Transport Report

Temple Quarter Enterprise Zone

Bristol City Council

June 2012

Halcrow
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Appendices

1 Introduction

1.1 Background

Halcrow have been commissioned by Bristol City Council to undertake a Transport Study to inform the preparation of a Spatial Framework for the Bristol Temple Quarter Enterprise Zone, undertaken by the City Design Group.

The study brief requires that Halcrow consider pedestrian and cycle linkages, bus operations and traffic management issues. Consideration should also be given to the quantification of transport impacts using available modelling tools.

1.2 Temple Quarter Enterprise Zone

The Temple Quarter Enterprise Zone (EZ) is the West of England's Enterprise Zone, which together with 5 Enterprise Areas – Avonmouth/Severnside, Bath City Riverside, Emersons Green/Science Park, Filton/A38 and the Weston Regeneration Area – plays a key role in supporting growth of the city region's economy. The EZ itself covers approximately 70 hectares (173 acres) of land in the vicinity of Bristol Temple Meads Railway Station. Figure 1.1 shows the area covered by the EZ.

It is intended that the zone will act as a magnet for inward investment and boost the local economy by creating new jobs, through a range of development opportunities, with a particular emphasis on opportunities for creative industries and technologies. Initial analysis suggests that the EZ will lead to the creation of almost 17,000 new jobs over a 25 year period, with both new and refurbished space featuring offices, research and development and retail areas. A business rate discount will apply in the EZ, as well as (potentially) the relaxation of some planning requirements.

Temple Meads station itself, already a key gateway to the city, will become an even more important and attractive gateway for businesses. This proximity of the EZ and Temple Meads station means that the zone will also benefit from electrification of the Great Western mainline plus local transport enhancements in the Greater Bristol area such as Bus Rapid Transit.

1.3 This report

A series of tasks have been undertaken, and associated Technical Notes produced describing the work done. After this introductory chapter, the remainder of the report brings together the discussions from those notes, as follows:

- Chapter 2 puts the EZ in context, describing the planning situation, existing bus access and outlining some of the key features of trip-making by people working in Bristol, and in particular those working in and around the EZ, setting the scene for analyses discussed in further chapters.
- Chapter 3 describes the initial investigation into the likely travel demand precipitated by the EZ, through a review of available data sources, existing policies and previous studies.
- Chapter 4 takes the trip generation and initial mode split and investigates the effects of different assumptions regarding modes used.

- Chapter 5 summarises the results of Chapter 4, in particular highlighting the effects on public transport modes and in the context of local (walking) accessibility to the EZ.
- Chapter 6 brings together a series of potential enabling measures that could be considered to provide suitable access to the EZ by various modes of transport.
- Chapter 7 sets out some concluding thoughts.

There are six appendices:

- Appendix A has additional notes on the planning context surrounding the EZ.
- Appendix B holds the Figures described in Chapter 4.
- Appendix C contains a technical note that discusses some of the more detailed rail issues that surround the EZ, being as Temple Meads station is the focus of planned changes and potentially significant enhancements to the rail system in the Greater Bristol area.
- Appendix D shows visualisations of a potential Temple Circus underpass.
- Appendix E has details of Temple Circus underpass cost estimates.
- Appendix F shows visualisations of a potential Temple Circus footbridge.

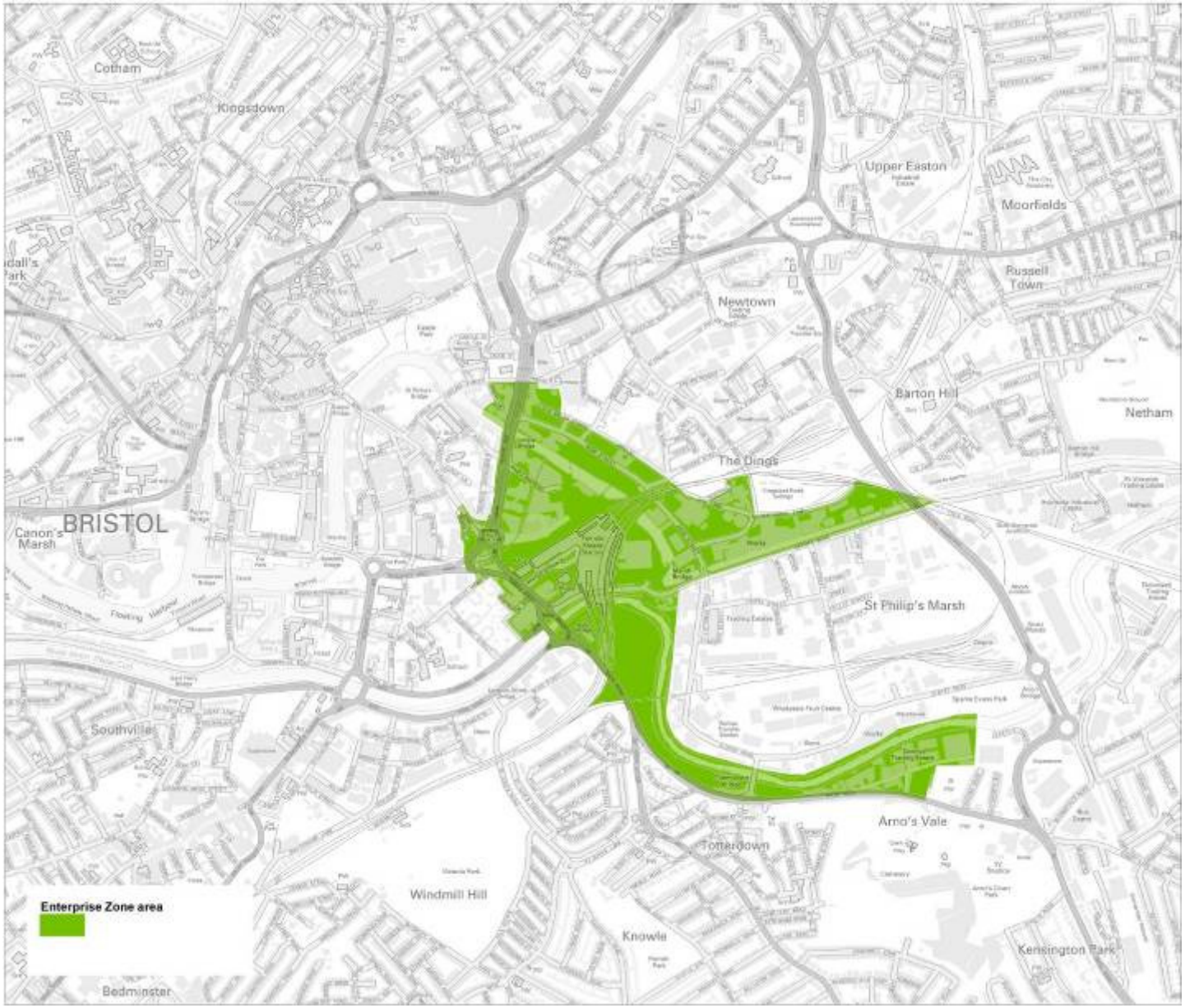


Figure 1.1 – Temple Quarter Enterprise Zone – location

2 The Enterprise Zone in context

2.1 Planning situation

The EZ covers approximately 70 hectares (173 acres) of land to the north and east of Bristol Temple Meads Railway Station (Figure 1.1 showed the area covered by the EZ).

Initial analysis suggests that the EZ's renewal and redevelopment will lead to the creation of almost 17,000 new jobs over a 25 year period. In doing so, these jobs will need to be accommodated in over 240,000 sq m (2.6 million sq ft) of space, which will include new and refurbished buildings in a mixed use development. As part of the EZ process, a business rate discount will apply in the EZ, as well as (potentially) the relaxation of some planning requirements.

Figure 2.1 shows the regeneration context within which the EZ fits. In particular, the EZ contains elements of Bristol City's Regeneration Policy Areas (City Centre Extensions North of the Feeder Canal and City Centre Gateway Temple Gate), as well as being closely related to the City Centre Gateway Old Market, Inner East and South Bristol regeneration policy areas. Further context planning elements are summarised in Appendix A.

A number of specific sites are also identified in Figure 2.1, which represent recent developments and/or available land in the EZ. The plots have a variety of different statuses, as set out in Table 2.1.

Plot (Fig 2.1)	BCC Ref	Site Name	Status
A1	1	Bank Place	Permitted
B1	2	Glassfields	Permitted
C1		Old Soap Works /	Occupied
C5		The Atrium (ND12B)	Occuiped
C4		The Plaza & The Quadrant (ND13+ND12A)	Occupied
C3		Ratcliffe Court (ND11)	Occupied
B9		ND8 Temple Quay North	Occupied
C7		Cityspace (47-49 Barton Vale)	Occupied
B10	5	Plot ND9 Temple Quay North	
B7	3	ND6 Temple Quay	Permitted
B8	4	ND7 Temple Quay North	Outline Only
B4		1 Glass Wharf (Burges Salmon)	Partially Occupied
B3		The Eye	Unoccupied
B2		Trinity Quay	Occupied
B5	6	2 Glass Wharf (ND4)	Outline Permission
B6	7	3 Glass Wharf (ND5 Temple Quay North)	Permitted
E1	8	Island Site, Temple Gate	Permitted
D10		Plot 3 Temple Quay	No permissions
F2	10	Diesel Depot	No permissions
G2		Bath Road Former Esso Garage	Permission refused
F1	9	Sorting Office	Permission lapsed; renewal not determined
D12		Collett & Herbert Houses & Telephone Exchange	Refused
E2		Redcliffe Futures SPD East of KPMG	
C9		51 Barton Road	Permitted (possibly part built/occupied)
C8		47-49 Barton Road	Permitted (possibly part built/occupied)
C6		41-45 Barton Road	Refused

Plot (Fig 2.1)	BCC Ref	Site Name	Status
D11		Plot 6 Temple Quay	No permissions
D1		3 Temple Back East (ROK)	
D2		1 Temple Back East (Bristol & West)	Occupied
D3		2 Temple back East (Osborne Clarke)	Occupied
D4		3 Rivergate	Occupied
D5		2 Rivergate (ex BT)	
D6		2 Rivergate (GOSW)	
D9		2 The Square (Civil Service)	
D8		1 The Square	Occupied
D7		Friary	
C2		Plot ND10 Temple Quay North	
G1		Bath Rd Open Space West of Totterdown Bridge	No applications
G3c	11	Paintworks Phase 3	Pending Decision
C10		Land bounded by hawkins, Unity & Jacob Streets	Pending Decision

Table 2.1: Enterprise Zone development plot status

Table 2.2 shows summary information for the EZ, including potential development space, employee numbers and parking spaces, based on knowledge of current development status and occupancy.

			Development in the EZ…			
			Built and occupied	Built and unoccupied	Permitted but not built	Total
Commercial floorspace (sq.m)		B1 gross	119,432	0	106,825	226,257
		B1 net	95,546	0	85,460	181,006
		B8	-5,466	0	0	-5,466
		A1/A3/ A4	2,867	277	5,107	8,251
		long-stay	5,355	0	0	5,355
Residential		sq.m	1037	3859	1954	6850
	short-stay parking (on-street)		14	72	269	355
Car parking spaces			979	0	527	1,506
Proposed Motorcycle Parking			168	0	99	267
Proposed Cycle Parking Spaces		Long-stay	499	72	494	1,065
		Short-stay	92	0	92	184
Potential employees	per sq.m GFA	20	5,972	0	5,341	11,313
		12	9,953	0	8,902	18,855
	per sq.m NFA	20	4,777	0	4,273	9,050
		12	7,962	0	7,122	15,084

Notes: Employee/20sqm is equivalent to 1 employee/12sqm with 70% occupancy
Gross to net conversion 80%

Table 2.2: Summary of development space, potential employees and parking in the EZ

2.2 Current bus services

Bus services do not enter the EZ in the main, though many services pass around the edge. Principal services run along the southern boundary (Bath Road) and just inside the western edge of the zone (Temple Gate, Temple Way). To the north of the EZ, services mostly operate through Old Market, some 250m to the north. Upstream of Bath Road Bridge, bus services next cross the River Avon / Feeder Canal at Netham Lock, some 2km distant.

2.2.1 Bus frequencies

Most areas of Bristol and its immediate surroundings have frequent bus access to Temple Gate or Old Market, and thus by proximity as noted above, to the EZ itself through short walks (frequent being defined for the purpose of this assessment as 3 or more daytime services per hour). As radial routes merge towards the city centre, so the frequency of services available to the travelling public tends to increase. A better than 10 minute frequency (more than 6 buses per hour) is available along many corridors, as shown in Table 2.2.

Corridor	Daytime Buses per hour
Triangle / Park Street	26
Whiteladies Road	22
Stapleton Road (Old Market to Fishponds Road)	17
Bath Road (Arnos Vale to Three Lamps)	16
Church Road, St George	13.5
Cribbs Causeway / Henbury / Brentry	13
White Tree Roundabout to Blackboy Hill	13
Fishponds Road	12
Wells Road (Broad Walk to The Bush)	11
Frenchay Park Road, Stapleton	8
Kingswood town centre	7.5
Westbury Village	7
Cotham Brow (top)	7

Table 2.2: Bus frequencies on key corridors

Areas in Bristol that have fewer bus services available (including those with little or no direct services to the vicinity if the EZ) include:

- Montpelier / St Andrew's / Bishopston / Horfield
- Filton
- All of the north Fringe beyond Avon Ring Road
- Frenchay Village
- All of south-west Bristol west of Redcatch Road, Knowle & Hengrove Depot (Bedminster, Ashton, Bedminster Down, Withywood, Hartcliffe)

Inter-urban services from neighbouring towns do not in the main directly pass the EZ, and are focused on the Marlborough Street bus station. With the exception of services from Bath, Keynsham, Norton-Radstock, Wells and Street, almost no other frequent hourly interurban services pass the EZ. Those services that do, travel along the Hotwell Road (from the south-west) and M32/Whiteladies Road/Gloucester Road (from the north) and terminate at the bus station.

Figure 2.2 shows combined bus frequencies leading to the EZ (wider Bristol area), with Figure 2.3 showing similar information immediately around the EZ. Table 2.2 gives a breakdown of bus services, corridors and origins from Temple Gate south. Table 2.3 has similar information for Temple Gate north/Temple Meads; Tables 2.4 and 2.5 show services at Old Market (east and west respectively).

Corridor	Origin	Service	Daytime Hourly Frequency
Bath Road	Bath	339/X39	5
	Norton-Radstock	178	1
	Keynsham	349/649	3
	Stockwood	57	2
	total from Brislington	57, 178, 339/X39, 349/649	11
	Broomhill	1	5
	total from Arnos Vale	1, 57, 178, 339/X39, 349/649	16
Wells Road	Stockwood	54	5
	Street, Glastonbury & Wells	376	1
	Wells		1
	total from Bear's Bridge	54, 376	7
	Hengrove Depot	20	4
		51	4
	total from The Bush, Totterdown	20, 51, 54, 376	15
Three Lamps	total from the Three Lamps	1, 20, 51, 54, 57, 178, 339/X39, 349/649, 376	31
Clarence Road	Weston-super-Mare	121	0.5
	Cumberland Basin	506	2
	UWE Bower Ashton Campus	U1	2
	total on Clarence Road	121, 506, U1	4.5
Temple Gate	total on Temple Gate	1, 20, 51, 54, 57, 121, 178, 339/X39, 349/649, 376, 506, U1	35.5

Table 2.2: Corridor services and frequencies – Temple Gate (from the south)

Corridor	Origin	Service	Daytime Hourly Frequency
Westbury Road (White Tree Rbt to Black Boy Hill)	Cribbs Causeway via Westbury Village	1	5
	Cribbs Causeway via Southmead	54	5
	total on Westbury Road	1, 54	10
Park Street / Centre / Broadmead	Clifton & Redland Clockwise Circular	8	5
	Redland & Clifton Anticlockwise Circular	9	5
	total from Triangle / Park Street	1, 8, 9, 54	20
Victoria Street	Cribbs Causeway via Westbury Village	1	5
	Centre	51	4
	Cribbs Causeway via Southmead	54	5
	Bus Station	178	1
	Bus Station	339/X39	5
	Bus Station/ Broadmead	349/649	3
	Southmead via Easton	506	2
	UWE Frenchay Campus	U1	2
	total from Victoria Street	1, 51, 54, 339/X39, 506, U1	27
Temple Way	Clifton & Redland Clockwise Circular	8	5
	Redland & Clifton Anticlockwise Circular	9	5
	Bus Station	376	2
	total on Temple Way	8, 9, 376	12
Redcliffe Way	Southmead via The Arches	20	2
	Centre	20	2
	Bus Station	121	0.5
	total from Bus Station	20, 121	4.5
Bus Station (via Centre, Temple Way, Broadmead)	total from Bus Station	178, 339/X39, 121	6.5

Table 2.3: Corridor services and frequencies – Temple Gate / Temple Meads (from the north)

Corridor	Origin	Service	Daytime Hourly Frequency
Stapleton Road	Downend	4	2
	Horfield Common	24	3
	Emerson's Green	48/49	6
	UWE	U3	6
	total on Trinity Road	4, 24, 48/49, U3	17
Clarence Road / Lawrence Hill	Kingswood	6	4
	Staple Hill	7	4
	Withwyood via Brislington	36	3
	Bitton via Kingswood	42	3
	Cadbury Heath via Kingswood	43	3
	Kingswood via Hanham	44	3
	Longwell Green via Hanham	45	3
	Bath	332	1
	Chippenham via Marshfield	635	0.5
	total on Clarence Road	6, 7, 36, 42, 43, 44, 45, 332, 635	24.5
West Street	total on West Street	4, 6, 7, 24, 36, 42, 43, 44, 45, 48/49, 332, 635, U3	41.5
Midland Road	Southmead Hospital via Easton	506	2
Old Market	total on West Street	4, 6, 7, 24, 36, 42, 43, 44, 45, 48/49, 332, 506635, U3	43.5

Table 2.4: Corridor services and frequencies – Old Market (from the east)

Corridor	Origin	Service	Daytime Hourly Frequency
BlackBoy Hill / Whiteladies Road (1) (2)	Cribbs Causeway via Lawrence Weston	40	3
	Avonmouth via Coombe Dingle	41	3
	total on Black Boy Hill	40, 41	6
Park Street / Centre / Broadmead	Clifton & Redland Clockwise Circular	8	5
	Redland & Clifton Anticlockwise Circular	9	5
	total from Triangle / Park Street	1, 8, 9, 40, 41, 54	16
Nelson Street / Union Street / Horsefair	Ashton Vale	24	3
	Centre	4	2
	Centre	42	3
	Centre	43	3
	Centre	44	3
	Centre	45	3
	Centre	48	4
	Centre	635	0.5
	total from Broadmead	1, 4, 8, 9, 40, 41, 42, 43, 44, 45, 48, 49, 635	37.5
High Street, Broad Weir	Centre	6	4
	Centre	7	4
	Centre	36	3
	Cumberland Basin	506	2
	UWE Bower Ashton Campus	U1	2
	total from High Street	6, 7, 36, 506	15
Bond Street	Bus Station	332	1
	Bus Station	376	2
	UWE Frenchay Campus	U1	2
	total from Bond Street	332, 376, U1	5

(1) Service 9 heads inbound on Whiteladies Road but has been discounted due to the long loop it then takes through Clifton Village
(2) Services 1 and 54 pass Penn Street, in Broadmead, just to the NW of Old Market, before entering the EZ at Temple Gate later on in their journey.

Table 2.5: Corridor services and frequencies – Old Market (from the west)

2.2.2 Bus journey times

Much of south Bristol and inner East Bristol is within a 15 minute bus ride of Temple Gate or Old Market. A journey of 30 minutes is achievable from Hanham, Kingswood, Frenchay Hospital, Filton Avenue, Clifton Down Shopping Centre and outer parts of South Bristol (eg Stockwood). A journey of 1 hour covers most of the urban area of Bristol. It is interesting to note though that journeys from Bath and Wells take less time than from Brentry or Cribbs Causeway.

Table 2.6 illustrates selected bus journey times from timing points to Temple Gate and Old Market. Figure 2.4 shows bus journey times to Temple Gate and Old Market, with Figure 2.5 expanding this to illustrate overall bus/walk accessibility in the form of journey time contours to the EZ for the AM peak (07:00-09:00), which includes allowance for walking from the alighting bus stop to the EZ (represented by Temple Square).

