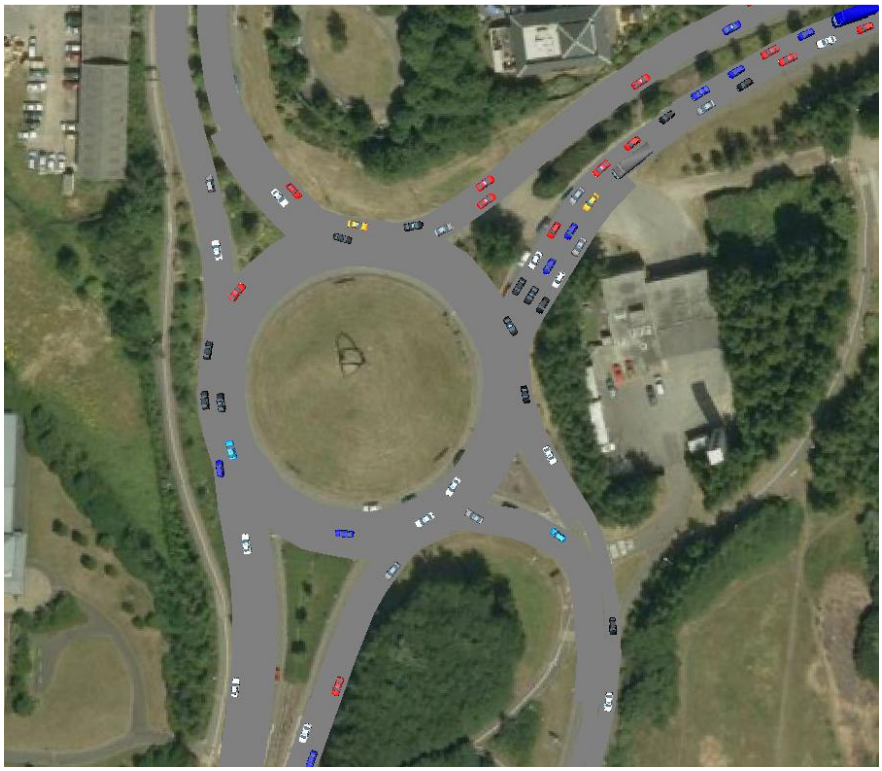
Appendix O Transport Assessment

Bilston Leisure Centre

Transport Assessment



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Wolverhampton City Council
Bilston Leisure Centre
Transport Assessment Report

Contents

(All traffic count data and model files are available on CD)

Executive Summary

The proposed Bilston Leisure Centre forms a key part of the regeneration of Bilston Town Centre and will occupy a site adjacent to one of the busiest roads in the Black Country. It will thus be a high-profile and landmark building. It will also border the Bislton Urban Village site, a major redevelopment proposal which will breath new life into the town.

This Transport Assessment looks at the impact of the Leisure Centre in terms of its effect on the local road network and pedestrian/cycle infrastructure. To assist in this, a microsimulation model has been created of the adjacent roads, as being the most appropriate tool for the traffic analysis.

A robust estimate of traffic generation for the Leisure Centre has been arrived at, using data from comparable sites in Britain. The analysis shows the addition of this traffic will contribute to a general worsening of travel conditions, but its impact is much less than that due to the forecast growth in background traffic, and that of traffic from the Bilston Urban Village redevelopment.

It is therefore concluded that the addition of the Leisure Centre traffic can be accepted in the short-term, but there should be a contribution to transport infrastructure improvements.

1 Introduction

1.1 Jacobs Engineering was commissioned by Wolverhampton City Council to prepare this Transport Assessment, which forms part of the planning application documentation for the Bilston Leisure Centre.

1.2 The Leisure Centre will be sited adjacent to the Black Country Route on the border of Bilston Town Centre. It will form part of a major redevelopment of a brownfield site to the south of the town centre which will include a new Health Centre, residential and employment sites. The leisure Centre is intended to be a landmark building of high aesthetic standard and will occupy a prominent location visible to passing traffic. It will supersede the existing Leisure Centre in Prouds Lane, Bilston.

Figure 1 Location Plan

1.3 Facilities in the Leisure Centre will include

- 2 swimming pools
- Multi-use Sport Hall
- Squash Courts
- Children's gym area
- Weights room
- Play area
- Cafe

Total Gross-floor area (GFA) is 6576 square metres, or 6,100 sqm excluding plant/power rooms.

1.4 For this Transport Assessment, forecasts of the expected use of the Leisure Centre have been derived from the TRICS database and allocated to the local road network. A microsimulation model has been built to simulate vehicular movements on this road network, so the effect of the Leisure Centre can be observed in conjunction with other expected changes.

2 Planning Background

2.1 The Bilston Urban Village is a major regeneration project sponsored by Wolverhampton City Council and Advantage West Midlands. The objective is to redevelop brownfield land to the south of Bilston town centre for a mix of employment and residential, with community facilities including the leisure centre on a site well-placed adjacent to the town centre and public transport links.

2.2 Outline planning permission for the development was obtained in 2006.

2.3 Development of the Leisure Centre and adjacent Health Centre will form Block A of the Bilston Urban Village development. The former will be served off Dudley St, the latter Bankfield St, with pedestrian/cycle access provided from a central north/south boulevard linking Bilston town centre with these sites and the remainder of the development.

2.4 As part of the Bilston Urban Village proposals, two junction alterations are underway, with completion in late 2008. The priority junction of Dudley St with the Black Country Route is being remodelled, with the adjacent pelican crossing on the Black Country Route superseded by a resited toucan which will form a link between the main boulevard leading from the Urban Village and Bilston town centre. At the time of production of this TA, and the traffic surveys, the right-turn into Dudley St from the Black Country Route had been closed, and Dudley St itself closed south of the junction with Prosser St. Thus Dudley St serves solely as an access to Parkfield High School and Prosser St on a left-in/left-out arrangement.

2.5 The nearby junction of Bankfield St with the Black Country Route, now a left-in/left-out priority junction, is being signalised. Two left-turn lanes out of Bankfield St are to be provided for ordinary traffic, with the addition of a right-turn Buses Only facility. The main traffic role of Bankfield St is to serve as the sole egress from Morrison's supermarket. A new link road, now under construction, will link Bankfield St with the southern section of Dudley St, restoring a through link between the Bradley area and the Black Country Route. This will enable a direct bus service from Bradley to Bilston bus station to be restored.

3 Existing Travel Patterns and Conditions

3.1 Traffic data for the Black Country Route adjacent to the Leisure Centre site is available from the DfT National Traffic Census (site 99404). Average Annual Dailey traffic (AADT) for recent years is given in the table below.

