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TRANSPORT ASSESSMENT

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1 Introduction

- 1.1 Cala Homes (Midlands) Limited propose the redevelopment of seven hectares of land off Fringford Road in Bicester. The proposals encompass a maximum of 200 residential units and a community facility which, for the purposes of analysis, has been assumed to be a local shop.
- 1.2 This Transport Assessment (TA), which is accompanied by a residential Travel Plan (TP), has been prepared in support of a planning application for the above development, following consultation with Oxfordshire County Council (OCC). Consultation correspondence is included as **Appendix A**.
- 1.3 The TA appraises the surrounding highway network in terms of pedestrian and cycle facilities. It records the existing provision for public transport and links to these from the proposed development site.
- 1.4 The local and strategic highway networks and their junctions are described, and accident data for this area recorded and analysed.
- 1.5 Key junctions in the area are analysed for capacity and function, taking into account other future committed development.
- 1.6 Recommendations for any mitigation indicated by the above analyses, where appropriate, are set out in the penultimate section.

2 Planning Policy Context

- 2.1 Transport issues for any new development are considered within the context of planning policy documents which exist nationally and locally. The national policy guidance is the National Planning Policy Framework (NPPF) which guides local authorities to consider planning applications with reference to local consultation which would eventually be manifest in proposed Neighbourhood Plans.
- 2.2 The NPPF emphasizes the need to respond to market forces and the prevailing economy to encourage and support the types of development that would most benefit the community at any given time. This would extend to transport issues and demand a different approach to traffic impact.
- 2.3 The local planning document is the Local Plan. Having been subject to a number of changes, including to a Core Strategy and a reversion to a Local Plan, the document is produced by Cherwell District Council with reference to Oxfordshire's planning guidance and the NPPF.
- 2.4 Under these various documents a number of policies have been 'saved', but the underlying principles upon which all planning guidance is based in terms of transport are those relating to sustainability and safety.
- 2.5 The proposed development will therefore be considered with particular reference to sustainability, safety, and local benefit.

3 Site Description

- 3.1 The site lies on the western side of Fringford Road to the north of Bicester in an area generally referred to as Caversfield. The site is at present private land of approximately seven hectares which is occupied by a dwelling, stables and pasture.
- 3.2 The site is situated 27km from Banbury to the north-west; 16km from Buckingham to the north-east; 50km from Northampton to the north; 37km from Milton Keynes and 28km from Aylesbury to the east; 20km from Oxford to the south; and 17km from Witney to the east.
- 3.3 Fringford Road forms the eastern boundary, beyond which lies residential development, whilst the southern boundary is formed by an unnamed road and farmland beyond. To the west beyond a wooded area lies a dwelling and grounds. The northern boundary of the site is comprised of farmland.
- 3.4 The site is currently served by two accesses: one off Fringford Road opposite Skimmingdish Lane; and one off the unnamed road.
- 3.5 The site location is shown on **Figure 01** whilst the site boundary is illustrated on **Figure 02**.

4 Surrounding Highway Network

4.1 Local highway network

- 4.1.1 The local highway network is dominated by the A4095 and the A4421 which together form part of the bypass surrounding Bicester. From here, a number of roads run towards the town centre whilst others radiate outwards to surrounding settlements.
- 4.1.2 The A4095 links with Bucknell Road at its westernmost end and terminates at its junction with the A4421 and Buckingham Road about 1.9km to the east. It averages approximately nine metres in width and is subject to a 50mph speed limit. It is furnished with a shared footway/cycleway on its southern side for its entire length. Junctions with major or distributor roads are standard roundabouts, whilst those with minor thoroughfares are generally of a ghost island priority arrangement.
- 4.1.3 The A4421 originates at a roundabout junction with the A421 9.5km to the north of the Bicester bypass, and continues as part of the bypass eastward to link with the A41 to the south-east of the town. As part of the bypass, it continues from its roundabout junction with A4095 eastwards as Skimmingdish Lane. It links with Launton Road about 1.3km distant at a roundabout junction and with Bicester Road 300m further east, also at a roundabout. This section of the A4421 is generally about nine metres wide, is furnished with a footway/cycleway on its southern side and is subject to a 40mph speed restriction.
- 4.1.4 The site is situated on the western side of Fringford Road to the north of Bicester, which runs from the A4095 at a ghost island priority junction, becoming Bicester Road 1.5km, to the north of the site, and continues northwards for another 800m to link with Stratton Audley Road at a staggered priority junction. It continues as Fringford Road from this junction for 1.8km to the village of Fringford. From here it is possible to travel to Brackley, 10km distant, via unclassified roads.
- 4.1.5 In the vicinity of the site, Fringford Road is approximately six metres wide and is furnished with a one metre wide footway on the eastern side of the carriageway. It lacks street lighting, but 240 metres south of the site a gateway feature has been

installed together with a reduction from the national speed limit to 40mph. A similar arrangement is in place 500m to the north of the site, where the national speed limit is once again in force. Close to the site, Fringford Road is residential in nature, but generally rural otherwise.

- 4.1.6 Skimmingdish Lane is located directly opposite the site joining with Fringford Road at a simple priority junction, is aligned west-east and 700m in length, linking with the A4421 at its eastern end with a simple priority junction. It hosts a large driver training facility on its southern side, whilst its northern side is occupied by residential dwellings. This road is approximately 6.5 metres in width and has wide grass verges on both sides and a 0.75m footway on its northern side serving the residential element. This road is subject to a 30mph speed limit and lacks street lighting.
- 4.1.7 100m south of the proposed development site an unnamed, unclassified road runs from Fringford Road to link with the B4100 to the west, linking with each at a simple priority junction. This road is approximately 450m in length and about 5.5 metres wide. It lacks both street lighting and footways. It is rural in nature, and abuts the proposed development site on its northern side for most of its length. This thoroughfare is habitually used as an alternative route from Fringford Road to the B4100 and the A4095 due to the difficult right turn out of Fringford Road onto the A4095.
- 4.1.8 The B4100 runs from the A4095 600 metres to the south of its junction with the unnamed road for 5.8km north-westwards to link with the A43. It is generally 7.3 metres in width and subject to the national speed limit. It is of rural character, lacking both footways and street lighting. The B4100 joins both the A4095 and the A43 at standard roundabout junctions. The southern arm of the A43 links with the M40 1.3km distant.
- 4.1.9 The northern section of Bucknell Road is approximately six metres wide and 2km in length, running north-westwards from its roundabout junction with the A4095 to the village of Bucknell. Rural in nature, Bucknell Road lacks both street lighting and footways, and is subject to the national speed limit. The southern section of

Bucknell Road, generally about 6m wide, runs from the A4095 to the town centre 1.6km distant. This part of the route is residential in nature, subject to a 30mph speed limit, is street-lit, and boasts footways on both sides of the carriageway.

4.1.10 Howes Lane joins Bucknell Road at a simple priority junction 100m south of the junction of Bucknell Road with the A4095. It forms part of the A4095 and the Bicester bypass. It is approximately 1.5km long, about seven metres in width and, although it is street-lit, lacks footways on either side. It is predominantly subject to a 40mph speed limit, although this is reduced to 30mph about 300 metres from its junction with Bucknell Road. It is largely semi-rural in character.

4.1.11 Banbury Road, an extension of the B4100 towards the town centre, links with the A4095 at a roundabout junction. This route is approximately seven metres wide, is street-lit, carries footways on both sides of the carriageway, and is subject to a 30mph speed limit.

4.1.12 Buckingham Road is a southern spur of the A4211 from its roundabout with the A4095. Residential in nature, it is approximately 8.5 metres wide, is street-lit and furnished with footways on both sides of the carriageway. Linking with Bicester town centre, it is subject to a 30mph speed limit.

4.1.13 The Local Highway Network is shown on **Figure 03**.

4.2 Strategic highway network

4.2.1 The A4095 and the A4421, described above, form part of the strategic highway network as well as the local highway network. All major routes to and from Bicester link with the bypass, and are described in the following sections.

4.2.2 The A41 is 13km in length connecting Bicester to the A44 and the north-western part of Oxford, from whence the city is accessible via the A4144. The A41 also links with the A4421 to run for 58km eastwards towards Aylesbury and the M25.

4.2.3 The A4095 runs south-westwards from Bicester to Witney, 28km distant, from whence it continues for 14km to terminate at Faringdon.

- 4.2.4 The B4030 links the Bicester bypass with the A44 to the west, and from there to Chipping Norton, a total distance of 28km.
- 4.2.5 Bucknell Road, described above, connects the A4095 with the A43 and the M40. The A43 provides a main route to Brackley, continuing northwards to link with Towcester and Northampton, terminating at Stamford 110km distant.
- 4.2.6 The A4421 runs from the A4095 to the A421, thence to Buckingham 15km away. This road links with Milton Keynes before continuing to join the M1 43km distant from Bicester.
- 4.2.7 Bicester Road runs from the A4421 to the north-east of Bicester in a south-eastwards trajectory to meet the A41 3.8km away.
- 4.2.8 The M40, accessible via Bucknell Road described above, lies to the west of Bicester providing a link to London to the east and the Midlands to the north.
- 4.2.9 The Strategic Highway Network is illustrated on **Figure 04**.