Table 2.6: Selected Journey Times from timing points to Temple Gate and Old Market

Journey time	Timing point	Journey time (mins)		Example Service
		To Old Market	To Temple Gate	
Less than 15 mins	Lawrence Hill (Croydon St)	4	-	43
	Bedminster Parade	-	4	121
	Knowle	-	7	51
	Brislington	-	8	339
	Eastville Robertson Road	9,10	-	4,24
	UWE Bower Ashton	-	10	U1
	Montpelier Colston Girls' School	10	-	U1
	Bedminster Down	-	11	121
	St George Northcote Road	12	-	43
	Eastgate Centre	14	(3)	4, 24
	Crofts End	13	-	6
	Broomhill	-	14	1
	Hengrove Bamfield	-	14	20
	Keynsham town centre	14,16	-	349,178
	St Anne's Park	15	-	36
	Whitchurch Village	(4)	15	376
Less than 30 mins	Clifton Down Shopping Centre	16	28,32	40 (OM),1,54(TG)
	St George Glen Park	17	-	42
	Kingsdown Parade	-	19	20
	Hanham Maypole	20	-	45
	Blackboy Hill	20	32	40 (OM),54(TG)
	Bedminster (Sion Road)	21	(2)	24
	Sandy Park (Sunnydene)	21	-	36
	Clifton Village	(1)	21	9
	Fishponds	22	-	49
	Horfield Filton Avenue	21	21	U1
	Pensford	(4)	21	376
	Kingswood	22,36,41	-	42,44,6
	Saltford	-	22	X39
	Hanham Common	23	-	44
	Lockleaze	23	(3)	24
	Sneyd Park	24	-	40
	Frenchay Hospital	25	-	4
	Stockwood	-	26	54
	Hengrove Park	-	25,34	51,20
	Soundwell Turnpike	27	-	6
	Coombe Dingle (Coombe Lane)	28	-	41

Journey time	Timing point	Journey time (mins) To Old Market	To Temple Gate	Example Service
30 to 60 mins	Horfield Common	31	(3)	24
	Sea Mills Square	31	-	40
	Golden Hill	31	-	20
	Downend Horseshoe	30,37	-	48,4
	New Cheltenham (Highview Rd)	32	-	6
	Staple Hill	32	-	54
	UWE Frenchay	34	43	U1
	Ashton Vale	34	(2)	24
	Cadbury Heath	35,37,39	-	45,42,43
	Shirehampton	35,36	-	41,40
	Westbury Village	-	41	1, 20
	Henleaze Lake Road	(1)	42	54
	Avonmouth	44	-	41
	Emerson's Green	44,47	-	48,49
	Bath	-	45,55	X39,332
	Lawrence Weston	45	-	40
	Bitton (Cherry Gardens)	49	-	42
	Southmead (Charlton Road)	-	53	20
	Henbury (Tormarton Crescent)	(1)	54	1
	Wells	(4)	55	376
	Brentry (Lyppincourt Road)	(1)	57	54
More than 1 hour	Cribbs Causeway	(1)	64,65	1,54
	Midsomer Norton	-	68	178
	Glastonbury	-	77	376
	Street	-	95	376

(1) passes along Horsefair / Penn Street / Broad Weir to the north-west of Old Market earlier in journey
(2) passes along Redcliff Hill earlier in journey
(3) passes along Redcliff Hill later in journey
(4) crosses Old Market roundabout later in journey

Table 2.6: Selected Journey Times from timing points to Temple Gate and Old Market

2.3 Employment in/around the Enterprise Zone

2.3.1 2001 Census – residence & workplace data

While the 2001 Census was carried out some time ago, and much development in the Enterprise area did not exist in its current form at the time it was carried out, results from the Census can still be used to illustrate patterns of work-related movement to the city centre, in particular because they provide a comprehensive pattern of movement across the whole city and wider UK. [1]

Tables 2.7 & 2.8 show summary residence, workplace and mode use information for people with workplaces in the Cabot and Lawrence Hill wards in central Bristol.

[1] Corresponding data from the 2011 Census will be available in due course, but while basic population figures are to be released later in 2012, the more detailed workplace statistics are unlikely to be available until 2013.

RESIDENCE in…		All People	Works mainly at Home	Car-Driver	Car-Pass	M-cycle	Train	Bus	Taxi	Bicycle	On Foot	U'grd, Metro, Light Rail	Other	Residence Location Split	Total population of residence location (working age: 16-74)	
Cabot & Lawrence Hill	Bristol City	9,018	1,326	1,322	214	58	48	760	54	352	4,834	6	44	10.4%	16,237	55.5%
Avonmouth / Shirehampton	Bristol City	1,219		574	106	28	33	381	-	51	43	3	-	1.4%	15,686	7.8%
Bedminster / Ashton Vale	Bristol City	5,038		1,232	277	66	9	999	12	548	1,880	3	12	5.8%	24,122	20.9%
Brislington / Knowle	Bristol City	4,481		1,765	399	82	7	1,558	15	187	465	-	3	5.2%	23,591	19.0%
Clifton / Stoke Bishop	Bristol City	4,315		1,370	169	30	22	438	7	264	1,996	6	13	5.0%	24,294	17.8%
Easton / St.George	Bristol City	4,221		1,511	333	76	29	1,310	15	334	604	-	9	4.9%	23,640	17.9%
Fishponds	Bristol City	3,257		1,381	256	85	9	1,106	6	250	164	-	-	3.8%	24,183	13.5%
Henleaze / Westbury	Bristol City	2,151		1,219	152	50	-	475	6	124	125	-	-	2.5%	14,408	14.9%
Horfield / Bishopston	Bristol City	3,307		1,217	221	63	16	1,105	12	296	374	-	3	3.8%	25,325	13.1%
Redland / Montpelier	Bristol City	5,283		1,275	193	37	14	691	21	572	2,467	3	10	6.1%	26,297	20.1%
South Bristol	Bristol City	6,280		2,584	554	136	3	2,559	12	173	253	-	6	7.2%	47,362	13.3%
Southmead / Henbury	Bristol City	1,145		605	74	36	3	344	3	39	35	-	6	1.3%	13,943	8.2%
Bath	B&NES	1,492		737	47	36	489	152	-	16	-	6	9	1.7%	67,439	2.2%
Keynsham / Saltford	B&NES	1,197		547	55	24	37	497	-	22	3	-	12	1.4%	13,917	8.6%
Midsomer Norton / Radstock	B&NES	615		482	26	12	37	55	-	-	3	-	-	0.7%	31,296	2.0%
South West B&NES	B&NES	883		645	59	27	-	140	3	9	-	-	-	1.0%	10,511	8.4%
Clevedon	N.Som	939		679	79	25	24	123	-	6	3	-	-	1.1%	15,408	6.1%
Nailsea / Long Ashton / Winford	N.Som	2,708		1,727	221	51	123	508	3	63	6	3	3	3.1%	22,810	11.9%
Portishead / Portbury	N.Som	1,751		1,236	172	41	-	248	-	29	25	-	-	2.0%	18,926	9.3%
Weston-super-Mare	N.Som	2,124		1,256	159	55	297	336	3	6	9	-	3	2.5%	62,871	3.4%
Yatton & Southern N.Som	N.Som	1,273		898	102	17	115	128	-	9	4	-	-	1.5%	14,114	9.0%
Kingswood	S.Glos	8,441		4,288	723	229	36	2,814	15	265	53	-	18	9.7%	76,384	11.1%
Stoke Gifford / Bradley Stoke	S.Glos	3,743		2,178	284	116	103	936	-	79	44	-	3	4.3%	43,068	8.7%
Thornbury / Almodsbury	S.Glos	1,083		856	67	27	14	98	-	12	9	-	-	1.3%	22,568	4.8%
Yate / Chipping Sodbury	S.Glos	2,136		1,370	184	51	66	432	3	15	12	-	3	2.5%	37,062	5.8%
South Wales		1,887		1,199	146	18	374	126	-	6	18	-	-	2.2%	1,600,608	0.1%
Gloucestershire		1,507		1,222	85	21	94	67	-	6	12	-	-	1.7%	404,703	0.4%
Wiltshire		1,181		807	34	13	315	9	-	-	-	-	3	1.4%	310,126	0.4%
Swindon		239		175	6	-	52	3	-	-	3	-	-	0.3%	131,041	0.2%
Somerset		1,757		1,397	76	44	146	67	-	12	15	-	-	2.0%	353,416	0.5%
Oxfordshire / Reading Berkshire		195		141	3	-	33	12	-	6	-	-	-	0.2%	945,952	0.02%
London		186		84	3	3	45	24	3	3	21	-	-	0.2%	5,300,273	0.004%
South Coast		201		147	6	-	12	21	-	-	9	-	6	0.2%	1,776,626	0.01%
Devon & Cornwall		405		265	12	-	79	18	-	3	22	-	6	0.5%	1,128,915	0.04%
West Midlands		385		307	9	12	21	12	-	3	21	-	-	0.4%	3,780,798	0.01%
Other		591		420	24	3	51	51	-	-	42	-	-	0.7%		
Sub Totals																
Bristol City		49,715		16,055	2,948	747	193	11,726	163	3,190	13,240	21	106	57.4%	279,088	17.8%
B&NES		4,187		2,411	187	99	563	844	3	47	6	6	21	4.8%	123,163	3.4%
North Somerset		8,795		5,796	733	189	559	1,343	6	113	47	3	6	10.2%	134,129	6.6%
South Goucestershire		15,403		8,692	1,258	423	219	4,280	18	371	118	-	24	17.8%	179,082	8.6%
N & NW of WoE area (incl Wales)		3,779		2,728	240	51	489	205	-	15	51	-	-	4.4%	5,786,109	0.1%
S & SW of WoE area		2,363		1,809	94	44	237	106	-	15	46	-	12	2.7%	3,258,957	0.1%
East of WoE area		1,801		1,207	46	16	445	48	3	9	24	-	3	2.1%	6,687,392	0.03%
Other		591		420	24	3	51	51	-	-	42	-	-	0.7%		
Overall Total - all Workplaces		86,634	1,326	39,118	5,530	1,572	2,756	18,603	193	3,760	13,574	30	172			

Table 2.7: 2001 Census – residence of people with a workplace in Cabot & Lawrence Hill wards

RESIDENCE in…		All People	Works mainly at Home	Car-Driver	Car-Pass	M-cycle	Train	Bus	Taxi	Bicycle	On Foot	U'grd, Metro, Light Rail	Other
Cabot & Lawrence Hill	Bristol City	100%	*14.7%*	17.2%	2.8%	0.8%	0.6%	9.9%	0.7%	4.6%	62.8%	0.1%	0.6%
Avonmouth / Shirehampton	Bristol City	100%		47.1%	8.7%	2.3%	2.7%	31.3%	-	4.2%	3.5%	0.2%	-
Bedminster / Ashton Vale	Bristol City	100%		24.5%	5.5%	1.3%	0.2%	19.8%	0.2%	10.9%	37.3%	0.1%	0.2%
Brislington / Knowle	Bristol City	100%		39.4%	8.9%	1.8%	0.2%	34.8%	0.3%	4.2%	10.4%	-	0.1%
Clifton / Stoke Bishop	Bristol City	100%		31.7%	3.9%	0.7%	0.5%	10.2%	0.2%	6.1%	46.3%	0.1%	0.3%
Easton / St.George	Bristol City	100%		35.8%	7.9%	1.8%	0.7%	31.0%	0.4%	7.9%	14.3%	-	0.2%
Fishponds	Bristol City	100%		42.4%	7.9%	2.6%	0.3%	34.0%	0.2%	7.7%	5.0%	-	-
Henleaze / Westbury	Bristol City	100%		56.7%	7.1%	2.3%	-	22.1%	0.3%	5.8%	5.8%	-	-
Horfield / Bishopston	Bristol City	100%		36.8%	6.7%	1.9%	0.5%	33.4%	0.4%	9.0%	11.3%	-	0.1%
Redland / Montpelier	Bristol City	100%		24.1%	3.7%	0.7%	0.3%	13.1%	0.4%	10.8%	46.7%	0.1%	0.2%
South Bristol	Bristol City	100%		41.1%	8.8%	2.2%	0.0%	40.7%	0.2%	2.8%	4.0%	-	0.1%
Southmead / Henbury	Bristol City	100%		52.8%	6.5%	3.1%	0.3%	30.0%	0.3%	3.4%	3.1%	-	0.5%
Bath	B&NES	100%		49.4%	3.2%	2.4%	32.8%	10.2%	-	1.1%	-	0.4%	0.6%
Keynsham / Saltford	B&NES	100%		45.7%	4.6%	2.0%	3.1%	41.5%	-	1.8%	0.3%	-	1.0%
Midsomer Norton / Radstock	B&NES	100%		78.4%	4.2%	2.0%	6.0%	8.9%	-	-	0.5%	-	-
South West B&NES	B&NES	100%		73.0%	6.7%	3.1%	-	15.9%	0.3%	1.0%	-	-	-
Clevedon	N.Som	100%		72.3%	8.4%	2.7%	2.6%	13.1%	-	0.6%	0.3%	-	-
Nailsea / Long Ashton / Winford	N.Som	100%		63.8%	8.2%	1.9%	4.5%	18.8%	0.1%	2.3%	0.2%	0.1%	0.1%
Portishead / Portbury	N.Som	100%		70.6%	9.8%	2.3%	-	14.2%	-	1.7%	1.4%	-	-
Weston-super-Mare	N.Som	100%		59.1%	7.5%	2.6%	14.0%	15.8%	0.1%	0.3%	0.4%	-	0.1%
Yatton & Southern N.Som	N.Som	100%		70.5%	8.0%	1.3%	9.0%	10.1%	-	0.7%	0.3%	-	-
Kingswood	S.Glos	100%		50.8%	8.6%	2.7%	0.4%	33.3%	0.2%	3.1%	0.6%	-	0.2%
Stoke Gifford / Bradley Stoke	S.Glos	100%		58.2%	7.6%	3.1%	2.8%	25.0%	-	2.1%	1.2%	-	0.1%
Thornbury / Almodsbury	S.Glos	100%		79.0%	6.2%	2.5%	1.3%	9.0%	-	1.1%	0.8%	-	-
Yate / Chipping Sodbury	S.Glos	100%		64.1%	8.6%	2.4%	3.1%	20.2%	0.1%	0.7%	0.6%	-	0.1%
South Wales		100%		63.5%	7.7%	1.0%	19.8%	6.7%	-	0.3%	1.0%	-	-
Gloucestershire		100%		81.1%	5.6%	1.4%	6.2%	4.4%	-	0.4%	0.8%	-	-
Wiltshire		100%		68.3%	2.9%	1.1%	26.7%	0.8%	-	-	-	-	0.3%
Swindon		100%		73.2%	2.5%	-	21.8%	1.3%	-	-	1.3%	-	-
Somerset		100%		79.5%	4.3%	2.5%	8.3%	3.8%	-	0.7%	0.9%	-	-
Oxfordshire / Reading Berkshire		100%		72.3%	1.5%	-	16.9%	6.2%	-	3.1%	-	-	-
London		100%		45.2%	1.6%	1.6%	24.2%	12.9%	1.6%	1.6%	11.3%	-	-
South Coast		100%		73.1%	3.0%	-	6.0%	10.4%	-	-	4.5%	-	3.0%
Devon & Cornwall		100%		65.4%	3.0%	-	19.5%	4.4%	-	0.7%	5.4%	-	1.5%
West Midlands		100%		79.7%	2.3%	3.1%	5.5%	3.1%	-	0.8%	5.5%	-	-
Other		100%		71.1%	4.1%	0.5%	8.6%	8.6%	-	-	7.1%	-	-
Sub Totals													
Bristol City		100%		33.2%	6.1%	1.5%	0.4%	24.2%	0.3%	6.6%	27.4%	0.0%	0.2%
B&NES		100%		57.6%	4.5%	2.4%	13.4%	20.2%	0.1%	1.1%	0.1%	0.1%	0.5%
North Somerset		100%		65.9%	8.3%	2.1%	6.4%	15.3%	0.1%	1.3%	0.5%	0.0%	0.1%
South Goucestershire		100%		56.4%	8.2%	2.7%	1.4%	27.8%	0.1%	2.4%	0.8%	-	0.2%
N & NW of WoE area (incl Wales)		100%		72.2%	6.4%	1.3%	12.9%	5.4%	-	0.4%	1.3%	-	-
S & SW of WoE area		100%		76.6%	4.0%	1.9%	10.0%	4.5%	-	0.6%	1.9%	-	0.5%
East of WoE area		100%		67.0%	2.6%	0.9%	24.7%	2.7%	0.2%	0.5%	1.3%	-	0.2%
Other		100%		71.1%	4.1%	0.5%	8.6%	8.6%	-	-	7.1%	-	-
Overall Total - all Workplaces		100%		45.9%	6.5%	1.8%	3.2%	21.8%	0.2%	4.4%	15.9%	0.0%	0.2%

Table 2.8: 2001 Census – mode share of people with a workplace in Cabot & Lawrence Hill wards

In the first instance, these wards have been used to illustrate the pattern of residence and workplace locations associated with the EZ because they cover the area in its entirety (mostly it is in the Lawrence Hill ward with part of Cabot ward). Secondly, while it is included because part of the EZ is in the Cabot ward, the remainder of this ward covers a large amount of Bristol city centre, with its (particularly) existing office employment. Hence, the Lawrence Hill and Cabot wards between them represent the range of employment types that the EZ already does provide and will increasingly do so into the future.

Some key points to note from Tables 2.7 and 2.8 about the people working in the Lawrence Hill and Cabot wards include:

- 90% of people with workplaces in one of the two wards live in one of the West of England (WoE) local authority areas, with almost two thirds of those being in Bristol City;
- There is a relatively even split across suburban areas within Bristol City, with no dominant sources of workers, though Kingswood (in South Gloucestershire) actually provides the largest number, of the areas identified in the Tables;
- Outside the WoE area, the adjacent counties of Somerset, Wiltshire (including Swindon) and Gloucestershire, together with South Wales, account for almost 8% of workers, with only 2% coming from further afield (in 2001);
- Over 50% of people usually travel to work by car (as a driver or passenger), though this drops to 40% for residents of Bristol city (and 20% for residents of the Lawrence Hill and Cabot wards), and rises to around 60% in the other WoE authorities;
- Overall public transport mode share for workplaces in the Lawrence Hill and Cabot wards is around 25%;
- Public transport use varies though, in part according to the availability of services. For instance, within Bristol there are limited opportunities to use rail, so mode share is low, but is higher for people who live in places on the main rail lines (for example, for workers in the area who live in Bath over 30% use rail and Wiltshire/Swindon over 25%), though the total numbers of people making these movements are comparatively low overall, as noted above;
- From most areas in Bristol and South Gloucestershire, bus mode share is typically 20%-30% to workplaces in the Lawrence Hill and Cabot wards, which is, correspondingly, largely responsible for the overall figure. Bus mode share from Kingswood is slightly higher than Bristol City as a whole.
- For people who live within Bristol, and relatively close to the centre, walking to work is significant, typically from places closer to the EZ (in particular as Bedminster, Clifton, Redland and Montpelier, where 40% or more people walk to work);
- Cycling is also important, with 6%-11% of workers living in parts of Bristol City that are relatively close to the EZ cycling to work; unsurprisingly, this proportion also drops as distances increase.

The geographical pattern of home residences of Bristol City Centre workers has also been derived from the 2001 Census information. Figure 2.6 shows the spread of residences of all workers in the city centre, indicating (as set out in Tables 2.7 and 2.8) that most people live relatively close to Bristol, with decreasing numbers form further afield. Figures 2.7-2.11 show the patterns for people using different modes of transport; car, train, bus, cycle and walk respectively. Figure 2.7 (car) has a similar pattern to Figure 2.6 (all trips), reflecting the use of car is ultimately dominant in work trips to the city centre. Other modes show more restrictive patterns. For instance, rail trips follow rail lines and bus trips are mostly from within or close to the city – similarly for walk and cycle, with a smaller radius for cycling than walking.

2.3.2 Quality of Life Survey

Changes to modal use by residents of Bristol City in more recent years are reflected in the Quality of Life annual survey, which started in 2005. This survey does not identify the locations that residents of various wards in the city work in, but indicates changes to normal mode of transport to work of people living in areas within Bristol.

Table 2.9 shows mode shares of journeys to work by Bristol residents, recorded by the surveys in 2005 and 2010.

For instance, people who live in Bristol and travel to work by car (as a driver) has declined by almost 3% overall, though with local increases and decreases. Differential changes will likely reflect the costs of motoring as well as re-locations of employment opportunities to or from the local area, and increases in unemployment.

