacent to the highway boundary, without interfering with existing buildings.

The model test step 3 was not based on a formally designed layout, but simply on theoretical lane arrangements that had the potential to achieve the required results in terms of capacity and queues such that the impact of the Western Way development on this junction would not be severe. This theoretical arrangement was therefore developed further in the preparation of an outline design drawing in order to establish to what extent the tested lane arrangements could realistically be installed on the ground and the actual extent of the requirement to purchase land to accommodate the proposed additional exit lane on Western Way.

The model test step 3 had established that, in order to achieve the results modelled, the outline drawing should aim to achieve the following arrangement and lane widths:

1. Two lanes on the northbound carriageway of Western Way (exiting the junction) for a distance of at least 35m in length – consequently the existing straight ahead lane from Newmarket Road (west) should also be assigned for use by left turners as well as straight ahead traffic in addition to the existing left turn lane. No amendments will be required to the assignment of the approach lanes on Newmarket Road (east) due to the works required as described in item number 3 below.
2. Widening the existing lanes on the Newmarket Road approaches. The test model showed that the following widths would offer capacity improvements but there may be scope to adjust these widths to suit what width is available to use within the highway boundary:
   a.) Left turn lane from Newmarket Road (west) to Western Way increased to 3.5m
   b.) Ahead lane from Newmarket Road (west) to Newmarket Road (east) increased to 3.5m
   c.) Right turn lane from Newmarket Road (west) to Dettingen Way – no change (2.7m)
   d.) Right turn lane from Newmarket Road (east) to Western Way marginally increased to 3.4m
   e.) Combined straight ahead and right turn lane from Newmarket Road (east) to Newmarket Road (west) and Dettingen Way increased to 3.5m.
3. An additional right turn lane from Newmarket Road (east) of at least 58m in length. The test model assumed a width of 3.4m for this lane.

The resulting outline drawing, working within the physical constraints at the site of the junction, was able to achieve the following:

1. Two lanes on the northbound carriageway of Western Way for a distance of 43.6m in length and associated reassignment of lanes on the Newmarket Road (west) approaches).
   The required amount of land purchase required from a landscaped in private ownership to achieve this is 36.95sqm (maximum width of approximately 2.0m and maximum length of approximately 32m).
2. Increased lane widths on Newmarket Road approaches as follows:
   a.) Left turn lane from Newmarket Road (west) to Western Way increased to 3.5m
   b.) Ahead lane from Newmarket Road (west) to Newmarket Road (east) increased to 3.5m
   c.) Right turn lane from Newmarket Road (west) to Dettingen Way – no change (2.7m)
   d.) Right turn lane from Newmarket Road (east) to Western Way marginally increased to 3.5m
   e.) Combined straight ahead and right turn lane from Newmarket Road (east) to Newmarket Road (west) and Dettingen Way increased to 3.5m.
3. An additional right turn lane from Newmarket Road (east) of 90.0m in length and 3.4m in width.
   Relating to items 2 and 3 above, these will also require land purchase of an amount of verge located between the existing footway and the existing cycle way along the southern edge of Newmarket Road that is currently in private ownership.

It can be seen from the above list that the achieved lane widths and lengths are identical to those modelled in the test or else a little greater. The model of the junction was run again, incorporating the physical dimensions offered in the outline layout drawing and the summary results of this model are shown in **Table 9.1**.

As a result of the proposed outline layout it will be necessary to convert a short length (approximately 29m) of the existing segregated footway/cycle way along the southern edge of Western Way on the western side of the junction to a 2.6m wide shared use footway/cycleway. Whilst this is narrower than the usually preferred minimum width of 3.0m for a shared route it is only for a very short distance and, according to minimum widths discussed in the Sustrans Handbook for Cycle Friendly Design, this width should allow sufficient space for two cyclists to pass each other or for two pedestrians to pass a cyclist. Additionally, it will be necessary to remove up to 3 trees in the verge along the southern edge of Newmarket Road on the east side of the junction and up to 4 trees in the verge along the southern edge of Newmarket Road on the west side of the junction. It is not known at this time whether or not these trees have Tree Preservation Orders attached to them. In any event it can be expected that the removal of these trees will result in a requirement to plant new trees.

Comparing the results in **Table 9.1** for the 2030 proposed mitigation layout model with the Western Way development traffic included with the equivalent results in **Table 7.7** relating to the test mitigation model, it can be seen that the proposed junction layout that could be feasibly accommodated on the ground offers marginally better results for DoS and queues than the test model did. It can be seen that, in the worst case scenario modelled for the proposed junction layout, the highest DoS is 92.2% and the longest mean maximum queue length is 28.5 PCU. Overall the results are very comparable to the results for the 2030 model including the Sixth Form development but excluding the Western Way

development for the existing junction layout as shown in **Table 7.7**. The differences from the expected mean maximum queue lengths without the proposed mitigation or the Western way development traffic to the mean maximum queue lengths for each approach arm for the worst case scenario with the proposed mitigation and the Western Way development traffic added by 2030 are:

	AM peak hour	PM peak hour
• Western Way:	+3.0 PCU	+6.2 PCU
• Newmarket Road (east):	-7.4 PCU	-0.5 PCU
• Dettingen Way:	+0.5 PCU	+1.6 PCU
• Newmarket Road (west):	+4.3 PCU	+3.6 PCU

Note that 1 PCU is the equivalent of 1 car.

Table 9.1 Results for Junction 4 proposed outline signal controlled junction mitigation layout, future situations

	AM Peak hour		**PM Peak hour**	
Highest lane result on each approach	Mean Max Queue (PCU)	DoS (%)	Mean Max Queue (PCU)	DoS (%)
	Existing 2019			
Western Way	11.7	69.2	15.1	68.5
Newmarket Road (east)	9.0	53.3	15.9	68.2
Dettingen Way	8.5	73.2	11.6	67.9
Newmarket Road (west)	14.6	76.8	14.2	60.6
	Existing 2019 incl. 6th form			
Western Way	12.0	70.5	15.7	69.9
Newmarket Road (east)	9.7	56.9	16.1	69.8
Dettingen Way	8.6	72.2	11.8	68.6
Newmarket Road (west)	15.6	78.1	14.6	62.2
	Existing 2030 incl. 6th form			
Western Way	14.8	78.2	19.0	79.4
Newmarket Road (east)	11.8	67.9	19.6	79.9
Dettingen Way	10.1	78.0	14.2	78.4
Newmarket Road (west)	19.1	87.7	17.3	70.5
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution A			
Western Way	15.4	79.4	22.9	82.0
Newmarket Road (east)	13.6	74.4	17.8	80.8
Dettingen Way	10.4	79.0	14.0	81.4
Newmarket Road (west)	19.2	85.3	18.0	78.4
	Existing 2019 incl. 6th form and WW - Scenario 3 Distribution B			
Western Way	15.5	79.9	22.5	81.1
Newmarket Road (east)	13.3	73.9	17.8	80.8
Dettingen Way	10.2	78.3	14.0	81.4
Newmarket Road (west)	19.0	84.9	18.1	78.6
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution A			
Western Way	19.7	91.7	28.5	91.9
Newmarket Road (east)	18.6	90.3	22.4	90.1
Dettingen Way	12.9	88.2	18.2	92.2
Newmarket Road (west)	26.8	91.0	21.6	85.7
	Existing 2030 incl. 6th form and WW - Scenario 3 Distribution B			
Western Way	19.7	89.5	27.8	90.8
Newmarket Road (east)	18.0	89.3	22.4	90.1
Dettingen Way	12.7	87.5	18.2	92.2
Newmarket Road (west)	26.9	91.8	21.6	85.9

Given the above analysis and results it is expected that, with the introduction of the proposed mitigation layout for this junction, the Western Way development would not be considered to have a severe impact on traffic at this location. The modelling undertaken for this proposed junction layout at this stage has been based on the existing traffic signal

control specification i.e. using all of the same base phase, stage and timing data, with amendments made to physical parameters as necessary. It is possible that further amendments to the model relating to signal timings as well as geometric parameters may occur during the detailed design stage. Of course the development of this proposed mitigation layout and the acceptability of the modelling results remain subject to further consultation with the Local Highway Authority.

However, as the outline design layout of this proposed option has confirmed the requirement to purchase land from private land owners (quite possibly more than one land owner) this is considered to pose a significant risk to the viability of the installation of this proposed junction arrangement.

9.2 Test b – Replace traffic signal junction with non-signalised roundabout

Test b layout option, to replace the existing signal controlled junction with a standard roundabout with controlled pedestrian crossings on three arms, was progressed to outline design stage to ensure that it could realistically be accommodated within the constraints of the existing kerb lines, or at least within the constraints of the existing highway boundary, whilst remaining in accordance with the required highway design standards. The initial outline design maintained all existing lane assignments on each approach, which included three approach lanes on Newmarket Road (west). **Table 9.2** summarises the Standard ARCADY modelling results for this outline roundabout layout which suggests that RFCs would not exceed 0.71 in the morning peak hour by 2030 for the worst case scenario with all development traffic added, and queues would not exceed 3 PCUs. In the evening peak hour the model suggests that RFCs would not exceed 0.95, which is slightly above the preferred maximum of 0.85, but that this would only result in queues of up to 9 PCUs. These results were almost identical to the test model results shown in **Table 7.8**.

As the Standard model assumes that all traffic is distributed evenly among the available approach lanes, the model for this initial roundabout layout was then rerun as a Simulation ARCADY model in order to ensure that traffic was assigned to the appropriate approach lanes and to identify the impacts of this. The results of this model are shown in **Table 9.3**. These results suggest that, by 2030 for the worst case scenario with all development traffic added, queues of up to 45 PCU would form on Newmarket Road (east) and of up to 30 PCU would form on Newmarket Road (west) in the morning peak hour, with only short queues on all other arms. In the evening peak hour the model suggests that queues of up to 32 PCU would form on Western Way with only short queues on all other arms.

Table 9.2 Results for Junction 4 proposed outline roundabout junction mitigation layout, future situations – Standard ARCADY model

	AM peak hour			PM peak hour		
	Queue (PCU)	**Delay (s)**	**RFC**	**Queue (PCU)**	**Delay (s)**	**RFC**
	Existing 2019					
1 - Western Way	1.1	5.26	0.51	1.2	5.37	0.54
2 - Newmarket Rd (E)	0.9	4.52	0.48	0.9	4.37	0.49
3 - Dettingen Way	0.4	7.96	0.30	0.8	11.21	0.46
4 - Newmarket Rd (W)	0.6	2.82	0.39	0.5	2.35	0.32
	Existing 2019 + 6th form					
1 - Western Way	1.1	5.34	0.52	1.3	5.66	0.57
2 - Newmarket Rd (E)	1.0	4.67	0.50	1.0	4.46	0.49
3 - Dettingen Way	0.5	8.39	0.32	0.9	11.80	0.48
4 - Newmarket Rd (W)	0.7	2.95	0.41	0.5	2.37	0.32
	Existing 2030 + 6th form					
1 - Western Way	1.6	6.70	0.60	1.9	7.46	0.66
2 - Newmarket Rd (E)	1.4	5.77	0.58	1.3	5.43	0.57
3 - Dettingen Way	0.7	11.02	0.41	1.8	20.78	0.65
4 - Newmarket Rd (W)	1.0	3.51	0.48	0.6	2.66	0.38
	Existing 2019 + 6th form + WW (Scenario 3, Distribution A)					
1 - Western Way	1.7	6.72	0.62	3.5	11.14	0.78
2 - Newmarket Rd (E)	1.5	6.03	0.60	1.4	5.70	0.58
3 - Dettingen Way	0.8	12.14	0.44	1.9	23.52	0.66
4 - Newmarket Rd (W)	1.0	3.78	0.50	0.6	2.68	0.37
	Existing 2019 + 6th form + WW (Scenario 3, Distribution A)					
1 - Western Way	1.7	6.80	0.62	3.3	10.64	0.77
2 - Newmarket Rd (E)	1.5	5.96	0.60	1.4	5.69	0.58
3 - Dettingen Way	0.8	11.94	0.43	1.9	23.33	0.66
4 - Newmarket Rd (W)	1.0	3.72	0.49	0.6	2.70	0.37
	Existing 2030 + 6th form + WW (Scenario 3, Distribution A)					
1 - Western Way	2.5	9.07	0.71	6.8	20.51	0.88
2 - Newmarket Rd (E)	2.3	8.15	0.70	2.0	7.52	0.67
3 - Dettingen Way	1.4	18.57	0.57	8.5	94.47	0.95
4 - Newmarket Rd (W)	1.4	4.76	0.58	0.8	3.06	0.43
	Existing 2030 + 6th form + WW (Scenario 3, Distribution A)					
1 - Western Way	2.6	9.22	0.71	6.3	18.96	0.87
2 - Newmarket Rd (E)	2.2	8.04	0.69	2.0	7.50	0.67
3 - Dettingen Way	1.3	18.11	0.56	8.4	92.86	0.94
4 - Newmarket Rd (W)	1.4	4.66	0.58	0.8	3.07	0.44

