
AXA REAL ESTATE INVESTMENT MANAGERS UK LTD

WESTWOOD

HIGH LEVEL JUNCTION ASSESSMENT TECHNICAL NOTE

04 JULY 2014

PROJECT: 286897A-HHC

1 INTRODUCTION

- 1.1 PB has previously prepared a technical note (Trip Generation Technical Note) outlining the steps undertaken to derive gross trip generation figures for the proposed development at Westwood. This note generated trip numbers from a variety of sources including:
- Estimate of Footfall (CBRE);
 - Calculation of Employment Densities (CBRE);
 - Land Use Schedule (Lyon Sleeman Hoare);
 - TRICS Database.
- 1.2 The information provided by other sources has been reconciled alongside the Leisure Impact Assessment, undertaken by Colliers International, and the Retail Impact Assessment, undertaken by CBRE, since the previous technical note was issued. As a result the daily trip generation numbers previously calculated have been revised.
- 1.3 PB has also received the LINSIG model from Devon County Council for the HA Pinch Point funding scheme for improvement works at Junction 27. This model will be used to undertake a high level assessment of the impact the development will have the proposed scheme, which is due to commence later this year.
- 1.4 The purpose of this technical note is:
- To review the methodology for daily trip generation;
 - To estimate the reduction required for linked and pass by trips;
 - To estimate the temporal distribution of the generated trips;
 - To estimate the spatial distribution of the generated trips;
 - To determine the peak hour for the development;
 - To undertake a high level junction assessment;
 - To identify potential mitigation measures.
- 1.5 This note is not the final assessment of traffic impacts at Westwood and is to be used to inform the Local Plan allocation process. A full Transport Assessment will be undertaken, as well as continued liaison with the Highways Agency and Devon County Council, as part of any subsequent planning application.

2 DEVELOPMENT DATA

- 2.1 A summary of the information provided by the various sources for the Westwood development is shown in Table 1 below:

Development Zone	Product Mix	Floorspace (sqft)	Estimated Jobs (FTE)	Visitor Numbers
Westwood Reef	<i>Surf Lagoon & Beach</i>		35	336,780
	<i>Water/Sand Play</i>			
	<i>Cycling Trails/Circuits</i>			
	<i>Aerial Adventure</i>	5,000		
	<i>Adrenaline Activities</i>			
	<i>Bandstand/Event Lawn</i>			
	<i>Surf/Cycle Pavilion</i>	10,000		
Westwood Boardwalk	<i>Restaurants/Cafés/Bars</i>	30,000	154	149,857
Westwood Sports Village	<i>Experience-led, Try and Buy Retail</i>	60,000	100	564,617
	<i>Activity Leisure</i>	30,000	43	
Westwood Artisan Village	<i>Restaurants/Cafés</i>	20,000	103	826,697
	<i>Food Retail</i>	20,000	98	
	<i>Artisan Village (non-food)</i>	25,000	122	
	<i>Wine/Cider Centre</i>	5,000	26	
	<i>Cookery School</i>	5,000	26	
	<i>Craft Brewery</i>	10,000	26	
	<i>Food Wholesale</i>	15,000	20	
	<i>Food Research</i>	5,000	23	
<i>Food Process/Prep</i>	20,000	52		
Westwood Garden	<i>Garden Centre</i>	25,000	50	233,351
Westwood Square	<i>West Country Visitor Centre</i>	20,000	50	3,480,924
	<i>Indoor Family Attraction</i>	25,000	36	
	<i>Cinema</i>	50,000	52	
	<i>Lifestyle Outlet Village</i>	180,000	880	
	<i>Restaurants/Cafés</i>	20,000	103	
Westwood Resort	<i>Full Service Hotel</i>	60,000	50	270,875
	<i>Conference/Concert Venue</i>	400,000	413	
Westwood @J27	<i>Service Area</i>	21,000	108	N/A
	<i>Budget Hotel</i>	60,000	50	
Westwood Connect	<i>Logistics 1</i>	250,000	871	N/A
	<i>Logistics 2</i>	250,000		
	<i>Logistics 3</i>	250,000		
	<i>CM Building</i>	4,000	10	
Retirement Village	<i>Mix of 2 bed and 1 bed</i>	240 Units	TBC	N/A
Total		1,875,000	3,501	5,863,102