Overall, walking and cycling mode shares have increase by around 1% each (from 2005 to 2010). However, these values mask differential changes in different areas. Walking to work has declined by almost 15% from Bedminster (with increases in car and bus use), but increased by over 12% from Lawrence Hill (decreases in car and bus use). These sorts of differential changes may well be as a result of re-locations of employment opportunities to or from the local areas concerned. Cycle use displays a similar pattern, with some areas showing increases, while others have reduced. Anecdotally though, as promotional activity and investment as part of Bristol being designated Cycling City in 2008 has taken hold, cycle use has increased overall.

	Percent of respondents who go to work by…														
	Car (driver)			Car (passenger)			Bus			Walking			Cycle		
Residents of…	2005	2010	change 2005-10	2005	2008	change 2005-08	2005	2010	change 2005-10	2005	2010	change 2005-10	2005	2008	change 2005-08
Ashley	41.8%	31.6%	-10.2%	1.3%	1.9%	0.6%	6.9%	5.4%	-1.5%	25.0%	27.4%	2.4%	19.4%	20.9%	1.5%
Avonmouth	64.6%	58.6%	-6.0%	5.1%	8.7%	3.6%	12.4%	8.9%	-3.5%	7.9%	9.3%	1.4%	2.8%	3.8%	1.0%
Bedminster	37.4%	51.6%	14.2%	7.1%	4.0%	-3.1%	9.1%	13.0%	3.9%	32.3%	17.5%	-14.8%	10.1%	8.3%	-1.8%
Bishopston	58.5%	55.8%	-2.7%	1.7%	0.8%	-0.9%	5.9%	7.6%	1.7%	16.1%	12.0%	-4.1%	13.6%	15.1%	1.5%
Bishopsworth	56.5%	61.2%	4.7%	11.8%	8.8%	-3.0%	18.0%	8.1%	-9.9%	8.1%	12.4%	4.3%	1.2%	2.0%	0.8%
Brislington East	67.7%	59.4%	-8.3%	5.1%	7.1%	2.0%	8.1%	11.8%	3.7%	9.1%	7.9%	-1.2%	5.1%	6.9%	1.8%
Brislington West	58.7%	59.7%	1.0%	8.7%	1.3%	-7.4%	10.9%	9.5%	-1.4%	13.0%	14.1%	1.1%	6.5%	8.1%	1.6%
Cabot	33.3%	20.0%	-13.3%	2.7%	0.0%	-2.7%	5.3%	9.6%	4.3%	42.7%	46.8%	4.1%	8.0%	10.1%	2.1%
Clifton	43.1%	34.5%	-8.6%	1.0%	0.0%	-1.0%	4.9%	8.8%	3.9%	35.3%	37.9%	2.6%	9.8%	13.5%	3.7%
Clifton East	33.7%	42.6%	8.9%	2.3%	0.0%	-2.3%	3.5%	3.9%	0.4%	45.3%	42.7%	-2.6%	11.6%	3.5%	-8.1%
Cotham	36.3%	36.4%	0.1%	1.1%	1.9%	0.8%	9.9%	5.6%	-4.3%	40.7%	39.9%	-0.8%	8.8%	9.7%	0.9%
Easton	50.5%	48.8%	-1.7%	5.1%	4.6%	-0.5%	13.6%	9.5%	-4.1%	11.2%	16.8%	5.6%	13.1%	22.8%	9.7%
Eastville	66.3%	56.8%	-9.5%	3.8%	6.6%	2.8%	12.5%	12.8%	0.3%	8.8%	10.4%	1.6%	5.0%	9.2%	4.2%
Filwood	55.2%	44.1%	-11.1%	8.3%	8.4%	0.1%	15.9%	23.9%	8.0%	13.1%	14.9%	1.8%	2.1%	4.3%	2.2%
Frome Vale	65.8%	69.0%	3.2%	6.3%	2.2%	-4.1%	8.9%	7.2%	-1.7%	12.7%	0.9%	-11.8%	3.8%	12.2%	8.4%
Hartcliffe	60.7%	53.7%	-7.0%	8.0%	5.8%	-2.2%	13.4%	15.7%	2.3%	9.0%	12.6%	3.6%	4.5%	4.6%	0.1%
Henbury	68.5%	82.3%	13.8%	5.4%	11.6%	6.2%	7.6%	9.6%	2.0%	12.0%	2.8%	-9.2%	4.3%	1.7%	-2.6%
Hengrove	73.8%	74.1%	0.3%	6.3%	9.1%	2.8%	12.5%	9.3%	-3.2%	2.5%	6.3%	3.8%	0.0%	1.7%	1.7%
Henleaze	66.7%	60.7%	-6.0%	1.9%	6.5%	4.6%	6.5%	11.6%	5.1%	12.0%	19.5%	7.5%	11.1%	7.3%	-3.8%
Hillfields	61.7%	63.9%	2.2%	9.0%	6.3%	-2.7%	10.0%	5.6%	-4.4%	9.5%	11.2%	1.7%	5.5%	7.6%	2.1%
Horfield	53.0%	54.4%	1.4%	1.2%	3.4%	2.2%	14.5%	10.2%	-4.3%	19.3%	14.9%	-4.4%	3.6%	6.2%	2.6%
Kingsweston	69.2%	58.4%	-10.8%	8.2%	4.0%	-4.2%	12.3%	15.5%	3.2%	4.1%	6.8%	2.7%	2.1%	3.9%	1.8%
Knowle	61.5%	49.5%	-12.0%	8.8%	3.5%	-5.3%	13.2%	10.2%	-3.0%	8.8%	17.2%	8.4%	4.4%	6.2%	1.8%
Lawrence Hill	34.2%	32.1%	-2.1%	8.2%	3.4%	-4.8%	17.7%	12.5%	-5.2%	25.3%	37.7%	12.4%	7.6%	4.8%	-2.8%
Lockleaze	51.1%	66.6%	15.5%	6.3%	4.8%	-1.5%	18.4%	7.4%	-11.0%	12.1%	5.7%	-6.4%	9.2%	4.5%	-4.7%
Redland	42.0%	44.7%	2.7%	5.0%	2.5%	-2.5%	5.0%	6.7%	1.7%	27.0%	25.2%	-1.8%	16.0%	11.9%	-4.1%
St George East	69.6%	69.1%	-0.5%	1.1%	5.2%	4.1%	14.1%	9.6%	-4.5%	7.6%	4.0%	-3.6%	3.3%	2.1%	-1.2%
St George West	65.8%	58.9%	-6.9%	1.3%	6.2%	4.9%	11.4%	8.9%	-2.5%	10.1%	14.7%	4.6%	2.5%	7.8%	5.3%
Southmead	58.7%	57.8%	-0.9%	11.0%	11.3%	0.3%	11.0%	15.7%	4.7%	11.6%	14.2%	2.6%	3.5%	7.3%	3.8%
Southville	45.6%	32.7%	-12.9%	5.8%	1.5%	-4.3%	5.8%	8.9%	3.1%	22.3%	30.3%	8.0%	13.6%	12.0%	-1.6%
Stockwood	68.4%	66.1%	-2.3%	7.4%	5.2%	-2.2%	14.7%	15.7%	1.0%	4.2%	7.9%	3.7%	1.1%	3.1%	2.0%
Stoke Bishop	68.6%	68.6%	-	5.7%	6.4%	0.7%	5.7%	4.1%	-1.6%	15.7%	9.6%	-6.1%	1.4%	10.4%	9.0%
Westbury-on-Trym	73.5%	80.0%	6.5%	5.1%	3.8%	-1.3%	6.1%	5.9%	-0.2%	8.2%	8.3%	0.1%	3.1%	4.3%	1.2%
Whitchurch Park	65.4%	70.4%	5.0%	9.4%	12.1%	2.7%	11.3%	9.4%	-1.9%	8.8%	8.6%	-0.2%	1.9%	1.7%	-0.2%
Windmill Hill	43.8%	40.3%	-3.5%	7.3%	3.7%	-3.6%	4.2%	4.8%	0.6%	25.0%	25.9%	0.9%	10.4%	7.8%	-2.6%
TOTAL															
Bristol (City of)	56.7%	54.0%	-2.7%	5.4%	4.9%	-0.5%	10.1%	9.5%	-0.6%	16.2%	17.4%	1.2%	6.8%	7.8%	1.0%
CATEGORIES															
Aged over 50	58.8%	56.1%	-2.7%	6.8%	5.3%	-1.5%	12.0%	10.6%	-1.4%	14.7%	14.9%	0.2%	2.3%	4.7%	2.4%
Male	61.5%	55.6%	-5.9%	3.1%	3.4%	0.3%	6.9%	8.4%	1.5%	11.4%	12.6%	1.2%	9.8%	9.8%	-
Female	53.0%	52.8%	-0.2%	7.1%	5.8%	-1.3%	12.5%	10.3%	-2.2%	19.9%	20.6%	0.7%	4.5%	6.5%	2.0%

Table 2.9: Quality of Life survey – mode share of journeys to work by Bristol residents

2.3.3 Summary

Considering development that has occurred in central Bristol since the 2001 Census was carried out there will have been some changes to travel patterns, in particular in the vicinity of Bristol Temple Meads station, as this has seen significant (particularly office) development and is a key part of the Enterprise area. As a result, it is likely that observations of patterns of movement are reflecting trends in the residences of workers, as a result of the nature of development at Temple Meads.

For instance, significant rises in rail travel observed have been in the Bristol area, with almost 40% more passengers using Temple Meads in 2010 than in 2005. This rise in rail use is indicative of wider economic issues such as fuel prices and traffic congestion, but probably also already reflects a greater number of professional jobs located near Temple Meads station; people who are perhaps more likely to take advantage of comparatively easy longer-distance rail access while living outside the city (or further afield).

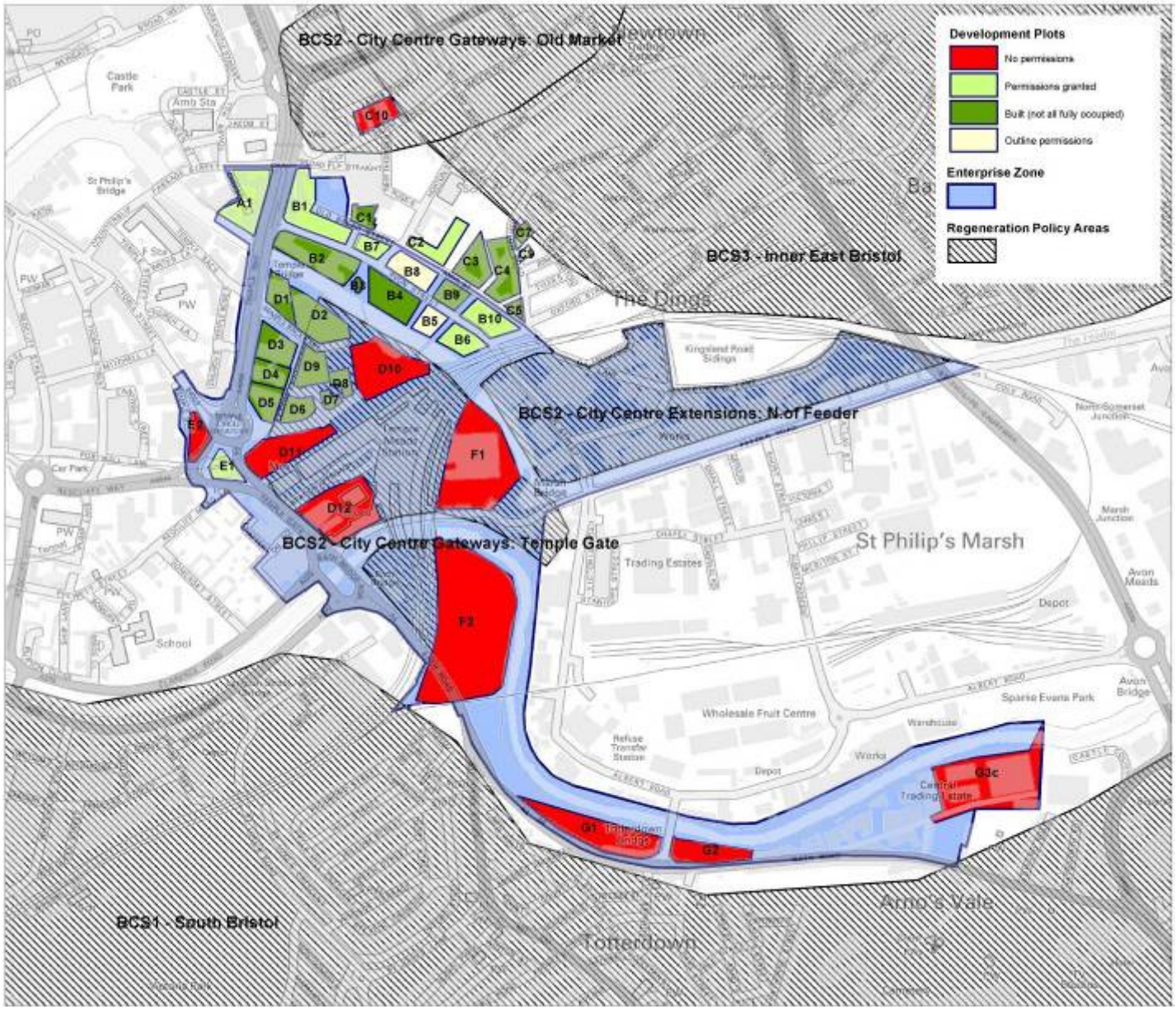


Figure 2.1: Temple Quarter Enterprise Zone – Planning context

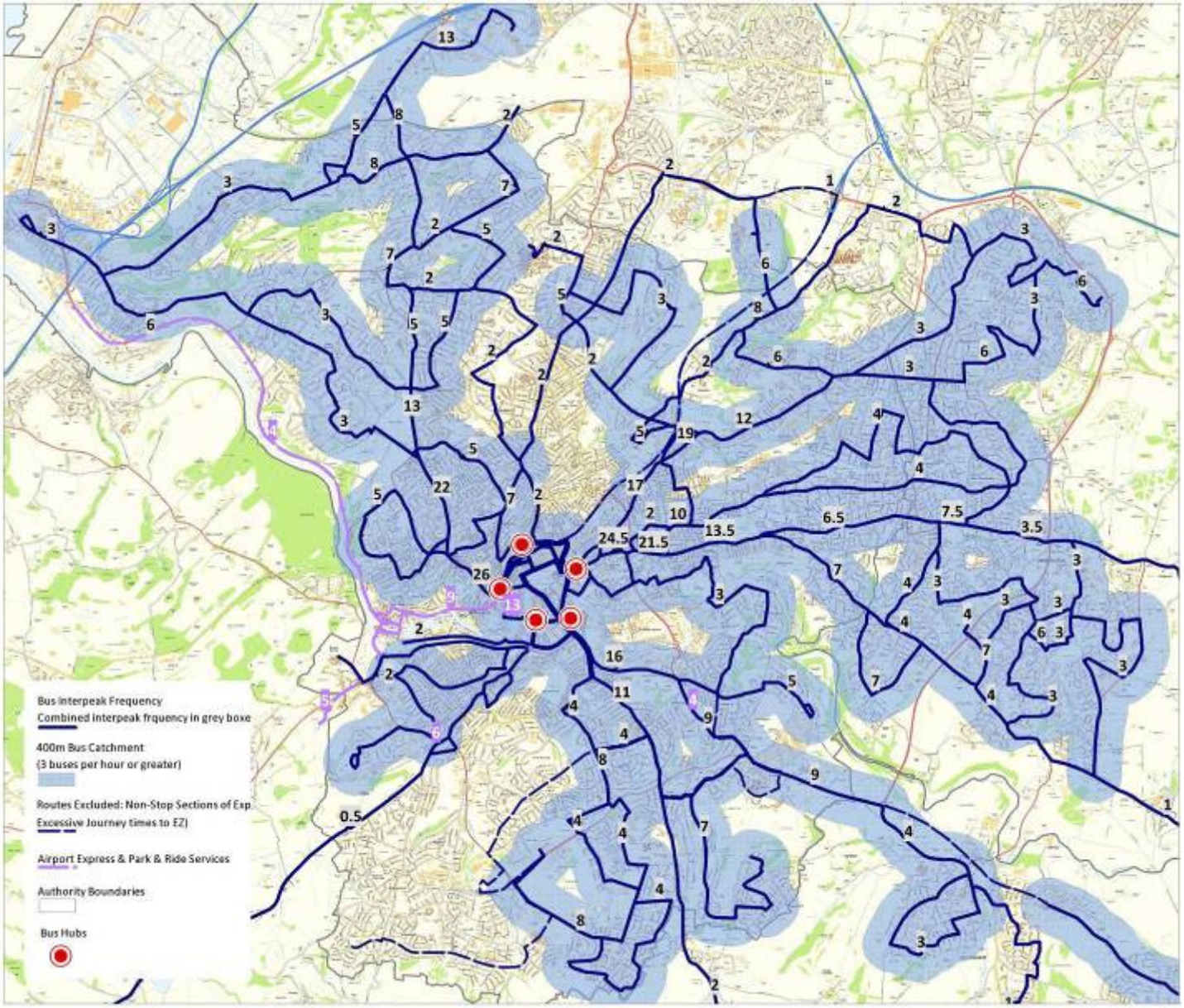


Figure 2.2: Combined bus frequencies leading to the Enterprise Zone (wider Bristol area)

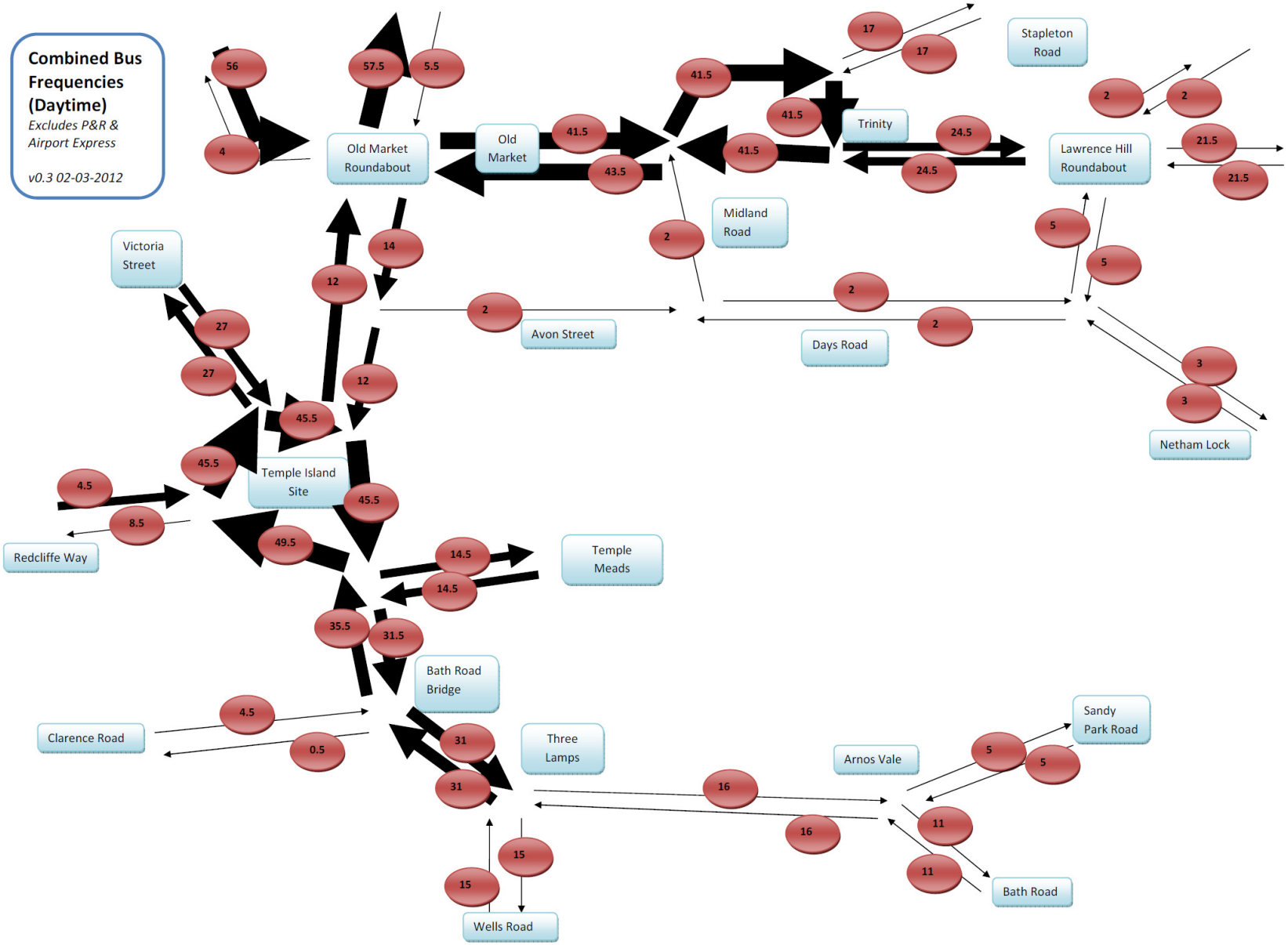


Figure 2.3: Combined bus frequencies (daytime) immediately around the Enterprise Zone