Table 9.3 Results for Junction 4 proposed outline roundabout junction mitigation layout with 3 approach lanes on Newmarket Road (west), future situations – Simulation ARCADY model

	AM peak hour			PM peak hour		
	Queue (PCU)	Delay (s)		Queue (PCU)	Delay (s)	
	[Lane Simulation] - Existing 2019					
1 - Western Way	3.2	14.05		2.9	12.27	
2 - Newmarket Rd (E)	3.0	13.05		1.8	8.89	
3 - Dettingen Way	0.5	8.00		0.7	8.93	
4 - Newmarket Rd (W)	3.2	11.32		2.0	9.35	
	[Lane Simulation] - Existing 2019 + 6th form					
1 - Western Way	3.3	14.33		2.9	13.13	
2 - Newmarket Rd (E)	3.4	13.94		1.9	9.24	
3 - Dettingen Way	0.7	8.16		0.8	8.91	
4 - Newmarket Rd (W)	2.8	12.44		1.9	9.32	
	[Lane Simulation] - Existing 2030 + 6th form					
1 - Western Way	5.2	22.08		5.0	17.35	
2 - Newmarket Rd (E)	6.7	26.47		3.3	11.51	
3 - Dettingen Way	0.7	10.62		1.5	14.30	
4 - Newmarket Rd (W)	5.3	19.80		2.8	11.41	
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution A)						
1 - Western Way	6.1	22.45		11.7	38.56	
2 - Newmarket Rd (E)	13.4	51.40		3.3	13.40	
3 - Dettingen Way	0.9	11.71		1.6	17.85	
4 - Newmarket Rd (W)	12.1	41.46		3.0	12.08	
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution B)						
1 - Western Way	6.2	24.33		10.4	33.13	
2 - Newmarket Rd (E)	13.8	52.67		3.7	13.81	
3 - Dettingen Way	1.0	11.34		1.4	16.20	
4 - Newmarket Rd (W)	10.0	35.93		2.8	12.19	
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution A)						
1 - Western Way	12.6	42.59		30.9	79.06	
2 - Newmarket Rd (E)	47.5	145.60		5.6	19.70	
3 - Dettingen Way	1.2	15.00		3.4	36.89	
4 - Newmarket Rd (W)	31.9	92.28		4.3	16.36	
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution B)						
1 - Western Way	13.2	45.91		28.9	75.73	
2 - Newmarket Rd (E)	44.2	139.62		5.4	19.30	
3 - Dettingen Way	1.3	15.17		3.2	35.45	
4 - Newmarket Rd (W)	28.1	84.21		4.3	17.19	

For reference, queues that currently occur at this traffic signal controlled junction were observed during the traffic surveys undertaken on Tuesday, 26th February 2019. On Newmarket Road (west) queues in the morning peak hour extended beyond the length that was captured by the survey camera i.e. queues were in excess of 35 vehicles. The survey company that undertook the surveys estimated that queues would in fact reach lengths of between 35 and 70 vehicles on this approach. **Table 9.4** gives the maximum queue lengths observed during the traffic survey at this junction in peak hours.

Table 9.4 Observed maximum peak hour queue lengths at Western Way/Newmarket Road (Junction 4) on Tuesday, 26th February 2019

	Maximum observed vehicle queues	
	AM peak hour	**PM peak hour**
Western Way	20	20
Newmarket Rd (E)	35	35
Dettingen Way	12	15
Newmarket Rd (W)	>35 up to an estimate of 70	23

Given this, the results of the Simulation ARCADY model clearly represent a significant betterment to the existing queuing situation on this approach in the 2019 models. Average queues are not expected to exceed 14 PCU on Newmarket Road, 12 PCU on Western Way or 2 PCU on Dettingen Way for 2019 scenarios which include both the Sixth Form and the Western Way development traffic. The queue lengths achieved in this model for the worst 2030 scenarios that include all development traffic represent a betterment on Dettingen Way and Newmarket Road (west) from the exiting 2019 situation. For Western Way the results for 2030 represent a betterment in the morning peak hour but a 50% increase in the evening peak hour compared to the existing 2019 queues. On Newmarket Way (east) the results for 2030 represent a betterment in the evening peak hour but a 37% increase in the morning peak hour compared to the existing 2019 queues.

Table 7.4 represents the results of the model of the existing traffic signal controlled junction layout and operation. Whilst the queues in this table for the 2019 existing situation are lower than actually observed, it can be seen that, by 2030 with only the committed Sixth Form development traffic added, without any changes to the junction layout queues are expected to increase from the existing situation by 35% in the evening peak hour on Western Way and by 40% in the morning peak hour on Newmarket Road (east). Therefore the results for the proposed roundabout outline design represent an improvement on this expected rate of increase on Newmarket Road (east) even with the Western Way development traffic added. The results represent a slightly higher increase in queuing on Western Way than would otherwise have been expected without the development. Potential queues of up to 30 PCUs on Western Way would extend back to a short distance around the right-angle bend on Western Way, approximately 85m short of the Western Way/ASDA roundabout (Junction 2).

However, the initially prepared outline design for this roundabout required a compromise in that, in order to remain within the existing highway boundary, a pinch point in the footway would be required of a width less than the required 2m on the north western corner of Newmarket Road and Western Way. In order to address this issue the proposed roundabout design was remodelled to include only two lanes on the Newmarket Road (west) approach. This would allow for significant more space on the north western corner of the junction for pedestrians. At the time of writing this report the outline design for this proposed layout had not been completed, however the results of the test model of this arrangement are shown in **Table 9.5**. This test model was undertaken as a Simulation ARCADY model in order to ensure that the new lane assignment was thoroughly tested.

It can be seen that these results are almost identical to the results in **Table 9.3** for the 3 lane approach option on Newmarket Road (west). It can therefore be concluded that the option of a non-signal controlled roundabout at the junction of Western Way/Newmarket Road (Junction 4) with controlled pedestrian crossings across 3 approaches and with 2 approach lanes on Western Way (west) is an appropriate junction mitigation option to pursue. Junction operation results compare very favourably to what would be expected to occur at this junction if the Western Way development was not implemented and no changes to the junction were made. The only slight risk is the increase in vehicle queues expected on Western Way in the evening peak hour by 2030.

Table 9.5 Results for Junction 4 proposed roundabout junction mitigation test layout with 2 approach lanes on Newmarket Road (west), future situations – Simulation ARCADY model

	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (s)		Queue (PCU)	Delay (s)	
	[Lane Simulation] - Existing 2019					
1 - Western Way	2.9	14.22		3.0	13.11	
2 - Newmarket Rd (E)	2.8	12.62		2.0	9.16	
3 - Dettingen Way	0.5	7.45		0.8	9.10	
4 - Newmarket Rd (W)	2.7	11.93		2.0	8.93	
	[Lane Simulation] - Existing 2019 + 6th form					
1 - Western Way	3.0	14.02		3.2	13.56	
2 - Newmarket Rd (E)	3.4	14.79		1.8	9.47	
3 - Dettingen Way	0.5	8.18		0.8	9.40	
4 - Newmarket Rd (W)	3.5	13.52		2.1	9.38	
	[Lane Simulation] - Existing 2030 + 6th form					
1 - Western Way	5.8	22.65		5.6	20.29	
2 - Newmarket Rd (E)	6.2	25.60		3.1	11.69	
3 - Dettingen Way	0.7	9.84		1.5	14.14	
4 - Newmarket Rd (W)	5.9	20.68		2.6	11.87	
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution A)						
1 - Western Way	5.7	21.48		11.1	34.07	
2 - Newmarket Rd (E)	14.4	56.65		3.4	13.94	
3 - Dettingen Way	0.9	11.58		1.4	16.19	
4 - Newmarket Rd (W)	9.2	32.23		2.8	12.02	
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution B)						
1 - Western Way	6.6	24.74		11.0	33.49	
2 - Newmarket Rd (E)	14.3	51.19		2.9	12.68	
3 - Dettingen Way	0.8	11.42		1.6	16.76	
4 - Newmarket Rd (W)	8.0	30.06		2.8	12.65	
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution A)						
1 - Western Way	12.0	42.30		29.4	74.66	
2 - Newmarket Rd (E)	49.8	153.37		5.2	19.06	
3 - Dettingen Way	1.1	14.90		3.4	35.50	
4 - Newmarket Rd (W)	28.0	81.78		4.0	16.29	
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution B)						
1 - Western Way	13.4	46.23		26.3	69.59	
2 - Newmarket Rd (E)	44.7	135.37		5.8	20.29	
3 - Dettingen Way	1.3	14.83		3.3	34.72	
4 - Newmarket Rd (W)	23.6	72.20		4.4	16.38	

10.0 Final linked model and review of Junction 3

A final analysis exercise was undertaken to check the potential cumulative impacts of the expected Western Way peak hour development traffic on the local highway network once the proposed junction mitigation works for Junction 2 and Junction 4 are in place. In order to do this a new Simulation ARCADY model was created that linked Junctions 2, 3 and 4. Linked models can only be generated in simulation mode so results cannot offer an RFC value. Assessment is therefore considered in terms of queues and delays only. This linked model allows for the correct lane assignment of vehicles and considers the distances between and the delays at each junction in order to determine the likely overall impact of the traffic on the local highway network as whole.

This first linked model produced included the following junction layouts:

- **Junction 2** – proposed roundabout with 2 exit lanes off Western Way (east) (refer to **Figure 8.1**).
- **Junction 3** – existing roundabout layout and lane assignment, including controlled pedestrian crossing.
- **Junction 4** – proposed roundabout with 2 lanes on the Newmarket Road (west) approach (refer to **Section 9.2**).

This model resulted in totally unacceptably long queues along Western Way (east) that would back up through Junction 1 in the evening peak hour. This was not consistent with the previous modelling undertaken. It was identified that the existing lane assignment at Junction 3 was the problem whereby, despite there being two approach lanes on Western Way (east), only one is assigned to vehicles that are travelling straight ahead to Western Way (west) (or turning left into the retail park). The other is currently assigned solely for vehicles turning right into the ASDA car park. As by far the dominant traffic flow is the Western Way (east) to Western Way (west) flow, this creates an imbalance in the use of the available approach lanes causing an extensive amount of traffic to be waiting on the Western Way (east) approach and backing up through Junction 2 and beyond.

The linked model was therefore revised with a slightly different junction layout arrangement for Junction 3 as follows:

- **Junction 2** – proposed roundabout with 2 exit lanes off Western Way (east) (refer to **Figure 8.1**).
- **Junction 3** – existing roundabout, including controlled pedestrian crossing, adjusted to create 2 exit lanes off Western Way (west) in order to allow both approach lanes on Western Way (east) to be used by straight ahead traffic, and lane assignment amended accordingly.
- **Junction 4** – proposed roundabout with 2 lanes on the Newmarket Road (west) approach (refer to **Section 9.2**).

Having reviewed the existing layout of Junction 3 and the adjacent highway along Western Way (west), it was considered feasible that the exit on Western Way (west) could be widened for a sufficient width and length to accommodate 2 exit lanes by utilising some of the width available in existing verges. This may necessitate the removal of an existing bus layby. As no other bus stop along Western Way has a layby, it is considered that the removal of this layby (if it proves necessary) could be considered acceptable by the Local Highway Authority, but this will need to be consulted on once the outline layout for this junction is confirmed. At the time of writing this report the outline layout for this junction proposal was in the process of being prepared.

The results of this linked model are shown in **Table 10.1**.