Table 1: Summary of Development Data

2.2 The estimate of visitor numbers provided by CBRE contained a breakdown of visitors for the first 3 years of the development. The visitor numbers are estimated to fluctuate throughout the year with seasonal peaks anticipated in the summer season and in the run up to Christmas. Details of the seasonal and yearly variations are shown below in Table 2. For the purposes of this technical note the Year 3 figures will be used to determine trip generation from the development.

Month	Year One	Year Two	Year Three
January	293,000	336,752	362,099
February	337,527	387,531	416,700
March	370,421	425,298	457,310
April	396,058	454,733	488,960
May	392,286	450,402	484,304
June	401,301	460,753	495,434
July	433,089	497,250	534,678
August	441,263	506,635	544,769
September	395,759	454,390	488,592
October	371,935	427,036	459,179
November	416,899	478,662	514,691
December	499,272	573,239	616,386
Total	4,749,110	5,452,681	5,863,102

Table 2: Visitor Number Seasonality Index

3 METHODOLOGY

- 3.1 In order to generate a total number of trips for the whole development it was necessary to manipulate the data for annual visitor figures and estimated jobs numbers separately.
- 3.2 A set of factors and assumptions were applied for the various elements of the visitor footfall figures and a further set were applied for the employment data. In addition information was obtained from the TRICS database where appropriate.
- 3.3 Once daily trip generation numbers were derived temporal and spatial distribution factors were applied. The factors applied differed between the various development zones and were based on data sets appropriate to land use proposed.
- 3.4 The distribution models developed allowed the development peak to be identified but also allowed trip numbers for various hours throughout the year to be estimated, including the peak hours identified in the Devon County Council LINSIG model.
- 3.5 A modal split of 70% car trips, 20% rail trips and 10% bus trips was applied to all trips generated by the development, both visitors and employees. The final split will be determined through discussion with the highway authorities but it was considered that this split reflects the transportation options currently and potentially available at the Westwood site.
- 3.6 The factors applied and the rationale behind their use is outlined in the following sections.

4 DAILY TRIP GENERATION

Leisure Activities – Visitor Numbers

- 4.1 The estimate of visitor numbers has been factored to determine daily trip rates for the following leisure based development zones:
 - Westwood Reef;
 - Westwood Boardwalk;
 - Westwood Artisan Village.

- 4.2 Although there is a mixture of retail and leisure elements within these zones it was decided that leisure is the dominant use and should therefore be assessed as such.
- 4.3 The visitor numbers for Westwood Reef were factored using information obtained from the Transport Assessment for The Wave, Bristol. The Wave, Bristol has recently submitted a planning application and received a Resolution to Grant earlier in June 2014. The data within The Wave TA relating to seasonality, spread across the week and car occupancy (3 people per car) has been applied to the Westwood Reef visitor numbers to generate daily trip rates throughout the year. The proposal at the Westwood Reef is almost unique in nature and there are no comparable schemes already constructed within the UK.
- 4.4 The visitor numbers for Westwood Boardwalk and Westwood Artisan Village were factored using two sources. The seasonality variation was based on the information provided by CBRE in the Estimate of Footfall document and car occupancy was assumed to be lower at 2.4 people per car. The spread across the week was based on TRICS data for Pubs and Restaurants given the high percentage of food based activities within these development zones.

Leisure Activities – Job Numbers

- 4.5 The job estimates for the development zones stated in Section 4.1 have been factored to take into account potential shift patterns. The numbers represent full time equivalent staff therefore the assumption was made that all staff will work 5 out of 7 days, spread evenly across the week.
- 4.6 The total two way daily trip generation for the leisure activities, for a typical weekday and weekend in August in Year 3, is shown below in Table 3.