5 Pedestrian and Cycle Provision

- 5.1 A Non-motorised User (NMU) audit has been carried out, the report for which is attached as **Appendix B**, and the findings of which are summarised in the sections below, together with a summary of local amenities and their distances and walking and cycling times from the proposed development.
- 5.2 Local pedestrian infrastructure includes the provision of a footway on the eastern side of Fringford Road which links with the bus stop on Skimmingdish Lane and that on the A4421. This is approximately one metre in width and in generally good repair, although a small area has potholes which have been marked for repair.
- 5.3 The northern section of the Bicester bypass, comprising the A4095 and the A4421, is furnished with a footway/cycleway on its southern side for its entire length, affording non-motorised access to all routes leading into the town centre, and a wide range of facilities within the established residential areas surrounding it.
- 5.4 There are bus stops within the vicinity of the site: one 240 metres away on Skimmingdish Lane which represents a walk of approximately three minutes; one on the A4421 1km and 12 minutes' walk away; and one 750 metres distant on Banbury Road, a nine-minute walk.
- 5.5 There are no Public Rights of Way (PROW) in the vicinity of the site, although the site itself is traversed by an existing private right of way which will be retained and incorporated into the layout.
- 5.6 The site lies 2.5km from Bicester town centre, representing a walk of approximately 30 minutes and a cycle journey of ten minutes. However, there are amenities closer to the development site, as illustrated in **Figure 05** which also shows the cycle routes, and set out in **Table 5.1**.

Table 5.1 Local Amenities

Amenity		Distance	Walk time	Cycle time
Healthcare	Doctor	1.4km	17 minutes	5 minutes
	Dentist	2.4km	29 minutes	8 minutes
	Hospital	2.7km	33 minutes	10 minutes
Education	Nursery	1.0km	12 minutes	4 minutes
	Primary school	1.0km	12 minutes	4 minutes
	Secondary school	2.9km	36 minutes	11 minutes
Retail	Town Centre	2.4km	30 minutes	9 minutes
	Local shops	1.1km	13 minutes	5 minutes
	Superstore	3.2km	39 minutes	11 minutes
Services	Bank	2.4km	30 minutes	9 minutes
	Library	3.2km	39 minutes	11 minutes
	Post office	1.9km	24 minutes	7 minutes
Sport	Fitness club	1.5km	18 minutes	6 minutes
	Gym	2.7km	32 minutes	9 minutes
Leisure	Pub	1.5km	19 minutes	6 minutes
	Restaurant	1.5km	19 minutes	6 minutes
Travel	Bus stop	230m	3 minutes	57 seconds
	Railway Station	2.2km	28 minutes	9 minutes

5.7 It may be seen that most amenities are within a reasonable walking distance from the site, with the nearest primary and nursery schools and the local shops less than fifteen minutes' walk away.

5.8 Although there are no dedicated cycle lanes, Fringford Road and Skimmingdish Lane are designated as on-road cycle routes by Sustrans, which provide immediate access for cyclists to the local highway network.

5.9 Fringford Road links with the A4095 to the south, which is well-equipped with a shared cycleway/footway along all of its northern section. There are safe, lightly-trafficked routes from here to the town centre, and excellent links to the National

Cycle Route 51 which connects Bicester with Milton Keynes to the north-east and with Oxford to the south. The NR51 also links with the NR50 which provides a connection to Daventry and Leicester to the north.

- 5.10 It may be concluded that the proposed development site is reasonably well-connected to local facilities for pedestrians, and has excellent connections for cyclists.

6 Public Transport

6.1 Bus services

6.1.1 As detailed in Section 5, three pairs of bus stops lie within reasonable walking distance of the proposed development site. These serve a total of seven routes, as set out in **Table 6.1** below.

Table 6.1 Bus services

No.	Route	Operator	Freq	Stop	m
8	Weston Favell - Northampton - Towcester (- Brackley - Bicester)	Stagecoach	5/day	A4421	1000
22	Bicester - Caversfield - Bicester (Circular)	Heyfordian	1/hour	SL	230
23	Bicester - Caversfield - Bicester (Circular)	Heyfordian	1/hour	SL	230
37	Bicester - Hardwick - Finmere	Heyfordian	2/day	BR	750
T1A	Bicester - Banbury	Tex	4/day	BR	750
X5	Cambridge - Bedford – Oxford	Stagecoach	2/hour	A4421	1000
X81	Bicester - Aynho - Banbury	Heyfordian	4/day	BR	750

where SL = Skimmingdish Lane; and BR = Banbury Road

6.1.2 Several key destinations are served by bus from the Fringford Road area, as shown in **Table 6.2**.

Table 6.2 Key destinations by bus

	Town Centre	Bicester North Stn	Bicester Town Stn	Brookside School	Bicester Hospital	Bicester Village
8	✓	✓				
22	✓	✓	✓			
23	✓	✓	✓			
37	✓					
T1A	✓				✓	✓
X5	✓	✓			✓	
X81	✓			✓		

- 6.1.3 The bus stop on Skimmingdish Lane is equipped with a shelter, although no seating or timetables are in evidence. The A4421 bus stops are in the form of unsigned laybys, without shelters, seating or timetables. The southbound bus stop on Banbury Road is furnished only with a pole, whilst its northbound partner is unmarked.
- 6.1.4 It can be seen that the site is reasonably well served by bus, with hourly services to the town centre from a stop only 240m distant. Half-hourly services are available from the A4421 to Oxford, the largest employment centre in Bicester's catchment area.
- 6.1.5 Bus services 8, 22, 23 and X5 all stop at Bicester North railway station, whilst services 22 and 23 stop at Bicester Town railway station, thus providing frequent links to the rail network.
- 6.1.6 The local bus routes are illustrated on **Figure 06**.

6.2 Train services

- 6.2.1 There are two railway stations in Bicester known as Bicester North and Bicester Town. Bicester North railway station is located to the north of the town centre, whilst Bicester Town is situated to the south of the town centre. Each resides on a different line, providing Bicester with a wide range of train services to destinations all over the country. **Table 6.3** lists key destinations by rail from Bicester. Journeys in the return direction are not shown.

Table 6.3 Rail services from Bicester (one direction)

Destination	Frequency	Destination	Frequency
Banbury	43/day, 2/hour	Leamington Spa	29/day, 2/hour
Warwick	29/day, 2/hour	Stratford-on-Avon	6/day
Birmingham	23/day, 1/hour	Market Risborough	37/day, 2/hour
High Wycombe	48/day, 3/hour	London Marylebone	54/day, 4/hour
Oxford	11/day, 1/hour		

- 6.2.2 As detailed in **Section 6.1**, there are frequent bus services to both of Bicester's railway stations, affording quick and easy links to undertake train journeys.
- 6.2.3 It may be seen that Bicester is very well connected by rail, with frequent services to key destinations across the country, including local employment settlements.

7 Accident analysis

- 7.1 In order to establish the recent accident record at and between key junctions, five-year accident data for the area were obtained from OCC. Thus the data ranged from 1st January 2008 to the most recently available, 11th November 2012.
- 7.2 The area covered the A4095 and A4421 as the northern section of the bypass, and 50m into every arm of each of its junctions. Fringford Road, the unnamed road and Skimmingdish Lane were also included.
- 7.3 For this area and time-frame, a total of 30 Personal Injury Accidents (PIA) were recorded, of which one was serious and one fatal.
- 7.4 Four incidents involved pedestrians, but none involved cyclists.
- 7.5 In terms of probable cause, 40% were ascribed to driver error; 30% to driver behavior; 16.67% to driver impairment; and 6.67% to the road environment. All accidents involving pedestrians appeared to be caused by the pedestrian.
- 7.6 There appears to be four separate clusters of accidents on the network under consideration.
- a) Four accidents occurred on Bucknell Road on the approach to the A4095. One, of serious severity, was a hit and run involving a pedestrian; two were ascribed to drink driving, one of which was fatal; and a fourth resulted from loss of control. Therefore, although these accidents occurred in close proximity to each other, their causes appear to differ. None were ascribed to the road layout or conditions, therefore it is deemed that no mitigation is indicated at this location.
- b) The Howes Lane/Shakespeare Drive junction saw a cluster of three accidents in the last five years. All were caused by the driver running a red light. This would suggest that either the signals are not clearly visible, or that drivers do not expect to come across a signalised junction in this location. A site visit confirmed that the lights are visible from both directions, but not prominent due to the generally vertical alignment of surrounding features, natural and manmade. Mitigation might include means to provide a non-vertical background to the signal heads; to increase the junction's prominence by creating a feature, or by reducing the speed limit to 30mph in this location allowing traffic calming measures to be introduced.
- c) A cluster of five accidents occurred at the junction of the B4100 and the unnamed road. Two involved right-turning drivers failing to give way, one from the B4100 and one from the unnamed road. Two drivers lost control on the bend on the B4100, whilst one accident was caused by a non-uk driver driving on the wrong side

of the road. The disparity of causation would suggest that there is no defect in the layout of the junction, nor that the somewhat limited visibility is a recurring problem. No mitigation is indicated in this location.

d) Three accidents have occurred at the junction of Fringford Road with the A4095, although none were of similar causation. One was caused by a driver misleading another with a poor signal, a second occurred when a driver emerging from Fringford Road failed to give way, and the third was caused by a pedestrian crossing against the signal.