Table 10.1 Results for linked junction model including Junction 3 test proposed outline roundabout layout, 2 exit lanes on Western Way (west), future situations – Simulation ARCADY model

	AM Peak hour			PM Peak hour		
	Queue (PCU)	Delay (s)		Queue (PCU)	Delay (s)	
	[Lane Simulation] - Existing 2019					
Junction 4 - 1 - Western Way	2.3	11.99		2.5	11.63	
Junction 4 - 2 - Newmarket Rd (E)	3.2	12.36		2.1	9.18	
Junction 4 - 3 - Dettingen Way	0.5	7.63		0.9	10.07	
Junction 4 - 4 - Newmarket Rd (W)	2.2	11.50		1.8	9.25	
Junction 3 - A - ASDA	0.3	3.87		0.5	4.20	
Junction 3 - B - Western Way (E)	1.4	6.11		1.2	6.02	
Junction 3 - C - Western Way Retail Park	0.1	5.40		0.2	6.19	
Junction 3 - D - Western Way (W)	3.0	8.62		1.5	6.66	
Junction 2 - A - Western Way (E)	3.4	12.33		1.1	6.77	
Junction 2 - B - Olding Road	0.1	7.56		0.6	6.66	
Junction 2 - C - Western Way (W)	1.4	5.29		1.0	4.56	
	[Lane Simulation] - Existing 2019 + 6th form					
Junction 4 - 1 - Western Way	3.7	12.89		2.9	12.31	
Junction 4 - 2 - Newmarket Rd (E)	3.3	14.42		1.8	9.12	
Junction 4 - 3 - Dettingen Way	0.4	8.72		0.7	8.57	
Junction 4 - 4 - Newmarket Rd (W)	3.0	13.95		1.8	8.97	
Junction 3 - A - ASDA	0.3	4.16		0.5	4.01	
Junction 3 - B - Western Way (E)	1.8	6.52		1.0	6.01	
Junction 3 - C - Western Way Retail Park	0.0	5.75		0.2	5.82	
Junction 3 - D - Western Way (W)	3.4	9.03		1.8	6.66	
Junction 2 - A - Western Way (E)	3.5	14.08		1.4	6.32	
Junction 2 - B - Olding Road	0.0	6.64		0.6	7.03	
Junction 2 - C - Western Way (W)	1.4	5.48		1.4	4.65	
	[Lane Simulation] - Existing 2030 + 6th form					
Junction 4 - 1 - Western Way	4.5	15.61		4.2	15.17	
Junction 4 - 2 - Newmarket Rd (E)	8.7	29.77		3.2	11.87	
Junction 4 - 3 - Dettingen Way	0.6	12.01		1.6	13.64	
Junction 4 - 4 - Newmarket Rd (W)	5.3	19.60		2.9	11.15	
Junction 3 - A - ASDA	0.3	4.21		0.8	4.80	
Junction 3 - B - Western Way (E)	1.8	7.33		1.3	7.22	
Junction 3 - C - Western Way Retail Park	0.1	6.43		0.3	6.77	
Junction 3 - D - Western Way (W)	5.2	12.30		2.7	8.41	
Junction 2 - A - Western Way (E)	4.5	18.92		1.3	7.85	
Junction 2 - B - Olding Road	0.1	6.39		0.8	7.49	
Junction 2 - C - Western Way (W)	2.1	6.55		1.7	5.01	
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution A)						
Junction 4 - 1 - Western Way	5.1	18.99		7.2	21.45	
Junction 4 - 2 - Newmarket Rd (E)	16.6	62.24		3.6	13.37	
Junction 4 - 3 - Dettingen Way	0.6	10.26		1.4	13.35	
Junction 4 - 4 - Newmarket Rd (W)	7.5	25.85		3.2	11.49	
Junction 3 - A - ASDA	0.3	4.56		0.7	5.05	
Junction 3 - B - Western Way (E)	1.8	7.35		2.7	8.98	
Junction 3 - C - Western Way Retail Park	0.1	6.19		0.3	7.65	
Junction 3 - D - Western Way (W)	9.1	28.45		2.1	9.38	
Junction 2 - A - Western Way (E)	8.7	30.53		2.3	9.56	
Junction 2 - B - Olding Road	0.7	8.41		2.0	10.34	
Junction 2 - C - Western Way (W)	3.1	7.86		2.0	5.58	
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution B)						
Junction 4 - 1 - Western Way	4.3	17.23		7.8	20.66	
Junction 4 - 2 - Newmarket Rd (E)	13.1	49.88		3.2	12.43	
Junction 4 - 3 - Dettingen Way	0.7	11.52		1.4	14.32	
Junction 4 - 4 - Newmarket Rd (W)	13.9	43.71		3.2	13.04	
Junction 3 - A - ASDA	0.5	4.99		0.5	5.36	
Junction 3 - B - Western Way (E)	2.1	6.93		2.7	8.79	
Junction 3 - C - Western Way Retail Park	0.1	5.60		0.4	8.63	
Junction 3 - D - Western Way (W)	11.5	24.40		2.7	9.93	
Junction 2 - A - Western Way (E)	9.4	20.80		1.8	8.83	
Junction 2 - B - Olding Road	0.5	8.99		1.5	10.70	
Junction 2 - C - Western Way (W)	3.4	7.30		2.1	5.78	

Table 10.1 *(cont…)*						
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution A)						
Junction 4 - 1 - Western Way	6.0	23.29		13.5	42.41	
Junction 4 - 2 - Newmarket Rd (E)	40.6	120.44		5.8	17.12	
Junction 4 - 3 - Dettingen Way	1.7	15.78		2.7	38.49	
Junction 4 - 4 - Newmarket Rd (W)	28.0	65.15		5.0	17.62	
Junction 3 - A - ASDA	0.4	6.27		0.7	6.29	
Junction 3 - B - Western Way (E)	1.9	8.01		4.1	12.24	
Junction 3 - C - Western Way Retail Park	0.2	7.25		0.6	11.94	
Junction 3 - D - Western Way (W)	15.9	33.82		4.0	12.73	
Junction 2 - A - Western Way (E)	18.6	52.36		3.1	15.25	
Junction 2 - B - Olding Road	0.3	7.90		2.0	14.32	
Junction 2 - C - Western Way (W)	2.7	7.48		2.6	5.89	
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution B)						
Junction 4 - 1 - Western Way	9.2	30.08		14.2	41.31	
Junction 4 - 2 - Newmarket Rd (E)	42.8	135.96		5.6	17.17	
Junction 4 - 3 - Dettingen Way	1.8	13.23		3.1	31.79	
Junction 4 - 4 - Newmarket Rd (W)	24.2	62.82		3.9	15.82	
Junction 3 - A - ASDA	0.6	5.77		1.0	6.35	
Junction 3 - B - Western Way (E)	2.5	8.09		3.7	13.29	
Junction 3 - C - Western Way Retail Park	0.1	6.39		0.5	11.33	
Junction 3 - D - Western Way (W)	13.6	34.53		3.0	13.95	
Junction 2 - A - Western Way (E)	33.3	91.57		5.7	27.40	
Junction 2 - B - Olding Road	0.5	9.54		2.3	13.37	
Junction 2 - C - Western Way (W)	2.5	7.37		2.1	6.38	

10.1 Linked model: review of Junction 2 future operation

From the results in **Table 10.1**, under the proposed junction layout arrangements modelled i.e. Junction 2 being a roundabout with 2 exit lanes on Western Way (east), it can be seen that queuing at this junction, impacted by the traffic flows through the network, is shown to be very similar to that shown for the individual Simulation ARCADY model for this junction (refer to **Table 8.3**). As discussed in **Section 8.0** and confirmed by these linked network model results, queues on Western Way (west) and on Olding Road can be expected to be minimal in both peak hours by 2030 with all development traffic added as will queues on Western Way (east) in the evening peak hour. Potential queues of up to approximately 33 PCUs on Western Way (east) in the morning peak hour by 2030 will not be long enough to cause an obstruction to any junctions along Western Way to the east of Junction 2. It should be noted that the potential 33 PCU queue length is associated with Distribution B which is the traffic distribution arrangement associated with having a decked car park at the northern warehouse site rather than over the existing Olding Road car park. At the time of writing this report it is understood that this option is unlikely to be pursued. In the event that Distribution A is pursued, whereby a decked car park is located over the Olding Road car park rather than over the northern warehouse site, the linked Simulation model has resulted in rather shorter queues of up to 19 PCUs. These modelling results are a vast improvement on the unacceptable results for queuing along this arm of the junction that were revealed by the original linked model tested with the arrangement of Junction 3 remaining as existing.

A Simulation PICADY model was prepared for the existing priority T-junction arrangement at Junction 2 to determine the more accurate queues and delays, relating to current lane assignment of traffic flows, that would occur at this junction in the future if the Western Way development did not occur. **Table 10.2** illustrates the comparison between queues and delays that would be expected to occur in the future at this junction under the existing arrangements without the Western Way development traffic added but with the committed Sixth Form development added, and under the proposed junction arrangements with both the Sixth Form and the Western Way development traffic added.

Table 10.2 Comparison of queues and delays expected under existing and proposed Junction 2 arrangements with and without Western Way development traffic added.

	AM Peak hour		PM Peak hour	
	Queue (PCU)	**Delay (s)**	**Queue (PCU)**	**Delay (s)**
EXISTING JUNCTION LAYOUT – NO WESTERN WAY DEVELOPMENT				
	[Lane Simulation] - Existing 2019			
Western Way East	0.0	0.00	0.0	0.00
Olding Road	0.0	12.69	1.0	13.06
Western Way West	3.3	13.03	0.2	0.54
	[Lane Simulation] - Existing 2019 incl. 6th form			
Western Way East	0.0	0.00	0.0	0.00
Olding Road	0.1	13.32	1.1	13.84
Western Way West	5.1	14.77	0.3	0.57
	[Lane Simulation] - Existing 2030 incl. 6th form			
Western Way East	0.0	0.00	0.0	0.00
Olding Road	0.1	15.35	1.7	18.25
Western Way West	11.2	38.22	0.3	0.67
PROPOSED JUNCTION LAYOUT – WITH WESTERN WAY DEVELOPMENT				
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution A)				
Western Way (E)	8.7	30.53	2.3	9.56
Olding Road	0.7	8.41	2.0	10.34
Western Way (W)	3.1	7.86	2.0	5.58
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution B)				
Western Way (E)	9.4	20.80	1.8	8.83
Olding Road	0.5	8.99	1.5	10.70
Western Way (W)	3.4	7.30	2.1	5.78
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution A)				
Western Way (E)	18.6	52.36	3.1	15.25
Olding Road	0.3	7.90	2.0	14.32
Western Way (W)	2.7	7.48	2.6	5.89
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution B)				
Western Way (E)	33.3	91.57	5.7	27.40
Olding Road	0.5	9.54	2.3	13.37
Western Way (W)	2.5	7.37	2.1	6.38

These results demonstrate that, as is to be expected at a priority T-junction, traffic approaching from Western Way (east) currently experiences no delay at all as it is not required for this traffic to give way to any other movement. The nature of a roundabout, as is proposed, will result in delays to traffic approaching from this direction as this traffic will be required to give way at the roundabout. In fact it is this approach that is likely to experience the longest delays compared to other approaches at the proposed roundabout layout, with delays by of up to just under 1 minute per vehicle for the most likely traffic distribution arrangement, Distribution A, in the morning peak hour and delays of up to 1½ minutes for the unlikely traffic distribution arrangement, Distribution B. Delays on this approach in the evening peak hour will be considerably shorter.

Conversely, delays on Western Way (west) and on Olding Road are expected to reduce as in the morning peak hour as a result of the proposed changes to the junction, even with the Western Way development traffic added. Delays by 2030 on these approaches are expected to be approximately 5 seconds shorter than existing delays in 2019 and more significantly shorter when compared to the delays expected for the existing junction arrangement without Western Way development traffic by 2030 (up to 30 seconds shorter). Delays in the evening peak hour for Olding Road by 2030 are expected to be comparable to those expected without the Western Way development traffic added, and delays on Western Way (west) are expected to be in the region of 5 seconds longer under

the proposed junction arrangements with Western Way development traffic added compared to would be expected under the existing arrangement.

10.2 Linked model: review of Junction 3 future operation

From the results in **Table 10.1**, under the proposed junction layout arrangements modelled i.e. Junction 3 being a roundabout with 2 exit lanes on Western Way (west), it can be seen that queuing at this junction, impacted by the traffic flows through the network, is very favourable. Queues on all approaches are expected to be minimal for both peak hours after all development traffic is added with the exception of queues on Western Way (west) in the morning peak hour, which are expected to reach approximately 16 PCUs by 2030. Potential queues of this length will not be long enough to cause an obstruction to any junctions along Western Way to the west of Junction 3. A queue of this length will not extend as far as the right-angle bend in Western Way.

A Simulation ARCADY model was prepared for the existing roundabout arrangement at Junction 3 to determine the more accurate queues and delays, relating to current lane assignment of traffic flows, that would occur at this junction in the future if the Western Way development did not occur. **Table 10.3** illustrates the comparison between queues and delays that would be expected to occur in the future at this junction under the existing arrangements without the Western Way development traffic added but with the committed Sixth Form development added, and under the proposed junction arrangements with both the Sixth Form and the Western Way development traffic added.

These results demonstrate that, under the proposed junction arrangements with the Western Way development added, delays on the approach from ASDA are expected to increase across both peak hours by up to approximately only 2 seconds compared to what would have been expected by 2030 if the junction arrangement remained unchanged and the Western Way development did not occur. On the Western Way (east) approach, delays are expected to reduce by over 20 seconds in the morning peak hour and reduce by approximately 8 seconds in the evening peak hour compared to what would otherwise have occurred. On the approach from the retail park access delays are expected to increase by up to 3 seconds. On the Western Way (west) approach delays are expected to increase by approximately 21 seconds in the morning peak hour by 2030 and by up to approximately 4 seconds in the evening peak hour as a result of the proposed junction arrangements and the addition of the Western Way development.

Table 10.3 Comparison of queues and delays expected under existing and proposed Junction 3 arrangements with and without Western Way development traffic added.