Year	PC	2WMV	CAR	BUS	LGV	HGV	All_MV
1999	51	157	29040	384	4759	1618	35958
2000	50	159	28372	389	4783	1575	35278
2001	48	165	28939	397	4764	1578	35843
2002	17	278	33781	528	4663	1603	40853
2003	16	312	33308	471	5082	1686	40859
2004	12	274	33375	438	5037	1717	40841
2005	42	166	28756	335	5072	1668	35997
2006	65	172	28844	329	5153	1707	36205

Table 3.1 National Census Site 99403

3.2 There was a noticeable increase in car traffic between 2002 and 2004, after which volumes fell back to previous levels. Apart from this anomaly there has been little change in overall traffic levels.

3.3 Day by day traffic variation is available from an automatic traffic count on the A463 Black Country Route taken in February 2007. This gave the following data

	Eastbound	Westbound	2-way
08:00 – 09:00 weekday ave	1599	1247	2846
17:00 – 18:00 weekday ave	1355	1573	2928
07:00 – 19:00 weekday ave	15064	13920	28984
07:00 – 19:00 Saturday	11912	10013	21925
07:00 – 19:00 Sunday	8990	7760	16750
Weekday busiest hour	1632 (07:00 – 08:00)	1573 (17:00 – 18:00)	2975 (07:30 – 08:30)
Saturday busiest hour	1231 (12:00 – 13:00)	1121 (12:00 – 13:00)	2352 (12:00 – 13:00)
Sunday busiest hour	1075 (11:00 – 12:00)	921 (13:00 – 14:00)	1954 (12:00 – 13:00)

Table 3.2 Day by day traffic variation. Site L7029

Wednesday flows, whether full-day or peak hour, were very close to the weekday average. Thus the counts commissioned for this TA, undertaken on a Wednesday, should represent a typical weekday. Further surveys undertaken on Thursday 12th June showed flows in line with those on the 4th.

3.4 The busiest weekend flows were well below the weekday peak-hour flows, so even if Leisure Centre traffic were exceptionally high at the weekend, the road network would still be less busy.

3.5 For the purposes of this Traffic Assessment, specific counts were undertaken at local junctions, the principle sites being the Coseley Rd/ Black Country Route Island and the Oxford St/ Black Country Route junctions. A summary of the total vehicular peak movements is given below:

	Coseley Rd Island	Oxford St Island
AM Peak	5853 (07:30 – 08:30)	4340 (07:30 – 08:30)
PM Peak	5349 (16:30 – 17:30)	4694 (16:45 – 17:45)

Table 3.3 Observed Peak Busiest Hour Total vehicle Movements

3.6 Whereas Coseley Road Island is busier in the morning than in the evening, the reverse is the case for Oxford St Island. Flow on the Black Country Route between the two junctions is about 2000 vehicles eastbound, 1400 westbound in the morning peak and 1600 vehicles eastbound, 2000 vehicles westbound in the evening peak. These observed flows are higher than those from the ATC in 2007: the higher westbound flows can be explained by the ATC being between the entry and exit for Morrison's supermarket, but the eastbound flows ought to be comparable. Both the roundabout surveys and the ATC show a difference in directional flows, with westbound traffic higher than eastbound over the day.

3.7 The price of petrol increased sharply in May and June 2008: this, however, is not thought to have suppressed the peak travel volumes noticeably and, as noted above, they exceed the 2007 figures.

3.8 As the Leisure Centre would be busier in the evening than in the morning, testing of the road network has been based on the evening peak. The peak hour has been taken as 16:30 to 17:30.

3.9 A further reason for choosing the evening peak is the Morrison's store, accessed in off the Black Country Route via Bristol St, with sole egress onto the Black Country Route via Bankfield St. This is much busier in the evening peak than in the morning peak and as a result the future signalised junction will have its greatest impact on delays in that period.

3.10 With the only egress from Morrison's via Bankfield St, it might be thought that a substantial proportion of departing traffic would U-turn at Coseley Rd island to gain destinations to the east. Similarly, it could be expected that a considerable proportion of the arriving flow would be from the west, U-turning at Oxford St island. The observed U-turns at both junctions are relatively light, which suggests that many drivers take return routes from Morrison's which are different to their outward route. This might be partly explained by some journeys being 'pass-by', but does suggest that routes to/from the Leisure Centre may also not be 'symmetric'.

3.11 The queue surveys showed that, over the surveyed period, queues were clearing in both the morning and evening peak hours. At Coseley Road Island only the Black Country Route east approach had any appreciable queueing on it and this in the PM peak only, with an average queue of about 20 – 25 vehicles. At Oxford St Island there were occasional lengthy queues on the Black Country Route in from Vulcan Island, with average queues of around 20 vehicles in both peaks. There were also variable queues on both arms of Oxford St.

4 Committed Development Traffic

4.1 In any Transport Assessment, it is necessary to allow for other developments which have received (or are likely to receive) planning permission and therefore can be expected to have been implemented prior to the Design Year for the development in question.

4.2 For this site, the most significant development is the remainder of the Bilston Urban Village, of which the Leisure Centre itself forms a part.

4.3 The 2005 Transport Assessment produced by Waterman Civils produced traffic forecasts for each major element of the Urban Village. Each element was assigned to one or more of the site access points, and the totals aggregated to get total flow increases for the development. Assignment was based on the observed turning proportions at major junctions, the impact of each development thus dissipating as the distance from it increases. Separate assessments were made for the morning and evening peaks and for inbound and outbound traffic.

4.4 The 2005 TA was based on the following expected breakdown of land use, excluding the Leisure Centre itself.

Development type	Expected maximum development size
Residential (C3)	1040 units
Employment (B1, B2)	16,900 sqm
Health (D1)	4,500 sqm

4.5 These estimates are still valid, and the original 2005 traffic generations and assignments for this traffic have been used in this Assessment as best estimates of committed development traffic. These are summarised in Appendix 2.

4.6 There will be some local commercial development within the Urban Village, but this will serve the development itself and so apart from a few delivery vehicles would not generate traffic from outside the Urban Village itself.

4.7 The estimated size of the Leisure Centre was taken as 5,600 sqm: the actual area will be slightly higher at 6,100 sqm (exceeding power/plant room). Leisure Centre traffic is considered in Section 5 following.

5 Proposed Development Traffic

5.1 This section considers the traffic generated by the development itself, in terms of its volume, origin and access routes.