- 7.7 Of all the above clusters, only one would appear to have come about through features pertaining to the road itself.
- 7.8 The other PIA's on the network in question were isolated events due to a number of causes, but none indicating problems with the road network.
- 7.9 In terms of mitigation for the above, it would be unreasonable for the developers of up to 200 units, when compared with the total number of units coming forward in Bicester, to cover the cost of mitigation of accidents in locations which serve a wide-ranging area, and through which the development will generate only very low flows in comparison to future volumes of traffic in these locations.
- 7.10 It is concluded that the cost of mitigation at the Howes Lane/Shakespeare Drive junction should be borne in part by all developers on a *pro rata* basis, the funds for which would be extracted from proportional contributions made by each of the developers of future projects in the Bicester area.
- 7.11 The accident data is included as **Appendix C**, whilst a plan showing the locations of the accidents and their severity is included as **Figure 07**.

8 The Development Proposals

- 8.1 The development site of approximately seven hectares includes a dwelling and out-buildings which will be demolished.
- 8.2 The proposed development is for a maximum of 200 dwellings as a mixture of houses and flats, of which 30% will be affordable. The indicative development layout is illustrated on **Figure 08**.
- 8.3 The development will be served by a single access off Fringford Road.
- 8.4 Car and cycle parking provision will be in accordance with the current standards set by OCC, which are detailed in **Appendix D**.
- 8.5 There is also the intention to provide a community facility although its final form is yet to be determined. For the purposes of analysis, however, it has been assumed that this will take the form of a local shop.
- 8.6 The existing Right of Way traversing the site will be retained and incorporated into the pedestrian footways through the site.
- 8.7 All on-site roads will be built to an adoptable standard.
- 8.8 Off-site highway works connected with the development will include the provision of a footway along the western side of Fringford Road between the proposed side access and the existing footway.
- 8.9 It is proposed to provide a pedestrian crossing on Fringford Road situated equidistant between the proposed site access and Skimmingdish Lane, thus affording easy access for pedestrians to the eastern footway on Fringford Road, to Skimmingdish Lane and thence to the bus stops and to local facilities, including schools and nurseries. This measure will also assist existing residents to access the proposed community facility.
- 8.10 The site access, the indicative layout for which is included as **Figure 09**, will take the form of a simple priority junction, the visibility at which will be 4.5 x 120m in both directions, satisfying the standards set out in OCC's Technical Support Data as Section 6 of their Residential Road Design Guide.
- 8.11 A Construction Traffic Management Plan will be produced at the detailed application stage.

9 Assessment Methodology

9.1 A number of key junctions have been identified as potentially sensitive to the effects of the traffic generated by the proposed development. In order to show that they have sufficient capacity to accommodate additional traffic movements, analyses have been carried out on the following junctions as agreed with officers of OCC:

- 01 Bucknell Road / Howes Lane priority junction
- 02 Bucknell Road / A4095 roundabout junction
- 03 A4095 / B4100 roundabout junction
- 04 B4100 / unnamed road priority junction
- 05 Fringford Road / Skimmingdish Lane priority junction
- 06 Fringford Road / unnamed road priority junction
- 07 Fringford Road / A4095 priority junction
- 08 A4095 / A4211 roundabout junction
- 09 A4211 / Skimmingdish Lane priority junction
- 10 Fringford Road / Site Access priority junction

9.2 Fully classified turning movement surveys were undertaken at each of the above junctions and, from the survey results, the network peak hours were identified.

9.3 The observed flows were then growthed to the assessment years of 2016 and 2021 using factors derived from the DfT approved TEMPRO which resulted in the future base flows for the junctions under consideration.

9.4 Bicester is the subject of extensive development scheduled to be built out over the coming eighteen years or more. The following committed and allocated developments have been identified:

Kingsmere	2085 houses + 8.691ha B1 / B2
Upper Heyford	761 houses + 1.6ha B1, 1.8ha B2, 8.6ha B8
Gavray Drive	500 houses
Bicester Ecotown	5000 houses + 3000 B1 / B2 jobs
Caversfield MOD	187 houses
Talisman Road	140 houses
Bicester Business Park	6ha B1
Bicester town centre	1.34ha A3 / A4, 0.22ha D2
Graven Hill	Unknown

9.5 OCC have advised that all anticipated committed and allocated development has been included in a SATURN model for the town, produced by Halcrow. The SATURN model has been constructed for 2007 without additional development (base flows),

- and for 2031 to include all committed and allocated development listed above.
- 9.6 It is not known at this time when each of these developments will come forward, nor details of their phasing. It was originally agreed with officers of OCC that, since no growth factor has been applied to the SATURN model, the 2007 base SATURN flows would be subtracted from the 2031 forecast SATURN flows to derive the total number of trips generated by the committed and allocated development, and sum these with the base flows calculated for 2016 and 2021 to provide base flows plus committed development. This would have provided a highly robust assessment.
- 9.7 However, upon receipt of the SATURN turning movement data, it was discovered that the redistribution of traffic inherent in the SATURN program had resulted in a number of negative turning movements when subtracting the 2007 flows from the 2031 flows. The methodology was therefore reconsidered.
- 9.8 It was considered that a workable calculation could be achieved if the difference in the 2031 and 2007 SATURN flows (the committed and allocated development generated traffic) were redistributed across the network according to the proportions of all turning movements, resulting in all positive numbers. This method, however, resulted in some unrealistically high flows for a number of turning movements. In order to achieve a somewhat representative set of network flows the committed development generated flows were subjected to a *pro rata* calculation from 2031 to the assessment years of 2016 and 2021. These flows have been used in the capacity assessments of the key junctions. It is to be noted that, at this stage, a representation of Bicester traffic in future years can only be estimated, but the approach is considered to be a robust one.
- 9.9 Additionally, the 2031 SATURN model traffic flows, with and without the proposed development flows, were analysed at each junction as a test to confirm the impact of the proposed development under the most onerous of conditions and 10 years beyond the generally accepted analysis year.
- 9.10 The peak hour vehicular trips predicted to be generated by the proposed development were calculated using trip rates supplied by the TRICS database. These were distributed across the network according to a gravity model which was constructed to determine the percentages of drivers travelling to various employment centres within a radius of up to 150km depending upon the size of the settlement. The percentages of drivers travelling to key employment areas in Bicester were also calculated in this way. The gravity model weighting was not adjusted from the standard of two.
- 9.11 Because the observed flows indicated that a small number of drivers were also using

Bucknell Road and Fringford Road during the peak hours, these were factored in as small percentages according to their proportions to the overall traffic flows in and out of Bicester.

- 9.12 The development generated traffic was summed with the base flows for the years of assessment to derive the forecast flows without committed development. Similarly, the committed development flows were summed with the network base flows to derive base flows with committed development, with which the generated flows were summed to yield the forecast flows with committed development.
- 9.13 All turning movement scenarios are included in **Appendix E**, and are considered in more detail in the following sections.

10 Trip Generation and Distribution

- 10.1 In order to predict the numbers of vehicular trips generated by the proposed development during the morning and evening network peaks, the TRICS database was consulted to identify trip rates for both market (private) and affordable (rented) houses, together with those for local shops. Although the final layout may include flats, only trip rates for houses, both market and affordable, have been identified in order to provide a robust assessment; and although the layout may include fewer dwellings at the detailed application stage, calculations have been carried out on the basis of a maximum of 200 residences.
- 10.2 A shop of 100m² has been chosen to represent the community facility because of its relatively high trip generation, thus ensuring robust analysis.
- 10.3 **Table 10.1** sets out the trip rates for each element as derived from the TRICS database, together with the resultant estimated numbers of trips. The full TRICS results are included as **Appendix F**.

Table 10.1 Development trip rates and trips

Use		Trip rates				Trips			
		07:45-08:45		17:00-18:00		07:45-08:45		17:00-18:00	
		Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
Houses (private)	140 units	0.1335	0.365	0.379	0.227	19	51	53	32
Houses (rented)	60 units	0.0865	0.175	0.221	0.159	5	11	13	10
Shop	100m ²	4.491	4.189	5.176	5.225	4	4	5	5
Total						27	62	68	45

- 10.4 The above trip generation figures are highly robust, since the shop is likely to generate fewer trips than calculated from TRICS because it is assumed that most of its patrons will walk, especially those from the proposed development.
- 10.5 The total peak hour development generated trips have been distributed across the network based on the outcome of a gravity model which identified, firstly, the number of trips expected to travel to the town centre and, secondly, those that would travel to various centres of employment outside of Bicester. Routes were assigned for journeys to each of these settlements, based on the following assumptions:
- Gravity model shows 20% of generated trips travelling from the site to the B4100 via the unnamed road where the turning movement percentage is

18%

- The unnamed road is invariably used in preference to the A4095/Bucknell Road junction for travel to the B4100
- Fringford Road and Bucknell Road have been assigned percentages as per the observed network exit and entry proportions, and are assumed to be local trips
- Most trips to the town centre would be via Buckingham Road where a right turn out of Fringford Road can be avoided
- Most trips from the town centre would be via Banbury Road as drivers would wish to avoid the right turn into Fringford Road
- The proportion of vehicles travelling into the town was further divided to represent drivers accessing Bicester's major centres of employment: Bicester town centre, Bicester Village, Bicester Distribution Park, and Launton Road industrial area.