	AM Peak hour		PM Peak hour	
	Queue (PCU)	Delay (s)	Queue (PCU)	Delay (s)
EXISTING JUNCTION LAYOUT – NO WESTERN WAY DEVELOPMENT				
	[Lane Simulation] - Existing 2019			
ASDA	0.2	3.59	0.5	3.74
Western Way (E)	3.5	16.17	2.2	12.15
Western Way Retail Park	0.0	5.52	0.3	6.20
Western Way (W)	1.8	7.02	1.7	6.41
	[Lane Simulation] - Existing 2019 incl. 6th form			
ASDA	0.2	3.73	0.6	4.15
Western Way (E)	3.1	17.11	2.9	13.81
Western Way Retail Park	0.0	5.30	0.2	6.00
Western Way (W)	2.2	7.63	1.7	6.64
	[Lane Simulation] - Existing 2030 incl. 6th form			
ASDA	0.2	4.35	0.7	4.53
Western Way (E)	8.2	29.89	5.0	21.09
Western Way Retail Park	0.1	5.43	0.2	7.31
Western Way (W)	4.1	11.84	2.3	8.55
PROPOSED JUNCTION LAYOUT – WITH WESTERN WAY DEVELOPMENT				
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution A)				
ASDA	0.3	4.56	0.7	5.05
Western Way (E)	1.8	7.35	2.7	8.98
Western Way Retail Park	0.1	6.19	0.3	7.65
Western Way (W)	9.1	28.45	2.1	9.38
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution B)				
ASDA	0.5	4.99	0.5	5.36
Western Way (E)	2.1	6.93	2.7	8.79
Western Way Retail Park	0.1	5.60	0.4	8.63
Western Way (W)	11.5	24.40	2.7	9.93
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution A)				
ASDA	0.4	6.27	0.7	6.29
Western Way (E)	1.9	8.01	4.1	12.24
Western Way Retail Park	0.2	7.25	0.6	11.94
Western Way (W)	15.9	33.82	4.0	12.73
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution B)				
ASDA	0.6	5.77	1.0	6.35
Western Way (E)	2.5	8.09	3.7	13.29
Western Way Retail Park	0.1	6.39	0.5	11.33
Western Way (W)	13.6	34.53	3.0	13.95

10.3 Linked model: review of Junction 4 future operation

From the results in **Table 10.1**, under the proposed junction layout arrangements modelled i.e. Junction 4 being a roundabout with 2 approach lanes on Western Way (west), it can be seen that queuing at this junction, impacted by the traffic flows through the network, is generally favourable. Results for expected queues on all approaches in the morning peak hour by 2030 with the Western Way development traffic added are either lower or very comparable to those that resulted from the Simulation model undertaken for the individual junction (refer to **Table 9.5**) and as discussed in **Section 9.2**. The only queues of any particular significance will be on Newmarket Road in both directions, with queue lengths of up to 43 PCU on Newmarket Road (east) and up to 28 PCU on Newmarket Road (west).

The results of the original LinSig model undertaken for the existing signal controlled layout of Junction 4 was re-examined to determine delays as well as queue lengths that would occur at this junction in the future if the Western Way development did not occur. **Table 10.4** illustrates the comparison between queues and delays that would be expected to occur in the future at this junction under the existing arrangements without the Western Way development traffic added but with the committed Sixth Form development added, and under the proposed junction arrangements with both the Sixth Form and the Western Way development traffic added.

Table 10.4 Comparison of queues and delays expected under existing and proposed Junction 4 arrangements with and without Western Way development traffic added.

	AM Peak hour			PM Peak hour	
	Queue (PCU)	Delay (s)		Queue (PCU)	Delay (s)
EXISTING JUNCTION LAYOUT – NO WESTERN WAY DEVELOPMENT					
	[LinSig] - Existing 2019				
Western Way	11.9	80.0		16.5	76.8
Newmarket Rd (E)	19.2	60.4		17.3	77.8
Dettingen Way	8.5	92.6		12.5	89.5
Newmarket Rd (W)	16.1	69.7		14.3	68.2
	[LinSig] - Existing 2019 incl. 6th form				
Western Way	12.6	85.9		17.3	77.2
Newmarket Rd (E)	20.8	63.6		17.6	79.4
Dettingen Way	9.0	95.7		12.8	90.5
Newmarket Rd (W)	17.5	71.5		14.6	70.6
	[LinSig] - Existing 2030 incl. 6th form				
Western Way	16.7	110.7		22.3	97.4
Newmarket Rd (E)	26.0	75.5		22.9	99.4
Dettingen Way	12.4	133.7		16.6	112.9
Newmarket Rd (W)	22.5	89.4		18.0	78.0
PROPOSED JUNCTION LAYOUT – WITH WESTERN WAY DEVELOPMENT					
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution A)					
Western Way	5.1	18.99		7.2	21.45
Newmarket Rd (E)	16.6	62.24		3.6	13.37
Dettingen Way	0.6	10.26		1.4	13.35
Newmarket Rd (W)	7.5	25.85		3.2	11.49
[Lane Simulation] - Existing 2019 + 6th form + WW (Scenario 3, Distribution B)					
Western Way	4.3	17.23		7.8	20.66
Newmarket Rd (E)	13.1	49.88		3.2	12.43
Dettingen Way	0.7	11.52		1.4	14.32
Newmarket Rd (W)	13.9	43.71		3.2	13.04
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution A)					
Western Way	6.0	23.29		13.5	42.41
Newmarket Rd (E)	40.6	120.44		5.8	17.12
Dettingen Way	1.7	15.78		2.7	38.49
Newmarket Rd (W)	28.0	65.15		5.0	17.62
[Lane Simulation] - Existing 2030 + 6th form + WW (Scenario 3, Distribution B)					
Western Way	9.2	30.08		14.2	41.31
Newmarket Rd (E)	42.8	135.96		5.6	17.17
Dettingen Way	1.8	13.23		3.1	31.79
Newmarket Rd (W)	24.2	62.82		3.9	15.82

These results demonstrate that, under the proposed junction arrangements with the Western Way development added, by 2030 delays on the approach from Western Way are expected to reduce significantly compared to existing experienced delays in 2019, with a reduction of between approximately 30 and 50 seconds across both peak hours. This reduction in delay is improved further when compared to the delay that would be expected

by 2030 if no junction alteration were made and the Western Way development was not implemented, to between approximately 55 and 85 seconds. On the Newmarket Road (east) approach, delays are expected to increase by 2030 by between approximately 45 seconds and 1 minute in the morning peak hour but reduce by approximately 82 seconds in the evening peak hour compared to what would otherwise have occurred by 2030 without the development or the junction rearrangements. On the approach from Dettingen Way delays are expected to reduce significantly by 2030 by approximately 2 minutes in the morning peak hour and by approximately 77 seconds in the evening peak hour compared to what would otherwise have been experienced by that time. On the Newmarket Road (west) approach delays are expected to reduce by approximately 25 seconds in the morning peak hour by 2030 and by just over 1 minute in the evening peak hour as a result of the proposed junction arrangements and the addition of the Western Way development.

10.4 Overall conclusions regarding junction analysis of proposed junction arrangements

From the above analysis it is concluded that, it is acknowledged that some longer queues and delays can be expected by 2030 on some of the approaches to Junctions 2, 3 and 4 by 2030 as a result of the proposed junction alterations and the addition of the Western Way development compared to those that would have been expected if the development did not occur. However, none of these will have a significant impact on the local highway network in so far as the expected average maximum queue lengths will not cause significant obstructions to other junctions on the local highway network. The overriding conclusions drawn from the above analysis is that any increase in delay on some approaches that will result from the proposed development will be outweighed by the benefit of an expected reduction in delay on other approaches, some of which are very significant.

11.0 Preliminary development parking analysis

11.1 Car parking

For each of the three development scenarios tested for the Final Business Case, the expected car parking demand for the Western Way development was calculated using data from the TRICS database which offers average arrival and departure trip rates at hourly intervals throughout the day by each mode of transport for each different proposed use of the site. This expected parking demand was compared with the proposed parking provision for the site to identify if the proposed provision would be sufficient to meet the expected demand. The proposed provision and the expected demand were compared with the Local Authority parking standards for new developments (Suffolk Guidance for Parking (2015)) to confirm that the requirements of the standards would be met.

Table 11.1 summarises the parking comparison analysis for car parking at the development. The analysis reviewed daytime and evening parking demands on weekdays and weekends and considered opportunities for sharing of parking when the demand by different uses differed at different times of day. It was concluded that the demand for parking would be at its maximum during the daytime on weekdays, and it is the car parking figures for this time period that are represented in the table. The number of spaces required to be dedicated for use by disabled users is included in the overall number of car parking spaces stated in the table.

As discussed in **Section 6.2**, it should be noted that any proposal to provide student accommodation car parking as part of this development has not been included in the assessment and is therefore not represented in **Table 11.1**. The Local Authority parking standards do not include a requirement for student accommodation parking so a scale of car parking allowance compared to the number of proposed student rooms needs to be

agreed with the Local Highway Authority in order to ensure that the proposals will meet with their approval. Any proposals for student accommodation car parking will be in addition to the parking provision figures offered in **Table 11.1**.

From the results of the table it can be seen that, for development Scenario 1, the proposed car parking provision is higher than is permitted by the Local Authority parking standards by approximately 346 spaces and is also in excess of the expected parking demand.

For Scenario 2 the proposed car parking provision is higher than is permitted by approximately 193 spaces but, if an additional 210 spaces relating to additional Health Centre staff are allowed for in the Local Authority requirement if this becomes applicable, the number of proposed spaces would be 17 spaces fewer than the maximum requirements of the parking standards. The potential for this permitted additional allowance relates to the fact that one of the parameters for determining the maximum number of car parking spaces permitted by the Local Authority parking standards is 1 space per member of staff. Currently it has been assumed that the number of staff members to account for in this calculation will be equal to half the number of proposed desks at the new health centre. However, if the number of members of staff to account for in this calculation is, in fact, equal to the total number of desk spaces proposed to be provided, the maximum of an additional 210 spaces would become a factor under the current proposals for 419 desks in the health centre. The expected maximum parking demand for Scenario 2 is significantly lower than the proposed parking provision by approximately 358 spaces.

For Scenario 3 the proposed car parking provision is lower than the maximum permitted by the Local Authority parking standards by approximately 136 spaces and this difference would increase to 346 if an additional 210 spaces relating to additional Health Centre staff are allowed for in the Local Authority maximum allowance if this becomes applicable. However, the expected maximum parking demand for Scenario 3 is lower than the proposed parking provision by approximately 253 spaces.

If the overall development use is aligned with the assessed Scenario 3 proposals for combined office use, health centre use and leisure centre use in the proportions and of the scale tested for the FBC, it is concluded that the proposed car parking provision as tested for the FBC (distribution arrangement A or B) would meet the requirements of the Local Authority parking standards (i.e. it would not exceed maximum requirements) and would amply accommodate expectations of parking demand. The provision of a reduced number of spaces compared to the maximum allowance is justified by the demand analysis. The number of spaces proposed to be provided lies between the expected maximum demand and the maximum allowable number of spaces.

Table 11.1 Weekday car parking requirements of the proposed Western Way development (including spaces for disabled users)*

	Peak parking time period	Scenario 1 Office only	Scenario 2 Office & Health	Scenario 3 Office, Health & Leisure
Maximum no. of spaces in accordance with Local Authority parking standards#	06:00 - 20:00	972	1125**	1454**
Maximum expected parking demand derived from TRICS data##		1089	960	1065
		Proposed parking distribution arrangement (April 2019)		
		A	**B**	
Accessed off Olding Road	Proposed number of development car parking spaces	526	526	
Accessed off Beetons Way (south)***		547	286	
Accessed off Beetons Way (north)		250	500	
TOTAL		**1323**	**1312**	

*Includes provision for West Suffolk House staff and visitor parking (not operational parking). Does not include any requirement for student accommodation car parking.
**Provision for Health assumes 211 members of staff which is 50% of the number of desks currently proposed to be provided (421). If 421 members of staff were assumed, then the maximum permitted parking provision would be 210 more than stated.

#Parking requirements in the LA parking standards relate to total GFA for offices, GFA for public areas in leisure centres and number of staff and number of consulting rooms for health centres.
##Parking demand derived from TRICS data is based on GFA for all tested uses and does not depend on user numbers or number of rooms.
***Access off Beetons Way (south) includes:
For distribution arrangement A – car park deck on the west side, 10 spaces for disabled users at West Suffolk House and spaces to be provided on the east side.
For distribution arrangement B – 10 spaces for disabled users at West Suffolk House and spaces to be provided on the east side.

11.2 Parking for all other modes

Table 11.2 illustrates the requirements for parking at the Western Way development by all modes other than standard car parking for each of the three tested development scenarios in accordance with the Local Authority development parking standards ((Suffolk Guidance for Parking (2015)). Unlike the requirements for standard car parking spaces, which relate to a maximum number permitted, the parking requirements for all other modes relate to a minimum number of spaces required to be provided. The minimum requirements relate to a number of different parameters depending on the mode e.g. GFA, number of standard car parking spaces etc. So if the proposed size of a building or the proposed number of standard car parking spaces changes for the proposed development, it is likely that the number of spaces required for other modes will also change.