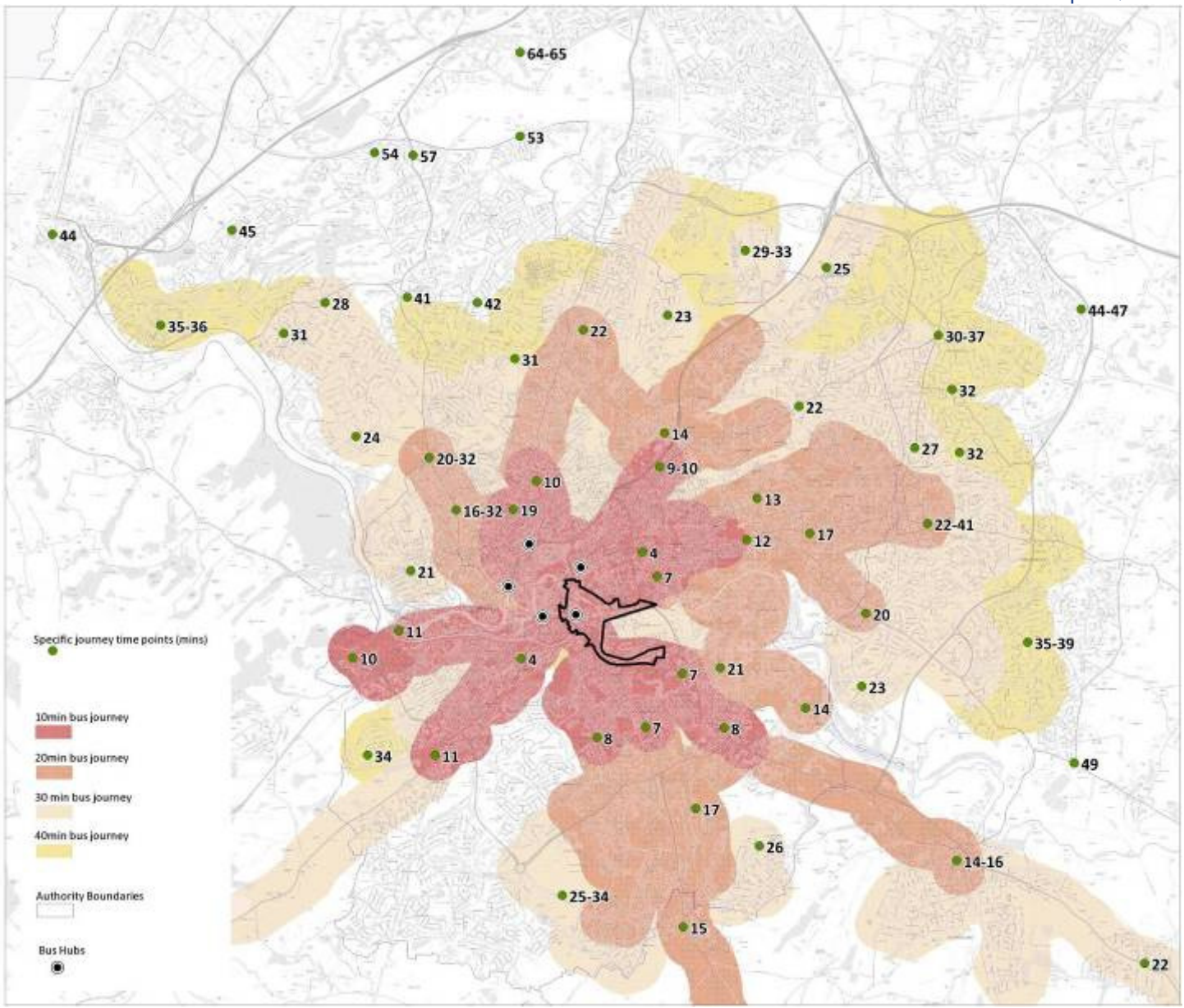


Figure 2.4: Weekday inter-peak bus journey times to Old Market/Temple Gate

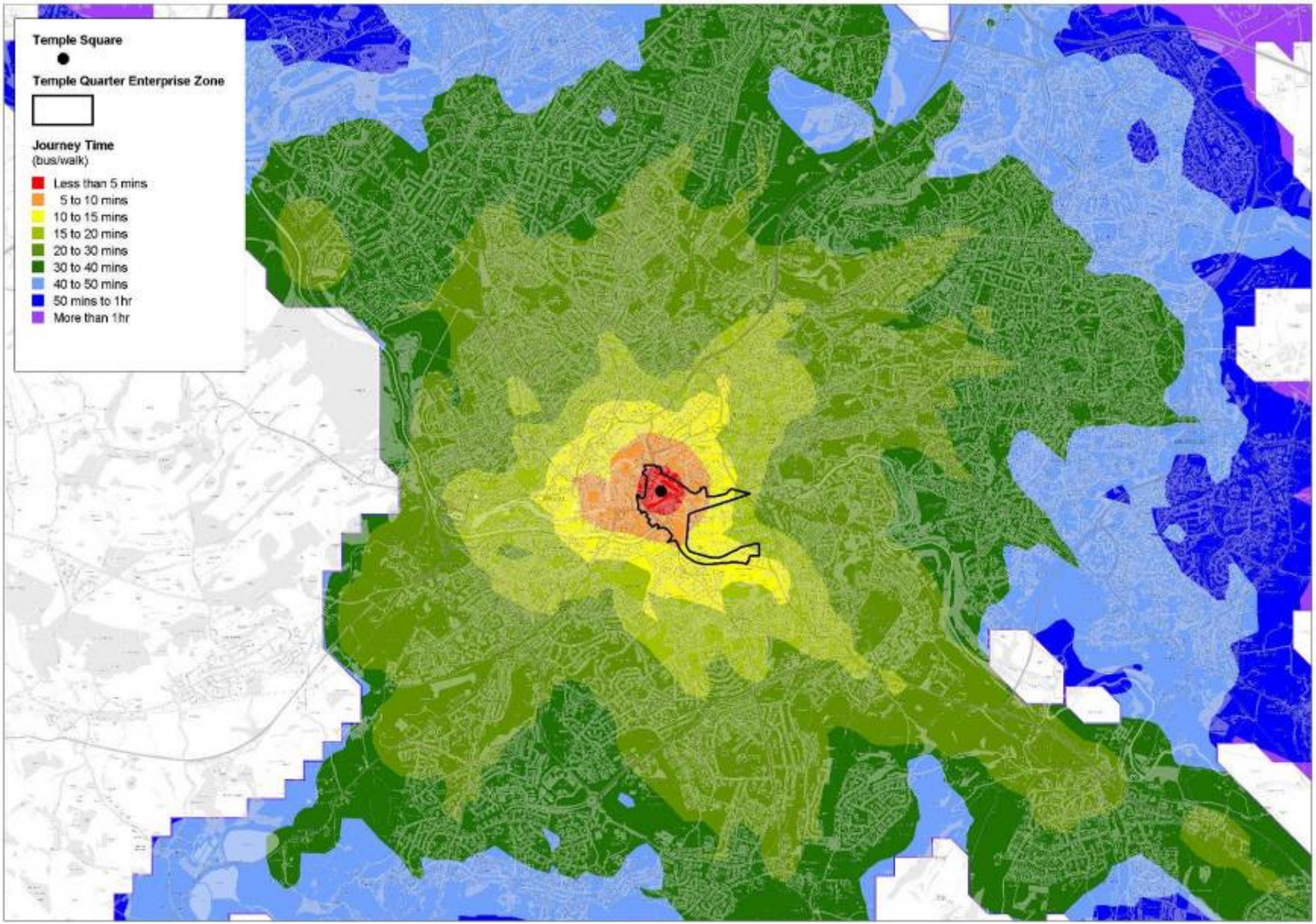


Figure 2.5: Summary bus/walk accessibility to the Enterprise Zone in the AM Peak (07:00-09:00)

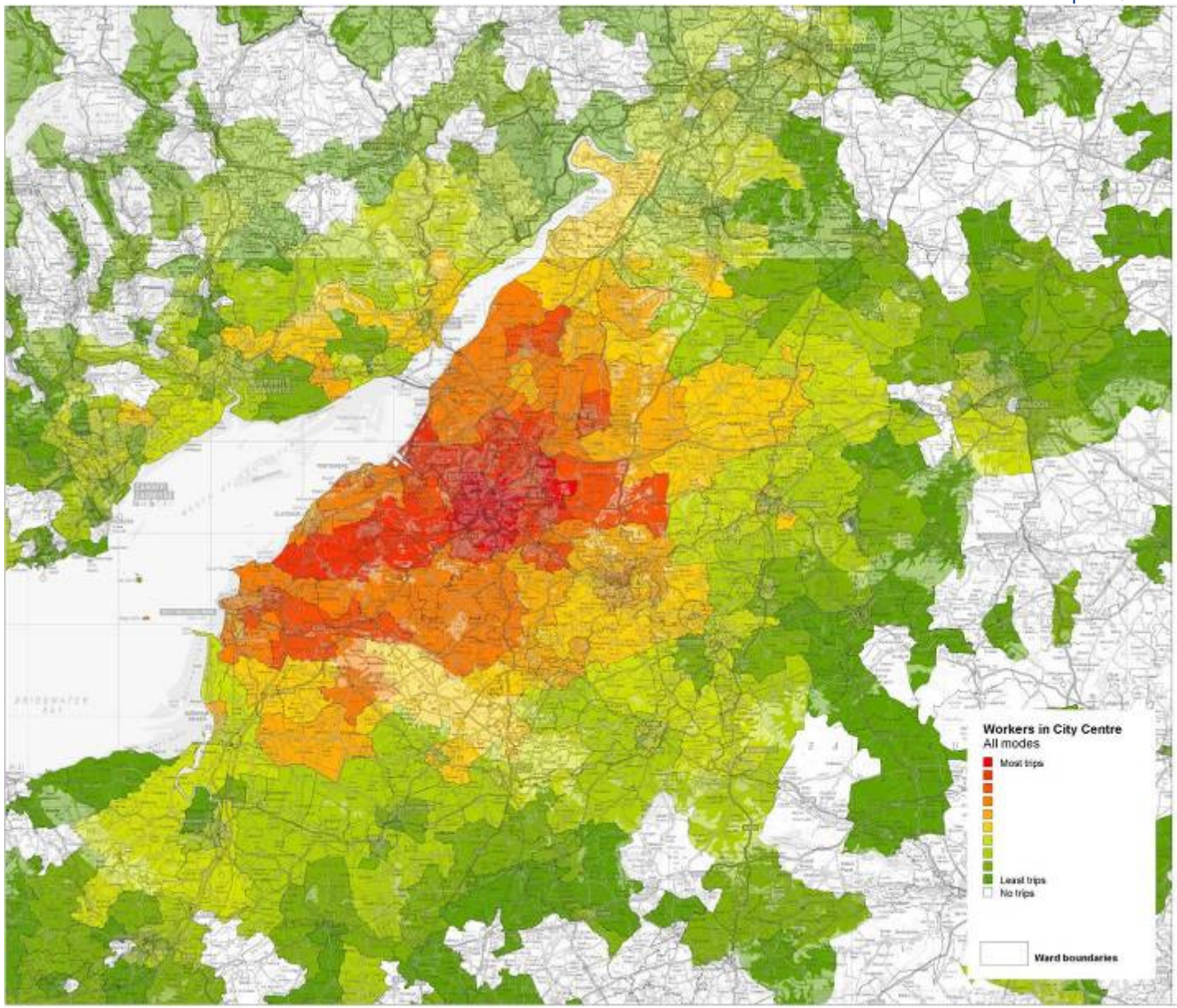


Figure 2.6: 2001 Census – pattern of residences for workers in Bristol City Centre – All trips

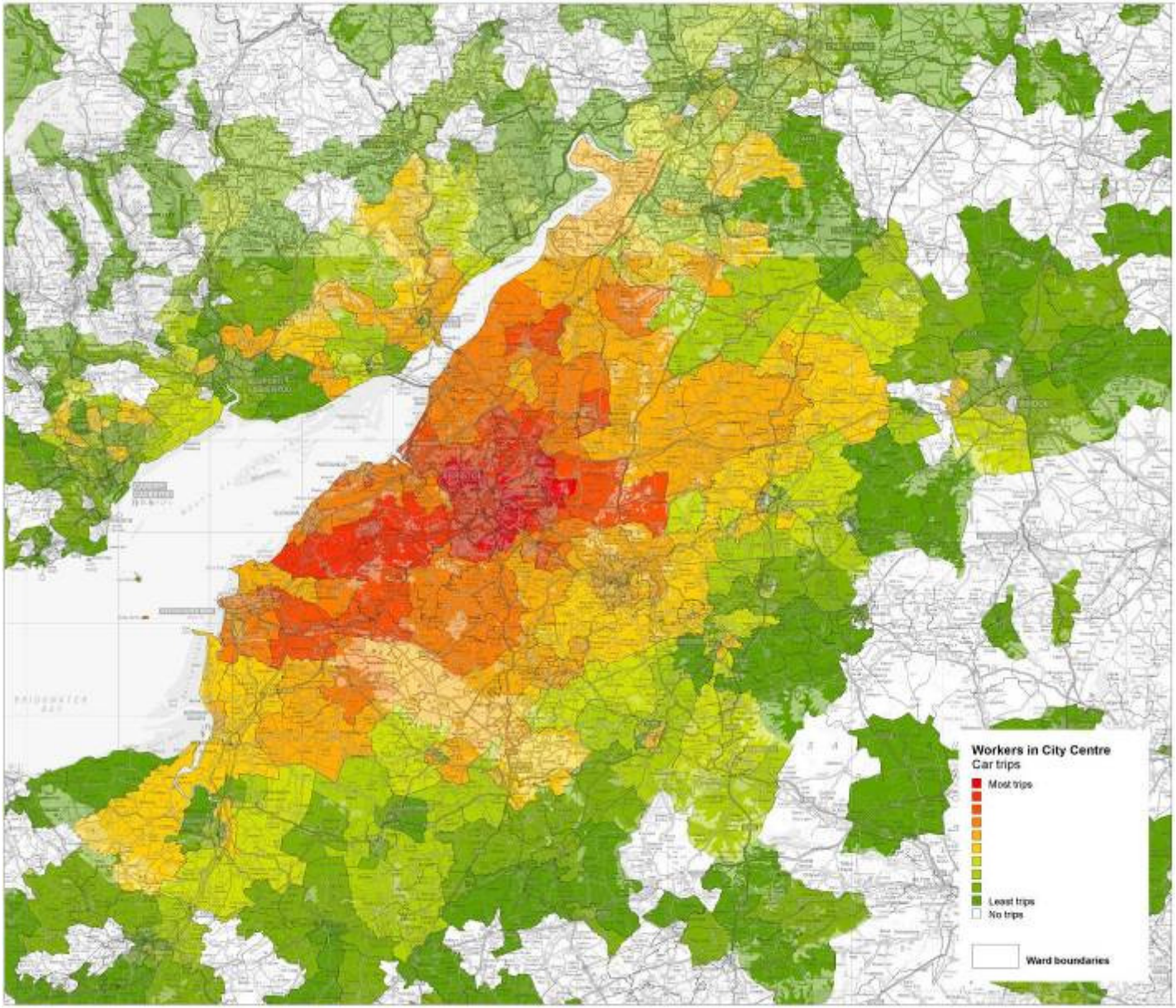


Figure 2.7: 2001 Census – pattern of residences for workers in Bristol City Centre – Car trips

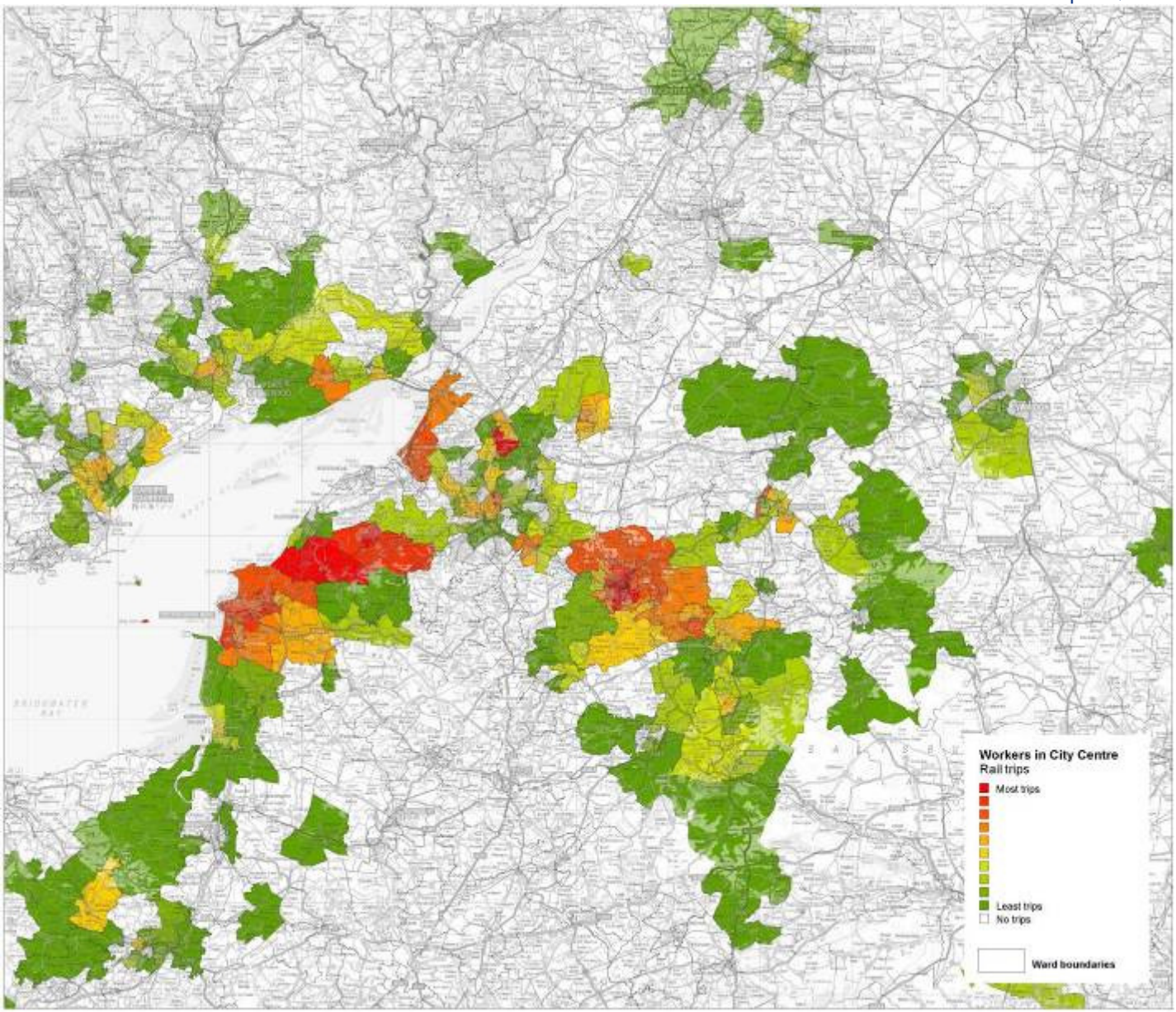


Figure 2.8: 2001 Census – pattern of residences for workers in Bristol City Centre – Rail trips