10.6 The distribution to employment centres within Bicester breaks down as shown in **Table 10.2**:

Table 10.2 Development traffic distribution within Bicester by destination

Destination	% of Bicester traffic	% of overall traffic
Town Centre	13%	5.70%
Bicester village	14%	6.14%
Launton Road employment area	53%	23.23%
Bicester Distribution Park	20%	8.77%
	100%	43.83%

10.7 The gravity model resulted in the following overall distribution, taking into account the observed flows onto Bucknell Road and Fringford Road. **Table 10.3** lists the distributions so derived.

Table 10.3 Development traffic distribution by route

Route	Arrivals	Departures
A4421 N	10.36%	10.36%
A4421 S	8.33%	8.33%
B4100	18.52%	18.52%
Bicester Road	4.16%	4.16%
Howes Lane	19.01%	19.01%
Buckingham Road	0.00%	11.01%
Banbury Road	11.01%	0.00%
Launton Road	21.60%	21.60%
Bucknell Road	4.00%	4.00%
Fringford Road	3.00%	3.00%
	100.00%	100.00%

- 10.8 Because the traffic flows associated with the shop are negligible, the above distribution was applied to the total development generated traffic.
- 10.9 The trip generation is shown diagrammatically in **Appendix E**.

11 Observed, Base and Forecast Traffic Flows

- 11.1 A turning movement survey was undertaken on Wednesday, 13th March 2013 at the key junctions in the study area, as agreed in the Scope. The results yielded the observed traffic flows upon which further calculations were based, and identified the peak hours as 07:45-08:45 and 17:00-18:00. The survey data are contained in **Appendix G**, whilst the traffic flow diagrams for the observed flows are shown in **Appendix E**.
- 11.2 Base traffic flows were calculated using the TEMPRO software supplied by the Department for Transport, where growth factors for the years under consideration are applied to the observed traffic flows to represent the increase in background traffic over time.
- 11.3 The resulting growth factors are shown in **Table 11.1**, where 2016 is the proposed year of opening. Figures are also given for five years thence to provide a robust assessment.

Table 11.1 Growth factors

Year	am peak	pm peak
2013-2016	1.0337	1.0349
2013-2021	1.1083	1.1308

- 11.4 In order to derive an approximation of additional traffic generated from new development in the future, committed development for the area was identified as detailed in **Section 9** to yield the scenario 'base flows plus committed development'.
- 11.5 The base traffic flows for the years under consideration were summed with the total peak hour generated trips to produce the forecast flows without committed development for 2016 and 2021, and the peak hour generated flows were also summed with the base flows plus committed development to produce the forecast flows with committed development. These scenarios are all illustrated diagrammatically in **Appendix E**.

12 Junction Analyses

- 12.1 'Junctions 8' published by TRL has been used to analyse the key junctions under consideration, of which none are signalised.
- 12.2 Within this software, PICADY analyses the individual capacity of each arm of priority and roundabout junctions, and identifies the Ratio of Flow to Capacity (RFC) where a RFC of 0.85 is generally considered to be the maximum at which the junction will operate satisfactorily whilst retaining a small amount of spare capacity to accommodate daily fluctuations and some future growth. An RFC of 0.85 or under on all arms is therefore generally accepted as indicating that the junction requires no mitigation in order to continue to operate within capacity.
- 12.3 'Q' represents the maximum queue that will occur during the time period modelled, and delay is represented in seconds per vehicle. LOS is the Level of Service, a rating ranging from A to F, as calculated by Junctions 8.
- 12.4 The scenarios which have been modelled for each junction for both the morning and evening peaks are:
- Observed flows 2013
 - Base flows 2016
 - Base flows 2021
 - Base + committed development flows 2016
 - Base + committed development flows 2021
 - Forecast flows without committed development 2016
 - Forecast flows with committed development 2021
 - SATURN flows without development
 - SATURN flows with development

12.5 Junction 01 – Bucknell Road / Howes Lane

- 12.5.1 The summary results of this analysis are shown in **Table 12.1**, whilst full results are contained as **Appendix H**.

Table 12.1 Junction 01 – Howes Lane/Bucknell Road: PICADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	Howes Lane	L	0.94	10.4	0.49	B	30.19	151.26	1.06	F
		Howes Lane	R	0.11	18.61	0.1	C	4.93	311.72	1.05	F
		Bucknell Road	R	31.89	180.67	1.07	F	3.35	28.06	0.78	D
b	Base 2016	Howes Lane	L	1.01	10.88	0.51	B	42.49	202.29	1.11	F
		Howes Lane	R	0.12	20.51	0.11	C	5.82	357.24	1.09	F
		Bucknell Road	R	42.31	233.61	1.12	F	3.94	32.11	0.81	D
c	Base 2021	Howes Lane	L	1.2	12.11	0.55	B	83.82	472.23	1.25	F
		Howes Lane	R	0.17	26.56	0.15	D	9.25	579.86	1.18	F
		Bucknell Road	R	68.11	421.62	1.2	F	6.71	51.07	0.89	F
d	Base + Cmtd 2016	Howes Lane	L	1.41	13.49	0.59	B	100.21	563.52	1.29	F
		Howes Lane	R	0.23	35.77	0.19	E	10.62	666.81	1.2	F
		Bucknell Road	R	95.31	596.33	1.28	F	7.98	59.28	0.92	F
e	Base + Cmtd 2021	Howes Lane	L	51	481.67	1.66	F	237.35	1338.5	1.61	F
		Howes Lane	R	4.32	810.01	1.37	F	22.94	1426.9	1.55	F
		Bucknell Road	R	188.29	1134	1.47	F	29.49	172.48	1.07	F
f	Forecast - Cmtd 2016	Howes Lane	L	1.05	11.1	0.52	B	49.44	240.92	1.14	F
		Howes Lane	R	0.13	21.61	0.12	C	6.24	384.6	1.12	F
		Bucknell Road	R	48.85	280.54	1.14	F	4.36	34.95	0.83	D
g	Forecast - Cmtd 2021	Howes Lane	L	1.26	12.46	0.56	B	95.02	535.49	1.27	F
		Howes Lane	R	0.18	28.85	0.16	D	10.08	640.6	1.19	F
		Bucknell Road	R	76.38	481.28	1.23	F	7.67	57.22	0.91	F
h	Forecast + Cmtd 2016	Howes Lane	L	1.48	14.01	0.6	B	112.76	626.39	1.31	F
		Howes Lane	R	0.26	40.33	0.21	E	11.47	729.08	1.23	F
		Bucknell Road	R	107.19	661.77	1.3	F	9.2	66.88	0.93	F
i	Forecast + Cmtd 2021	Howes Lane	L	125.46	2296.9	25.44	F	253.98	1437.1	1.65	F
		Howes Lane	R	8.78	2718.9	22.78	F	24.11	1526.5	1.59	F
		Bucknell Road	R	200.97	1205.2	1.5	F	33.71	192.52	1.08	F
j	SATURN 2031	Howes Lane	L	390.26	1E+10	1E+10	F	443.47	1E+10	1E+10	F
		Howes Lane	R	50.68	1E+10	1E+10	F	50.1	1E+10	1E+10	F
		Bucknell Road	R	243.95	1402.9	1.55	F	258.93	1479.9	1.58	F
k	SATURN 2031 + Devt	Howes Lane	L	443.48	1E+10	1E+10	F	458.59	1E+10	1E+10	F
		Howes Lane	R	50.1	1E+10	1E+10	F	50.83	1E+10	1E+10	F
		Bucknell Road	R	258.94	1480	1.58	F	269	1535.1	1.59	F

12.5.2 The table above indicates that the Bucknell Road / Howes Lane junction is not operating satisfactorily at present and will not do so in the future, with or without development-generated traffic. In particular, traffic has difficulty at present turning right from Bucknell Road into Howes Lane in the morning peak hour and out of Howes Lane during the evening peak, causing significant queues to develop.

12.5.3 This problem is exacerbated with the addition of the committed development, although the addition of the development traffic at this

junction results in very little change.

- 12.5.4 It is to be noted that as the junction becomes further over capacity the accuracy of the model becomes less reliable. The model breaks down for the 2031 analyses based on 2031 SATURN data.

12.6 Junction 02 – A4095 / Bucknell Road

- 12.6.1 The summary results of this analysis are shown in **Table 12.2**, whilst full results are contained in **Appendix H**.