It should be noted that the calculation of figures for other modes of transport in **Table 11.2** is based on the number of car parking spaces, and these have been related in these

calculations for this table to the requirements of the Local Authority parking standards. Consultation with the LHA has since confirmed the requirement to calculate these figures in relation to the number of car parking spaces actually proposed. Therefore these figures can be expected to change.

Table 11.2 Minimum number of parking spaces required for other modes of transport*

	Car parking spaces for disabled users**	Motorcycle parking spaces	Cycle parking spaces	Electric car charging parking spaces**
Scenario 1 Office only	31	38	146	Minimum of 1 space per every 20 non-residential car parking spaces PLUS ducting to be provided for a further 5% of the car parking spaces
Scenario 2 Office & Health	72#	45	183	
Scenario 3 Office, Health & Leisure	103#	70	217	

*All scenarios include for parking provision for West Suffolk House. Parking provision at student accommodation is not accounted for.
Car parking spaces for disabled users and electric car charging spaces are included in the total number of car parking spaces to be provided, as stated in **Table 9.1; they are not required in addition to this number of car parking spaces.
#The normal requirement for spaces for disabled users is 5% of the total car parking provision, however the LA parking standards state that this provision is expected to be significantly higher for health centres. Therefore an allowance for 10% of car parking provision related to the health centre has been made in the calculation of spaces for disabled users for Scenarios 2 and 3.

11.3 Parking management

As discussed in **Sections 5.0** and **6.2**, the modelled distribution of development traffic is based on the notion that the proportion of total expected development traffic that travels to and from each proposed development car park will be the same as the proportion of total development parking provision offered in each car park. The development traffic has been distributed at each junction within the local network according to the existing proportion of traffic that travels in each valid direction at each of the junctions.

This methodology therefore does not consider the scenarios that, for example, people travelling from the west will choose to park in the most westerly car park provided as this is the first one they will come to, or that people will park in the closest car park to the specific development use they are attending. Neither does the methodology allow for people who try to find a place in what they consider to be the most convenient development car park (possibly in accordance with either of the two potential scenarios just mentioned), but who find no spaces available so have to come back out of the car park and seek parking elsewhere.

These potential, unfavourable scenarios will require addressing through management strategies embedded in the proactive implementation of a suitable Travel Plan for the site. Such parking management strategies might include:

- Allocating certain spaces to specified users e.g. staff or visitors, and to specified uses of the development site e.g. Health Centre, Leisure Centre. This way, irrespective of what direction the driver of the vehicle is travelling from, they will be required to travel to the designated car park for their purpose rather than picking whichever one

they arrive at first or is, in their opinion, most convenient to the location they are attending.

- Consider an appropriate charging scheme and permit system for different types of users to provide disincentives to staff to occupy visitor spaces all day so that visitors cannot use them, and to provide all users with a motive to consider alternative forms of transport that may be more attractive if car parking is not free of charge.
- For example, a parking management option for the Health Centre might be:
  - Charge for visitor parking, as is common practice at many health centres and other medical facilities, such that the cost is quite low for a short visitor stay that would suit an appointment, but that would be very excessive if a member of staff parked there all day.
  - Charge for a staff parking permit at a rate that is more favourable than parking in the visitor spaces all day, but that also provides a disincentive for staff to drive if they could more economically travel to work by other means, so as to help reduce staff parking demand and staff vehicle trips on the local highway network. The above charging regime could be controlled by electronic entry and exit barriers with ticket machines for visitors and staff electronic pass fobs for staff who have paid for a permit.
  - Locate staff parking furthest away from the entrances to the health centre as a disincentive to staff to drive, giving more convenient priority parking to the health centre visitors who are likely to be more in need of a shorter walk to the entrance doors, given the nature of the purpose of the facility.
    To that end it would be appropriate to allocate the proposed car parking to be accessed from Beetons Way (north) to staff parking.

Of course, as the overall car parking provision on the Western Way development will be shared with other occupying users, any Travel Plan and car parking allocation and management strategy would need to be co-ordinated to be appropriate for all users of all occupying uses.

12.0 Initial expectation of staff modal split

2011 UK Census data has been examined in order to determine the modal split of travel that of people who work in the immediate area of the Western Way development site. **Table 12.1** shows the proportion of people who work in this area who travel by each mode of transport and so represents the modal split that can be expected of staff who will work at the proposed Western Way development if no further incentive to travel sustainably is implemented. The Census data offers no indication of how visitors to the site might travel.

Table 12.1 Modal split of those who work at the site taken from 2011 UK Census data

Mode of travel to work	Percentage of staff
Driving a car or van	75.8%
On foot	11.3%
Passenger in a car or van	5.3%
Bicycle	3.7%
Bus, minibus or coach	1.9%
Motorcycle, scooter or moped	1.1%
Train	0.9%
Taxi	0%

The information in **Table 12.1** may be helpful when the exact uses/occupiers of the Western Way development and the associated numbers if staff for each use are known, in deciding how many of the proposed car and cycle parking spaces are to be allocated to staff of each occupying use and the number of remaining spaces to be set aside for visitor use.

13.0 Access by sustainable modes of transport

The current accessibility of the Western Way development site by sustainable modes of transport has been reviewed.

13.1 Public Transport

13.1.1 Existing bus services

The site is served by numerous bus services including a large number of school and college services as well as more regular public services. **Table 13.1** summarises the public bus services that stop at bus stops adjacent to the Western Way development site.

It can be seen from **Table 13.1** that, despite the seemingly large number of bus services available, there is only one bus service that currently operates frequently throughout the day during the week that might offer a convenient transport option for those people who will work at the site, this being service number M44. This service serves local residential areas but does not extend beyond Bury St Edmunds, however, it also serves Bury St Edmunds train station, further extending its usefulness to commuters to the site from further afield, providing access to wider transport connections.

Service number M44 also offers a frequent Saturday service and service numbers 851 and 853 offer Sunday services that may be useful for those wishing to attend the proposed Leisure Centre and Health Centre at weekends.

All other bus services listed in **Table 13.1** are of very limited or no discernible use to users of the proposed development.

Tables 13.2 and **13.3** list the school and college bus services that serve the site in the mornings and afternoons respectively.

Many services listed in **Table 13.2** begin their journey from outside of Bury St Edmunds and so may offer opportunities for commuters who live along the route to use these services to arrive to work at the site in the mornings between approximately 08:00 and 09:00. Similarly those services listed in **Table 13.3** provide return trips that leave the site between approximately 15:50 and 17:10. A number of these services stop at Bury St Edmunds train station and most stop at Bury St Edmunds bus station, further extending their potential usefulness to commuters to the site, providing access to wider transport connections. It is understood that these bus services are available for use by the general public, however, opportunities for commuters to use these services will be limited by the following factors:

- One journey available at each end of the day so no flexibility on schedule that may not suit working hours.
- Lack of availability of many of these services during school holidays.
- Available capacity on the buses if highly occupied by pupils/students.
- Unattractive prospect of using a bus service dominated in use by children/teenagers.

Table 13.1 Public bus services serving the development site

Service Number	Bus Stop Name and Location	Route	Number of services serving stops per day (Mon to Sun)	First Service	Last Service
84	Adj. West Suffolk House on Western Way	Thetford, Barnham, Ingham, Bury St Edmunds	1 (no Sunday service)	08:52	
384	Opp. West Suffolk House on Western Way	Stowmarket, Woolpit, Beyton, Thurston, Bury St Edmunds	1 (no weekend service)	08:45	
851	Adj. West Suffolk House on Western Way	Bury St Edmunds, Mildenhall Road Est, Howard Est, Town Centre	8 (Sunday only)	09:48	17:48
M44	Adj. West Suffolk House on Western Way	Bury St Edmunds, Mildenhall Road Est, Howard Estate	27 (no Sunday service)	06:46	18:42
Breeze 2	Adj. ASDA on Western Way	Bury St Edmunds Town Service	6 (Monday to Friday)	09:21	14:21
357	Adj. Hutton Close on Newmarket Road	Mildenhall, Red Lodge, Bury St Edmunds	2 (no Sunday service)	10:26	13:16
M77	Adj. Hutton Close on Newmarket Road	Bury St Edmunds Town Centre, Westley Estate, Town Centre	1 (no weekend service)	09:04	
853	Opp. Hutton Close on Newmarket Road	Bury St Edmunds, Westley Est, Priors Est (Circular)	8 (Sunday only)	09:07	17:07

Table 13.2 Existing morning school and college bus services

Service	Bus Stop Name and Location	Route	Frequency of service per day (M to F)	Time
15A	Opp. West Suffolk House on Western Way	Haverhill, Bury St Edmunds	1	08:32
310		Newmarket, Bury St Edmunds	1	08:24
311		Bury St Edmunds, Newmarket, Exning	1	08:09
311A		Bury St Edmunds, Newmarket	1	08:29
374		Clare, Hartest, Horringer, Bury St Edmunds	1	08:43
752		Bures, Sudbury, Long Melford, Bury St Edmunds	1	08:43
753		Sudbury, Bury St Edmunds	1	08:45
956		Lakenheath, Mildenhall, Bury St Edmunds	2	08:21 and 08:36
14B	Adj. West Suffolk House on Western Way	Haverhill, Bury St Edmunds	1	08:44
16A		Newmarket, Mildenhall, Bury St Edmunds	1	08:29
84		Thetford, Barnham, Ingham, Bury St Edmunds	1 school stop	08:34
86		Brandon, Thetford, Bury St Edmunds	1	08:36
86A		Brandon, Thetford, Bury St Edmunds	1	08:36
191		Diss, Thetford, West Suffolk College	1	08:47
304		Diss, Stanton, Bury St Edmunds	1	08:37
310		Newmarket, Bury St Edmunds	1	08:32
311		Bury St Edmunds, Newmarket, Exning	1	08:17
311A		Newmarket, Bury St Edmunds	1	08:37
332		Thetford/Euston, Honington, Bury St Edmunds	1	08:33
955		West Row, Mildenhall, Bury St Edmunds Schools	1	08:32
956		Lakenheath, Mildenhall, Bury St Edmunds	2	08:28 and 08:42

Table 13.3 Existing afternoon school and college bus services

Service	Bus Stop Name and Location	Route	Frequency of service per day (M to F)	Time
84	Opp. West Suffolk House on Western Way	Bury St Edmunds, Ingham, Barnham, Thetford	1	15:58
86		Bury St Edmunds, Thetford, Brandon	1	15:53
191		West Suffolk College, Thetford, Diss	1	17:16
304		Bury St Edmunds, Stanton, Diss	1	15:53
310		Bury St Edmunds, Newmarket, Exning	1	15:51
332		Bury St Edmunds, Honington, Euston/Thetford	1	15:53
338		Bury St Edmunds, Stanton, Garboldisham	1	16:08
14A	Adj. West Suffolk House on Western Way	Bury St Edmunds, Haverhill	1	16:02
15A		Bury St Edmunds, Haverhill	1	15:57
310		Bury St Edmunds, Newmarket, Exning	1	15:57
311		Exning, Newmarket, Bury St Edmunds	1	15:57
311A		Bury St Edmunds, Newmarket	1	15:57
312		Bury St Edmunds, Barrow, Ousden, Newmarket	1	15:57
374		Bury St Edmunds, Horringer, Hartest, Clare	1	15:58
384		Bury St Edmunds, Thurston, Beyton, Woolpit, Stowmarket	1	15:57
752		Bury St Edmunds, Long Melford, Sudbury, Bures	1	15:57
956		Bury St Edmunds, Lakenheath, Mildenhall	1	15:57
15	Adj. West Suffolk College on Newmarket Road	Bury St Edmunds, Haverhill	1	17:10

13.1.2 Existing and proposed bus stop facilities

It will be necessary during the process of undertaking a full Transport Assessment for the development to review the existing bus stop facilities that serve the site. It would be appropriate, in order to ensure the greatest appeal for the use of bus services, to ensure that superior waiting facilities are provided and to install these if they do not already exist at the required locations. This might necessitate the installation of some or all of the following facilities:

- Bus shelter
- Seating
- Lighting
- Litter bin
- Printed bus route and timetable information and contact details
- Real time bus arrival information
- High bus access kerbs
- Localised additional width of footways to offer suitable waiting space without obstructing pedestrians (and cyclists if on a shared path).

It is possible that existing bus stops will require relocating and/or bus stop facilities may require reinstalling/improving as a result of proposed highway works associated with the Abbeygate Sixth Form College development and the Western Way development along Western Way and Beetons Way (north and south). In particular, bus waiting facilities will require careful thought as part of the design of a bus park on Beetons Way (south) adjacent to West Suffolk College if this is to be incorporated as part of the proposed Western Way development.

The three existing bus stops of greatest interest to the development site in terms of convenient location are located westbound and eastbound on Western Way (adjacent to and opposite West Suffolk House) and on Beetons Way (south) opposite the main West Suffolk College site. At the Beetons Way (south) bus stop there is currently a shelter installed, set back from the footway so as to avoid obstruction to pedestrians (refer to **Photo 13.1**). This bus stop will require relocating as a result of the proposed traffic signal controlled junction works at the Western Way/Beetons Way junction.