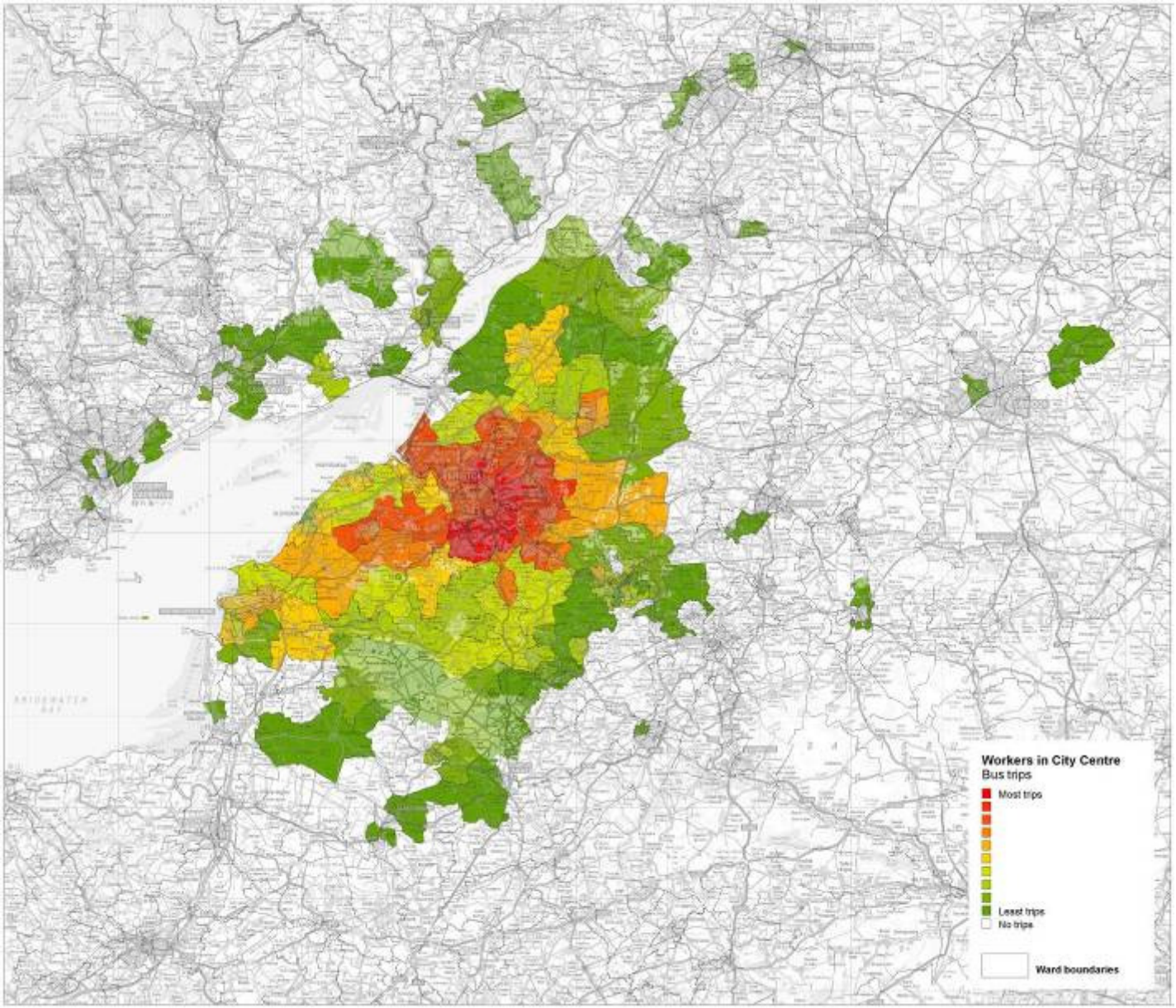


Figure 2.9: 2001 Census – pattern of residences for workers in Bristol City Centre – Bus trips

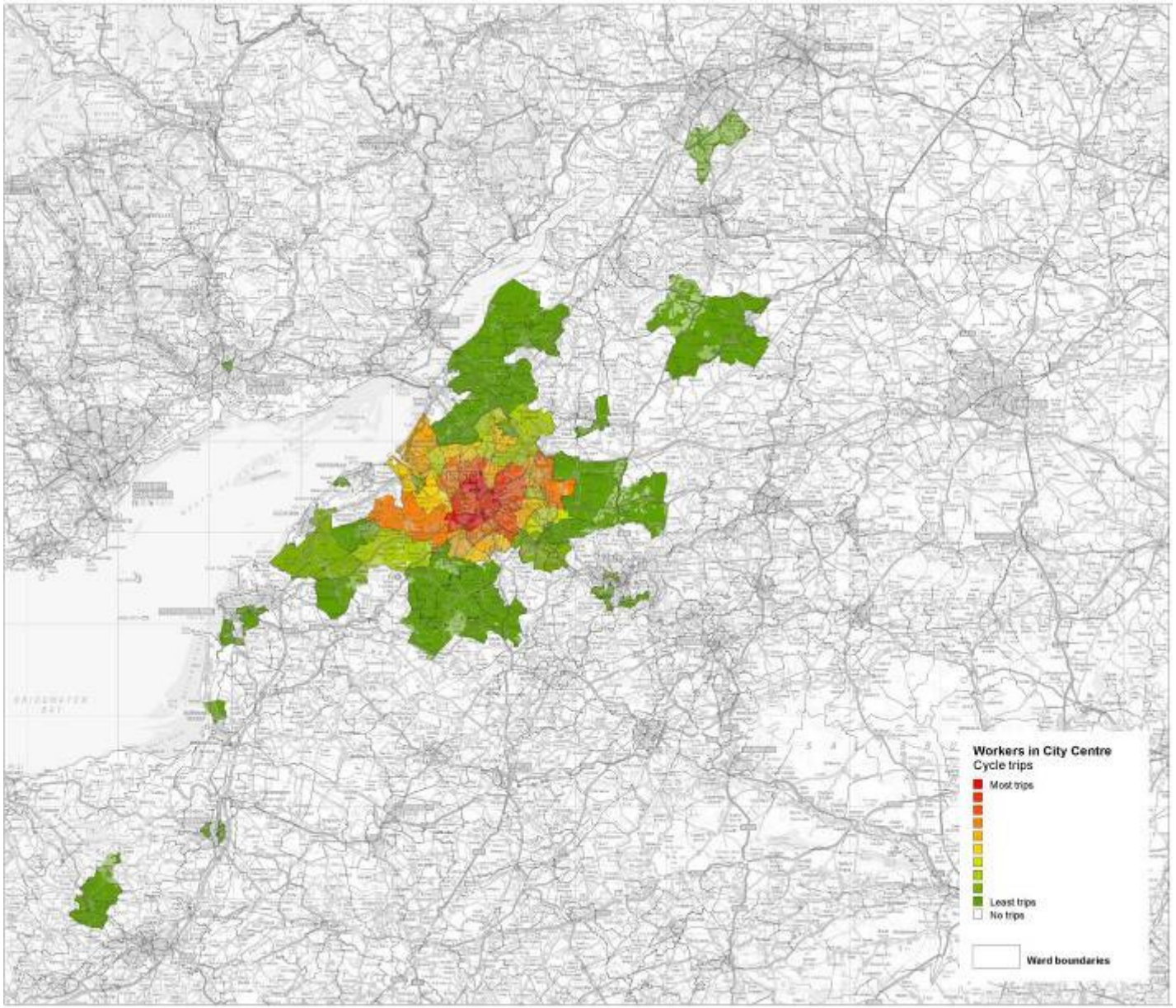


Figure 2.10: 2001 Census – pattern of residences for workers in Bristol City Centre – Cycle trips

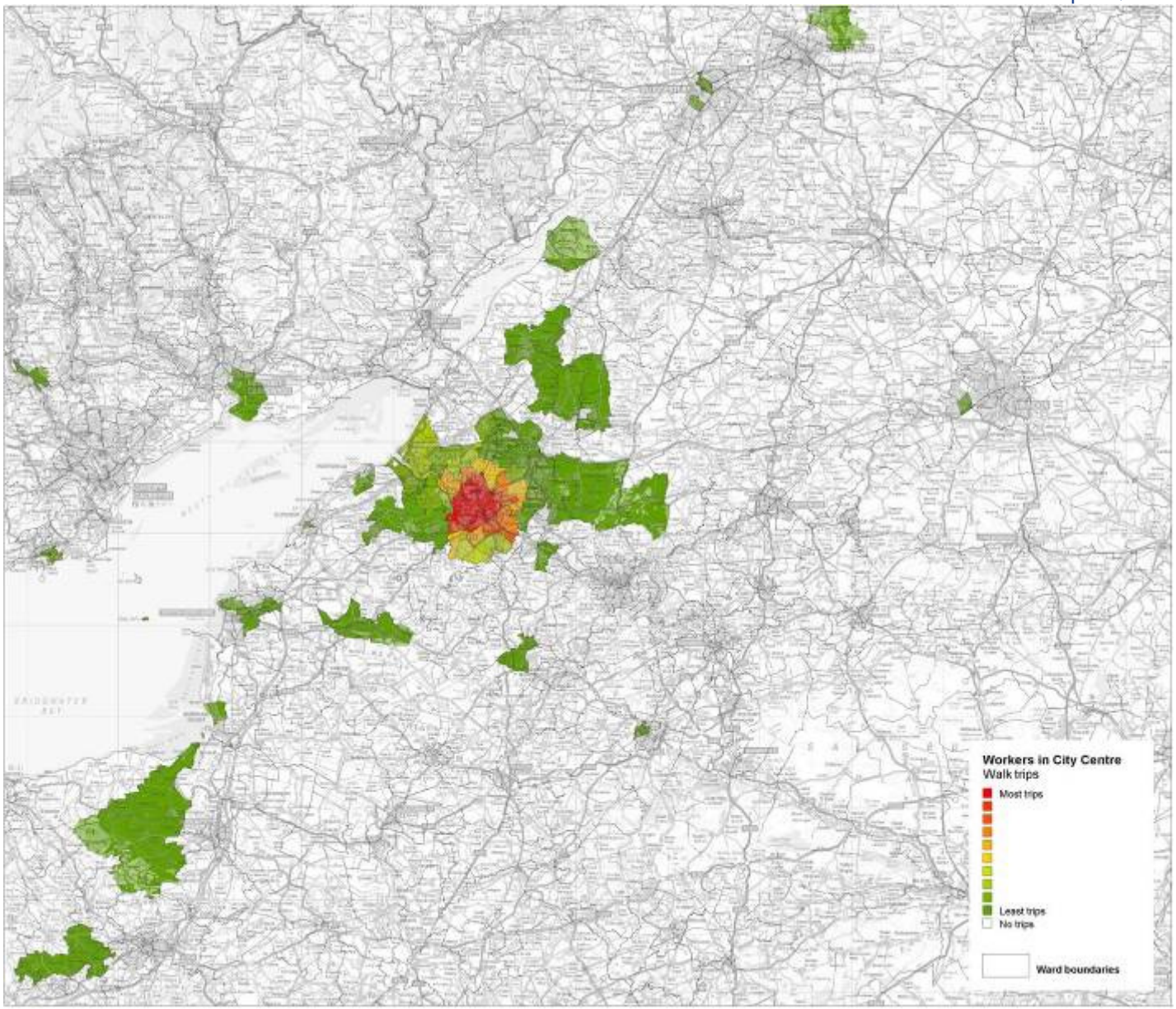


Figure 2.11: 2001 Census – pattern of residences for workers in Bristol City Centre – Walk trips

3 Initial trip and mode assessment

The purpose of this chapter is to investigate likely travel demand of the EZ, through a review of available data sources, existing policies and previous studies. In the first instance, this builds on an understanding of current travel characteristics discussed in Chapter 2, going on to identify the modal net trip generation and initial assessments of possible origins of trips travelling to the EZ.

3.1 Data sources

A number of sources of data have been used, including:

- GBATS3 – multi-modal macro demand model, (Atkins, base year 2009)
- TRICS – database which provides trip generation information for a wide variety of development scenarios
- 2001 Census residence and workplace – disaggregated by ward for the Bristol area (2001);
- Bristol Quality of Life Survey – annual questionnaire covering a wide variety of issues in the city, including mode of travel to work (annual since 2005);
- Bristol Big Commuter Count – through which a number of employees in Bristol provided details of their method of travel to work (2011);
- Survey of staff at Halcrow Bristol Office – situated within the EZ (2011).

Each of the sources is discussed, including how it has been used to help determine travel demand to/from the EZ. Note that throughout the remainder of this chapter:

- 'AM' refers to the morning peak of 08:00-09:00; and
- 'PM' is the evening peak from 17:00-18:00.

GBATS3 (Base year 2009)

GBATS3 is multi-modal macro demand model of the greater Bristol area. The model includes highway and public transport assignment models. Following a brief review of the models, outputs from the 2009 base year models have been used to determine the number of trips to/from specific zones:

- Within the EZ itself (6 zones); and
- The wider Bristol city centre (32 zones).

The GBATS3 model does not include information on walking, cycling, home working or other means of travel. Hence modal share numbers drawn from this model are indicative of the relative proportion of motorised modes; car, bus and rail. GBATS3 data has also been used to generate a possible origin and distribution of trips into the city centre. Table 3.1 shows the GBATS3 highway and PT trip distribution for AM arrivals and PM departures by sector.

	Highway				Public Transport			
	AM to EZ	PM from EZ	AM to EZ	PM from EZ	AM to EZ	PM from EZ	AM to EZ	PM from EZ
Bristol City Centre	1662	1608	19%	16%	371	1115	7%	32%
West Bristol	781	769	9%	8%	499	346	10%	10%
East Bristol	1870	1805	21%	18%	848	414	16%	12%
South Bristol	2272	2523	26%	25%	1511	625	29%	18%
North Fringe	197	277	2%	3%	180	85	4%	2%
East of Bristol	233	708	3%	7%	355	178	7%	5%
Thornbury	67	75	1%	1%	48	18	1%	1%
Yate	115	119	1%	1%	141	24	3%	1%
Bath	85	156	1%	2%	343	115	7%	3%
Avonmouth	202	33	2%	0%	121	16	2%	0%
Keynsham	14	46	0%	0%	109	18	2%	1%
B&NES	324	313	4%	3%	75	26	1%	1%
Weston-Super-Mare	37	43	0%	0%	142	72	3%	2%
Clevedon & Portishead	33	101	0%	1%	56	24	1%	1%
Royal Portbury docks	156	155	2%	2%	21	6	0%	0%
Long Ashton	19	10	0%	0%	5	9	0%	0%
Nailsea	114	218	1%	2%	86	9	2%	0%
Rest of North Somerset	103	163	1%	2%	94	42	2%	1%
Rest of UK	475	780	5%	8%	140	294	3%	9%
Total	8760	9904	100%	100%	5144	3437	100%	100%

Table 3.1 – GBATS3 AM Origin and PM Destination trips to city centre by mode GBATS3 (Base Year 2009)

TRICS

The TRICS database provides trip generations from a large number of developments, incorporating the full range of types of development (commercial, residential, retail, etc) and a variety of different locations. Information from TRICS has been filtered to include only multi-modal office-employment sites within town centre locations (albeit initially excluding sites in the database in London as these were used for calibration purposes). Seven sites were selected as being suitable to provide trip generations for the EZ, including one in the North West of England, two in the West Midlands, two in the North of England, and one each in Wales and Scotland. Where information relating to pubic transport trip generations, this has been split into bus and rail using data from other sites.

The total person trip rate, per employee for all modes, is summarised in Table 3.2. These values have been compared with trip rates for London sites within TRICS and the TRAVL (Trip Rate Assessment Valid for London) database and are considered to be representative.

AM arrival	0.531
PM departure	0.452

Table 3.2 – TRICS Mean Person Trip rate per employee (all modes, town centre office)

2010 Quality of Life Survey

The quality of life survey is a household questionnaire, based on a random sample of the population taken from the electoral register in 2010 and 5,200 results were returned. This information is not specific for employees working in the EZ or city centre. Summary information from this survey was presented in Chapter 2.

2001 Census

Information from the 2001 Census can be used to illustrate patterns of work-related movement to the city centre, using the Cabot and Lawrence Hill Wards to best reflect the EZ. Detailed analyses of this dataset were presented in Chapter 2.

The Census provides de facto origins of work trips into the EZ/city centre. This was discussed in Chapter 2 and is summarised in Table 3.3. The data suggests that 56% of all workers in the city centre originate from the City of Bristol, though the vast majority of walkers and cyclists come from the same area. Bus users are overwhelmingly from the Bristol urban area, including elements of South Gloucestershire. Only 7% of workers in the city centre who live in Bristol travel by train, with most rail commuters to central Bristol living in Bath, North Somerset or 'other' areas. A significant number of residents of Bristol who work in the city centre drive to work, though cars are more significant for residents of South Gloucestershire, North Somerset and 'other' areas.

	2001 Census - Trips to City Centre (Cabot and Lawrence Hill)						
	All trips	Train	Bus	Car	Bike	Walk	Other
Origin / Total Trips	80,731	2,387	18,201	37,495	3,581	11,147	7,920
Bristol, City of	56%	7%	62%	41%	84%	97%	56%
South Gloucestershire	19%	9%	24%	23%	10%	1%	22%
North Somerset	11%	23%	7%	15%	3%	0%	12%
Bath and North East Somerset	5%	24%	5%	6%	1%	0%	4%
Other	9%	37%	2%	14%	1%	1%	6%

Table 3.3 – 2001 Census: Residential origin of workers in the city centre (by mode)

The mode share and origin distribution derived from the 2001 Census has been incorporated into the analysis of overall mode share and distribution for EZ trip generations.

Big Commuter Count

A large number of employers in Bristol take part in the Big Commuter Count, which helps find out how people in the city travel to work. The Count is an online survey which takes place annually. This information is not specific for people working in the EZ or even the city centre. The mode share has been incorporated into the analysis of overall mode share for EZ trip generations.

Halcrow Bristol

The Halcrow Bristol office is based in the Temple Quay area and, as such, provides a valuable specific sample from within the EZ itself. A survey of 50 employees has been undertaken previously, and the resulting mode share incorporated into the analysis of overall mode share for EZ trip generations.

3.2 Mode share

Table 3.4 provides a summary modal share for EZ trips, including values derived from each data source described earlier in this chapter. The modal share values utilised are the mean of AM inbound and PM outbound output.

In order to calculate the overall modal share it is necessary to estimate the missing information by filling in the 'blanks' using primary source data as well as re-weighting the original data to include modes that the source does not include (such as non-motorised modes in GBATS3). For instance, car passenger data was estimated using the 2001 Census proportion of car driver to car passenger data. The resulting augmented modal shares (extrapolated to fill in the 'blanks' for each data source) are discussed below (and shown in Table 3.5).

	2009 GBATS3 Base (Bristol Enterprise Zones only)	2009 GBATS3 Base (Bristol City Centre zones)	TRICS (mean of Town Centre sites)	2010 Quality of Life Survey - Bristol	2001 Census (J2W Bristol)	2001 Census (J2W in City Centre wards)	2011 - Big communter count	2012 - Halcrow Bristol
Car driver	76.4%	68.6%	34.8%	54.0%	54.0%	46.4%	43.7%	30.6%
Walk			16.5%	17.4%	13.0%	13.8%	16.9%	16.3%
Bus	3.0%	20.9%	21.2%	9.5%	14.0%	22.5%	9.3%	8.2%
Work at home					6.0%	0.8%	1.9%	2.0%
Car passenger			5.3%	4.9%	6.0%	6.7%	4.7%	0.0%
Cycle			0.8%	7.8%	4.0%	4.4%	14.3%	26.5%
Motorcycle					2.0%	1.9%	1.7%	2.0%
Train	20.7%	10.5%	21.2%		1.0%	3.0%	4.9%	14.3%
Other						0.4%	2.7%	0.0%

Table 3.4 – Journey to Work Model Share for each Source (raw data)

Using the data various sources, an appropriate overall mode share has been determined, using the source values and local knowledge to generate suitable values for the modal share of trips related to the EZ. The chosen mode shares have been selected from the highlighted values, with the following guiding criteria:

- 'GBATS3' has been assumed to be the most reliable source for predicting bus and rail trips.
- The '2001 Census' provides the best data for walking, motorcycle and other modes trips, as this is not available from GBATS3.
- The 'Quality of Life' survey was felt to best represent the number of cyclists as this information is more up to date than the Census and there have been observed increases in cycling trips since 2001.
- The 'Big Commuter Coun't is assumed to provide the most reliable source for working from home as again, this is assumed to have increased since 2001.
- Car driver and car passenger trips have been calculated from the remaining trips after other modes have been included.
- The proportion of car driver to car passenger trips is based on the 2001 Census.