Table 12.2 Junction 02 – A4095 / Bucknell Road: ARCADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	ID	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	Bucknell Road N	1	0.04	0.98	0.03	A	0.03	1.09	0.03	A
		A495	2	0.93	4.27	0.48	A	0.63	3.57	0.39	A
		Bucknell Road S	3	0.31	2.2	0.24	A	0.66	2.76	0.4	A
b	Base 2016	Bucknell Road N	1	0.04	0.98	0.04	A	0.03	1.1	0.03	A
		A495	2	1	4.41	0.5	A	0.67	3.66	0.4	A
		Bucknell Road S	3	0.33	2.23	0.25	A	0.7	2.83	0.41	A
c	Base 2021	Bucknell Road N	1	0.04	1	0.04	A	0.04	1.14	0.04	A
		A495	2	1.16	4.79	0.54	A	0.78	3.91	0.44	A
		Bucknell Road S	3	0.36	2.29	0.27	A	0.82	3.03	0.45	A
d	Base + Cmtd 2016	Bucknell Road N	1	0.04	1.01	0.04	A	0.04	1.15	0.04	A
		A495	2	1.31	5.13	0.57	A	0.82	3.99	0.45	A
		Bucknell Road S	3	0.39	2.34	0.28	A	0.86	3.1	0.46	A
e	Base + Cmtd 2021	Bucknell Road N	1	0.05	1.04	0.05	A	0.05	1.22	0.04	A
		A495	2	1.8	6.25	0.64	A	1.06	4.56	0.52	A
		Bucknell Road S	3	0.47	2.48	0.32	A	1.12	3.55	0.53	A
f	Forecast - Cmtd 2016	Bucknell Road N	1	0.04	0.99	0.04	A	0.03	1.11	0.03	A
		A495	2	1.04	4.5	0.51	A	0.69	3.7	0.41	A
		Bucknell Road S	3	0.33	2.24	0.25	A	0.72	2.86	0.42	A
g	Forecast - Cmtd 2021	Bucknell Road N	1	0.04	1	0.04	A	0.04	1.15	0.04	A
		A495	2	1.21	4.89	0.55	A	0.81	3.97	0.45	A
		Bucknell Road S	3	0.37	2.3	0.27	A	0.84	3.07	0.46	A
h	Forecast + Cmtd 2016	Bucknell Road N	1	0.04	1.01	0.04	A	0.04	1.16	0.04	A
		A495	2	1.37	5.26	0.58	A	0.84	4.04	0.46	A
		Bucknell Road S	3	0.4	2.35	0.28	A	0.88	3.14	0.47	A
i	Forecast + Cmtd 2021	Bucknell Road N	1	0.05	1.04	0.05	A	0.05	1.23	0.05	A
		A495	2	1.87	6.42	0.65	A	1.09	4.63	0.52	A
		Bucknell Road S	3	0.47	2.49	0.32	A	1.15	3.61	0.54	A
j	SATURN 2031	Bucknell Road N	1	0.15	1.15	0.13	A	0.05	1.23	0.05	A
		A495	2	1.38	6.26	0.58	A	1.09	4.63	0.52	A
		Bucknell Road S	3	0.68	2.77	0.41	A	1.15	3.61	0.54	A
k	SATURN + Devt 2031	Bucknell Road N	1	0.14	1.18	0.12	A	0.14	1.19	0.13	A
		A495	2	1.07	5.29	0.52	A	1.1	5.38	0.53	A
		Bucknell Road S	3	0.79	2.95	0.44	A	0.82	2.99	0.45	A

- 12.6.2 The table above indicates that this roundabout junction will operate satisfactorily during both peak hour periods under all scenarios, with no significant queueing or noticeable delay, even with the inclusion of the committed development.

12.7 Junction 03 – A4095 / B4100 / Banbury Road

12.7.1 The summary results of this analysis are shown in **Table 12.3**, whilst full results are contained in **Appendix H**.

Table 12.3 Junction 3 – A4095 / B4100 / Banbury Road: ARCADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	ID	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	B4100 N	1	1.65	6.77	0.63	A	0.79	5.27	0.44	A
		A4095 E	2	1.12	4.33	0.53	A	1.47	4.82	0.6	A
		Banbury Road	3	0.32	3.9	0.24	A	0.79	5.83	0.44	A
		A4095 W	4	0.67	3.92	0.4	A	1.36	6.39	0.58	A
b	Base 2016	B4100 N	1	1.86	7.37	0.65	A	0.87	5.6	0.47	A
		A4095 E	2	1.22	4.56	0.55	A	1.61	5.13	0.62	A
		Banbury Road	3	0.34	4.02	0.25	A	0.87	6.23	0.47	A
		A4095 W	4	0.71	4.06	0.42	A	1.53	6.94	0.61	A
c	Base 2021	B4100 N	1	2.47	9.19	0.72	A	1.15	6.78	0.54	A
		A4095 E	2	1.49	5.19	0.6	A	2.16	6.29	0.69	A
		Banbury Road	3	0.39	4.33	0.28	A	1.18	7.76	0.54	A
		A4095 W	4	0.83	4.41	0.45	A	2.17	9.09	0.69	A
d	Base + Cmtd 2016	B4100 N	1	3.26	11.56	0.77	B	1.24	7.16	0.56	A
		A4095 E	2	1.76	5.84	0.64	A	2.35	6.71	0.7	A
		Banbury Road	3	0.44	4.63	0.31	A	1.29	8.27	0.57	A
		A4095 W	4	0.94	4.74	0.49	A	2.42	9.92	0.71	A
e	Base + Cmtd 2021	B4100 N	1	8.8	28.8	0.91	D	2.23	11.41	0.7	B
		A4095 E	2	2.84	8.41	0.74	A	4.46	11.34	0.82	B
		Banbury Road	3	0.6	5.55	0.38	A	2.58	14.73	0.73	B
		A4095 W	4	1.3	5.82	0.57	A	6.11	22.82	0.87	C
f	Forecast - Cmtd 2016	B4100 N	1	1.99	7.74	0.67	A	0.93	5.87	0.48	A
		A4095 E	2	1.24	4.63	0.56	A	1.63	5.2	0.62	A
		Banbury Road	3	0.35	4.08	0.26	A	0.91	6.42	0.48	A
		A4095 W	4	0.73	4.1	0.42	A	1.63	7.27	0.62	A
g	Forecast - Cmtd 2021	B4100 N	1	2.67	9.79	0.73	A	1.24	7.17	0.56	A
		A4095 E	2	1.51	5.28	0.6	A	2.18	6.38	0.69	A
		Banbury Road	3	0.41	4.41	0.29	A	1.25	8.04	0.56	A
		A4095 W	4	0.85	4.46	0.46	A	2.36	9.69	0.71	A
h	Forecast + Cmtd 2016	B4100 N	1	3.56	12.48	0.79	B	1.34	7.61	0.58	A
		A4095 E	2	1.8	5.95	0.64	A	2.39	6.82	0.71	A
		Banbury Road	3	0.46	4.71	0.31	A	1.36	8.6	0.58	A
		A4095 W	4	0.96	4.79	0.49	A				
i	Forecast + Cmtd 2021	B4100 N	1	10.49	33.92	0.93	D	2.49	12.59	0.72	B
		A4095 E	2	2.91	8.63	0.75	A	4.57	11.64	0.83	B
		Banbury Road	3	0.62	5.67	0.38	A	2.79	15.78	0.74	C
		A4095 W	4	1.33	5.9	0.57	A	7.19	26.51	0.89	D
j	SATURN 2031	B4100 N	1	1.66	6.78	0.63	D	0.72	4.3	0.42	A
		A4095 E	2	1.13	4.34	0.53	A	3.88	10.28	0.8	B
		Banbury Road	3	0.32	3.9	0.24	A	0.62	6.07	0.39	A
		A4095 W	4	0.67	3.92	0.4	A	1.06	6.09	0.52	A
k	SATURN + Devt 2031	B4100 N	1	1.5	6.53	0.6	D	0.76	4.45	0.43	A
		A4095 E	2	1.72	5.32	0.63	A	3.96	10.51	0.8	B
		Banbury Road	3	0.39	4.75	0.28	A	0.66	6.23	0.4	A
		A4095 W	4	1.33	6.2	0.57	A	1.13	6.34	0.53	A

- 12.7.2 The results table shows that this operates well under current and future base flow conditions. The addition of the development traffic produces no noticeable deterioration in the operation of the junction, but the inclusion of the committed development, regardless of whether or not the development traffic is included, causes the junction to exceed capacity in the 2021 pm peak. However, with the redistribution that the SATURN model produces this junction is predicted to operate well in 2031, with or without the development traffic.
- 12.7.3 The above analysis illustrates that the development proposals have no negative effect on the satisfactory operation of this junction.

12.8 Junction 04 – B4100 / unnamed road

- 12.8.1 The summary results of this analysis are shown in **Table 12.4**, whilst full results are contained in **Appendix H**.