5.2 The Leisure Centre building would be around 6,100 square metres effective GFA comprising different sports and leisure facilities. Information on likely traffic generation is available from the TRICS database. TRICS is trip generation and analysis database containing information from various sites in the country on their location, characteristics and size, from which predictions for the Bilston site can be made.

5.3 Form the various Leisure Centre sites available in TRICS, a subsample of ten sites was produced of sites with factors/characteristics that resemble those at Bilston. These factors were

- Good public transport
- Built-up residential area
- Availability of parking either on-site or close by
- Comparable size

5.4 The selected sites were

	GFA	Year Surveyed
Liverpool Halewood	8000	2007
Huyton, Merseyside	3120	2005
Workington, Cumbria	5360	2005
Gloucester	5886	2004
Lewes, Sussex	5000	2000
Sale, Manchester	7600	2004
Droitwich, Worcestershire	6000	2005
Glasgow	8400	1999
Weymouth, Dorset	5800	1998
Bridport, Dorset	5600	1998

TABLE 5.1 TRICS sites selected for comparison

5.5 Further details of the sites and their traffic are included in Appendix 1. The peak-hour (08:00 – 09:00 and 17:00 – 18:00) flows are given in Tables 5.2 and 5.3 below. Note

that these do not coincide with the busiest periods for the leisure centres themselves, which are usually early evening. Taking 17:00 – 18:00 predicted Leisure Centre traffic and adding it to the 16:30 – 17:30 current evening peak hour will give a slightly-overstated 'busiest evening hour' for evaluation.

	Arrivals	Departures	Totals
Droitwich	0.75	0.667	1.417
Glasgow *	0.643	0.583	1.226
Bridport, Dorset	0.554	0.536	1.09
Workington	0.485	0.504	0.989
Halewood, Liverpool	0.5	0.45	0.95
Lewes, Sussex	0.44	0.5	0.94
Sale, Manchester	0.474	0.461	0.935
Huyton, Merseyside	0.545	0.288	0.833
Gloucester	0.289	0.391	0.68
Weymouth*	0.155	0.086	0.241

*busiest of one or more surveys

Table 5.2 AM Peak trip rates (per 100sqm GFA), ranked by 2-way flow

	Arrivals	Departures	Totals
Halewood, Liverpool	1.938	1.212	3.15
Huyton, Merseyside	2.34	0.8	3.14
Workington	1.68	1.40	3.08
Bridport	1.357	1.143	2.5
Lewes	1.26	0.98	2.24
Gloucester	1.00	1.31	2.31
Sale	1.01	1.15	2.16
Droitwich	1.08	0.70	1.78
Glasgow*	0.92	0.76	1.8
Weymouth*	1.09	0.36	1.45

*busiest of one or more surveys

Table 5.3 PM Peak trip rates (per 100sqm GFA), ranked by 2-way total flow

5.6 Even within this subset, traffic data showed a considerable range for car-based trips. No particular causal factors could be identified, though it appears that leisure centres with swimming pools experience higher rates, perhaps reflecting a higher customer rate per unit floor area. Availability of public transport did not appear to be a particularly strong influence.

5.7 There was a wide spread of trip rates for AM and PM peak. Halewood Leisure Centre, Liverpool produced the highest trips (3.15 per 100sqm) in the PM peak despite good public transport. The leisure centre In Huyton, Liverpool has excellent public transport accessibility but fewer car parking spaces, but produced almost as many trips. The leisure centre in Gloucester city centre has excellent public transport access but no dedicated parking, other than town-centre pay car parks, but a trip rate only slightly lower. Overall, the busiest leisure centres generated about twice as many car trips, per unit floor area, as the quietest. Mean and 85%ile trip rates for the sample are given in Table 5.4 below.

	AM Peak		**PM Peak**	
	In	**Out**	**In**	**Out**
Mean	0.48	0.45	1.22	0.99
85%ile	0.60	0.54	1.84	1.27

Table 5.4: Development Trip Rates from TRICS for the 10 Sample Sites
(Trip rates per 100sqm GFA)

5.8 On the basis of the above site data, the following trip rates have been taken for assessment of the Bilston Leisure Centre. They represent approximately the 85%ile rates of the TRICS sample above, so should be robust.

	AM Peak		**PM Peak**	
	In	**Out**	**In**	**Out**
Trip Rate per 100sqm GFA	0.6	0.5	1.6	1.2
Vehicle movements	37	31	98	73

Table 5.5: Assumed Development Trip Rates For Bilston Leisure Centre

5.9 By comparison, the 2005 TA assumed 44 trips in and 27 trips out AM, 74 trips in and 62 trips out PM, based on average trip rates, and for a GFA about 10% less than now proposed.

5.10 None of the sites chosen from the TRICS database had a Travel Plan in operation at the time of their being surveyed. Any modal transfer arising out of the Travel plan for Bilston would reduce the above forecasts, so this should ensure they err on the generous side.

5.11 For weekends, TRICS does not provide enough information that would be sufficient enough for trips rate calculation and so no further analysis has been done for this scenario. The traffic data in Table 3.2 shows weekend peak flows to be well below weekday peak flows, so weekend periods are not critical in terms of highway capacity.

Parking

5.12 Based on the above peak flows, and the arrival/departure profiles of the ten sample sites, a parking accumulation table can be derived giving the parking demand that corresponds to the expected trip pattern at Bilston. The figures are given in Table 5.6 below.

Period	IN	OUT	End Accumulation
00:00 - 06:00			0
06:00 - 07:00	6	1	5
07:00 - 08:00	31	10	26
08:00 - 09:00	37	31	32
09:00 - 10:00	54	28	58
10:00 - 11:00	43	36	64
11:00 - 12:00	35	44	56
12:00 - 13:00	38	41	53
13:00 - 14:00	40	41	52
14:00 - 15:00	36	36	52
15:00 - 16:00	52	49	54
16:00 - 17:00	61	54	60
17:00 - 18:00	98	73	85
18:00 - 19:00	96	78	103
19:00 - 20:00	87	92	97
20:00 - 21:00	44	76	65
21:00 - 22:00	17	49	32
22:00 - 24:00	0	32	0

Table 5.4 Car Parking Accumulation, based on trip rates in Table 5.5

5.13 It is immediately noticeable that for much of the day the parking accumulation exceeds the capacity of the on-site car park. This will result in users' travel patterns being affected in the following ways:

1. Drivers will drive to the Leisure Centre and be lucky enough to find a space, or wait until one becomes available
2. On arrival drivers will find the car park full, and relocate to one of the town

centre car parks
3. Drivers will not attempt to try the Leisure Centre car park, but will drive straight to a town centre car park
4. Drivers will switch to another mode of transport

5.14 Whilst the problem does not arise in the morning peak, the shortfall in on-site parking spaces will cause problems in the evening peak, as well as later in the evening. How drivers behave will clearly affect the traffic movements that need to be considered in this report.