	Two Way (vehicles)			
	Mon-Thu	Fri	Sat	Sun
Westwood Reef	503	433	1,418	1,418
Westwood Boardwalk	282	586	578	578
Westwood Artisan Village	1,195	2,873	2,832	2,832

Table 3 – Leisure Activities Trip Generation, Two Way (August Year 3)

Retail Activities – Visitor Numbers

- 4.7 The estimate of visitor numbers has been factored to determine daily trip rates for the following retail based development zones:
- Westwood Sports Village;
 - Westwood Garden;
 - Westwood Square.
- 4.8 Although there is a mixture of retail and leisure elements within these zones it was decided that retail is the dominant use and should therefore be assessed as such.
- 4.9 The visitor numbers for all retail based zones were factored using two sources. The seasonality variation was based on the information provided by CBRE in the Estimate of Footfall document and car occupancy was assumed to be 2.4 people per car. The spread across the week was based on traffic data for the slip roads at M5 Junction 17 (Cribbs Causeway). This location was chosen due to the retail centric development in the locality and the flow profile percentages were applied to the Westwood visitor numbers, in conjunction with the seasonality variation, to generate daily trip rates throughout the year.

Retail Activities – Job Numbers

- 4.10 The job estimates for the development zones stated in Section 4.7 have been factored to take into account potential shift patterns. The numbers represent full time equivalent staff therefore the assumption was made that all staff will work 5 out of 7 days, spread evenly across the week.

4.11 The total two way daily trip generation for the leisure activities, for a typical weekday and weekend in August in Year 3, is shown below in Table 4.

	Two Way (vehicles)			
	Mon-Thu	Fri	Sat	Sun
Westwood Sports Village	1,249	1,096	929	919
Westwood Garden	507	444	375	375
Westwood Square	7,938	6,999	5,967	5,909

Table 4 – Retail Activities Trip Generation, Two Way (August Year 3)

TRICS Data

4.12 The TRICS database has been used to determine trip rates for the following development zones:

- Westwood Resort;
- Westwood @ J27;
- Westwood Connect;
- Retirement Village.

4.13 The information for each element from the TRICS database contains trip rates for employees and any visitors to that land use. Therefore applying to the daily rates to the proposed floor area produced an all encompassing daily trip generation for these areas.

4.14 There is insufficient data within the TRICS database to differentiate between weekday and weekend or seasonal flows therefore a flat profile has been assumed for these land uses. The two way daily trip generations are shown below in Table 5

	Two Way (vehicles)			
	Mon-Thu	Fri	Sat	Sun
Westwood Resort	720	1,230	1,218	1,218
Westwood @ J27	767	767	767	767
Westwood Connect	1,292	1,292	1,292	1,292
Retirement Village	456	456	456	456

Table 5 – TRICS Daily Trip Generation, Two Way

Development Total

4.15 The total daily two way trip generation for the whole development, for a typical weekday and weekend in August in Year 3, is shown below in Table 6. These figures are based on each zone being a standalone development with no reduction in trips, save for the modal split.

	Two Way (vehicles)			
	Mon-Thu	Fri	Sat	Sun
Westwood Reef	503	433	1,418	1,418
Westwood Boardwalk	282	586	578	578
Westwood Sports Village	1,249	1,096	929	919
Westwood Artisan Village	1,195	2,873	2,832	2,832
Westwood Garden	507	444	375	371
Westwood Square	7,938	6,999	5,967	5,909
Westwood Resort	720	1,230	1,218	1,218
Westwood @ J27	767	767	767	767
Westwood Connect	1,292	1,292	1,292	1,292
Retirement Village	456	456	456	456
Total	14,909	16,176	15,832	15,760

Table 6 – Westwood Development Daily Trip Generation, Two Way (August Year 3)

5 DISCOUNTING OF DAILY TRIP GENERATION

- 5.1 The initial assessment of trip generation assumed that each zone at Westwood would be a standalone development and that all trips generated would be new trips to the network. For a development such as Westwood, in the location proposed, it would be correct to assume that visits to each zone could be linked and that some trips could already be on the highway network.
- 5.2 For the purposes of this assessment the assumption was made that no trips generated by Westwood Connect and the Retirement Village would be discounted.
- 5.3 The discounts applied to the daily trip rates for each development zone are shown in Table 7 below.