Table 12.4 Junction 04 –B4100 / unnamed road: PICADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	Unnamed road	L	0.18	8.53	0.16	A	0.06	6.24	0.05	A
		Unnamed road	R	0.21	12.7	0.17	B	0.09	10.04	0.08	B
		B4100	R	0	0	0	A	0.01	4.1	0.01	A
b	Base 2016	Unnamed road	L	0.19	8.75	0.16	A	0.06	6.31	0.05	A
		Unnamed road	R	0.22	13.23	0.18	B	0.1	10.31	0.09	B
		B4100	R	0	0	0	A	0.01	4.06	0.01	A
c	Base 2021	Unnamed road	L	0.22	9.31	0.18	A	0.07	6.52	0.06	A
		Unnamed road	R	0.26	14.56	0.21	B	0.11	11.12	0.1	B
		B4100	R	0	0	0	A	0.01	3.97	0.01	A
d	Base + Cmtd 2016	Unnamed road	L	0.25	9.81	0.2	A	0.07	6.58	0.06	A
		Unnamed road	R	0.3	15.83	0.23	C	0.12	11.36	0.11	B
		B4100	R	0	0	0	A	0.01	3.94	0.01	A
e	Base + Cmtd 2021	Unnamed road	L	0.33	11.49	0.25	B	0.08	6.99	0.08	A
		Unnamed road	R	0.44	20.37	0.31	C	0.16	13.14	0.14	B
		B4100	R	0	0	0	A	0.01	3.8	0.01	A
f	Forecast - Cmtd 2016	Unnamed road	L	0.25	9.34	0.2	A	0.08	6.5	0.08	A
		Unnamed road	R	0.29	14.02	0.23	B	0.13	10.7	0.12	B
		B4100	R	0	0	0	A	0.01	4.07	0.01	A
g	Forecast - Cmtd 2021	Unnamed road	L	0.28	9.98	0.22	A	0.09	6.72	0.08	A
		Unnamed road	R	0.34	15.52	0.25	C	0.15	11.56	0.13	B
		B4100	R	0	0	0	A	0.01	3.97	0.01	A
h	Forecast + Cmtd 2016	Unnamed road	L	0.31	10.58	0.24	B	0.09	6.77	0.08	A
		Unnamed road	R	0.39	17	0.28	C	0.15	11.78	0.13	B
		B4100	R	0	0	0	A	0.01	3.95	0.01	A
i	Forecast + Cmtd 2021	Unnamed road	L	0.42	12.74	0.3	B	0.11	7.22	0.1	A
		Unnamed road	R	0.56	22.49	0.36	C	0.2	13.73	0.17	B
		B4100	R	0	0	0	A	0.01	3.81	0.01	A
j	SATURN 2031	Unnamed road	L	0	0	0	A	0.52	8.3	0.34	A
		Unnamed road	R	0.56	18.06	0.36	C	0.18	10.79	0.15	B
		B4100	R	0	0	0	A	0.56	8.46	0.35	A
k	SATURN + Devt 2031	Unnamed road	L	0.04	8.73	0.04	A	0.53	8.55	0.35	A
		Unnamed road	R	0.68	19.72	0.41	C	0.33	12.45	0.25	B
		B4100	R	0	0	0	A	0.62	8.5	0.37	A

12.8.2 **Table 12.4** illustrates that this junction operates well, with little queueing or delay, and will continue to do so in future years, even with the inclusion of the committed development.

11.9 Junction 05 – Fringford Road / Skimmingdish Lane

11.9.1 The summary results of this analysis are shown in **Table 12.5**, whilst full results are contained as in **Appendix H**.

Table 12.5 Junction 05 –Fringford Road / Skimmingdish Lane: PICADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	Skimmingdish Ln	L	0.08	6.12	0.08	A	0.04	6.18	0.04	A
		Skimmingdish Ln	R	0.06	8.81	0.06	A	0.11	8.18	0.1	A
		Fringford Road	R	0.04	5.93	0.03	A	0.12	5.32	0.08	A
b	Base 2016	Skimmingdish Ln	L	0.09	6.17	0.08	A	0.04	6.21	0.04	A
		Skimmingdish Ln	R	0.06	8.9	0.06	A	0.12	8.27	0.1	A
		Fringford Road	R	0.04	5.95	0.03	A	0.12	5.31	0.08	A
c	Base 2021	Skimmingdish Ln	L	0.1	6.26	0.09	A	0.05	6.29	0.04	A
		Skimmingdish Ln	R	0.07	9.06	0.06	A	0.13	8.51	0.12	A
		Fringford Road	R	0.05	5.99	0.04	A	0.14	5.3	0.09	A
d	Base + Cmtd 2016	Skimmingdish Ln	L	0.1	6.37	0.09	A	0.05	6.3	0.04	A
		Skimmingdish Ln	R	0.08	9.22	0.07	A	0.13	8.56	0.12	A
		Fringford Road	R	0.05	6.01	0.04	A	0.14	5.29	0.09	A
e	Base + Cmtd 2021	Skimmingdish Ln	L	0.12	6.59	0.11	A	0.05	6.44	0.05	A
		Skimmingdish Ln	R	0.09	9.59	0.08	A	0.16	9.03	0.14	A
		Fringford Road	R	0.06	6.07	0.04	A	0.18	5.29	0.11	A
f	Forecast - Cmtd 2016	Skimmingdish Ln	L	0.09	6.59	0.09	A	0.04	6.69	0.04	A
		Skimmingdish Ln	R	0.1	9.39	0.09	A	0.23	9.8	0.19	A
		Fringford Road	R	0.05	6.02	0.03	A	0.14	5.23	0.08	A
g	Forecast - Cmtd 2021	Skimmingdish Ln	L	0.1	6.7	0.09	A	0.05	6.79	0.05	A
		Skimmingdish Ln	R	0.11	9.6	0.1	A	0.25	10.17	0.2	B
		Fringford Road	R	0.05	6.05	0.04	A	0.16	5.23	0.09	A
h	Forecast + Cmtd 2016	Skimmingdish Ln	L	0.11	6.81	0.1	A	0.05	6.81	0.05	A
		Skimmingdish Ln	R	0.12	9.79	0.11	A	0.26	10.25	0.21	B
		Fringford Road	R	0.05	6.07	0.04	A	0.16	5.23	0.1	A
i	Forecast + Cmtd 2021	Skimmingdish Ln	L	0.13	7.06	0.11	A	0.06	6.98	0.06	A
		Skimmingdish Ln	R	0.13	10.24	0.12	B	0.3	10.9	0.23	B
		Fringford Road	R	0.06	6.14	0.04	A	0.2	5.22	0.11	A
j	SATURN 2031	Skimmingdish Ln	L	0.24	6.47	0.19	A	0.52	8.3	0.34	A
		Skimmingdish Ln	R	0.07	8.72	0.06	A	0.18	10.79	0.15	B
		Fringford Road	R	0.24	6.47	0.18	A	0.56	8.46	0.35	A
k	SATURN + Devt 2031	Skimmingdish Ln	L	0.25	6.81	0.2	A	0.53	8.55	0.35	A
		Skimmingdish Ln	R	0.11	9.25	0.1	A	0.33	12.45	0.25	B
		Fringford Road	R	0.26	6.59	0.19	A	0.62	8.5	0.37	A

12.9.2 Junction 05 operates, and will continue to operate, very well, with no queueing and virtually no delay under any of the analysis scenarios.

12.10 Junction 06 – Fringford Road / unnamed road

12.10.1 The summary results of this analysis are shown in **Table 12.6**, whilst full results are contained as in **Appendix H**.

Table 12.6 Junction 06 –Fringford Road / Unnamed road: PICADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	Unnamed road Fringford Road	LR R	0.02 0.39	6.4 6.36	0.02 0.24	A A	0.1 0.15	6.69 6.21	0.09 0.11	A A
b	Base 2016	Unnamed road Fringford Road	LR R	0.02 0.42	6.42 6.41	0.02 0.25	A A	0.1 0.15	6.73 6.23	0.1 0.12	A A
c	Base 2021	Unnamed road Fringford Road	LR R	0.03 0.47	6.43 6.53	0.02 0.27	A A	0.11 0.18	6.84 6.31	0.1 0.13	A A
d	Base + Cmtd 2016	Unnamed road Fringford Road	LR R	0.03 0.52	6.43 6.64	0.03 0.29	A A	0.12 0.18	6.88 6.33	0.11 0.13	A A
e	Base + Cmtd 2021	Unnamed road Fringford Road	LR R	0.03 0.64	6.68 6.93	0.03 0.33	A A	0.14 0.22	7.07 6.47	0.12 0.16	A A
f	Forecast - Cmtd 2016	Unnamed road Fringford Road	LR R	0.04 0.57	6.39 6.81	0.03 0.31	A A	0.14 0.22	7 6.44	0.12 0.16	A A
g	Forecast - Cmtd 2021	Unnamed road Fringford Road	LR R	0.04 0.64	6.42 6.98	0.03 0.33	A A	0.15 0.25	7.13 6.54	0.13 0.17	A A
h	Forecast + Cmtd 2016	Unnamed road Fringford Road	LR R	0.04 0.7	6.43 7.11	0.04 0.35	A A	0.15 0.26	7.16 6.57	0.13 0.18	A A
i	Forecast + Cmtd 2021	Unnamed road Fringford Road	LR R	0.04 0.86	6.68 7.5	0.04 0.4	A A	0.18 0.3	7.38 6.73	0.15 0.2	A A
j	SATURN 2031	Unnamed road Fringford Road	LR R	1.01 0.28	15.43 6.63	0.51 0.2	C A	4.24 0.55	42.15 7.67	0.83 0.32	E A
k	SATURN + Devt 2031	Unnamed road Fringford Road	LR R	1.13 0.4	16.73 6.96	0.53 0.25	C A	5.87 0.68	56.74 8.13	0.88 0.37	F A

12.10.2 The table above shows that this junction operates well, and will continue to do so, with no queueing or noticeable delay under the current distribution. However, with the SATURN redistribution the delay increases in the pm peak with or without the development traffic. The RFC slightly exceeds 0.85 once the development traffic is added to the SATURN model flows, although it is to be noted that this increase is minimal and no more than could be expected from day-to-day fluctuation. The queuing here increases by no more than two vehicles and does not impact on the main road.