5.15 Given the general availability of free parking in Bilston town centre, within a short walk of the Leisure Centre, Option 4 is unlikely to be significant. Options 2 and 3 in some measure cancel each other out, but it is impossible to predict how drivers will actually behave. In fact there is a good case for providing *no* parking at the Leisure Centre (other than disabled/ key staff) as an under-provision could create more problems than no parking at all.

5.16 Parking charges at the Leisure Centre could be used to cap demand, or as part of a Travel Plan objective (for example, giving preference to high-occupancy cars), but whilst the town centre car parks are free charges at the Leisure Centre would only have limited impact on mode choice.

5.17 For this report, it has been assumed that the trip rates in Table 5.3 are those actually occurring, but movements to and from the Leisure Centre car park are capped at 60 per hour. The surplus movements have been reallocated to town centre car parks, which means, in modelling terms, they use Coseley Rd north and Oxford St north to their destination, rather than Dudley St. this has the consequence that total traffic movements on the *modelled* network are slightly lower than the total generated trips predicted (161 against 171 for the evening peak), as some trips from the Wolverhampton side of the town centre, and parking in the town centre, do not impinge upon the network.

5.18 A summary diagram of the trip movements for the Leisure Centre is given in Appendix 2.

6 The VISSIM Micro-simulation Model

6.1 As noted above, traffic to and from the Leisure Centre will pass through either the Coseley Road or Oxford St roundabouts, and, in traffic terms, can be considered to originate on the various arms of those junctions. No one arm is likely to carry more than perhaps a quarter of total Leisure Centre traffic. Thus the impact of this traffic will be very much less beyond these two roundabouts and the intervening section of the Black Country Route. It has been agreed with Wolverhampton City Council that traffic impact can be confined to the two roundabouts and the intervening section of the Black Country Route.

6.2 Along this section of the Black Country Route are the minor junctions with Bristol St, Bankfield Road, Dudley St and Wood Street. There are also three controlled pedestrian crossings. Thus it was considered that to assess each junction independently using traditional software (Arcady, Linsig etc) would not allow for the interaction of the junctions in terms of arrival distributions and tailbacks, and that a micro-simulation model would be more appropriate.

6.3 Micro-simulation models replicate behaviour of individual drivers at junctions and along roads and the interaction between drivers in streams of traffic. Thus an animation of any particular traffic pattern can be created. Having a visual representation of traffic is a very powerful tool in assessing the effects of changes in the road system as the effects can be directly visualised. Also by examining the model's performance in replicating existing traffic flows, queues and journey times there can be a high degree of confidence in its behaviour on future tests.

6.4 All traffic models require data on traffic movements. For all but the simplest models this needs to be as trip origins and destinations, so that the model can examine all feasible routes through the network and allocate vehicles to the most likely routes. One of the most labour-intensive steps in developing a micro-simulation model is producing the traffic movement matrix for it.

6.5 For the Bilston model, the road system is purely linear, and no traffic movement has a choice of route. In these circumstances it was possible to derive a trip matrix purely from the entry and exit traffic flows and some mathematical processing. Whilst this will give the correct turning proportions and volumes at each junction, It should be noted that this origin-destination matrix is purely hypothetical and probably does not accurately reflect *journey* patterns.

6.6 The micro-simulation program used was VISSIM, one of the market-leaders in this field which has been used extensively in many countries. Jacobs has considerable experience in the rubbing of these models.

6.7 Traffic data for the model was that obtained on Wednesday 4 June 2008. The Oxford St and Coseley Road islands were surveyed by video-camera with turning movement data for the 07:30 – 09:30 and 16:00 – 18:00 periods summated by 15-minute period. Queue data for these junctions was separately surveyed on the same day, for the purpose of calibrating the VISSIM model.

6.8 The model as produced is intended to represent the 16:30 – 17:30 period, this being the busiest overall hour based on the 4 June counts. As noted in Section 3, traffic flows for this day are higher than the February 2007 ATC figures, so they should be a robust depiction of current traffic patterns.

6.9 Signal settings for the Oxford St Island were obtained by direct observation on site. The signalised roundabout operates on a fixed cycle of 64s in both the morning and evening peak. Green periods and offsets are fixed, though these differ slightly between the two peaks.

6.10 The main roundabout counts were complemented by peak-hour manual classified counts for

- Dudley St (effectively Parkfield High School)
- Bankfield St (all traffic egressing Morrison's)
- Bristol St (traffic to Morrison's, also that to/from Bath St)
- Wood St (serving the bus station)

These counts give all movements in the vicinity of the Leisure Centre site.

6.11 The VISSIM model was developed and calibrated against its replication of the evening peak traffic. The final model successfully handled the observed departures flows with realistic queue lengths on all approaches.

6.12 The VISSIM model as initially developed and calibrated excludes the opening of the link road from Dudley St to Bankfield Road, reopening the through route from Bradley to the Black Country route and, more particularly, the Morrison's store. As designed, the new road layout allows northbound drivers to access the Black Country Route, where they are required to turn left, but not the Morrison's store or filling station. Southbound drivers will be able to exit Morrison's car park or filling station and gain Dudley St via the new link road. Future traffic from the Black Country Route can turn left or right into Bankfield

Road and reach Bradley via Dudley St.

6.13 Once the VISSIM model was confirmed to be accurately representing the existing situation, a modified version was developed incorporating the new junction layouts for Dudley St and Bankfield St with the Black Country Route, including the revised pedestrian crossing facilities.

6.14 The Bankfield St junction will go over to signal control which will permit drivers to turn left onto the Black Country Route (in two lanes), and also turn right from the eastbound and left from the westbound Black Country Route into Bankfield St. There will also be a bus lane which will allow buses turn right out of Bankfield St onto the Black Country Route and so gain the bus station.

6.15 The restoration of a through route from Bradley via lower Dudley St, the new link road and Bankfield St will mean that the traffic pattern observed in Spring 2008 will no longer be exactly valid. However, it is not considered that the reopening of this route will affect the assessment of the Leisure Centre, as from Bradley traffic will still have to proceed westwards to the Coseley Road island before continuing, so offering little advantage if any over existing routes. It will mean that traffic from Morrison's to Bradley will be able to avoid the Black Country Route altogether, resulting in a slight decrease of traffic. These two factors, which have opposing effects, should mean that opening up of this central route would have little impact on the test road network. As this right-turn runs simultaneously with the left-out turn from Bankfield St (except for the relatively infrequent case when the bus lane movement is called), and also the pedestrian movement across the westbound Black Country Route, it would not affect the signals capacity unless reaching about 300 vehicles/hour.