	% Discount	
	Linked Trips	Pass-By Trips
Westwood Reef	30%	5%
Westwood Boardwalk	30%	5%
Westwood Sports Village	30%	5%
Westwood Artisan Village	30%	5%
Westwood Garden	30%	5%
Westwood Square	30%	5%
Westwood Resort	20%	3%
Westwood @ J27	10%	1%

Table 7 – Discounts applied to Daily Trip Generation

- 5.4 The 30% linked trips discount for the predominantly leisure and retail zones is based on an assumption made within the Leisure Impact Assessment, prepared by Colliers International. Given the wide ranging activities available at the site it was assumed that approximately 1 in 3 trips to the development would visit more than one zone.
- 5.5 The 5% pass-by trips for the predominantly leisure and retail zones was based on a technical judgement given the location of the development on well travelled holiday routes.

6 TEMPORAL TRIP DISTRIBUTION

- 6.1 The temporal distribution was developed using a variety of sources applicable to each development zone.
- 6.2 The temporal distribution for the visitors to Westwood Reef was based on the flow profiles within The Wave, Bristol TA. As the facilities are similar, and both rely on a high degree of pre booking, it was deemed appropriate to use these assumptions.
- 6.3 For the visitors to the Westwood Boardwalk and Westwood Artisan Village the distribution was developed using flow profile data from TRICS for Pub and Restaurants as this is the predominant land use within these areas.
- 6.4 For the visitors to the retail activities (Westwood Sports Village, Westwood Garden and Westwood Square) the distribution was based on the flow profiles for the slip roads at M5 Junction 17.
- 6.5 For the employees at the leisure and retail activities a two shift pattern was assumed. For retail this was 08:00 to 16:00 and 12:00 to 20:00. For leisure this 10:00 to 18:00 and 14:00 to 22:00. The leisure elements take into account that restaurants and bars will be open later than retail premises. A degree of flexibility was allowed in the arrival and departure times either side of the shift patterns.
- 6.6 For Westwood Resort, Westwood @ J27, Westwood Connect and the Retirement Village flow profile data from TRICS was applied.

7 SPATIAL TRIP DISTRIBUTION

- 7.1 The spatial distribution has been developed using a series of factored gravity models based on information provided by Colliers International and CBRE. The base gravity model used a catchment area of 90 minutes drive time from Westwood and applied a 'distance deterrent' to ensure that local, smaller settlements are considered favourably in comparison to larger settlements further away.
- 7.2 The base spatial distribution model, shown in Table 8 below, was applied to the following development zones:
- Westwood Resort;
 - Westwood @ J27;
 - Westwood Connect;
 - Retirement Village.
- 7.3 The base gravity model was factored by the percentage of visitors to the leisure elements of the scheme from various catchments, as shown in Figure 6 of the Leisure Impact Assessment by Colliers International. This factored spatial distribution model, shown in Table 8 below, was applied to the following development zones:
- Westwood Reef;
 - Westwood Boardwalk;
 - Westwood Artisan Village.
- 7.4 The final gravity model was derived from the draft trade draw analysis associated with the Retail Impact Assessment. The data used to compile this information is being updated but it was the most up to date information available. The retail distribution model, shown in Table 8 below, was applied to the following development zones:
- Westwood Sports Village;
 - Westwood Garden;
 - Westwood Square.

	Route (% of Total)			
	M5 South	A38	M5 North	A361
Base Gravity Model	29%	17%	31%	24%
Leisure Gravity Model	32%	12%	37%	18%
Retail Gravity Model	44%	0%	43%	13%

Table 8 – Summary of Spatial Distribution Models

8 DEVELOPMENT PEAK HOUR

- 8.1 Based on the methodology in the previous sections the development peak was determined as 15:00 to 16:00 on a Saturday in August. The development distribution matrix for this hour is shown in Table 9 below.