Photo 13.1 Existing Beetons Way (south) bus stop

The bus stop on the eastbound carriageway of Western Way opposite West Suffolk House currently has nothing more in terms if facility than a bus flag identifying its location. The westbound bus stop on Western Way adjacent to West Suffolk House is currently well equipped with a shelter, bench, real time bus information and high bus access kerbs as shown in **Photo 13.2**, set within the existing verge width and so avoiding obstruction to pedestrians by waiting passengers.

Photo 13.2 Existing westbound bus stop on Western Way adjacent to West Suffolk House

It would be appropriate to avoid reducing the very good level of amenity currently offered by this bus stop if it is to be relocated as a result of the proposed works.

13.1.3 Potential future opportunities for bus routes

A number of the school/college bus services listed in **Tables 13.2** and **13.3** are, in fact, services that offer a regular service throughout the day for use by members of the public, but that divert their normal route slightly for one run in the morning and one run in the afternoon on school days. If the number of new employees in the area generated by the Western Way development is sufficient that bus operators feel that amendments to these routes could be commercially viable, it may be possible to consult with bus operators to include the Western Way stops on all runs, or perhaps every other run, of their service rather than just at school/college start and finish times. This could have the potential of considerably extending the public bus travel opportunities for the site throughout the day for use by both staff and visitors. In order to improve the viability of this arrangement, and so offer a more attractive business case to the bus operators, it would be necessary that the development commit to working with the bus operators in very proactively promoting the use of the bus services to staff and visitors and possibly offer incentives e.g. taster tickets and/or discounts. An exercise is currently being undertaken to identify the bus services that might be suitable to consider for route/timetable amendments in consultation with the appropriate bus operators, prior to engaging in full consultation with the bus

operators. An example of one service that may offer potential to benefit the Western Way development is shown below:

Example – Service number 84, operated by Coach Services

- This service runs between Thetford and Bury St Edmunds via Barnham, Ingham, and Fornham.
- It runs every half hour on Mondays to Saturdays from Thetford bus interchange from 06:40 to 17:45, arriving in Bury St Edmunds bus station between 07:07 and 18:25, and in the opposite direction leaving Bury St Edmunds bus station between 07:25 to 18:30 and arriving at Thetford bus interchange between 07:55 and 19:30.
- It is therefore clear that this service could offer good opportunities for staff and visitors of the Western Way development site if it stopped regularly at the site rather just at school/college start and finish times.
- This service offers the potential for much wider opportunities than currently offered by the M44 service alone, for staff and visitors from beyond the immediate area of Bury St Edmunds to travel to and from the site by bus.
- Unfortunately, the one bus stop on the regular route for this service that is currently missed out as a result of the service diverting to serve West Suffolk College and St. Benedict's School is the stop for Bury St. Edmunds train station. Whilst users of the Western Way development site can access the train station using the M44 service, it would not be considered acceptable to lose this stop on the 84 route as it serves an important transport interchange for those who use this bus service from locations not served by other buses that stop at the station. Therefore, some thought would need to be applied during the consultation with the bus operator to address how the service would serve both locations e.g. perhaps it may serve each location on alternate runs.

It has previously been suggested that options to divert some of the numerous college and/or public bus services from Newmarket Road through the grounds of West Suffolk College to the Western Way development site might offer opportunities to improve the public transport services to the development. The option to divert a bus service through the college site may or may not be helpful when considering the options to make more use of the public bus services that also serve schools and colleges as discussed above, depending on the particular service being considered. It should be borne in mind that the nearest bus stops from the approximate centre of the Western Way development site that are located on Newmarket Road are 400m and 600m away westbound and eastbound respectively, which is on the boundary of what is generally considered acceptable (this being 400m). Due to their already reasonably close proximity to the development site it could potentially be argued that to divert these services would not be justified as this would involve construction expense, disruption of traffic flows through the college and the abandonment of at least two bus stops in each direction along the length of Newmarket Road between the college access and the Western Way junction where these services would rejoin their original route. The abandonment of these existing bus stops along Newmarket Road by those services that might venture to divert through the college site and then along Western Way would mean that those people who currently use these bus stops for these services would have to walk further to an alternative bus stop, thus reducing their accessibility to public transport. Therefore careful thought should be given to the benefits and disbenefits of this option before pursuing it.

Another alternative improvement to public transport services might be to offer some sort of shuttle bus service between the Bury St Edmunds bus and train stations and the Western

Way development site either throughout the day or just over the morning and afternoon peak periods. As previously discussed in **Section 12.1.1**, the existing M44 bus service already offers a half hourly service throughout the day from Monday to Saturday between the bus and train stations and West Suffolk House, with the journey between the train station and West Suffolk House taking 23 minutes (potentially marginally longer than it would take to walk to the site from the train station (refer to **Section 12.1.4**)). This may be considered to be good existing connectivity to the train station. However, it is worth noting that a directly driven route with no stops would give a journey time of between only 5 minutes and 7 minutes (according to Google directions) so such a shuttle bus would offer significant time savings. Of course the frequency and viability of such a service would have to be carefully considered. There may be potential for a high level of usage from staff and visitors of the Western Way development site and staff and students of West Suffolk College, including the Vinten site and the Sixth Form College, as well as from the users of the other existing commercial premises in the immediate area of the site, if it were promoted effectively. In consultation with West Suffolk College, it may be considered feasible to route such a bus service through the college site. This would further reduce the journey time and would also reduce the need for this service to impact on the operation of the four junctions in the vicinity of the development site.

13.1.4 Rail opportunities

Bury St Edmunds train station is 1.7km (approximately a 21 minute walk or a 6 minute cycle ride – Google directions) from West Suffolk House. As discussed in **Section 13.1.1**, it is also served by the M44 bus service which runs frequently during the day from Monday to Saturday. Trains run hourly between Ipswich and Cambridge and every 2 hours between Ipswich and Peterborough, stopping at numerous stops in between.

13.2 Cycling opportunities

There currently exists a shared cycle/pedestrian route along Western Way and Beetons Way (south) along the northern and eastern boundaries of the proposed development site, providing links to the wider local and national cycle network including an off-road cycle route along Newmarket Road. Toucan crossing facilities (for cyclist and pedestrian use) are in place to cross the signal controlled junction of Western Way with A1302, Newmarket Road. It will be necessary that these cycle routes are accommodated and maintained on completion of the highway works that will be required to be undertaken as part of the mitigation works at Junction 1 for the Abbeygate Sixth Form development and at Junctions 2 and 4 for the Western Way development.

Sufficient good quality cycle parking facilities will need to be provided for the proposed development in accordance with the minimum requirements of the Local Authority parking standards as discussed in **Section 9.2** in order to facilitate maximum use of this mode of transport by development site users. Cycle parking should be located conveniently for access from local cycle routes and for users to access the destination buildings but should be situated so as to avoid obstruction to pedestrian desire lines to access the buildings. Cycle parking provision should be in the form of Sheffield stands (which provide 2 spaces per stand – one space on each side of the stand). Shelters should be provided over cycle stands intended for long stay use i.e. for use all day by staff. It may not be necessary to provide cycle shelters over stands intended for short stay (visitor) cycle parking. **Section 11.0** offers guidance regarding the expected extent of demand for cycle parking by staff at the site but a generous allowance should be made for an increase in staff demand that can be hoped to occur after the implementation, through a Travel Plan, of measures to encourage the use of sustainable transport when travelling to the site.

Currently secure, sheltered staff cycle parking is provided at West Suffolk House behind gated fencing as shown in **Photos 13.3** and **13.4**, located along the edge of the vehicle access off Beetons Way (south).

Photo 13.3 Existing West Suffolk House secure sheltered staff cycle parking (1)

Photo 13.4 Existing West Suffolk House secure sheltered staff cycle parking (2)

13.3 Facilities for walking

All roads on the local road network include footways. As discussed in **Section 13.2**, the site is bounded by shared cycle/pedestrian routes along Western Way and Beetons Way (south). Signal controlled crossings are in place at the Western Way/A1302, Newmarket Road junction and are also proposed at the signal controlled junction to be installed at Western Way/Beetons Way as part of the Abbeygate Sixth Form College development mitigation works. One of the shared routes is a lit, traffic free link from A1302, Newmarket Road to the southern end of Beetons Way, offering a safe, convenient short cut for both pedestrians and cyclists from the main road to the development site (refer to **Photo 13.5**). This route is a public bridleway.

Photo 13.5 Pedestrian/cycle path between Newmarket Road and Beetons Way (public bridleway)

14.0 Requirement for a Travel Plan

The Local Highway Authority has made it clear that the Western Way development site should be subject to a comprehensive and proactive Travel Plan that covers the whole of the development site. It has also been decided that the BREEAM credits available through the production and implementation of a Travel Plan be targeted. Given the existing high volumes of traffic in the vicinity of the development site and the fact that the Western Way development will add to this, putting more strain on the local highway network, the implementation of a site wide Travel Plan is highly appropriate. This will serve to encourage and facilitate the use of sustainable modes of transport by users and manage and reduce the number of motor vehicle trips made. Proposed mitigation measures at Junctions 1 and 4 offer results that demonstrate that the residual traffic impacts of the Western Way development are unlikely to be considered severe, however the results for peak hour capacity remain slightly above the preferred threshold by 2030. A successful Travel Plan will help to improve the operation of these junctions further by reducing the number of motor vehicles travelling through them in peak hours.

The figures in **Table 12.1** indicate that 75.8% of staff at the Western Way development can be expected to drive to work if no improvements or incentives to use alternative modes are offered. The Travel Plan will include a SMART target to reduce this percentage to a level agreed over a period of 5 years in consultation with the Local Highway Authority. Measures discussed in this report that would assist in achieving the objectives and targets of a Travel Plan include parking provision for cycles and electric vehicles, staff and visitor car parking management and the exploration of opportunities to improve public transport waiting facilities and service provision (refer to **Sections 11. 2**, **11.3**, **13.1.2** and **13.1.3** respectively). In addition, in order to achieve BREEAM credits and to further strengthen the Travel Plan, the development buildings will include shower, changing, and locker facilities. Further measures that may be included in the Travel Plan as considered appropriate might be:

- The provision of highly visible and accessible information for staff and visitors relating to the available sustainable transport options.

- Sustainable travel information targeted at new recruits and those transferring to the site from elsewhere before they make their first trip, so as to instil good travel habits from the outset.
- Clear and enforced car parking management strategy.
- Promotion of site wide car sharing opportunities.
- Preferential parking provision for those who car share.
- Exploration of opportunities to offer promotions and discounts on the use of public transport for all staff across the site, in consultation with bus operators, to include staff at West Suffolk College as these additional staff will increase the potential viability of such a prospect to the operators.
- Staff cycle training opportunities for riding and cycle maintenance.
- Implementation of a site wide Cycle to Work scheme offering discounted opportunities for staff to purchase bicycles.
- Promotion of sustainable transport events such as Cycle to Work Day etc.
- Increased availability and good management of pool cars across the site so that staff do not need to bring their car to work in order to make business trips.

The above list of potential Travel Plan measures is not exhaustive. Furthermore, a travel questionnaire of all staff based at the Western Way development site would be undertaken each year in order to measure progress towards objectives and targets and to provide the information required to focus travel planning measures appropriately.

The Travel Plan is to be a site-wide plan i.e. it is expected that all occupiers of the Western Way development site will work together to engage with and implement the plan in order to achieve its objectives. The role of Travel Plan co-ordinator will be assigned to someone who works on the site and that person will be responsible for managing the Travel Plan, overseeing its implementation and promotion and monitoring its progress. It will be required that the Travel Plan Co-ordinator will have the backing of senior management of all site occupying organisations and a Travel Plan Working Group consisting of representatives of each occupying organisation. A site-wide Travel Plan has the benefit of being able to co-ordinate the actions undertaken to manage the travel behaviour of a large number of staff such that larger scale measures can be implemented that would not be practical for a much smaller environment, especially if neighbouring organisations are invited to participate in and contribute to certain measures as appropriate. The Western Way development has the advantage of not only being a large site itself, but of also having sizable neighbours such as West Suffolk College.

15.0 Summary and conclusions

An exercise has been undertaken to determine the likely numbers of peak hour vehicle trips that various scenarios for the proposed Western Way development will produce and their likely distribution on the local highway network in accordance with the proposal plans current at the time of writing. The results of traffic count surveys have been used to input existing traffic flow data into models of the four junctions adjacent to the site that it has been agreed with the Local Highway Authority (LHA) should be examined. The expected Western Way development traffic has been added to these models for the various development scenarios in order to test the capacity at these existing junctions both before and after the Western Way development traffic is added. The future assessment year was 2030, as agreed with the LHA. In addition, the traffic expected to be generated by the adjacent committed development of Abbeygate Sixth Form College has also been added to the junction models for all future situations considered.