6.16 The provision of a right-turn from the Black Country Route into Bankfield St would be of most benefit to drivers if it offered a new and shorter route from western areas to Morrison's. At present the one-way system through the Morrison's car park prevents there being any advantage in this routeing, but should that change the right-turn into Bankfield St could become popular, carrying up to half of all Morrison's arrivals.

6.17 Future development of the Bilston Village site would increase traffic on this central link, with corresponding reductions in traffic through either the Coseley Road or Oxford St islands. The inclusion of this committed development, as outlined in Section 4, but all routed via one (or both) of these junctions should present a 'worst case' in traffic terms.

6.18 The Dudley Road junction will retain priority control. It will require drivers to turn left onto the Black Country Route (as previously), but also allow the turn right from the eastbound Black Country Route, as well as left from the westbound Black Country Route, into Dudley St. Such traffic will be confined to traffic to or from the new Leisure Centre, the

few houses on Prosser St, and Parkhall High School. There will be no controlled pedestrian facilities at the junction itself, but there will be a toucan crossing on the Black Country Route a little to the east of the junction in line with the proposed boulevard. It is possible that vehicular access to the Leisure Centre car park could be provided from the south, avoiding drivers having to come round nearly four sides of a square, but actual numbers from this direction would be slight and for modelling purposes this possibility has been ignored.

6.19 For the new junction at Bankfield Street a cycle time of 64s has been adopted, to match that for Oxford St Island, and the staging with respect to the Oxford St island signals offset to minimise delays. Pedestrian movements have been assumed on all cycles, in view of the expected high flows between the town centre and the new development. The staging for the toucan crossing at the boulevard, between Bankfield St and Dudley St has similarly been offset.

6.20 The 'tuning' of these signals has been with the objective of providing an acceptable VISSIM model of the local road network and it is possible that in real life traffic operation could be further optimised. However, this must not be at the risk of pedestrian safety, should the resulting crossing phases over the eastbound and westbound carriageways be poorly coordinated.

6.21 For visual purposes, notional pedestrian flows have been included in the simulations. For the crossings on the Black Country Route at Bankfield St and the proposed boulevard, pedestrian crossing times have been built into the signal settings and pedestrian stages are assumed to be called every cycle.

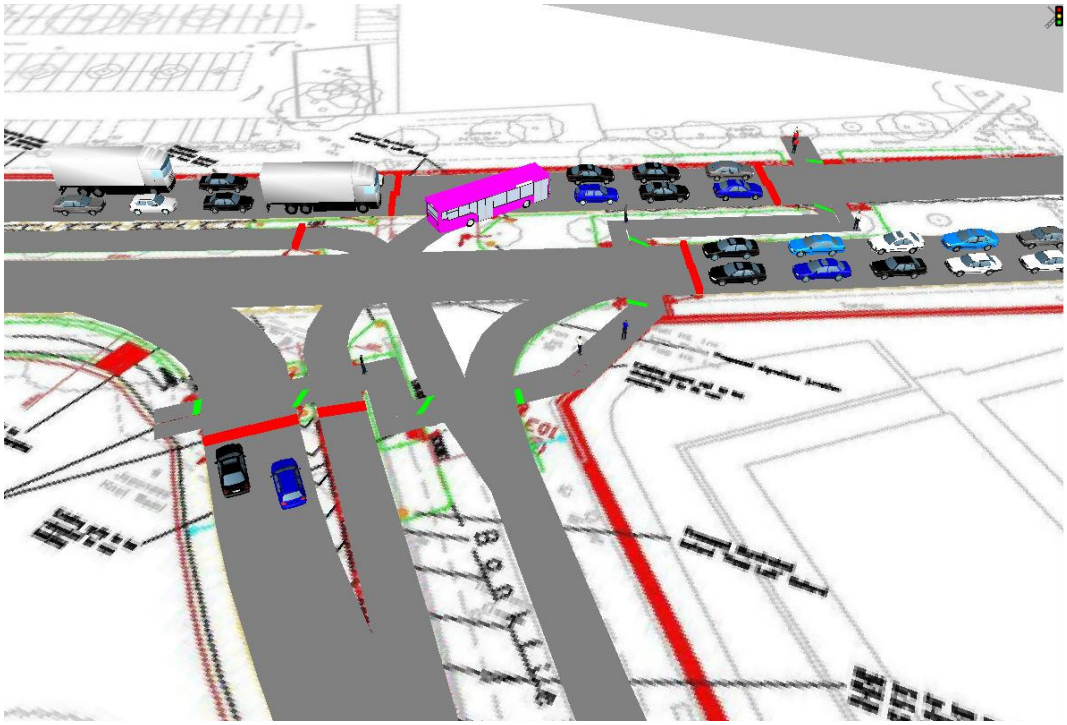


Figure 6.1: Sample VISSIM Simulation View showing new Bankfield St Junction

7 Assessment Scenarios and Results

7.1 An Assessment Year of 2018 (i.e. 10 years after the date of the planning application) has been agreed with Wolverhampton City Council Transportation Team. It has also been agreed that traffic growth can be taken to be the TEMPRO trip-end forecasts for that period.

7.2 TEMPRO is a central government produced database of expected journey trip-ends based on planning data and economic growth forecasts. The TEMPRO growth factors (average of trip productions and attractions) for this period for the Wolverhampton City area are

AM Peak 1.089, i.e. 8.9%
PM Peak 1.081, i.e. 8.1%

This has been applied to both the Light and heavy vehicle base matrices. For the 2010 tests, base traffic has been factored by 1.6%.

7.3 The various scenarios tested with the VISSIM model are

Scenario	Vehicle Movements, PM peak hour			
	Base	Leisure Centre	Committed Development	Total
2008 Base Do Nothing, with new junctions in place	6381*	-	-	6381
2010 Base (existing traffic plus growth)	6483	-	-	6483
2010 factored Base plus Leisure Centre (assumed opening year)	6483	161	-	6644
2018 factored Base (existing plus growth)	6898	-	-	6898
2018 factored Base plus Leisure Centre	6898	161	-	7059
2018 factored Base plus Leisure Centre plus committed development	6898	161	558	7617
* 6058 Light vehicles, 323 Heavy vehicles/buses				

Table 7.1: VISSIM Assessment Scenarios

7.4 Assessment criteria are journey times for the following movements:

- East/west along A463 Black Country Route, from east of Oxford St to west of Coseley Rd
- North/south along Coseley Rd, through A463 island
- North/south along Oxford St through A463 island

7.5 These give a representative sample of delays through the network and an indication of the level of performance. Average vehicle speed has also been measured for each scenario: this is based on all vehicles passing through the network.