12.11 Junction 07 – A4095 / Fringford Road

12.11.1 **Table 12.7** shows the summary results of the analyses, whilst the full printout is contained within **Appendix H**.

Table 12.7 Junction 07 –A4095 / Fringford Road: PICADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	A4095	L	0.3	7.86	0.23	A	0.08	7.14	0.07	A
		A4095	R	0.16	12.45	0.14	B	0.15	12.12	0.13	B
		Fringford Road	R	0	0	0	A	0	0	0	A
b	Base 2016	A4095	L	0.32	8.13	0.24	A	0.08	7.3	0.07	A
		A4095	R	0.17	13.11	0.15	B	0.17	12.9	0.15	B
		Fringford Road	R	0	0	0	A	0	0	0	A
c	Base 2021	A4095	L	0.38	8.85	0.27	A	0.1	7.82	0.09	A
		A4095	R	0.21	14.95	0.18	B	0.22	15.66	0.18	C
		Fringford Road	R	0	0	0	A	0	0	0	A
d	Base + Cmtd 2016	A4095	L	0.42	9.5	0.3	A	0.1	7.99	0.09	A
		A4095	R	0.25	16.8	0.2	C	0.25	16.63	0.2	C
		Fringford Road	R	0	0	0	A	0	0	0	A
e	Base + Cmtd 2021	A4095	L	0.59	11.78	0.37	B	0.13	9.23	0.11	A
		A4095	R	0.4	24.31	0.29	C	0.44	26.94	0.31	D
		Fringford Road	R	0	0	0	A	0	0	0	A
f	Forecast - Cmtd 2016	A4095	L	0.42	8.72	0.3	A	0.13	7.36	0.11	A
		A4095	R	0.17	13.32	0.15	B	0.18	13.69	0.15	B
		Fringford Road	R	0	0	0	A	0	0	0	A
g	Forecast - Cmtd 2021	A4095	L	0.49	9.54	0.33	A	0.15	7.94	0.13	A
		A4095	R	0.22	15.2	0.18	C	0.24	16.64	0.19	C
		Fringford Road	R	0	0	0	A	0	0	0	A
h	Forecast + Cmtd 2016	A4095	L	0.55	10.33	0.36	B	0.15	8.13	0.13	A
		A4095	R	0.25	17.1	0.2	C	0.26	17.69	0.21	C
		Fringford Road	R	0	0	0	A	0	0	0	A
i	Forecast + Cmtd 2021	A4095	L	0.78	13.13	0.44	B	0.19	9.53	0.16	A
		A4095	R	0.41	24.92	0.3	C	0.48	29	0.33	D
		Fringford Road	R	0	0	0	A	0	0	0	A
j	SATURN 2031	A4095	L	0.61	9.78	0.38	A	0.68	10.4	0.41	B
		A4095	R	0.13	15.23	0.12	C	0.54	17.37	0.36	C
		Fringford Road	R	0	0	0	A	0	0	0	A
k	SATURN + Devt 2031	A4095	L	0.76	10.73	0.44	B	0.8	11.15	0.45	B
		A4095	R	0.14	15.46	0.12	C	0.56	17.9	0.36	C
		Fringford Road	R	0	0	0	A	0	0	0	A

12.11.2 The above table illustrates that the addition of the development generated traffic to the network traffic, with or without the inclusion of the committed development, results in no noticeable deterioration of the operation of this junction.

12.12 Junction 08 – A4421 / Skimmingdish Lane / Buckingham Road / A4095

12.12.1 The summary results of this analysis are shown in **Table 12.8**, whilst full results are contained in **Appendix H**.

Table 12.8 Junction 08 –B4100 / Skimmingdish Lane / Buckingham Rd / A4095: PICADY summary results

		Arm		Q	07:45-08:45			Q	17:00-18:00		
		Name	ID		Del	RFC	L		Del	RFC	L
a	Observed 2013	A4421	1	1.09	4.91	0.52	A	0.5	3.01	0.33	A
		Skimmingdish Ln	2	0.51	2.94	0.34	A	1.93	5.73	0.66	A
		Buckingham Rd	3	0.4	2.84	0.29	A	0.52	4.02	0.34	A
		A4095 W	4	1.4	4.82	0.58	A	0.88	4.1	0.47	A
b	Base 2016	A4421		1.2	5.27	0.55	A	0.53	3.1	0.35	A
		Skimmingdish Ln		0.54	3.02	0.35	A	2.18	6.26	0.69	A
		Buckingham Rd		0.43	2.92	0.3	A	0.57	4.25	0.36	A
		A4095 W		1.54	5.14	0.61	A	0.96	4.32	0.49	A
c	Base 2021	A4421		1.54	6.29	0.61	A	0.63	3.39	0.39	A
		Skimmingdish Ln		0.61	3.21	0.38	A	3.19	8.45	0.76	A
		Buckingham Rd		0.49	3.12	0.33	A	0.74	5.08	0.43	A
		A4095 W		1.95	6.07	0.66	A	1.24	5.08	0.55	A
d	Base + Comtd 2016	A4421		1.92	7.47	0.66	A	0.66	3.47	0.4	A
		Skimmingdish Ln		0.68	3.39	0.41	A	3.58	9.32	0.79	A
		Buckingham Rd		0.55	3.31	0.36	A	0.8	5.36	0.45	A
		A4095 W		2.41	7.14	0.71	A	1.33	5.34	0.57	A
e	Base + Comtd 2021	A4421		3.91	13.76	0.8	B	0.9	4.15	0.48	A
		Skimmingdish Ln		0.88	3.91	0.47	A	10.52	24.97	0.93	C
		Buckingham Rd		0.73	3.87	0.42	A	1.38	8.18	0.58	A
		A4095 W		4.62	12.34	0.83	B	2.2	7.8	0.69	A
f	Forecast – Cmtd 2016	A4421		0.54	3.14	0.35	A	0.54	3.14	0.35	A
		Skimmingdish Ln		2.34	6.6	0.7	A	2.34	6.6	0.7	A
		Buckingham Rd		0.58	4.35	0.37	A	0.58	4.35	0.37	A
		A4095 W		1.04	4.55	0.51	A	1.04	4.55	0.51	A
g	Forecast - Cmtd 2021	A4421	1	1.6	6.55	0.62	A	0.64	3.44	0.39	A
		Skimmingdish Ln	2	0.63	3.26	0.39	A	3.5	9.12	0.78	A
		Buckingham Rd	3	0.49	3.14	0.33	A	0.76	5.23	0.43	A
		A4095 W	4	2.14	6.51	0.68	A	1.35	5.41	0.58	A
h	Forecast + Cmtd 2016	A4421		2.01	7.84	0.67	A	0.67	3.53	0.4	A
		Skimmingdish Ln		0.7	3.44	0.41	A	3.94	10.09	0.8	B
		Buckingham Rd		0.55	3.33	0.36	A	0.82	5.52	0.45	A
		A4095 W		2.67	7.73	0.73	A	1.45	5.7	0.59	A
i	Forecast + Cmtd 2021	Skimmingdish Ln	1	4.23	14.94	0.82	B	0.92	4.23	0.48	A
		Buckingham Rd	2	0.91	3.98	0.48	A	12.83	30.01	0.94	D
		A4095 W	3	0.73	3.9	0.42	A	1.44	8.51	0.59	A
		A4421	4	5.39	14.17	0.85	B	2.46	8.55	0.71	A
j	SATURN 2031	Skimmingdish Ln	1	1.8	7.51	0.65	A	1.49	4.97	0.6	A
		Buckingham Rd	2	0.68	3.65	0.4	A	9.7	24.66	0.92	C
		A4095 W	3	0.58	3.57	0.37	A	6.1	26.22	0.87	D
		A4421	4	3.54	9.38	0.78	A	0.4	3.11	0.29	A
k	SATURN + Devt 2031	Skimmingdish Ln	1	1.89	7.87	0.66	A	1.53	5.08	0.61	A
		Buckingham Rd	2	0.7	3.71	0.41	A	11.85	29.69	0.94	D
		A4095 W	3	0.58	3.59	0.37	A	6.82	29.43	0.89	D
		A4421	4	4.02	10.46	0.81	B	0.43	3.22	0.3	A

- 12.12.2 This junction operates satisfactorily under all scenarios in the morning peak hour. Bucking Road begins to slightly exceed capacity on its Buckingham Road arm in 2021 when the committed development is taken into account, although the proposed development traffic has no effect as can be seen from Scenario g. However, the RFC does not exceed 1, and queues are calculated to be no longer than 13 vehicles under the most onerous of conditions.
- 12.12.3 It is concluded, therefore, that although this junction experiences some strain in future years, it still continues to operate within tolerable conditions.