The results of this analysis revealed that the mitigation proposals previously submitted on behalf of the Abbeygate Sixth Form College development for the junction of Western Way/Beetons Way (Junction 1) would not be sufficient to accommodate the Western Way development traffic satisfactorily. The proposal for this junction was therefore refined in order to offer more capacity. The resulting traffic signal controlled junction proposals prepared by the Abbeygate Sixth Form team, which have been produced in consultation with the LHA and the Western Way team, offer mitigation such that an overall minor improvement to the operation of the junction is achieved by 2030 compared to that that would be expected had the Western Way development never occurred.

The results of the junction modelling analysis revealed that the Western Way/Olding Road junction (Junction 2) would not cope at all well in the future assessment year scenarios once the Western Way development traffic is added. It became clear after testing various options that major mitigation works would be required in the form of replacing the existing priority T-junction with a small standard roundabout. The proposed roundabout is expected to accommodate all existing and proposed traffic flows through to 2030 without traffic backing up to the adjacent junctions. The available space in which to locate this roundabout is very constrained with the existing skate park on the southern boundary of the roundabout and an existing access to a retail facility at the north of the roundabout. It is understood that it has been agreed that the skate park will be redeveloped in the same location in order to accommodate the required boundary of the proposed new junction arrangement. Regarding the existing retail facility access, ideally this should be realigned to form a fourth access off the proposed roundabout, as discussed with the Local Highway Authority. This will have implications regarding the parking provision available on the frontage of the retail facility. Consultation will need to take place with the owners and occupiers of the retail site in order to progress in the design of this access from the proposed junction.

The initial results for the junction of Western Way/ASDA access (Junction 3) suggested that this junction will continue to operate satisfactorily up to 2030 with the Western Way development traffic added. However further, more detailed analysis revealed that, when modelled as a linked network across all of the junctions studied, including the proposals for junction improvements for other junctions, Junction 3 will require mitigation works after all. This is to avoid excessive queue lengths backing up along Western Way to the east of the junction through Junction 2 and Junction 1 by the year 2030. The proposed mitigation at this junction is to offer two lanes on the exit of Western Way (west) in order to allow a higher throughput of traffic from Western Way (east). It is expected that this work should be able to be accommodated within the existing highway boundary by utilising some of the existing verge width on the north side of Western Way for a short length to the west of the junction. It is possible that this may result in the loss of an existing bus layby but, as no other bus stop on Western Way has a layby, it is considered that this could be acceptable to the Local Authority. The outline design of this proposed junction layout was still being prepared at the time of writing this report so it has not been possible to comment on the exact details of the design at this time.

It was revealed from the junction analysis that the junction of Western Way/A1302 Newmarket Road would become oversaturated once the proposed Western Way development traffic is added, with degrees of saturation increasing significantly by 2030. Options for mitigation to the existing traffic signal controlled junction, whilst maintaining its traffic signal control, were tested incrementally until a solution was found. The potential solution that retains the traffic signal control of this junction (Test a) requires existing approach lanes to be widened, an additional exit lane to be constructed on Western Way and an additional right turn lane to be constructed on Newmarket Road (east). The outline design of this junction layout option confirmed that it would require land purchase to

obtain privately owned verges along the southern edge of Newmarket Lane. In addition an area of private land of approximately 36.95sqm would also be required to be purchased in order to achieve the width required to install the additional exit lane on Western Way. Furthermore 7 trees along Newmarket Road are likely to require removing as a result of these proposed works along the southern edge of the road, 4 to the west of Dettingen Way and 3 to the east of Dettingen Way. Assuming that it is permitted to remove these trees, it can be expected that compensatory planting will be required. The requirement to purchase land in order to install this potential junction arrangement option is considered to pose a risk to the viability of pursuing this option further.

Given the risk associated with the Test a option, further options were explored to seek a solution that would not require any land purchase. The resulting proposed option (Test b) is to replace the existing traffic signal controlled junction with a standard roundabout with controlled pedestrian crossings on three approaches. The initial junction modelling results for the test of this option were very favourable through to the year 2030. At the time of writing this report this test option had been proceeded from sketch test to outline design in order to confirm that it can indeed be accommodated within the highway boundary constraints in accordance with the required highway design standards. A first outline design which maintained the existing lane arrangement at the junction was found to result in the need for an unacceptably narrow footway pinch point on the north west corner of the junction. However, the test junction was remodelled with amendments to the lane layout and this produced very favourable results that will require a reduced width of carriageway at this location, thereby offering opportunities for a wider footway that will meet requirements. This solution was in the process of being drawn up as an outline design at the time of writing this report. Consultation with the LHA has confirmed that they are very open to considering proposals to convert this currently signal controlled junction to a roundabout.

As a final check to review any cumulative impacts of the proposed junction mitigation measures and the addition of the Western Way development traffic, Junctions 2, 3 and 4 were modelled as a linked network. From the results of this analysis it is concluded that, whilst there will be some longer queues and delays on some approaches at some junctions as a result of the proposed development, these will be outweighed by the benefits of the reduced delays on other approaches which, in some cases are very significant, as summarised in **Table 15.1**.

Table 15.1 Summary of approximate expected delay increases and decreases at junctions as a result of the proposed Western Way development in peak hours, for the year 2030, compared to delays that would be expected to occur if no development and no junction alterations were implemented*

Junction 2: Western Way/Olding Road		**Junction 3: Western Way/ASDA**		**Junction 4: Newmarket Road/Western Way**	
Approach	Change in delay (sec/veh)	Approach	Change in delay (sec/veh)	Approach	Change in delay (sec/veh)
Western Way (east)**	+50s to +90s**	ASDA	+2s	Western Way	**-55s to -85s**
Olding Road	**-0s to -30s**	Western Way (east)	**-8s to -20s**	Newmarket Road (east)	**-82s (PM)** to +53s (AM)
Western Way (west)	**-5s**	Retail park	+3s	Dettingen Way	**-77s to -120s**
		Western Way (west)	+4s to +21s	Newmarket Road (west)	**-25s to -60s**

*Assumes that the traffic associated with the committed Abbeygate Sixth Form College development will be on the highway network.

**It should be noted that this approach currently experiences no delays at all due to it being an approach on the main carriageway of a priority T-junction that does not have to give way to other traffic. As a result of converting this junction to a roundabout, traffic on this approach will be required to give way, so delay figures relate to the whole of the expected delay rather than an increase in an existing delay.

From this table the scale of any increase in delay can be seen and the benefits, i.e. reduction in delays as a result of the proposed development by 2030, are highlighted in bold green text.

A parking analysis has been undertaken which compares the proposed number of staff and visitor parking spaces on the Western Way development site with the requirements of the Local Authority parking standards for the various proposed uses and the expected maximum shared use demand for parking on the site. As well as the requirements for regular car parking spaces, the Local Authority parking standards also define the requirements for spaces for disabled users, for electric car charging points, for motorcycles and for bicycles, so the requirements for these have been calculated. The conclusions of the parking analysis were that, dependent on the development use scenario taken forwards, the current car parking proposals (as applicable in April 2019) would both meet the maximum requirements of the Local Authority parking standards and meet the expected demand for car parking spaces. At the pre-planning meeting in May 2019 the Local Highway Authority stated a requirement that the development should provide as near to the maximum required parking provision as possible. Consequently a review of the proposed parking provision was undertaken in June 2019 which resulted in potential increased provision on the proposed parking deck over the Olding Road car park. The operation of Junction 1 will be the most critically effected by this increase in parking provision. Remodelling of Junction 1 with the increased proposed parking provision has concluded that this increase will have minimal impact on the junction modelling analysis undertaken for the purposes of the Final Business Case and as discussed in this report, which is based on the parking provision proposed in April 2019.

The distribution of Western Way development traffic used in the junction modelling has been based on the proportion of the total site car parking proposed in each site car park (as applicable in April 2019). The effectiveness of the junction modelling relies on an ordered use of the proposed car parks in order to avoid vehicles travelling around the local highway network seeking a vacant parking space. In order to avoid all users simply attempting to find a parking space in the first site car park they come to or the car park that they perceive to be the nearest to the building they wish to attend and then potentially having to leave the car park if it is full to seek a space in another car park, thus adding further to the vehicle trips on the local highway network, a strict car park management plan is recommended.

The LHA have been clear that they would expect the site to implement a site-wide Travel Plan and that significant improvements to the accessibility of sustainable transport modes will be introduced.

A study of the local bus services has revealed that there is only one regular local service during the day that serves the site. This service also serves Bury St. Edmunds bus station and train station. However, it only serves the very local residential area and does not serve anywhere beyond Bury St. Edmunds. Therefore the existing accessibility of the site by public transport is currently limited, although improved by the link to the bus and train station which offer connections to routes further afield.

The site is also served by numerous school and college bus services. Further investigation has revealed that, despite these services apparently only offering one service at the beginning and the end of each school day, many of these services are in fact public services that divert to serve the schools and colleges close to the site at each end of the day, but that offer a regular public service throughout the day, just not at these stops adjacent to the site. These services serve routes that travel beyond Bury St Edmunds. It has been concluded that there is therefore scope to potentially negotiate a slight alteration to the routes of some of these services in order to offer a regular service stop adjacent to the

site, that the bus operators may consider viable once the development is occupied. This would offer a significant improvement to frequency and route choice in terms of the public transport accessibility of the site. Other public transport improvement options have been reviewed including the possibility of providing a shuttle bus between the site and the train station either throughout the day or just at peak times. Any potential alteration to an existing service or contemplation of a new service will require negotiation with the local bus operators and will need to demonstrate their viability if they are to be run as a commercial service, otherwise the operation of such a service may require subsidising. As well as reviewing opportunities for improved bus services, it would also be appropriate to consider the potential to improve facilities at some of the bus stops adjacent to the development site in order to further encourage people to use public transport.

The site is well connected to the local cycle network with off-road cycle routes running along Western Way, Beetons Way and Newmarket Road.

It has been determined from Census data specific to this very local area that approximately 76% of Western Way development staff are likely to drive to the site for work if no Travel Planning initiatives are implemented. It will be a requirement that a comprehensive site-wide Travel Plan be proactively implemented at the Western Way development site both for planning purposes and in order to achieve BREEAM credits. A number of measures to facilitate the use of sustainable modes at the site will be incorporated into the site design from the outset such as car parking management, cycle parking, electric vehicle parking, showers, changing rooms and lockers, potential bus waiting and bus service improvements etc. Other measures will need to be actioned according to a schedule managed through the Travel Plan once the development is operational, for example a review of the use by and availability of cars for staff during the working day. The Travel Plan will require actively promoting and monitoring regularly to review progress towards achieving targets.

It is concluded that the Western Way development proposals will create challenges in terms of its potential traffic impact, but that there are opportunities to mitigate the likely impacts in the form of relatively extensive junction improvement works, strict car parking management, and travel planning measures to encourage and facilitate the use of sustainable transport. The implementation of these mitigation measures will be challenging, requiring highway upheaval, maintenance of safe access to other existing premises, maintenance of good quality pedestrian and cycle routes, consideration of implications for the existing skate park, negotiation with bus operators and West Suffolk College, and approval of the Local Highway Authority.

Appendix A

Conclusions of remodelling of Junction 1 with increased proposed car parking provision

Conclusions of remodelling of Junction 1 with increased proposed car parking provision

The analysis undertaken for the Transport input to the Final Business Case for the proposed Western Way development has been based on a proposed parking provision for the development that was current in April 2019. After consultation with the Local Highway Authority in May 2019, confirming that parking provision should be increased to be as close to the maximum requirements of the Local Authority parking standards as possible, options to increase the level of parking provision were explored. This exercise resulted in the following increased proposed parking provision in June 2019 compared to that proposed in April 2019:

- To the west of Beetons Way (south), instead of 261 spaces on the proposed deck over the Olding Road car park, this would be 522 spaces, all continuing to be accessed off Beetons Way (south).
- Also to the West of Beetons Way (south) 10 accessible spaces at West Suffolk House will remain in the proposal.
- To the east of Beetons Way (south), the formal car parking proposed to be constructed on the site of the existing Leisure Centre building is to remain in the proposal but the 98 proposed formal marked spaces immediately north of this parking will be removed from the proposed parking layout. The area on which these 98 spaces would have been located is currently an unmarked gravel parking area that can accommodate approximately 30 parked vehicles so these 30 unmarked spaces will remain in the parking space calculation. Therefore 268 (previous total proposed parking for this area) – 98 + 30 = 200 spaces (plus 6 standard and 1 accessible space proposed for the Nursery have been assumed to be retained in the proposal in this area).
- The existing car park at the end of Olding Road will continue to have 334 spaces as previously proposed and the extension of the car park to the immediate north of this will continue to have 190 spaces as previously proposed, all of which will be accessed off Olding Road.
- 248 spaces (including 27 motorcycle spaces are to be located on the Warehouse site just north of the railway bridge.