7.6 Predicted queue lengths have also been recorded on all the major approaches for all scenarios. These are average queue lengths, in metres, taken over the assessment hour. To ensure future queues are not understated, the external links into the model have been 'stretched' to at least 500m from the Oxford St and Coseley Road islands as appropriate. Timing points have been placed at these extremes to ensure all queue delays are incorporated. Queues on the Black Country Route westbound at Coseley Road, and eastbound at Oxford St (i.e. the 'internal' queues), have not been specifically recorded, as the intervening junctions and pedestrian crossings would give misleading values. In practice it is very difficult to separate the impact of the individual components, which is why the VISSIM model was used in the first place.

7.7 As part of the full Urban Village development, the 2005 TA anticipated that the Coseley Road island would need to be signalised, also that the Brook St entry into the Oxford St island would be slightly widened. These improvements have been excluded from the modelling to first see whether the network can cope without these schemes.

7.8 All VISSIM tests have been run for the equivalent of five hours, to minimise any variation arising from the semi-random nature of the traffic generation and so ensure that results are a true reflection of the levels of traffic demand in each scenario. A 'warm-up' period was introduced before the start of each test to ensure the network contained traffic at the start of the evaluation period.

Assessment Results

Scenario	Journey Times, PM peak hour					
	Black Country Route		Coseley Road		Oxford St	
	E'bound	W'bound	N'bound	S'bound	N'bound	S'bound
2008 Base Do Nothing, with new junctions in place	251	382	86	162	137	228
2010 Base (existing traffic plus growth)	351	614	83	78	239	262
2010 factored Base plus Leisure Centre (assumed opening year)	414	602	91	98	219	262
2018 Base (existing traffic plus growth)	462	593	100	123	262	265
2018 factored Base plus Leisure Centre	554	612	110	130	284	266
2018 factored Base plus Leisure Centre plus committed development	675	616	180	161	282	277
All values in seconds						

Table 7.2: VISSIM Assessment results – Journey Times

Scenario	Ave Queue lengths (m), PM peak hour					
	Into Cosleley Rd Island			Into Oxford St Island		
	Coseley Rd North	Coseley Rd South	Black Country Route W	Oxford St North	Oxford St South	Black Country Route E
2008 Base Do Nothing, with new junctions in place	285	9	25	306	31	154
2010 Base (existing traffic plus growth)	6	8	28	348	206	462
2010 factored Base plus Leisure Centre (assumed opening year)	80	13	73	354	176	479
2018 Base (existing traffic plus growth)	199	21	355	355	280	485

2018 factored Base plus Leisure Centre	249	31	301	356	323	484
2018 factored Base plus Leisure Centre plus committed development	386	178	442	359	318	485

Table 7.3: VISSIM Assessment Results – Queue Lengths on External Links

Scenario	Average Speed	
	Km/hour	Mph
2008 Base Do Nothing, with new junctions in place	20.4	12.6
2010 Base (existing traffic plus growth)	15.0	9.3
2010 factored Base plus Leisure Centre (assumed opening year)	14.3	8.9
2018 Base (existing traffic plus growth)	13.6	8.4
2018 factored Base plus Leisure Centre	12.4	7.7
2018 factored Base plus Leisure Centre plus committed development	11.0	6.8

Table 7.4: VISSIM Assessment Results – Average Traffic Speed

Comments on the above Assessments

7.9 The results for the 2008 base, with the introduction of the new junctions at Bankfield St and Dudley St, show results very similar to those in the calibration tests, indicating that the introduction of these has no material affect on the operation of the two roundabouts. This is as would be expected. However, it does show an unexpected queue on Coseley Road North, which was not present and is not present in later scenarios, so this appears to be an anomaly. The average speed of traffic, based on all vehicles exiting the network, was 12.6mph.

7.10 Rolling forward to 2010, the assumed opening year of the Leisure Centre, there is an overall worsening of queue lengths and a drop in speed to 9.3mph. This excludes traffic from the Leisure Centre itself, and is noteworthy as being due to the relatively small increase of 1.6% in the current traffic levels. About 460 vehicles were unable to access the network owing to the tailback of queues. This suggests that the network is running

very close to capacity now. There is almost the same worsening in conditions, and increase in journey time, arising from this small increase as that predicted over the longer period of growth 2010 – 2018. As will be seen, by 2018 the network cannot cope with the travel demand, resulting in some of the measurement statistics understating the true impact.

7.11 The addition of the Leisure Centre traffic into the 2010 scenario introduces a relatively slight further worsening, with overall average speed dropping to 8.9mph. About 540 vehicles were unable to access the network.

7.12 For 2018, scenarios have been tested both with and without the Leisure Centre. The purpose of the two tests is to determine the extent to which increased travel times are due to Leisure Centre traffic, and how much is due to the expected growth in background traffic. Comparing the results for these against the 2008 or 2010 scenarios, it can be seen that although travel times have increased appreciably, most of this arises from the growth in background traffic, and only a small proportion is due to the Leisure Centre.

7.13 Adding in the remainder of the Bilston Urban Village traffic, as committed development, shows a further deterioration in travel conditions. The tailback of traffic meant that queues reached the boundaries of the model, in effect impeding the loading of the target traffic movements onto the network. In practice, these queues would be extending beyond neighbouring junctions (e.g. Vulcan Roundabout on the A463 and Millfields Rd/ High St in Bilston) and so further spreading congestion. In all, about 1600 vehicles were unable to access the network, although the increase in demand amounts to 1200 above 2008 levels. This reinforces the view that the network is close to capacity now.

7.14 It is possible that minor changes in signal settings would improve network performance over that recorded above, which has not attempted to re-optimise the settings each time, but there is only finite scope for such fine-tuning to mitigate the above forecast conditions.

8 Road Safety

8.1 The 2005 Transport Assessment on the full development reviewed accident data for the five years up to April 2005. It covered local sections of the Black Country Route, Coseley Road, Broad Lanes, Highfields Road, Salop St, Loxdale St, Oxford St and Dudley St. Not all of this area is relevant to the traffic impact of the Leisure Centre. Overall it was concluded that there were no particular highway safety issues likely to affect, or be affected by, the proposed development. The impact of the Leisure Centre alone, responsible for only a small part of the total traffic generation, would therefore be minimal.