		August Saturday 15:00 – 16:00				
		Destination				
		M5 South	A38	M5 North	A361	Total
Origin	M5 South		143			143
	A38	272	0	268	113	653
	M5 North		137			137
	A361		68			68
	Total	272	348	268	113	1001

Table 9 – Development Peak Hour Trip Matrix

9 HIGH LEVEL JUNCTION ASSESSMENT

- 9.1 The development peak outlined in Section 8.1 is different to the peak hours tested within the Devon County Council LINSIG model. The methodology within the previous sections has allowed trip rates to be determined for testing against the LINSIG model peak hours. The peak hours within the model are:
- Weekday AM Peak (08:00-09:00);
 - Weekday PM Peak (17:00-18:00);
 - Summer Saturday Peak (13:00-14:00);
 - Other Saturday Peak (13:00-14:00).
- 9.2 For the purposes of this high level assessment the corresponding development peak hours from August in Year 3 were applied to the model with the exception of the 'Other Saturday' where a typical Saturday in April (Year 3) was used.
- 9.3 Table 10 below shows the LINSIG results for the junction as it currently operates. During the weekday peak each arm of the junction operates within capacity, although this is almost reached on the M5 Southbound off slip for the AM peak.
- 9.4 For the summer Saturday model the existing junction operates significantly above capacity, due to Lane 2 at the M5 Southbound off slip having a degree of saturation of 130.4% (Queue Length of 136.2 PCU). For off peak Saturdays the junction operates well within the capacity.

M5 Junction 27	Weekday AM Peak (08:00 – 09:00)			Weekday PM Peak (17:00-18:00)			Saturday Summer Peak (13:00-14:00)			Saturday (rest) (13:00-14:00)		
	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)
Existing Junction												
M5 (S/B Off) Lane 1	0.8	11.7	62.1	0.6	6.2	55.1	0.4	4.7	41.7	0.1	2.0	13.8
M5 (S/B Off) Lane 2	7.6	99.4	99.0	1.0	10.3	67.3	136.2	482.8	130.4	0.2	2.7	25.4
A38 Lane 1	0.3	2.4	36.2	0.2	1.9	27.5	0.2	2.2	31.2	0.1	1.7	19.1
A38 Lane 2	0.4	3.8	47.0	0.2	2.5	33.2	0.3	3.1	39.4	0.1	1.5	9.1
M5 (N/B Off) Lane 1	1.2	8.0	71.5	1.4	7.9	73.9	0.9	7.2	64.4	0.2	2.2	25.3
M5 (N/B Off) Lane 2	0.3	3.4	35.3	0.2	3.0	30.8	0.3	4.0	38.9	0.1	1.8	10.1
A361 Lane 1	0.8	3.4	60.4	0.7	3.2	59.4	0.6	3.1	55.9	0.3	2.2	39.9
A361 Lane 2	1.0	3.8	67.7	0.4	2.1	41.5	0.4	2.2	42.8	0.1	1.4	17.9

Table 10 – Junction 27 LINSIG Results – Existing Junction

9.5 The proposed HA Pinch Point funding scheme includes for the part time signalisation of both off slips and the addition of a third lane on the M5 Southbound off slip. The LINSIG results for this layout are shown in Table 11 below.