The resulting augmented mode sharess (along with the source values) can be found in Table 3.5.

	Data Sources								Bristol Enterprise Zone	
	2009 GBATS3 Base (Bristol Enterprise Zones only)	2009 GBATS3 Base (Bristol City Centre zones)	TRICS (mean of Town Centre sites)	2010 Quality of Life Survey - Bristol	2001 Census (J2W Bristol)	2001 Census (J2W in City Centre wards)	2011 - Big communter count	2012 - Halcrow Bristol	Crude Mean	Selected
Car driver	49.5%	44.5%	34.0%	54.0%	54.0%	46.4%	43.7%	30.6%	44.6%	**37.9%**
Walk	13.8%	13.8%	16.1%	17.4%	13.0%	13.8%	16.9%	16.3%	15.1%	**13.8%**
Bus	2.2%	15.5%	20.7%	9.5%	14.0%	22.5%	9.3%	8.2%	12.7%	**15.5%**
Work at home	1.9%	1.9%	1.9%	1.9%	6.0%	0.8%	1.9%	2.0%	2.3%	**1.9%**
Car passenger	7.1%	6.4%	5.2%	4.9%	6.0%	6.7%	4.7%	0.0%	5.1%	**5.4%**
Cycle	7.8%	7.8%	0.8%	7.8%	4.0%	4.4%	14.3%	26.5%	9.2%	**7.8%**
Motorcycle	1.9%	1.9%	0.0%	1.9%	2.0%	1.9%	1.7%	2.0%	1.7%	**1.9%**
Train	15.3%	7.8%	20.7%	2.2%	1.0%	3.0%	4.9%	14.3%	8.6%	**15.3%**
Other	0.4%	0.4%	0.4%	0.4%		0.4%	2.7%	0.0%	0.7%	**0.4%**

Table 3.5 – Estimated Modal Share for Enterprise Zone

Note that the suggested 38% of trips as a car driver is lower than that derived from both GBATS3 and the 2001 Census data, but is higher than TRICS. This is assumed to be a reasonable initial mode share based on the travel and transport characteristics of the EZ, though further analysis of mode share is contained in Chapter 4 of this report.

3.3 Trip generation

Person trip rates from TRICS (Table 3.2) and selected modal share values (Table 3.5) have been utilised to generate total person trips for the EZ. Table 3.6 shows the number of trips generated by the EZ; inbound in the AM peak and outbound in the PM peak for 4,000, 12,000 and 17,000 employees.

No. of employees	4,000		12,000		17,000	
Mode / Time Period	AM arrival	PM departure	AM arrival	PM departure	AM arrival	PM departure
Car driver	805	685	2414	2055	3420	2911
Walk	293	250	880	749	1246	1061
Bus	330	281	989	842	1401	1193
Work at home	40	34	121	103	172	146
Car passenger	116	98	347	295	491	418
Cycle	166	141	497	423	704	599
Motorcycle	40	34	121	103	171	146
Train	326	277	977	831	1384	1178
Other	9	8	27	23	38	32
Total	2124	1808	6372	5424	9027	7684

Table 3.6 – Estimated Trips to/from Enterprise Zone

Table 3.7 shows a generic distribution of trips on the local highway network. This is based on the 'most likely' route to/from the various sectors identified in Table 3.1 (drawn from GBATS3); the figures shown in Table 3.7 assume 17,000 employees in the EZ.

	Highway	
Route	AM to EZ	PM from EZ
Bristol City Centre	649	473
M32 / A38 North	333	368
A420	821	739
A4 Bath Road	165	151
A37 / A38 South	887	742
A370	120	157
A4018 / A4 Portway	445	281
Total	3420	2911

Table 3.7 – Estimated distribution of additional highway trips to/from Enterprise Zone (17,000 employees)

A significant number of EZ workers are assumed to use rail services, particularly because the EZ has Temple Meads station at its heart. Table 3.8 shows the postulated annual increase in rail patronage as a result of trips to/from EZ, based on the initial mode shares and trip generations previously described. Overall, an annual increase of between 500,000 and 2.3 million rail passengers could be generated by the EZ.

Forecast Rail Passengers					
No. of employees	4,000	12,000	17,000	Factor	No. periods
AM (08:00-09:00)	326	977	1,384		
Interpeak hour	67	202	286	0.22	
PM (17:00-18:00)	277	831	1,178		
AM (07:00-10:00)	879	2637	3736	2.7	253
IP (10:00-16:00)	404	1213	1719	6.0	253
PM (16:00-19:00)	582	1746	2473	2.1	253
Off Peak (06:00-07:00 & 19:00-24:00)	40	121	172	0.6	365
Sat (08:00-18:00) & Sun (10:00-16:00)	1079	3236	4584	16	56
Annual Passengers	547,111	1,641,334	2,325,223		

Table 3.8 – Annual Forecast Rail Passengers resulting from the Enterprise Zone [2]

3.4 Conclusions

In the initial estimates of trips to the EZ, it is considered that up to 38% could be car drivers in peak hours, resulting in an increased demand of up to 3,400 vehicles on the local network in the morning peak period. However, highway volumes could therefore be considerably affected by factors related to incorporating this level of traffic, including:

- Levels of congestion on the local highway network;
- Potential restrictions on car parking in the EZ;
- The effectiveness of on-site travel plans; and
- Attractiveness of alternate modes of travel.

It is estimated that there would be at least 31% bus and rail modal share for travel to/from the EZ, resulting in an increased bus and rail demand of around 2,800 passengers in the peak periods, and up to 2.3 million additional rail passengers annually.

Mode shares and the potential effects on demand, use and capacity of public transport modes (including Park & Ride) are discussed further in Chapter 4.

[2] The Interpeak factor (22%) is relative to the mean of the AM and PM Peak periods and is based on analysis from the TRICS database. The factoring data to estimate the daily and annual volumes are based on the West of England Annualisation Report (Atkins, August 2011) associated with the BATS3 models.

4 Modes used by Enterprise Zone trips

4.1 Initial mode split

A series of assessments have been made to identify the potential mode split of trips to/from new development in the EZ. This has drawn on various data sources to identify an initial mode split, as discussed in Chapter 3. The initial mode split is shown in Table 4.1, along with the number of trips arriving in the AM peak and departing in the PM peak by each mode in the three employment level scenarios.

Mode	Share	No. of employees in Enterprise Zone					
		4,000 employees		12,000		17,000	
		AM arrival	PM dep	AM arrival	PM dep	AM arrival	PM dep
Car driver	37.9%	805	685	2414	2055	3,420	2,911
Car passenger	5.4%	116	98	347	295	491	418
Motorcycle	1.9%	40	34	121	103	171	146
Train	15.3%	326	277	977	831	1,384	1,178
Bus	15.5%	330	281	989	842	1,401	1,193
Cycle	7.8%	166	141	497	423	704	599
Walk	13.8%	293	250	880	749	1,246	1,061
Other	0.4%	9	8	27	23	38	32
Work at home	1.9%	40	34	121	103	172	146
Total	100.0%	2,124	1,808	6,372	5,424	9,027	7,684

Table 4.1: Estimated Trips and mode shares to/from Enterprise Zone

This mode share assumes a realistic demand for individual modes, in particular for use of private cars (car driver). However, a key issue that we face is that there is very little 'spare' capacity on the highway, which also cannot easily be augmented, so this may prove to be challenging to accommodate in the EZ itself and on the road network leading to it. Similarly, potential bus passenger demand could challenge the current bus network.

Hence, in order to understand the effect on different transport modes as a result of potential restrictions to the number of new trips that could use cars, a series of assessments have been made to 're-distribute' trips to other modes. This chapter describes that process, and outlines the results.

4.2 Bus capacity in/around the Enterprise Zone

Buses will be an important component of transport to/from the EZ, with an initial forecast of around 23% of trips being by bus. Bus provision in the vicinity of the EZ is already very good, as discussed in Chapter 2, but it is important to consider the ability of the local bus network to be able to cope with the increases in bus trips that development of the EZ could generate.

Table 4.2 summarises the additional bus trips that would be generated in the peak period for each of the EZ development scenarios (initial mode share).

Enterprise Zone Development size (jobs)	Additional Bus Trips	
	AM peak 08:00-09:00	PM peak 17:00-18:00
4,000	330	281
12,000	989	842
17,000	1,401	1,193

Table 4.2:Additional bus trips generated by the Enterprise Zone

The Bus Rapid Transit network will have a critical role in providing some of this much needed public transport capacity in the 5 years, complemented by local service enhancements and better connectivity to city centre bus hubs. To identify the overall requirement for bus services, comparison has been made between the current network and its ability (or otherwise) to serve this additional demand. Several key assumptions have been made in doing this, as follows:

- In lieu of detailed knowledge of bus service usage (and hence available capacity), all bus services have been considered together as a single system. Further refinements of this assessment could focus on corridors or individual routes.
- Two illustrative levels of overall bus occupancy have been assumed. An occupancy rate of 75% is based on anecdotal observations of bus services arriving in the City Centre at various times during the AM peak. In addition to this, a higher occupancy level of 90% has also been considered to present a range of network requirements.
- Individual bus routes have not been isolated at this stage (as noted previously), and three levels of indicative bus capacity have been assumed, namely 45, 60 and 75. It is acknowledged that the capacities of vehicles operating individual services will vary.

Using the two assumed levels of occupancy and three notional bus capacities a series of calculations have been carried out to identify (for each combination of occupancy and capacity) the 'spare' capacity available across the network serving the EZ.

The amount of this spare capacity that would be used up in each development scenario then gives a resulting occupancy rate and remaining spare capacity. From this, the number of additional buses (at the assumed capacity) has been calculated that would be needed to carry the additional passengers under two scenarios:

- To retain the network at the current occupancy rate – the assumption underlying this being that the current operating occupancy is sustainable in the context of the day-to-day practical operability of the network(using both 75% and 90%).
- Where all the spare capacity of the network is deemed to be used up, the number of new buses (also at 100% occupancy) that would be needed to simply carry the additional passengers.

Table 4.3 sets out the findings of these analyses.

This indicates that between 5 and 10 new bus services per peak hour could be required (depending on occupancy and capacity assumptions) with 4,000 employees in the EZ, retaining current occupancy rates. This requirement rises to between 18 and 41 buses at 17,000 employees. In addition, at 17,000 employees in the EZ, if an initial 90% occupancy is assumed, up to 17 additional buses could be required simply to cater for trips assuming all buses are filled to capacity.

Future assessments

Refinements of this analysis would look at individual services or groups of services on corridors, in order to take into account bus occupancy and capacity on individual routes, as well as the directions of travel of trips to/from the EZ.

		average bus capacity *assumed 'working' bus occupancy*	*45* *75%*	*60* *75%*	*75* *75%*	*45* *90%*	*60* *90%*	*75* *90%*
Current EZ area	**AM to..**	buses per hour	149.5	149.5	149.5	149.5	149.5	149.5
	08:00-09:00	approx spare capacity based on 'working' occupancy	1,682	2,243	2,803	673	897	1,121
	PM from..	buses per hour	145	145	145	145	145	145
	17:00-18:00	approx spare capacity based on 'working' occupancy	1,631	2,175	2,719	653	870	1,088
+ 4,000 jobs	**AM to..**	new bus trips	330	330	330	330	330	330
	08:00-09:00	% of spare capacity used	20%	15%	12%	49%	37%	29%
		resulting occupancy	80%	79%	78%	95%	94%	93%
		spare capacity still remaining	1,352	1,913	2,473	343	567	792
		minimum new buses to keep occupancy <100%	-	-	-	-	-	-
		new buses to keep services at 'working' occupancy	**10**	**8**	**6**	**9**	**7**	**5**
	PM from..	new bus trips	281	281	281	281	281	281
	17:00-18:00	% of spare capacity used	17%	13%	10%	43%	32%	26%
		resulting occupancy	79%	78%	78%	94%	93%	93%
		spare capacity still remaining	1,351	1,894	2,438	372	589	807
		minimum new buses to keep occupancy <100%	-	-	-	-	-	-
		new buses to keep services at 'working' occupancy	**9**	**7**	**5**	**7**	**6**	**5**
+ 12,000 jobs	**AM to..**	new bus trips	989	989	989	989	989	989
	08:00-09:00	% of spare capacity used	59%	44%	35%	147%	110%	88%
		resulting occupancy	90%	86%	84%	105%	101%	99%
		spare capacity still remaining	693	1,253	1,814	-316	-92	132
		minimum new buses to keep occupancy <100%	-	-	-	**8**	**2**	-
		new buses to keep services at 'working' occupancy	**30**	**22**	**18**	**25**	**19**	**15**
	PM from..	new bus trips	842	842	842	842	842	842
	17:00-18:00	% of spare capacity used	52%	39%	31%	129%	97%	77%
		resulting occupancy	88%	85%	83%	103%	100%	98%
		spare capacity still remaining	789	1,333	1,877	-189	28	246
		minimum new buses to keep occupancy <100%	-	-	-	**5**	-	-
		new buses to keep services at 'working' occupancy	**25**	**19**	**15**	**21**	**16**	**13**
+ 17,000 jobs	**AM to..**	new bus trips	1,401	1,401	1,401	1,401	1,401	1,401
	08:00-09:00	% of spare capacity used	83%	62%	50%	208%	156%	125%
		resulting occupancy	96%	91%	87%	111%	106%	102%
		spare capacity still remaining	281	841	1,402	-728	-504	-280
		minimum new buses to keep occupancy <100%	-	-	-	**17**	**9**	**4**
		new buses to keep services at 'working' occupancy	**42**	**32**	**25**	**35**	**26**	**21**
	PM from..	new bus trips	1,193	1,193	1,193	1,193	1,193	1,193
	17:00-18:00	% of spare capacity used	73%	55%	44%	183%	137%	110%
		resulting occupancy	93%	89%	86%	108%	104%	101%
		spare capacity still remaining	439	982	1,526	-540	-323	-105
		minimum new buses to keep occupancy <100%	-	-	-	**13**	**6**	**2**
		new buses to keep services at 'working' occupancy	**36**	**27**	**22**	**30**	**23**	**18**

Table 4.3: Bus capacity and potential demand around the Enterprise Zone

4.3 Modal re-distribution

If the initial car mode share is taken to be too high, in seeking to re-distribute forecast car trips to other modes, it is important to consider the likely 'realistic' alternative modes that would be available. This has been based on the geographic distribution of mode splits identified from the 2001 Census workplace and residence data. Being a comprehensive dataset, this shows differential mode shares from disaggregate origins/destinations with respect to trips to/from the EZ; and specifically in this context, the central Bristol wards of Cabot and Lawrence Hill. The approximate split of workplace numbers by residence locations is as follows:

East Bristol (inc Kingswood)	18.5%	North of Bristol	6%
South Bristol	18%	Weston-super-Mare & Yatton	4%
North Bristol (inc Bradley Stoke)	13.5%	Bath & Kenysham	3%
Clifton & Redland	11%	East of Bristol	2%
Bristol City Centre	10.5%	South of Bristol	2%
West of Bristol	9%	South Wales	2%

Table 4.4 shows the mode shares of residents of areas in and around Bristol who work in Bristol City Centre; shaded cells in the table show the locations that are the most significant for each mode.

Residence in…	Car-driver	Car-pass	Motor-cycle	Train	Bus	Bike	Walk	Other
Bristol City Centre	17.2%	2.8%	0.8%	0.6%	9.9%	4.6%	62.8%	1.4%
Clifton & Redland	27.6%	3.8%	0.7%	0.4%	11.8%	8.7%	46.5%	0.6%
North Bristol (inc Bradley Stoke)	50.1%	7.2%	2.5%	1.3%	28.0%	5.1%	5.4%	0.3%
East Bristol (inc Kingswood)	45.1%	8.2%	2.4%	0.5%	32.9%	5.3%	5.2%	0.4%
South Bristol	35.3%	7.8%	1.8%	0.1%	32.4%	5.7%	16.4%	0.4%
Bath & Kenysham	47.8%	3.8%	2.2%	19.6%	24.1%	1.4%	0.1%	1.0%
South Wales	63.5%	7.7%	1.0%	19.8%	6.7%	0.3%	1.0%	-
Weston-super-Mare & Yatton	63.4%	7.7%	2.1%	12.1%	13.7%	0.4%	0.4%	0.2%
North of Bristol	73.5%	6.8%	2.2%	3.8%	11.9%	0.7%	1.1%	0.1%
East of Bristol	67.0%	2.6%	0.9%	24.7%	2.7%	0.5%	1.3%	0.3%
South of Bristol	75.0%	5.4%	2.3%	2.9%	12.7%	0.5%	0.7%	0.5%
West of Bristol	70.2%	7.4%	2.1%	4.9%	12.8%	1.5%	0.9%	0.2%

Table 4.4: Workplace in Cabot & Lawrence Hill – mode shares & origins (2001 Census)

The distribution of mode shares in Table 4.4 has been adjusted to reduce the effect of unrealistic responses (such as walking long distances). Used in conjunction with the origin split, the number of work trips generated by the EZ can be allocated to origins, to give broad estimates of trip origin by mode. Variation of the number of car trips can then be done, and trips that at re-allocated to other modes done so in a realistic manner. This still recognises areas that have the greatest predilection to use particular non-car modes (as highlighted in Table 4.4) will take the greatest share of re-allocated car trips.

Key assumptions made in the reallocation of trips are as follows:

- Car driver mode shares assumed at 38% initially, with options 1-5 respectively at maximum values of 30%, 25%, 20%, 15% and 10%;
- Car passenger mode share is reduced pro rata with car driver;
- Motorcycle, other (taxi, etc) and work at home mode shares kept constant; and

- Car driver trips are re-distributed to train, bus, cycle and walk trips, based on the current modal distribution (with restrictions as noted above).

Figure 4.1 (in Appendix A) shows the summary results from this exercise, with revised mode shares applied to totals trips generated by EZ employment trips arriving in the AM peak and departing in the PM peak, by each mode and for the three employment level scenarios. Figure 4.2a-f (in Appendix A) shows more detailed distribution of trips by residential origin/destination.

In summary, comparing the initial forecast mode split to the options for restricting car mode share:

- Car trips are deliberately reduced, and this is generally across the origins rather than specific to locations, as car driver is the largest mode for trips from all origins apart from local trips from areas nearest to the city centre;
- Bus trips particularly increase for people living within Bristol, with the emphasis on middle distance intra-city trips; such as from North Bristol (including Stoke Gifford and Bradley Stoke), East Bristol (including Kingswood) and South Bristol;
- Rail trips increase from areas around Bristol, aligned with the main rail routes; from north of the city (including most parts of South Gloucestershire and beyond), east of the city (Bath, Keynsham and Wiltshire), south west of Bristol (Weston-super-Mare and beyond) and South Wales; and
- Walking and cycling both increase within the city – cycle trips tend to increase more for areas further away from the city centre than walking, which becomes even more important for trips local to the EZ.

This results in changes to trip numbers by mode as shown in Table 4.5. Note that in the most extreme example (option 5, which has a maximum of 10% car driver mode share) overall car trips reduce by 75%, whereas bus trips rise by 85%, with train trips rising by 65%, cycle trips by 55% and walk trips by 30% (trips by other modes are constant as noted earlier).