8.2 The only changes to the highway network since the 2005 Report are the ongoing junction alterations at Dudley St and Bankfield St, with the temporary closure of a through route from Bradley via these roads.

8.3 Signals were introduced at Oxford St Island in March 2004, towards the end of the evaluation period in the 2005 report. These should have reduced the previous high accident rate at that junction and the number of shunt accidents on the approaches to it.

9 Non-car Users

9.1 The Leisure Centre is conveniently located for those arriving by bus or tram, the site being about 5 minute's walk from Bilston bus and tram stations. There are also other residential areas within walking distance and so the proportion of users approaching the site on foot should be high.

9.2 The site will be accessible by cycle, though heavy traffic flows may deter many riders. Bus is likely to be a more practicable alternative in many cases.

9.3 Most non-motorised users, whether using public transport to Bilston or walking/cycling throughout, will approach the site by crossing the Black Country Route. In most cases this will involve their using the controlled crossing at the proposed boulevard linking Bilston town centre with the Urban Village, adjacent to the Leisure Centre.

9.4 The pedestrian staging of this and other crossings is largely dependent on the traffic signal timings which in turn need to be correlated with those at the Oxford St Island to maximise traffic capacity. At the same time, it will be necessary to coordinate the pedestrian phases on the north and south arms of the crossing to minimise pedestrian delay, and avoid, as far as practicable, pedestrians having excessive waits, in particular on the central refuge.

9.5 In association with this Traffic Assessment, a framework Travel Plan has been prepared for consideration as part of the planning application. This gives more details on available travel modes and ways in which alternatives to private car can be promoted and supported.

10 Conclusions

10.1 The results of the VISSIM modelling suggest that although the local road network currently copes with peak-hour traffic without excessive queuing and delays, it is running close to capacity and even an increase of a few percent will cause queues at junctions to tail back and cause gridlock. In the worst test scenario, that for 2018 with background traffic growth and addition of the full Bilston Urban Village development traffic, the network was loaded with 19% more traffic than present and this simply could not be handled.

10.2 The impact of the Leisure Centre alone is relatively small. Tests 'with and without' for both 2010 and 2018 show it to have relatively little impact. As a contributor to the overall traffic increase, it would be appropriate for an associated contribution to remedial measures to be made as a part of any planning permission.

10.3 As part of the original Bilston Urban Village Transport Assessment, in 2005, it was recommended that traffic signals be added to the Coseley Road roundabout as a means of increasing capacity. The VISSIM tests show that the section of the Black Country Route between Coseley Road and Oxford St is heavily-congested with slow-moving traffic in either direction, and increasing capacity at Coseley Road might ease westbound flows, but would not relieve conditions eastbound and could potentially worsen them. It is also obvious that Oxford St Island will require some enhancement of capacity to complement works at Coseley Road. Whereas there is some scope to increase capacity at the latter, it would be extremely difficult to come up with a scheme to increase capacity at Oxford St. The alternative would be to seek measures to reduce public transport delay through bus lanes/ priorities at these junctions.

10.4 Given that the network is already near or at capacity, an alternative would be to invest in alternative methods of travel to cater for the underlying increase in demand. However, it is difficult to see how a relatively small generator such as the Leisure Centre could fund significant public transport or walk/cycle facilities. Its Travel plan will ensure that its impact in terms of further car movements is minimised.

10.5 It is concluded that a pro-rata contribution to the Coseley Road Island signalisation would be an appropriate contribution by the Leisure Centre scheme.

Appendices

Appendix 1

TRICS Data

TRICS sites chosen for comparison

Site	TRICS Ref	TRICS Location Category	Area, Ha	GFA	Employment	Surveyed	Trip modal percentages (where available), full-day Veh	Foot	Bus	Cycle
Liverpool Halewood	MS-07-C-01	Edge of Town	1.5	8000	35	2007	93	6	< 1	< 1
Huyton, Merseyside	MS-07-C-01	Edge of Town	1.08	3120	60	2005	72	5	23	0
Workington, Cumbria	CB-07-C-01	Edge of Town	2.3	5360	42	2005	90	10	0	0
Gloucester	GS-07-C-01	Edge of Town Centre	0.83	5886	138	2004	62	24	9	5
Lewes, Sussex	ES-07-C-02	Edge of Town	2	5000	29	2000				
Sale, Manchester	GM-07-C-04	Edge of Town Centre	0.6	7600	100	2004	67	19	12	2
Droitwich, Worcs	WO-07-C-02	Edge of Town	4.5	6000	26	2005	86	13	0	1
Glasgow	GL-07-C-02	Neighbourhood Centre	2.4	8400	55	1999				
Weymouth, Dorset	DC-07-C-04	Edge of Town	n/a	5800	18	1998				
Bridport, Dorset	DC-07-C-05	Edge of Town	4.5	5600	128	1998	89	8	1	1

Appendix 2

PM Trip Matrices for VISSUM Model

2008 Base Flow Matrix - Light Vehicles

			Destination											
			Coseley Rd. N	Coseley Rd S	BCR west	Dudley St.	Bankfield St.	Bristol St.	Wood St.	Oxford St (N)	BCR East	Oxford St. (S)	Brook St.	
			1011	1013	1014	1021	1031	1041	1051	1061	1062	1063	1064	TOTAL
			1	2	3	4	5	6	7	8	9	10	11	
1011	1	Coseley Rd (N)	0	421	271	0	0	0	13	76	459	84	3	1327
1013	2	Coseley Rd (S)	257	0	79	0	0	0	4	22	132	25	2	521
1014	3	BCR west	240	62	0	0	0	0	13	77	462	85	3	942
1021	4	Dudley St.	6	4	10	0	0	0	0	0	0	0	0	20
1031	5	Bankfield St.	87	50	115	3	0	0	0	15	34	14	0	318
1041	6	Bristol St.	6	4	10	0	0	0	0	0	0	0	0	20
1051	7	Wood St.	0	19	0	0	0	0	0	0	17	11	0	47
1061	8	Oxford St (N)	74	36	86	2	0	42	0	0	179	312	37	768
1062	9	BCR East	315	201	449	10	1	177	0	134	0	9	22	1318
1063	10	Oxford St. (S)	131	79	181	4	0	76	0	234	3	0	5	713
1064	11	Brook St.	7	5	10	0	0	4	0	25	12	1	0	64
TOTAL			1123	881	1211	19	1	299	30	583	1298	541	72	6058