M5 Junction 27	Weekday AM Peak (08:00 – 09:00)			Weekday PM Peak (17:00-18:00)			Saturday Summer Peak (13:00-14:00)			Saturday (rest) (13:00-14:00)		
	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)
HA Pinch Point Scheme												
M5 (S/B Off) Lane 1	6.6	50.4	73.8	4.8	25.9	72.1	3.1	18.9	42.9	0.8	9.8	23.7
M5 (S/B Off) Lane 2	3.1	37.7	41.2	1.9	17.4	36.0	4.9	22.3	60.8	0.7	9.4	19.3
M5 (S/B Off) Lane 3	3.0	37.6	40.9	1.9	17.3	35.8	4.9	22.3	60.8	0.7	9.4	19.3
A38 Lane 1	5.9	11.7	68.9	1.0	4.5	45.2	2.4	8.7	59.5	0.2	2.4	24.7
A38 Lane 2	1.4	4.0	46.2	0.7	2.7	32.7	1.7	4.7	41.8	0.1	1.5	9.1
M5 (N/B Off) Lane 1	7.4	21.4	53.5	4.9	16.4	63.2	5.2	23.1	63.9	1.2	10.4	32.5
M5 (N/B Off) Lane 2	7.4	21.4	53.5	4.9	16.4	63.3	5.2	23.1	63.9	1.2	10.4	32.3
A361 Lane 1	1.8	7.4	79.0	1.4	5.2	70.2	0.9	4.6	64.9	0.4	2.4	43.0
A361 Lane 2	0.8	3.2	61.4	0.4	2.1	41.2	0.4	2.2	42.6	0.1	1.4	17.7

Table 11 – Junction 27 LINSIG Results - HA Pinch Point Scheme

9.6 Table 11 shows that the implementation of the HA Pinch Point scheme would result in the junction operating within capacity at all times, with a maximum queue length of 7.4 PCU on the M5 Northbound off slip and A361 in the weekday AM peak.

9.7 The HA Pinch Point scheme was used as the base model and the relevant development trip rates were modelled in addition to the base flow data. The LINSIG results for this are shown in Table 12 below.

M5 Junction 27	Weekday AM Peak (08:00 – 09:00)			Weekday PM Peak (17:00-18:00)			Saturday Summer Peak (13:00-14:00)			Saturday (rest) (13:00-14:00)		
	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)	Queue (PCU)	Delay (Secs)	DOS (%)
HA Pinch Point Scheme and Westwood Development												
M5 (S/B Off) Lane 1	12.1	60.8	86.8	12.3	37.2	76.3	11.5	34.3	72.3	7.3	31.2	55.3
M5 (S/B Off) Lane 2	5.0	37.0	48.2	6.6	28.2	49.4	11.5	34.3	72.3	2.5	25.4	22.0
M5 (S/B Off) Lane 3	1.4	31.5	14.8	0.7	22.1	6.1	4.3	24.7	33.8	1.8	24.8	16.5
A38 Lane 1	8.4	15.7	74.5	6.8	11.3	73.9	10.8	18.4	78.8	1.2	3.1	40.4
A38 Lane 2	2.6	5.7	62.8	3.6	4.8	61.6	6.5	8.8	66.8	0.4	1.8	17.8
M5 (N/B Off) Lane 1	10.3	26.0	62.7	11.7	28.7	68.7	11.5	34.3	72.3	4.4	15.1	31.6
M5 (N/B Off) Lane 2	10.2	26.0	62.6	11.7	28.7	68.8	11.5	34.3	72.3	4.4	15.1	31.5
A361 Lane 1	16.7	24.9	93.7	16.0	22.1	91.9	18.3	22.3	90.8	2.5	4.1	59.2
A361 Lane 2	1.0	4.1	67.2	0.5	2.7	47.9	0.5	2.9	49.7	0.1	1.6	20.1

Table 12 – Junction 27 LINSIG Results - HA Pinch Point Scheme and Development

9.8 Table 12 shows that the junction operates within capacity with the addition of development flows but two arms (M5 Southbound off slip and A361) are approaching saturation in various modelled peaks.

10 SENSITIVITY TEST

10.1 Upon review of the proposed data it is recognised that the profile provided by the M5 Junction 17 data did not reflect the likely weekend peak of the retail elements at the site. Whilst the arrival and departure profiles on the M5 Junction 17 data appeared consistent with such a development, the spread of trips across the week appeared out of proportion and therefore a high level sensitivity test was undertaken.