Table 4.5: Changes to modal trips as a result of restricting car mode share

Scenario	Car-driver	Car-pass	Train	Bus	Bike	Walk
Option 1: 30% car driver mode share						
4,000 AM Peak – arrivals	-180	-26	64	85	29	27
4,000 PM Peak – departures	-153	-22	55	72	24	23
12,000 AM Peak – arrivals	-539	-77	193	255	86	82
12,000 PM Peak – departures	-459	-66	164	217	73	70
17,000 AM Peak – arrivals	-539	-77	193	255	86	82
17,000 PM Peak – departures	-650	-93	233	308	103	99
Option 2: 25% car driver mode share						
4,000 AM Peak – arrivals	-284	-41	102	134	45	43
4,000 PM Peak – departures	-242	-35	87	114	38	37
12,000 AM Peak – arrivals	-851	-122	305	403	135	130
12,000 PM Peak – departures	-725	-104	260	343	115	110
17,000 AM Peak – arrivals	-851	-122	305	403	135	130
17,000 PM Peak – departures	-1,026	-147	368	486	163	157

Scenario	Car-driver	Car-pass	Train	Bus	Bike	Walk
Option 3: 20% car driver mode share						
4,000 AM Peak – arrivals	-388	-56	139	184	62	59
4,000 PM Peak – departures	-330	-47	118	156	52	50
12,000 AM Peak – arrivals	-1,164	-167	417	551	185	177
12,000 PM Peak – departures	-991	-142	355	469	157	151
17,000 AM Peak – arrivals	-1,164	-167	417	551	185	177
17,000 PM Peak – departures	-1,403	-202	503	665	223	214
Option 4: 15% car driver mode share						
4,000 AM Peak – arrivals	-492	-71	176	233	78	75
4,000 PM Peak – departures	-419	-60	150	198	67	64
12,000 AM Peak – arrivals	-1,476	-212	529	699	235	225
12,000 PM Peak – departures	-1,257	-181	451	595	200	192
17,000 AM Peak – arrivals	-1,476	-212	529	699	235	225
17,000 PM Peak – departures	-1,780	-256	638	843	283	271
Option 5: 10% car driver mode share						
4,000 AM Peak – arrivals	-596	-86	214	283	95	91
4,000 PM Peak – departures	-508	-73	182	240	81	77
12,000 AM Peak – arrivals	-1,789	-257	641	848	284	273
12,000 PM Peak – departures	-1,523	-219	546	721	242	232
17,000 AM Peak – arrivals	-1,789	-257	641	848	284	273
17,000 PM Peak – departures	-2,157	-310	773	1,022	343	329

Table 4.5: Changes to modal trips as a result of restricting car mode share

4.4 Potential use of Park & Ride

4.4.1 Park & Ride trips

Having considered various situations where car mode share at the EZ is restricted and trips are made using other modes, it is useful to take a further step to consider the possible role that Park & Ride services could play, as these are natural options for car users. Bus-based Park & Ride services are already important in providing access to Bristol city centre, with three bespoke sites in operation at present (at Brislington, Portway and Long Ashton), and other locations for Park & Ride sites around the city have also been considered. Most notably, a site located adjacent to the M32 (between junctions 1 and 2) would fill a key gap in the provision of Park & Ride for traffic approaching Bristol from the north and west, and in particular using the motorway network. Reflecting the development significance that the EZ could represent to central Bristol, an 'M32' site has been included in the analyses.

Unfortunately, Park & Ride as a specific 'mode' is not separately identified in any of the source data used for this study. As such, a series of assumptions have been made to illustrate the potential role that Park & Ride could play for EZ trips. [3]

Catchments of the four sites (Brislington, Portway, Long Ashton and M32) have been defined, based on residential origins of prospective workers in the EZ. This includes

[3] Note that the Park & Ride trips discussed and quoted in this Chapter are for the AM and PM peaks, and are additional to existing use of the Park & Ride sites, being based solely on EZ traffic. Therefore, in the case of a notional M32 site, they do not represent full demand for such a site, just the demand that could come from EZ trips.

assumptions about which sites would be used (and the split between sites if more than one is available), and a weighting based on the likelihood that a site will be used. The weightings and site splits are applied to generic Park & Ride mode splits. These have been assumed at 15% of (weighted relevant) trips under the initial mode split scenario and then 20% of any trips that are re-distributed to other modes.

Park & Ride trips have been synthesised for the initial mode split scenario for the EZ, assuming that a proportion of people who were formerly car driver, car passenger, bus or train users could switch to Park & Ride. No motorcycle, walk or cycle trips are switched to Park & Ride. This is in line with anecdotal experience from other sites. Table 4.6 shows the number of Park & Ride trips for the EZ development scenarios, for each of the four sites assumed.

P&R Site	**4,000 jobs**		**12,000 jobs**		**17,000 jobs**	
	AM arr	PM dep	AM arr	PM dep	AM arr	PM dep
Brislington	33	28	100	85	141	120
Long Ashton	25	21	76	64	107	91
Portway	22	19	66	56	93	79
M32	42	35	125	106	176	150
Total	122	103	367	311	517	440

Table 4.6: Potential Enterprise Zone Park & Ride trips – initial mode split

Then for each of the reduced car mode share scenarios, a proportion of the car trips that are removed are assumed to use Park & Ride, with a commensurate reduction in the previously calculated switch to bus and rail.

Table 4.7 shows the total numbers of Park & Ride trips in each scenario. Figure 4.3 (in Appendix A) shows overall results, with mode shares adjusted to include Park & Ride, applied to totals trips generated by EZ employment trips arriving in the AM peak and departing in the PM peak by each mode in the three employment level scenarios. Figure 4.4a-f (in Appendix A) shows more detailed distribution of trips by residential origin/destination. In essence, this indicates potentially significant numbers of new Park & Ride trips could be generated by the EZ, and in particular this increases as car mode share is restricted.

Table 4.7: Potential Enterprise Zone Park & Ride trips – restricting car mode share scenarios

P&R Site	**4,000 jobs**		**12,000 jobs**		**17,000 jobs**	
	AM arr	PM dep	AM arr	PM dep	AM arr	PM dep
Option 1: 30% car driver mode share						
Brislington	38	32	113	97	161	137
Long Ashton	29	25	88	75	125	107
Portway	26	22	78	66	110	94
M32	48	41	144	123	204	174
Total	141	120	424	361	600	511
Option 2: 25% car driver mode share						
Brislington	40	34	121	103	172	146
Long Ashton	32	27	96	82	136	116
Portway	28	24	85	72	120	102
M32	52	44	155	132	220	187
Total	153	130	458	389	648	552
Option 3: 20% car driver mode share						
Brislington	43	37	129	110	183	156
Long Ashton	34	29	103	88	146	125
Portway	31	26	92	78	130	111
M32	56	47	167	142	236	201
Total	164	139	491	418	696	592

P&R Site	4,000 jobs		12,000 jobs		17,000 jobs	
	AM arr	PM dep	AM arr	PM dep	AM arr	PM dep
Option 4: 15% car driver mode share						
Brislington	46	39	137	117	194	165
Long Ashton	37	31	111	94	157	134
Portway	33	28	99	84	140	120
M32	59	50	178	151	252	214
Total	175	149	525	447	744	633
Option 5: 10% car driver mode share						
Brislington	48	41	145	124	206	175
Long Ashton	39	34	118	101	168	143
Portway	35	30	106	90	151	128
M32	63	54	189	161	268	228
Total	186	159	559	476	792	674

Table 4.7: Potential Enterprise Zone Park & Ride trips – restricting car mode share scenarios

4.4.2 Park & Ride site accumulation

All the analyses described to this point have used person trips. When considering capacity and use of Park & Ride sites, while person trip numbers are important in determining the requirement for bus services, use of the sites is dependant on the number of vehicles those 'person trips' arrive in. In addition, as noted earlier, the person trips quoted represent movements in the AM and PM peak hours. Hence, to determine the potential effect on Park & Ride occupancy, conversions from trips to vehicles and peak to implied daily accumulations at the sites are also required.

Table 4.8 shows vehicles entering and leaving the Park & Ride sites with the initially assumed mode split, assuming a car occupancy of 1.2 (with Table 4.9 having the same information for the five restricted car mode share scenarios).

P&R Site	4,000 jobs		12,000 jobs		17,000 jobs	
	AM arr	PM dep	AM arr	PM dep	AM arr	PM dep
Brislington	28	24	83	71	118	100
Long Ashton	21	18	63	54	89	76
Portway	18	16	55	47	78	66
M32	35	29	104	88	147	125
Total	102	86	305	259	432	367

Table 4.8: Potential Enterprise Zone Park & Ride vehicle usage – initial mode split

P&R Site	4,000 jobs		12,000 jobs		17,000 jobs	
	AM arr	PM dep	AM arr	PM dep	AM arr	PM dep
Option 1: 30% car driver mode share						
Brislington	32	27	95	80	134	114
Long Ashton	25	21	74	63	104	89
Portway	22	18	65	55	92	78
M32	40	34	120	102	170	145
Total	118	100	353	301	500	426
Option 2: 25% car driver mode share						
Brislington	34	29	101	86	143	122
Long Ashton	27	23	80	68	113	96
Portway	24	20	71	60	100	85
M32	43	37	129	110	183	156
Total	127	108	381	325	540	460

Table 4.9: Potential Enterprise Zone Park & Ride vehicle usage – restricting car mode share scenarios

(table continues on next page)

P&R Site	4,000 jobs		12,000 jobs		17,000 jobs	
	AM arr	PM dep	AM arr	PM dep	AM arr	PM dep
Option 3: 20% car driver mode share						
Brislington	36	31	108	92	153	130
Long Ashton	29	24	86	73	122	104
Portway	26	22	77	65	109	93
M32	46	39	139	118	197	167
Total	136	116	409	348	580	494
Option 4: 15% car driver mode share						
Brislington	38	32	114	97	162	138
Long Ashton	31	26	92	79	131	111
Portway	28	23	83	70	117	100
M32	49	42	148	126	210	179
Total	146	124	438	372	620	528
Option 5: 10% car driver mode share						
Brislington	40	34	121	103	171	146
Long Ashton	33	28	99	84	140	119
Portway	30	25	89	75	125	107
M32	53	45	158	134	223	190
Total	155	132	466	396	660	562

Table 4.9: Potential Enterprise Zone Park & Ride vehicle usage – restricting car mode share scenarios

EZ trips are expressed as peak hour movements, which are related to the total number of employees in the EZ at each development level. The resulting number of trips is a proportion of the total number of employees. These factors have been used as a proxy to calculate daily vehicle accumulations in Park & Ride sites as a result of users from the EZ.

Table 4.10 shows the number of vehicles that could accumulate in the Park & Ride sites as a result of EZ trips. Table 4.11 shows accumulations that could result from the five restricting car mode share options, including the difference in Park & Ride site accumulations between the initial mode share and option. These tables indicate that substantial additional users could be recorded at Park & Ride sites from EZ users alone, ranging from almost 200 (spread over the four sites included in this analysis) with 4,000 employees in the EZ, to over 800 with 17,000. Splits between sites are relatively even, reflecting that the four sites included provide good coverage from all the main approaches to Bristol.

P&R Site	4,000 jobs accumulation	12,000 jobs accumulation	17,000 jobs accumulation
Brislington	53	160	226
Long Ashton	40	121	171
Portway	35	105	149
M32	66	199	282
Total	195	585	829

Table 4.10: Potential Enterprise Zone Park & Ride accumulation – initial mode split

P&R Site	4,000 jobs		12,000 jobs		17,000 jobs	
	accum	change from initial	accum	change from initial	accum	change from initial
Option 1: 30% car driver mode share						
Brislington	60	7	181	22	257	31
Long Ashton	47	7	141	21	200	29
Portway	42	7	125	20	177	28
M32	77	10	230	31	326	44
Total	226	31	678	93	960	132
Option 2: 25% car driver mode share						
Brislington	65	12	194	35	275	49
Long Ashton	51	11	153	33	217	46
Portway	45	10	136	31	193	44
M32	83	16	248	49	352	70
Total	244	49	732	147	1,037	208
Option 3: 20% car driver mode share						
Brislington	69	16	207	47	293	67
Long Ashton	55	15	165	44	234	63
Portway	49	14	147	42	209	60
M32	89	22	266	67	377	95
Total	262	67	786	201	1,113	285
Option 4: 15% car driver mode share						
Brislington	73	20	220	60	311	85
Long Ashton	59	19	177	56	251	80
Portway	53	18	159	54	225	76
M32	95	28	284	85	403	121
Total	280	85	840	255	1,190	361
Option 5: 10% car driver mode share						
Brislington	77	24	232	73	329	103
Long Ashton	63	23	189	68	268	97
Portway	57	22	170	65	241	92
M32	101	34	302	103	428	146
Total	298	103	894	309	1,266	438

Table 4.11: Potential Enterprise Zone Park & Ride accumulation – restricting car mode share scenarios

5 Accessing the Enterprise Zone

5.1 Trips to/from the Enterprise Zone

The predictive work to assess the likely generations from the target increase in employment within the Enterprise Zone (EZ) has shown that, not unsurprisingly, there are some significant increases in demand for travel by all modes. It is often the increase in travel by car that results in greatest pressure on the transport network, but implicit in and assessment of travel demand is that there are increases for all modes. In the case of a city centre location like the EZ this means that, by virtue of the availability of good networks for all modes, walk and cycle, and public transport network also see a significant increase in demand. This can provide its own challenges.

The analysis to date has presented the forecast increase in demand to access the EZ for a projected increase in employment places of 4,000, 12,000 and 17,000. The forecast has been based on a series of assumptions on the mode split of trips to the EZ and the proportion of trips that occur in the peak hour. These assumptions are essentially based on the existing mode split of trips to the city centre. However, as this report has already investigated, because of the pressure on the highway network, there are some additional issues that require consideration and action in order to achieve the required level of access to the EZ. This chapter rounds up the analysis so far, and presents some specific assessments of local, walk, access to the EZ.

5.2 Mode share projections

The mode split of trips to the EZ, derived from a range of data, shows that non-car travel modes account for over half of all trips. Public transport accounts for over 30% of trips, broadly equally proportioned between rail and bus. Walking accounts for another 14% and cycle about 8%. About 38% of people arrive by car, with a further 5% as car passenger.

However, there is a significant issue with simply assuming these proportions are appropriate to for the basis of an assessment of the EZ. That is, there is an implicit assumption that 'all other things remain equal'. That is, the transport networks can accommodate the projected increase in demand for every mode. But, the transport network is under pressure – and this has different implications for different modes.

Walking & Cycling

Walking and cycling are the most sustainable modes of transport in that they do not involve the space and the infrastructure and energy use required by other modes. However, in assessing the scope for walking and cycling in any transport strategy, regard has to be given to journey distance and topography.

Thus, for walking and cycling, the projection of the existing mode share assumes that there will be sufficient additional opportunities for new employees working in the EZ to have a home base within walking and cycling distance from the EZ. With the regeneration of central Bristol and the intensification of use of residential land (i.e. flat and apartment living), it would, perhaps, be possible to provide sufficient new homes within walk and cycle distance of the EZ to allow the current proportion of walking and cycling to be projected into the future.

Car

For car based trips ('car driver' and 'car passenger') the assumption is that there will be sufficient highway capacity to accommodate the increase. Feedback from Bristol City Council (BCC) officers suggests that the existing highway arrangement is 'at capacity', and even with some planned enhancement to the capacity, the increase would be limited. Thus, it can not be expected that the forecast increase in trips associated with the car could be accommodated on the existing highway. Further opportunities to enhance the highway capacity are limited as this would not only involved works in the vicinity of the EZ, but also works well beyond the EZ to increase overall network capacity.

There is, therefore, a considerable demand for travel by car (based on the simple projection) that can not be met by the existing highway arrangement. This additional demand will need to be met by other modes. Some of the ways that this could be achieved were discussed in Chapter 4.

Public Transport

At present it is forecast that about 15% of the trips to the EZ will arrive by bus and 15% by train. From observations, in the peak hours, bus services are currently well used. However, as discussed in Chapter 2, there are only a limited number of bus services that directly pass by the EZ (from the south west of Bristol). From other locations a walk from the city centre stop location is required. The willingness of people to walk, or interchange onto a 'city centre hopper' type service, is difficult to establish at this time.

The Bus Rapid Transit network will have a critical role in providing some of this much needed public transport capacity in the 5 years, complemented by local service enhancements and better connectivity to city centre bus hubs. The effects on the bus system itself were discussed in Chapter 4.

The rail system in the (Greater) Bristol area going to be subject to a number of potentially significant enhancements over the next 6/7 years, including electrification of the Great Western Main Line, new services and changes to the station for rail users. Appendix C contains a technical note that discusses some of the more detailed rail issues that surround the EZ, being as Temple Meads station is the focus of planned changes and to the rail system.

Network Rail has been forecasting the likely future use of Bristol Temple Meads station. It has suggested that there will be a 40% increase in patronage between 2010 and 2020, and up to 79% by 2026. The forecast of rail trips generated by the EZ has been supplied to Network Rail to ensure consistency, and feedback from Network Rail has confirmed that the assumptions made in the simple projection analysis are in keeping with their own.

Accommodating growth in demand to travel

It is important to consider that increasing the proportion of walk and cycle trips is limited by the ability to provide additional new homes within the walk and cycle catchment areas of the EZ to accommodate the additional employees who would have travelled from further afield by car, as well as the specific walk or cycle facilities available to them. Note: there is a basic premise here that the required range of

employees will be willing to live in the City Centre. Hence, while there is clearly scope to increase the number of walk and cycle trips, this could be limited.

The role of public transport is therefore critical. This will have to increase in order to accommodate the forecast demand for travel to the EZ that will not be able to access the area by car and/or not be willing or able to live in a location from which walking or cycle would be attractive. The Greater Bristol Bus Network and Bus Rapid Transit (BRT) routes currently being developed will increase the attractiveness and the capacity of the public transport network. Proposed enhancements to the local rail network (Greater Bristol Metro) will also provide other opportunities. As discussed in Chapter 4, as an already important tool for accessing Bristol city centre, the role of Park & Ride needs to be carefully considered and perhaps expanded.

5.3 Variations of mode split

In considering the likely situation in 10 or 20 years time, it is clear that there are a number of assumptions that could be subject to variation. A key starting point is that there is very little additional capacity on the highway and hence the simple projection of access by car will not be possible.

It is recognised that it would not just be trips to the EZ that will be displaced. Displacement will happen for all trips, and thus some existing trips will be displaced just as some of the new trips to the EZ will not contemplate using car as a mode of access. But, with the highway being close capacity, no matter what trips are displaced, if the trip is to continue to occur, it will need to travel by another mode whether to the EZ or the remainder of the city centre (assuming that the majority of trips on Temple Way during peak hours are not through trips).

Thus, of the 38% of car based highway trips, it could be assumed that some would choose to travel at another time and some would find an alternative route. But, in order to access job opportunities, the majority of trips would still have to travel to the EZ by some means. The relationship between the availability of additional homes within walking and cycling distance to the proportion of walking and cycling trips that could be assumed has been noted above. Assuming that the scope to increase the proportion of walk and cycle trips is limited by the availability of new homes, travel by bus and train will have to increase to accommodate the demand for travel. There are two key issues:

- The ability for bus and train services to accommodate the increase (the vehicles and the stop locations or railway station) and
- The attractiveness of services with respect to those wanting to travel.

Mode Split Scenarios

A number of scenarios have been outlined (in Chapter 4), with the proportion of travel by car decreasing in each scenario. This gives an indication of the magnitude of change that could be realised as a function of the very limited additional highway capacity in the vicinity of the EZ.

Figure 5.1 shows the adjusted trip totals for these scenarios by mode, re-distributing trips to other modes from car, according to the proportions of modes used currently across the city. This introduces park & ride into the modal split and also incorporates

restrictions for 'unrealistic' movements (such as very long walk trips or Park & Ride trips from near the city centre).

It has to be remembered that in all the scenarios, the additional trips shown for bus and rail are over and above those that would be, on a 'neutral position projection', already 'demanding' to use public transport. Thus the potential total increase in demand is significant, with over 4,000 public transport trips to/from the EZ with 17,000 jobs in the zone and the most restricted car mode share. This is a 65% increase on the additional demand for public transport suggested by the initial mode split forecast with no restrictions on car use.

Bus use

We have considered the origins of trips to the EZ (and the wider city centre) and put this is in the context of the key bus stopping locations. This shows that, depending on which area of the Bristol conurbation is being considered, the city centre end of the bus service can be some distance from the EZ. This means that bus passengers are either faced with a walk or a change of bus to complete their journey. To illustrate this, Figure 5.2 shows walk accessibility to the EZ (Temple Square) and Figure 5.3 shows walk accessibility to potential 'Bus Hubs' in Bristol city centre (excluding Temple Quay as a bus hub).

Taking the redistribution of trips to non-car modes previously outlined, further analysis has been carried out to estimate the specific effects on bus use. Figures 5.4 and 5.5 illustrates the bus trips generated by the EZ under each of the mode split scenarios; Figure 5.4 shows bus trips according to the broad corridor that trips would use; Figure 5.5 shows potential use of Bus Hubs by EZ trips.

It can be noted that large numbers of bus users would approach the city centre on services that naturally run to the Hubs further away from the EZ, although some services would continue across the city centre.

Park & Ride

Park and Ride could make a valuable contribution towards any future strategy as it offers a public transport option for those not well served by public transport from their journey origin, and is already important for accessing Bristol city centre vis the three existing sites at Brislington, Long Ashton and Portway. In order to be successful it will require Park & Ride sites to be of sufficient capacity such that people wishing to use the service know that there will be space on arrival (both at the car park and on the bus service). It will also have to be attractive in terms of stop location in the City Centre. This will require careful routeing of services in the City Centre to ensure that walk times to/from stops are attractive to users.