12.13 Junction 09 B4100 / Skimmingdish Lane

- 12.13.1 This junction has been analysed using PICADY, the results of which are included as **Appendix H**, and summarised below in **Table 12.9**.

Table 12.9 Junction 09 – B4100 / Skimmingdish Lane: PICADY Results Summary

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
a	Observed 2013	Skimmingdish Ln	L	0.03	7.63	0.03	A	0.03	8.5	0.03	A
		Skimmingdish Ln	R	0.13	13.32	0.12	B	0.1	14.68	0.09	B
		B4100	R	0.04	3.86	0.03	A	0.01	4.44	0.01	A
b	Base 2016	Skimmingdish Ln	L	0.03	7.74	0.03	A	0.03	8.69	0.03	A
		Skimmingdish Ln	R	0.14	13.82	0.13	B	0.11	15.37	0.1	C
		B4100	R	0.04	3.83	0.03	A	0.01	4.41	0.01	A
c	Base 2021	Skimmingdish Ln	L	0.03	7.99	0.03	A	0.03	9.19	0.03	A
		Skimmingdish Ln	R	0.17	15.23	0.15	C	0.14	17.82	0.12	C
		B4100	R	0.06	3.77	0.04	A	0.02	4.35	0.02	A
d	Base + Cmtd 2016	Skimmingdish Ln	L	0.03	8.2	0.03	A	0.03	9.33	0.03	A
		Skimmingdish Ln	R	0.2	16.61	0.17	C	0.15	18.73	0.13	C
		B4100	R	0.07	3.73	0.05	A	0.02	4.33	0.02	A
e	Base + Cmtd 2021	Skimmingdish Ln	L	0.04	8.84	0.04	A	0.04	10.46	0.04	B
		Skimmingdish Ln	R	0.28	21.22	0.22	C	0.23	25.83	0.19	D
		B4100	R	0.09	3.49	0.06	A	0.02	4.22	0.02	A
f	Forecast - Cmtd 2016	Skimmingdish Ln	L	0.04	7.61	0.04	A	0.04	8.57	0.04	A
		Skimmingdish Ln	R	0.15	14.45	0.13	B	0.12	16.28	0.11	C
		B4100	R	0.06	3.86	0.04	A	0.06	4.52	0.04	A
g	Forecast - Cmtd 2021	Skimmingdish Ln	L	0.05	7.89	0.05	A	0.04	9.11	0.04	A
		Skimmingdish Ln	R	0.18	15.92	0.15	C	0.15	18.9	0.13	C
		B4100	R	0.08	3.8	0.05	A	0.07	4.45	0.05	A
h	Forecast + Cmtd 2016	Skimmingdish Ln	L	0.05	8.12	0.05	A	0.05	9.29	0.04	A
		Skimmingdish Ln	R	0.2	17.36	0.17	C	0.16	19.74	0.14	C
		B4100	R	0.09	3.65	0.06	A	0.07	4.43	0.05	A
i	Forecast + Cmtd 2021	Skimmingdish Ln	L	0.06	8.8	0.06	A	0.06	10.46	0.05	B
		Skimmingdish Ln	R	0.29	22.21	0.23	C	0.25	27.76	0.2	D
		B4100	R	0.14	3.53	0.08	A	0.1	4.33	0.06	A
j	SATURN 2031	Skimmingdish Ln	L	0.19	8.46	0.16	A	0.49	28.09	0.34	D
		Skimmingdish Ln	R	0.27	22.87	0.21	C	3.31	72.35	0.8	F
		B4100	R	1.61	5.66	0.42	A	3.21	7.91	0.6	A
k	SATURN + Devt 2031	Skimmingdish Ln	L	0.21	8.59	0.18	A	0.69	36.82	0.42	E
		Skimmingdish Ln	R	0.27	23.43	0.22	C	3.8	83.54	0.83	F
		B4100	R	1.7	5.81	0.43	A	3.76	8.88	0.64	A

12.13.2 The above table shows that this junction does not exceed capacity under any tested scenario, and it is unlikely to witness little queueing. The maximum delay will increase from around 72 seconds to 84 seconds in the pm peak hour for right turners from Skimmingdish Lane to the B4100 under the SATURN model's redistribution, but this is not a significant increase and no more than would be expected from daily fluctuation.

12.14 Junction 10 – Site Access / Fringford Road

12.14.1 The summary results of this analysis are shown in **Table 12.10**, whilst full results are contained in **Appendix H**.

Table 12.10 Junction 10 – Site Access / Fringford Road: PICADY summary results

		Arm		07:45-08:45				17:00-18:00			
		Name	Dir	Q	Del	RFC	L	Q	Del	RFC	L
f	Forecast - Cmtd 2016	Unnamed road Fringford Road	LR R	0.19 0	9.22 4.35	0.16 0	A A	0.13 0	9.15 5.03	0.11 0	A A
g	Forecast - Cmtd 2021	Unnamed road Fringford Road	LR R	0.19 0	9.34 4.3	0.16 0	A A	0.13 0	9.32 5.02	0.12 0	A A
h	Forecast + Cmtd 2016	Unnamed road Fringford Road	LR R	0.19 0	9.43 4.27	0.16 0	A A	0.13 0	9.38 5.02	0.12 0	A A
i	Forecast + Cmtd 2021	Unnamed road Fringford Road	LR R	0.19 0	9.67 4.18	0.16 0	A A	0.14 0	9.69 5	0.12 0	A A
k	SATURN + Devt 2031	Unnamed road Fringford Road	LR R	0.17 0	8.32 5.15	0.14 0	A A	0.11 0	8.19 5.08	0.1 0	A A

12.14.2 The table above indicates that the proposed site access junction will operate well under all future scenarios, with no noticeable queuing or delay.

12.15 It may be concluded that, with reference to the analysis results, all but the Bucknell Road / Howes Lane junction operate well at present, and will do so in future years even with the inclusion of the *pro rata* committed development, and with the addition of the development-generated traffic.

12.16 The above analyses are generally robust, and give an approximation of the level of operation of each junction under each scenario. It is to be noted that as the committed development is built out in Bicester with the potential for new local roads the distribution will change somewhat, aimed at alleviating any pressure on the junctions under consideration.

13 Off-site highway works

- 13.1 As part of the development proposals, the west side of Fringford Road southwards from the site access will be furnished with a footway to link with the existing footway to the south of the site.
- 13.2 A pedestrian crossing will be installed from the new footway across Fringford Road.
- 13.3 Although the Bucknell Road / Howes Lane junction does not operate satisfactorily, future committed and allocated development may trigger the requirement for new routes within Bicester that may alleviate pressure on this junction. Should, however, mitigation ultimately be required, it would be funded by contributions from all development coming forward in the area, on a *pro rata* basis.
- 13.4 Similarly, the junction of Howes Lane with Shakespeare Drive, at which a cluster of accidents has been noted, will benefit from mitigation which would be funded via all developers' contributions.
- 13.5 No other off-site highway works that would be the responsibility of Cala Homes have been identified.

14 Summary and Conclusions

- 14.1 The proposed development of up to 200 dwellings and a local shop have been considered in terms of current planning policy, both nationally and locally, particularly in terms of sustainability.
- 14.2 Study of the existing situation has shown that, given its semi-rural setting, the proposed development site is reasonably well-connected to centres of employment by public transport.
- 14.3 Walking and cycling routes have been identified, and considered in greater detail in an accompanying Pedestrian and Cycle Audit, where a need for improved pedestrian links from the site were identified. These consist of a footway along the site frontage to link with existing to the south, and a pedestrian crossing across Fringford Road.
- 14.4 An accident analysis was carried out which identified a number of clusters. All but one were, on examination, disparate in nature. However, the Howes Lane / Shakespeare Drive signalised junction is clustered with drivers failing to notice the red lights. Mitigation at this junction is recommended, to be funded by developer contributions across Bicester.
- 14.5 Trip generation and distribution for development-generated traffic were calculated on a highly robust basis and, when summed with predicted future network flows, were found to have a negligible effect on the junctions in the analysis area. The Bucknell Road / Howes Lane junction does not operate well at present, and is predicted to worsen over time, especially with the addition of the committed development traffic. Mitigation would be complex, the cost of which would be borne by all new development in the coming years.
- 14.6 It is concluded that, with the off-site highway works identified in this document, there should be no reason for refusal on traffic and transport grounds of the planning application under which the proposed development site is considered.