2008 Base Flow Matrix - Heavy Vehicles

			Destination											
			Coseley Rd. N	Coseley Rd S	BCR west	Dudley St.	Bankfield St.	Bristol St.	Wood St.	Oxford St (N)	BCR East	Oxford St. (S)	Brook St.	
			1011	1013	1014	1021	1031	1041	1051	1061	1062	1063	1064	TOTAL
			1	2	3	4	5	6	7	8	9	10	11	
1011	1	Coseley Rd (N)	0	12	6	0	0	0	10	2	22	7	0	59
1013	2	Coseley Rd (S)	8	0	2	0	0	0	2	0	4	1	0	17
1014	3	BCR west	9	0	0	0	0	0	16	3	32	11	0	71
1021	4	Dudley St.	0	0	0	0	0	0	0	0	0	0	0	0
1031	5	Bankfield St.	3	1	2	0	0	0	0	0	0	0	0	6
1041	6	Bristol St.	0	0	0	0	0	0	0	0	0	0	0	0
1051	7	Wood St.	0	6	0	0	0	0	0	2	11	4	0	23
1061	8	Oxford St (N)	3	1	2	0	0	0	0	0	7	25	1	39
1062	9	BCR East	24	6	18	0	0	1	0	8	0	2	0	59
1063	10	Oxford St. (S)	6	2	5	0	0	0	0	33	1	0	0	47
1064	11	Brook St.	0	0	1	0	0	0	0	1	0	0	0	2
TOTAL			53	28	36	0	0	1	28	49	77	50	1	323

Note:

The above matrices have been constructed from observed turning counts. They do not represent observed origin to destination movements and are valid only for the purpose of testing performance of the VISSIM network.

The following matrices for the Leisure Centre and remaining Bilston Urban Village development are forecasts based on the distribution of predicted trip-ends.

Appendix 2

PM Trip Matrices for VISSUM Model

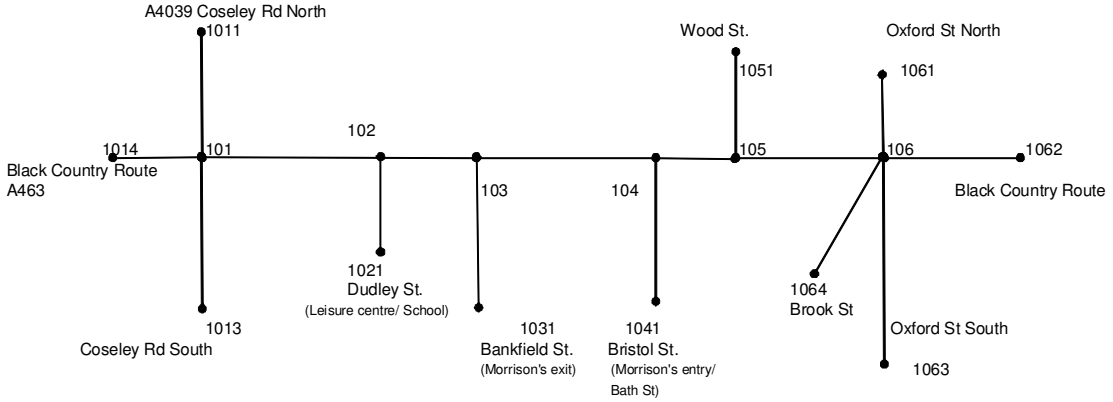
PM Leisure Centre Trips - Allowing for parking capacity of 60. Surplus diverted to town centre carparks

			Destination											
			Coseley Rd. N	Coseley Rd S	BCR west	Dudley St.	Bankfield St.	Bristol St.	Wood St.	Oxford St (N)	BCR East	Oxford St. (S)	Brook St.	
			1011	1013	1014	1021	1031	1041	1051	1061	1062	1063	1064	TOTAL
	Zones		1	2	3	4	5	6	7	8	9	10	11	
1011	1	Coseley Rd (N)	1	1	1	14	0	0	0	1	1	1	0	20
1013	2	Coseley Rd (S)	0	0	0	6	0	0	0	1	0	0	0	7
1014	3	BCR west	5	0	0	9	0	0	0	5	0	0	0	19
1021	4	Dudley St.	14	6	11	0	0	0	0	9	14	7	0	61
1031	5	Bankfield St.	0	0	0	0	0	0	0	0	0	0	0	0
1041	6	Bristol St.	0	0	0	0	0	0	0	0	0	0	0	0
1051	7	Wood St.	0	0	0	0	0	0	0	0	0	0	0	0
1061	8	Oxford St (N)	4	1	1	6	0	0	0	1	1	1	0	15
1062	9	BCR East	5	0	0	18	0	0	0	5	0	0	0	28
1063	10	Oxford St. (S)	0	0	0	8	0	0	0	3	0	0	0	11
1064	11	Brook St.	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL			29	8	13	61	0	0	0	25	16	9	0	161

Note: Movements to and from the Dudley St car park have been capped at 60 in, 60 out.
Surplus trips have been reassigned pro-rata to and from town centre car parks.
Reassigned trips to/from Coseley Rd North (5) and Oxford St North (5) will not reach the test network and so have been omitted

Committed Development Trip Matrix - Bilston Urban Village (excluding Leisure Centre)

			Destination											
			Coseley Rd. N	Coseley Rd S	BCR west	Dudley St.	Bankfield St.	Bristol St.	Wood St.	Oxford St (N)	BCR East	Oxford St. (S)	Brook St.	
			1011	1013	1014	1021	1031	1041	1051	1061	1062	1063	1064	TOTAL
			1	2	3	4	5	6	7	8	9	10	11	
1011	1	Coseley Rd (N)	0	51	0	0	6	0	0	0	0	0	0	57
1013	2	Coseley Rd (S)	26	0	25	0	2	0	0	0	32	0	0	85
1014	3	BCR west	0	9	0	0	5	0	0	0	0	0	33	47
1021	4	Dudley St.	0	0	0	0	0	0	0	0	0	0	0	0
1031	5	Bankfield St.	25	12	21	0	0	0	0	18	27	14	0	117
1041	6	Bristol St.	0	0	0	0	0	0	0	0	0	0	0	0
1051	7	Wood St.	0	0	0	0	0	0	0	0	0	0	0	0
1061	8	Oxford St (N)	0	0	0	0	2	0	0	0	0	0	36	38
1062	9	BCR East	0	54	0	0	8	0	0	0	0	0	44	106
1063	10	Oxford St. (S)	0	0	0	0	3	0	0	0	0	0	13	16
1064	11	Brook St.	0	0	38	0	0	0	0	16	25	13	0	92
TOTAL			51	126	84	0	26	0	0	34	84	27	126	558



VISSIM Diagrammatic network