	% of Flow			
	Mon-Thu (Average)	Fri	Sat	Sun
M5 Junction 17 Data	15.5%	15%	13%	10%
Factored Sensitivity Data	12%	16%	21%	19%

Table 13 – Proportion of Traffic Flow

10.2 Table 13 shows the data used in the assessment in Section 9 and factored data to ensure that the weekend peak of the retail elements is assessed. The factored data reduced the development flows on a weekday therefore only the Summer Saturday peak hour was assessed as part of the high level sensitivity test. The LINSIG results for this are shown in Table 14 below.

M5 Junction 27	Saturday Summer Peak Test (13:00-14:00)		
	Queue (PCU)	Delay (Secs)	DOS (%)
Summer Saturday Sensitivity Testing			
M5 (S/B Off) Lane 1	13.6	38.5	79.5
M5 (S/B Off) Lane 2	13.6	38.6	79.7
M5 (S/B Off) Lane 3	3.2	23.7	26.4
A38 Lane 1	12.4	24.4	83.2
A38 Lane 2	8.3	11.7	76.3
M5 (N/B Off) Lane 1	12.4	36.0	75.8
M5 (N/B Off) Lane 2	12.4	36.0	75.8
A361 Lane 1	30.7	50.1	97.8
A361 Lane 2	0.5	3.1	51.8

Table 14 – Junction 27 LINSIG Results – Sensitivity Results

10.3 Table 14 shows that the junction arms would operate within capacity for the sensitivity test, with the retail elements factored to ensure a weekend peak. Lane 1 of the A361 is approaching capacity for this event.

11 POTENTIAL MITIGATION MEASURES

- 11.1 The results of the high level junction assessment indicates that the proposed HA Pinch Point scheme at M5 Junction 27 could accommodate the proposed development at Westwood. However the spare capacity within the proposed improvement scheme would be removed by the development and therefore it is likely that the HA and DCC will request mitigation measures to be included as part of any development scheme to maintain a level of capacity at the junction.
- 11.2 There are several mitigation measures that could be assessed as part of a full Transport Assessment for the scheme. These could include but not be limited to:
- Increasing the modal split towards sustainable means of transport;
 - Full signalisation of the junction;
 - Introduction of segregated left turn lane on M5 southbound off slip;
 - Optimisation of signal timings with proposed development access;
 - Optimisation of lane markings and signage;
 - Lengthening of slip roads within M5 corridor.
- 11.3 As part of the assessment process we will liaise with the HA and DCC over the capacity criteria required at the junction and agree a mitigation scheme that is appropriate and deliverable.

12 CONCLUSIONS AND RECOMMENDATIONS

- 12.1 The technical note provides the methodology for determining traffic flows for the proposed development at Westwood and undertakes a high level assessment of its impact on M5 Junction 27. It is intended to support the Local Plan Allocation process and it is not intended as a full Transport Assessment, which would be submitted as part of any future planning application.
- 12.2 The background calculations related to the methodology will be available to the HA and DCC as part of the continued liaison throughout the assessment process.
- 12.3 The high level assessment has shown that development would have an impact on the junction but that all arms would operate under capacity for the summer Saturday peak hour.
- 12.4 However mitigation measures are likely to be requested as part of any development to ensure that a level of capacity is maintained at the junction. The level of capacity and the measures required to achieve this will be agreed with the HA and DCC during the assessment process.
- 12.5 Further refinement of the development flows will be undertaken during the assessment process to ensure that the proposed scheme includes the best estimate of trips generated. This will include:
- Reviewing the estimated spread of retail trips throughout the week, based on data sourced from similar developments (where appropriate);
 - Reviewing the estimated spread of employment trips throughout the week, based on data sourced from similar developments (where appropriate);
 - Reviewing the car occupancy estimates, based on data sourced from similar development (where appropriate);
 - Sensitivity tests to relate the visitor number estimates to TRICS or traffic count data for similar developments (where appropriate);
- 12.6 As part of the assessment a review the impact of the development on the local road network would be undertaken, as necessary, and ensure that the scheme provides appropriate provision for access and on site facilities.