The most recently proposed layout for the signal controlled junction at Junction 1 (Western Way/Beetons Way) has been remodelled for scenario 3 (office, health and leisure centre) to take account of this proposed increase in development parking provision. The modelling results have been checked and, in the worst case, the results are almost identical to those of the model for this junction that accounted for the previously proposed parking figures. The results give less than a 1% increase in DoS on Western Way and an increase in queues of only 1 vehicle, and a decrease in DoS of just under 1% on Beetons Way (north) and a decrease in queues of 3 vehicles. The most significant difference is an increase in DoS on Beetons Way (south) of 8% but the increase in queue length is less than 3 vehicles (up to 11.6 vehicles) and remains of a length that can be accommodated within the length of the proposed two lane approach (the length capacity being 17 vehicles before the back end of the proposed approach reverts to being a single lane).

Therefore it is not expected that these results will make any difference to the overall considerations of the Highway Authority to those results previously tabled for the previously proposed parking arrangement and as discussed in the Transport input to the Final Business Case for the proposed Western Way development.

It is understood that proposed parking provision for the development continues to be subject to change as the development design continues to evolve.

M-LH 01 June 2019

Appendix B

Retail access usage off Western Way opposite Olding Road

Review of car parking occupancy, traffic movements and vehicle classification at furniture retail park off Western Way, opposite Olding Road

Observations made from video survey footage of Tuesday, 26th February 2019 between the hours of 06:00 and 19:00, in order to inform the design of a potential new access into the retail park and enable modelling of this access.

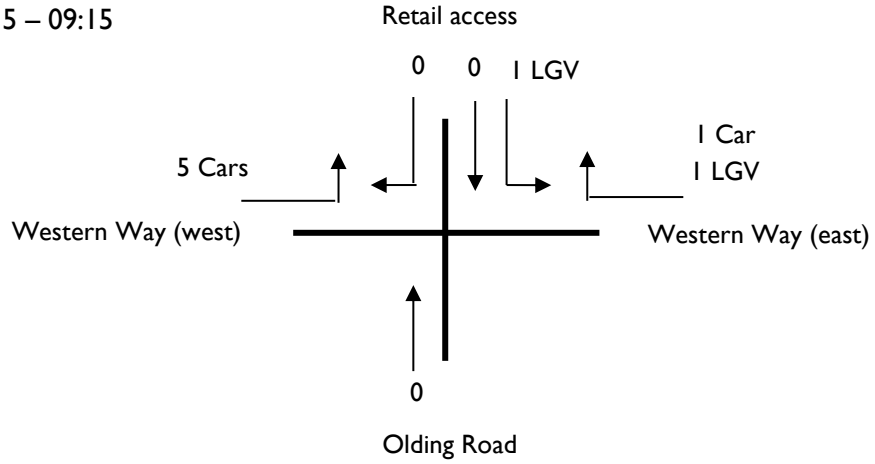
Car parking occupancy

From the video footage, which offered a good view of most of the frontage car park (maybe 2 or 3 spaces were cut from the angle of the shot), parking of no more than a maximum of 7 vehicles was observed throughout the day. This level of parking occurred in the early afternoon period, between approximately 12:30 and 14:30.

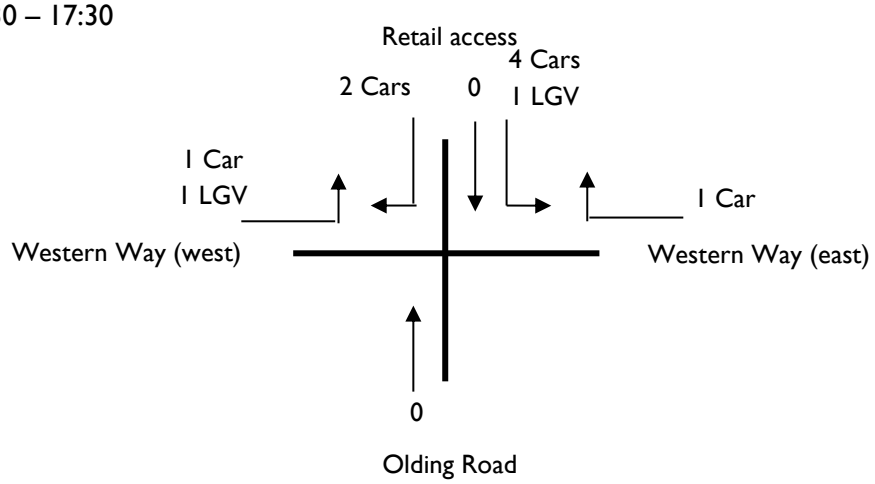
There are currently 15 parking spaces in this frontage car park, therefore it is concluded that 5 of these spaces could be lost without compromising the ability of the car park to cater for demand (assuming that all 3 spaces that could not be observed were occupied at the time of maximum occupation which is unlikely, in which case maybe 7 spaces could afford to be lost).

Traffic movements

AM Peak hour
08:15 – 09:15



PM Peak hour
16:30 – 17:30



Vehicle classification

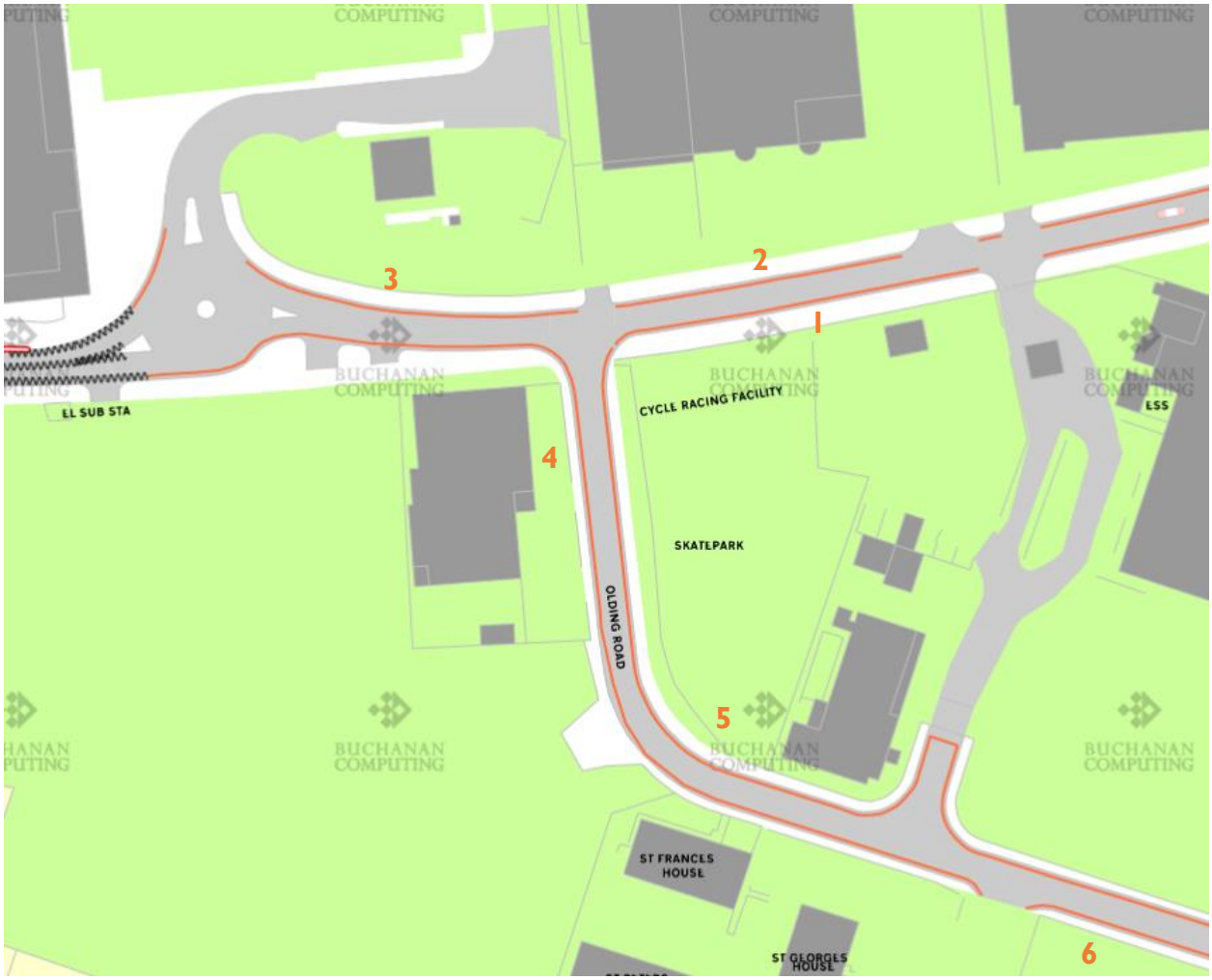
No vehicles larger than a 7.5T box truck (2 axles) was observed entering or exiting the retail park during the morning or evening peak hours, for which a detailed review of the video footage was undertaken. A less detailed review of the video footage (observations approximately every 10 minutes) revealed no vehicles any larger than this entering or leaving the retail park throughout the day between the hours of 06:00 and 19:00.

Appendix C

Review of Traffic Regulation Orders

Review of Traffic Regulation Orders in the vicinity of Western Way/Olding Road junction and recommendations

Data has been gathered from the following website
https://www.suffolktraffweb.uk/main.html



Note: the term 'effective from' in the following list relates to the last recorded documentation of the TRO and does not reflect the length of time for which the TRO has actually been in force.

1 Western Way Southside East of Olding Road

BOM_SE_MBTRO WESTERN WAY
No Waiting Mon-Sat 8am-6pm
Effective from 06/05/2019 to the present day
WESTERN WAY, SUFFOLK
Data correct at time of publication 02/05/2019

2 Western Way Northside East of Olding Road

BOM_SE_MBTRO WESTERN WAY
No Waiting Mon-Sat 8am-6pm
Effective from 06/05/2019 to the present day
WESTERN WAY, SUFFOLK
Data correct at time of publication 02/05/2019

3 Western Way Northside West of Olding Road

BOM_SE_MBTRO WESTERN WAY
No Waiting Mon-Sat 8am-6pm
Effective from 06/05/2019 to the present day
WESTERN WAY, SUFFOLK
Data correct at time of publication 02/05/2019

4 Western Way Southside West of Olding Road including the south of Olding Road

BOM_SE_MBTRO WESTERN WAY (Schedule DY59)
No Waiting Mon-Sat 8am-6pm
Effective from 06/05/2019 to the present day
WESTERN WAY, SUFFOLK
Data correct at time of publication 02/05/2019

5 Northside of Olding Road

BOM_SE_MBTRO OLDING ROAD
No Waiting Mon-Sat 8am-6pm
Effective from 06/05/2019 to the present day
OLDING ROAD, SUFFOLK
Data correct at time of publication 02/05/2019

6 Southside of Olding Road

BOM_SE_MBTRO OLDING ROAD
No Waiting Mon-Sat 8am-6pm
Effective from 06/05/2019 to the present day
OLDING ROAD, SUFFOLK
Data correct at time of publication 02/05/2019

The TROs in the area of the skate park are for no waiting between 08:00 and 18:00 hours, Monday to Saturday, therefore parking is currently permitted outside of these hours.

Beetons Way, located to the west of the site, has a TRO of no waiting at any time.

BOM_SE_MBTRO BEETONS WAY (Schedule DY60).
No waiting at any time
Effective from 06/05/2019 to the present day
BEETONS WAY, SUFFOLK
Data correct at time of publication 02/05/2019

Due to the potential usage of the skate park outside of the effective times of the existing TROs on Western Way/Olding Road, i.e. in an evening and on weekends (this would need to be confirmed prior to looking to commence changes to the TRO) it would be advisable to look at changing the TROs as part of the Western Way Development. The proposed changes to the site will mean that the times the site is occupied will change with the addition of the Leisure Centre to be located adjacent to the skate park site plus the proposed provision of the on-site health care facilities. The Leisure Centre will be operational in the evenings and at weekends and the health care facility is likely to be open for a period of time at weekends. Therefore, these uses will generate vehicle trips at these times as well as those associated with the use of the skate park and the demand for parking on site and in the vicinity will change. Plus as part of the proposed development there will be physical changes to the highway network, therefore the TROs will need amending to accommodate the proposed changes.

Recommendation

The proposed development changes come with the addition of parking on site, which in effect could potentially accommodate visitors to the skate park, especially outside of potential site peak hours, i.e. during evenings and weekends, outside of the typical working day. These are the hours which the existing TROs currently permit on-street parking. As the TROs will be subject to change as a result of the development, it is therefore recommended that the TROs on Olding Road be changed to the same level of parking prohibition as that which currently exists on Beetons Way, which is no waiting at any time. It is also recommended that this parking prohibition be extended from Beetons Way, along the Western Way up to the Olding Road junction. The on-street parking that would previously have been permitted in the evenings and at weekends could then be accommodated in the development car parks instead, provided that the parking management strategy of the development will allow this i.e. in terms of the use and accessibility through any parking barriers during these time periods and in terms of an appropriate charging regime bearing in mind that on-street parking at evenings and weekends is currently free of charge.

Recommendations to be consulted on with the Local Highway Authority.