Table 4.9 shows the number of vehicles that could accumulate in the Park & Ride sites as a result of EZ trips, including accumulations that could result from the five restricting car mode share options, including the difference in Park & Ride site accumulations between the initial mode share and option.

Rail

Increased access by rail is perhaps the most obvious way in which the displaced demand from car trips could be accommodated. The initial EZ projections have shown a significant increase in the absolute number of rail journeys – an amount

consistent with Network Rail projections. But, if the displaced car trips are added to this total, and perhaps also a proportion of the trips that can not be accommodated on bus services, the increase in demand to use rail services will be substantial. Table 3.8 shows potential increases in rail trips as a result of EZ development.

5.4 Pedestrian access

Figure 5.2 shows the main pedestrian routes in and around the EZ, in particular those linking the Temple Meads area to the rest of the city centre. Figures 5.3 and 5.4 illustrate pedestrian accessibility to the EZ in terms of potential journey times. It should be noted however, that these maps do not make allowance for crossing Temple Way/Temple Gate. Given the location of the EZ, this is a significant element of the walk journey of anyone heading to/from the EZ. Note also that this is not just for people walking as a main transport mode, but also includes those walking to/from most bus stops (and Bus Hubs) and using Park & Ride services.

Figures 5.5 and 5.6 show estimates of the number of people walking to/from the EZ in the various mode split scenarios outlined previously, with an indication of the numbers who would most likely have to cross Temple Way to get to/from, the EZ in Figure 5.7. Note that these are all one-way movements specific to trips generated by jobs located in the EZ, and other walkers would also be making the crossings (such as people accessing Temple Meads station from places outside the EZ).

There are a number of crossings of Temple Way, including pedestrian phases at the Temple Circle gyratory and other junctions in the vicinity. As there is an inherent 'conflict' between the need to provide for traffic and pedestrians, there can be delay (for either) as a result of providing safe time for each to move. This results in delay for pedestrians in waiting for 'green man' signals. A recent survey of signal timings on Temple Way indicated that delays typically vary from 42 seconds to 132 seconds, with an average of 68 seconds at the locations considered. Obviously this does not take into account those people who cross in an ad hoc manner, and/or ignore the phasing of traffic and pedestrian signals.

The amount of delay can therefore represent a significant amount of the journey, with many walk journeys to/from the EZ being not much over 1km (for instance, Bristol City Centre is between 1.2km and 1.4km from Temple Meads station forecourt). Hence, a delay in crossing the road could represent up to a 17% increase in overall walk journey time (for a notional 1km walk incorporating a crossing of Temple Way). This is illustrated in Figure 5.8, which shows time/distance plots of a 1km walk from Temple Meads with crossing times for Temple Way included (for average walking speeds of 4km/h and 4.5km/h). Figure 5.9 further illustrates the accumulation of delay with distance and time.

No. of employees	4,000		12,000		17,000		Mode share
Mode / Time Period	AM arrival	PM departure	AM arrival	PM departure	AM arrival	PM departure	
INITIAL ESTIMATE OF MODE SPLIT (trips to/from Enterprise Zone)							
Car driver	805	685	2414	2055	3420	2911	39%
Car passenger	116	98	347	295	491	418	6%
Motorcycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Bus	330	281	989	842	1401	1193	16%
Train	326	277	977	831	1384	1178	16%
Bicycle	166	141	497	423	704	599	8%
On foot	293	250	880	749	1246	1061	14%
excl Work at Home	2,084	1,774	6,251	5,321	8,855	7,538	100%
INITIAL ESTIMATE OF MODE SPLIT (trips to/from Enterprise Zone) - with park & ride							
Car driver	746	635	2,238	1,905	3,171	2,699	36%
Car pass	109	93	327	278	463	394	5%
M-cycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Park & Ride	122	104	366	311	518	441	6%
Bus	315	268	946	805	1,340	1,140	15%
Train	283	241	850	724	1,204	1,025	14%
Bicycle	166	141	497	423	704	599	8%
On foot	293	250	880	749	1,246	1,061	14%
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538	100%
REDUCED CAR MODE SHARE 1 - max 30% car							
Car driver	567	482	1,700	1,447	2,408	2,050	27%
Car pass	83	71	249	212	353	301	4%
M-cycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Park & Ride	141	120	424	361	600	511	7%
Bus	393	335	1,180	1,004	1,672	1,423	19%
Train	337	287	1,011	860	1,432	1,219	16%
Bicycle	193	164	579	493	820	698	9%
On foot	320	273	961	818	1,362	1,159	15%
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538	100%
REDUCED CAR MODE SHARE 2 - max 25% car							
Car driver	462	394	1,387	1,181	1,965	1,673	22%
Car pass	68	58	205	174	290	247	3%
M-cycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Park & Ride	153	130	458	389	648	552	7%
Bus	439	373	1,316	1,120	1,864	1,587	21%
Train	368	313	1,104	939	1,564	1,331	18%
Bicycle	209	178	626	533	887	755	10%
On foot	336	286	1,008	858	1,428	1,216	16%
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538	100%
REDUCED CAR MODE SHARE 3 - max 20% car							
Car driver	358	305	1,075	915	1,522	1,296	17%
Car pass	53	45	160	136	226	193	3%
M-cycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Park & Ride	164	139	491	418	696	592	8%
Bus	484	412	1,452	1,236	2,057	1,751	23%
Train	399	340	1,197	1,019	1,695	1,443	19%
Bicycle	224	191	673	573	954	812	11%
On foot	352	299	1,055	898	1,495	1,273	17%
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538	100%
REDUCED CAR MODE SHARE 4 - max 15% car							
Car driver	254	216	762	649	1,080	919	12%
Car pass	38	33	115	98	163	138	2%
M-cycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Park & Ride	175	149	525	447	744	633	8%
Bus	529	451	1,588	1,352	2,250	1,915	25%
Train	430	366	1,290	1,098	1,827	1,556	21%
Bicycle	240	205	721	614	1,021	869	12%
On foot	368	313	1,103	939	1,562	1,330	18%
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538	100%
REDUCED CAR MODE SHARE 5 - max 10% car							
Car driver	150	128	449	383	637	542	7%
Car pass	23	20	70	59	99	84	1%
M-cycle	40	34	121	103	171	146	2%
Other	9	8	27	23	38	32	0%
Park & Ride	186	159	559	476	792	674	9%
Bus	575	489	1,724	1,467	2,442	2,079	28%
Train	461	392	1,383	1,177	1,959	1,668	22%
Bicycle	256	218	768	654	1,088	926	12%
On foot	383	326	1,150	979	1,629	1,387	18%

Figure 5.1: Enterprise Zone trips with reduced car mode share

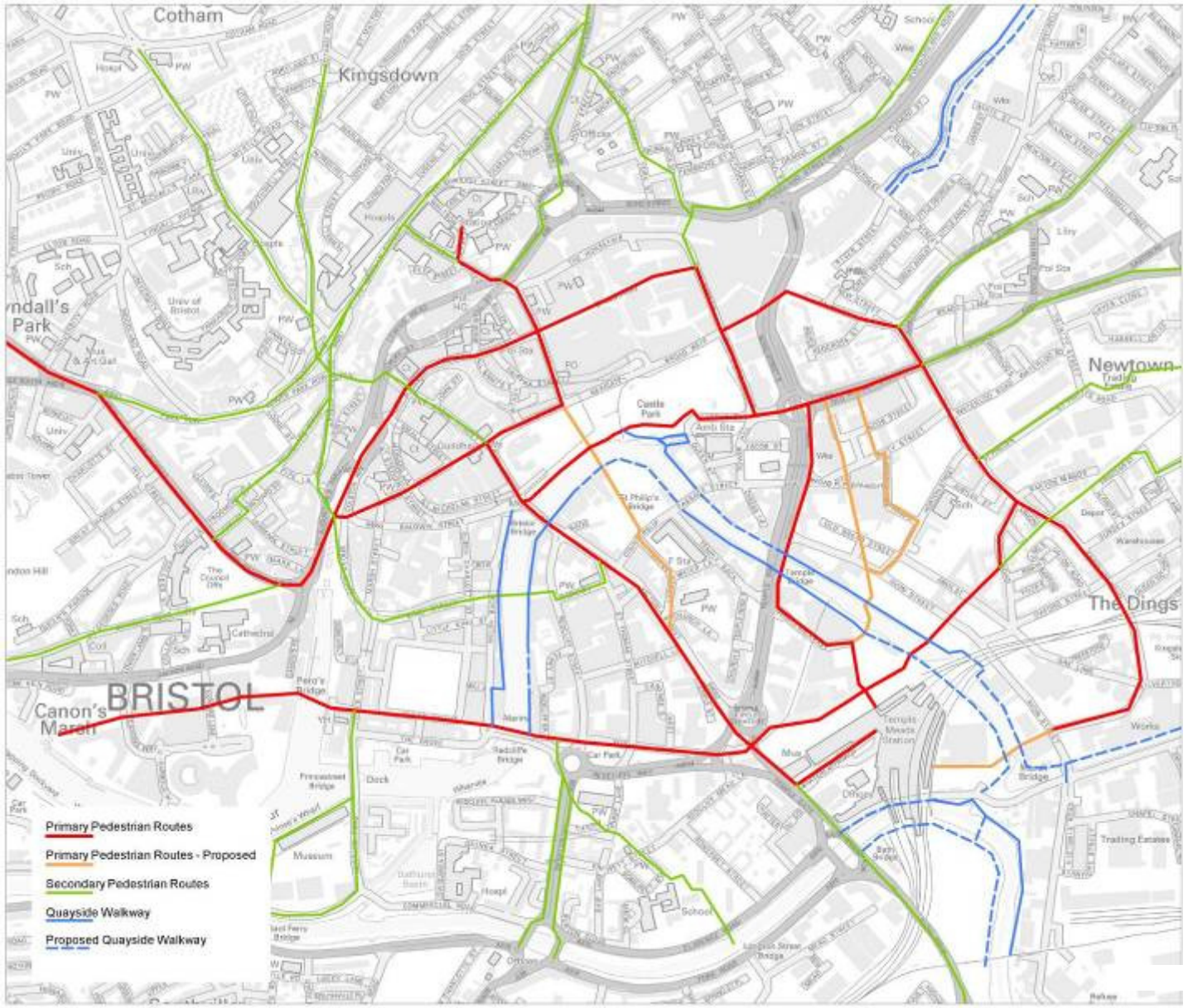


Figure 5.2: Walk routes between the Enterprise Zone and city centre

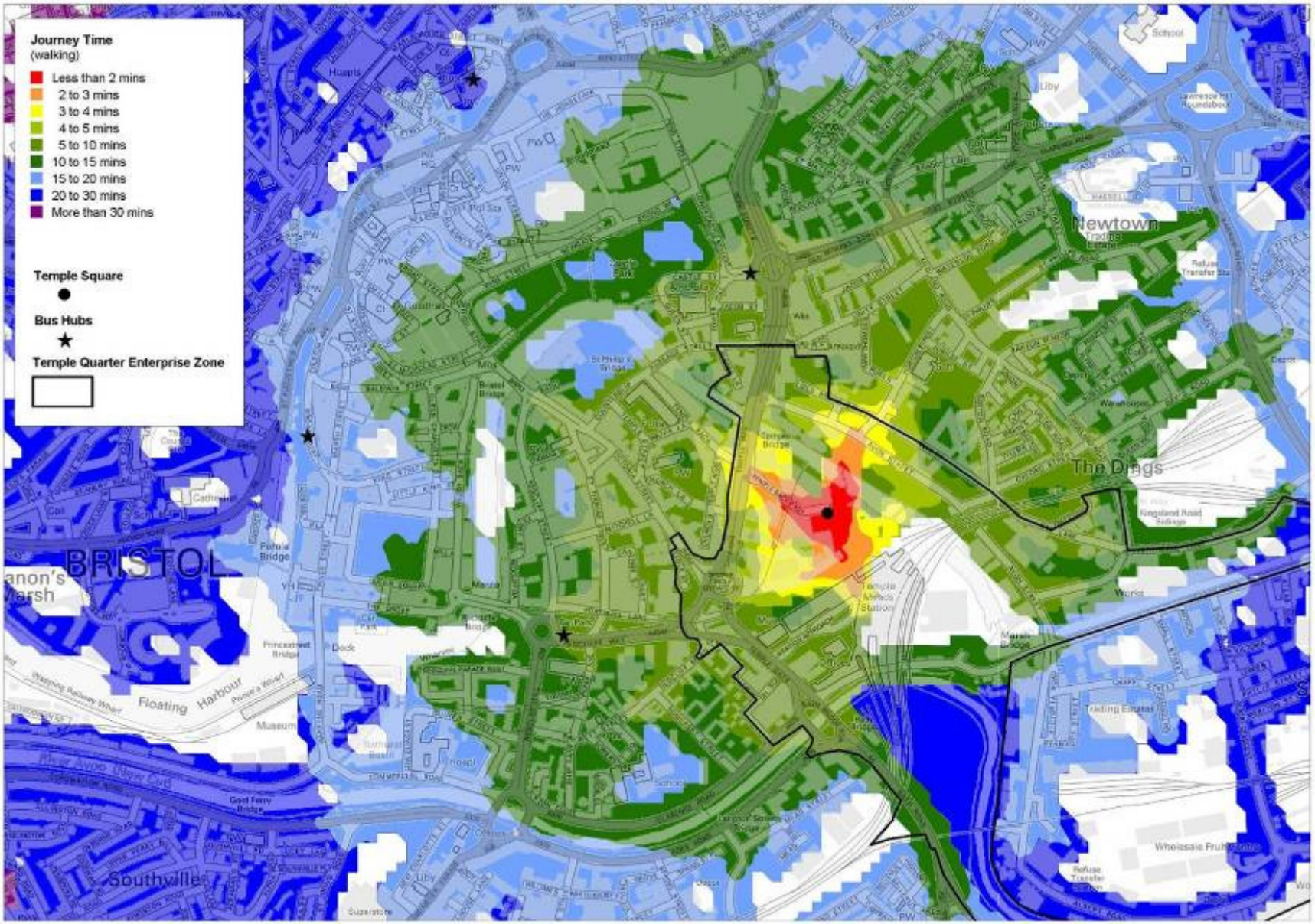


Figure 5.3: Walk accessibility to the Enterprise Zone (Temple Square)

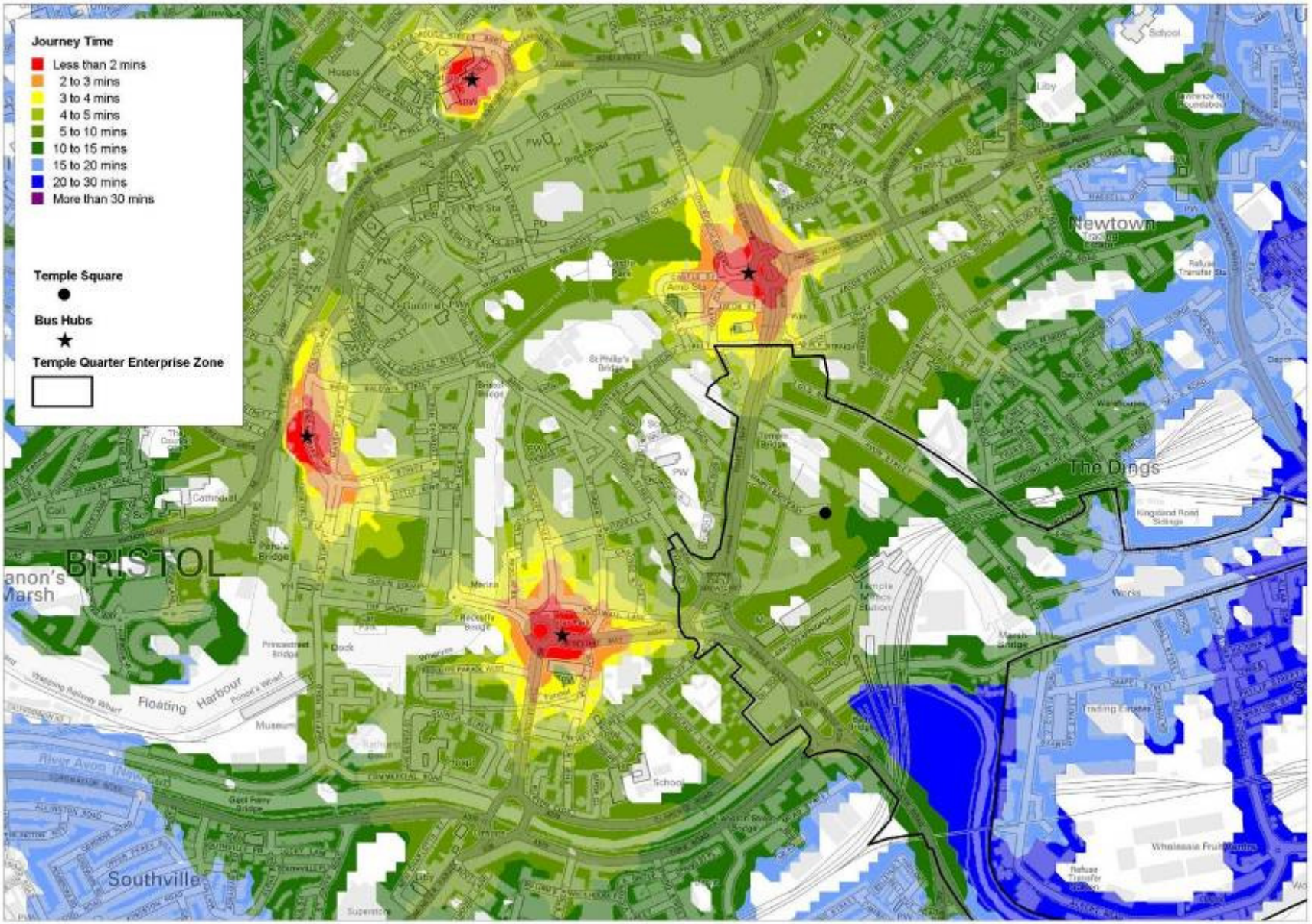


Figure 5.4: Walk accessibility to Bus Hubs in Bristol city centre

	4,000 AM Peak ARRIVALS		4,000 PM Peak DEPARTURES		12,000 AM Peak ARRIVALS		12,000 PM Peak DEPARTURES		17,000 AM Peak ARRIVALS		17,000 PM Peak DEPARTURES	
	Bus Trips	%	Bus Trips	%	Bus Trips	%	Bus Trips	%	Bus Trips	%	Bus Trips	%
INITIAL ESTIMATE OF MODE SPLIT (trips to/from Enterprise Zone)												
A38(N)/M32	72	23%	61	23%	215	23%	183	23%	304	23%	259	23%
A38(S)/A37	103	33%	88	33%	310	33%	264	33%	439	33%	373	33%
A4(E)/A4018	39	12%	33	12%	118	12%	100	12%	167	12%	142	12%
A4(W)	10	3%	8	3%	29	3%	25	3%	42	3%	36	3%
A420	91	29%	78	29%	274	29%	233	29%	388	29%	330	29%
	315	100%	**268**	100%	**946**	100%	**805**	100%	**1,340**	100%	**1,140**	100%
REDUCED CAR MODE SHARE (max 30% car driver) - increase walk, cycle, bus, train & park & ride												
A38(N)/M32	92	23%	78	23%	276	23%	235	23%	390	23%	332	23%
A38(S)/A37	125	32%	107	32%	376	32%	320	32%	533	32%	454	32%
A4(E)/A4018	49	13%	42	13%	148	13%	126	13%	210	13%	178	13%
A4(W)	11	3%	10	3%	34	3%	29	3%	48	3%	41	3%
A420	115	29%	98	29%	346	29%	295	29%	490	29%	417	29%
	393	100%	**335**	100%	**1,180**	100%	**1,004**	100%	**1,672**	100%	**1,423**	100%
REDUCED CAR MODE SHARE (max 25% car driver) - increase walk, cycle, bus, train & park & ride												
A38(N)/M32	104	24%	88	24%	311	24%	265	24%	440	24%	375	24%
A38(S)/A37	138	32%	118	32%	415	32%	353	32%	588	32%	500	32%
A4(E)/A4018	55	13%	47	13%	166	13%	141	13%	234	13%	200	13%
A4(W)	12	3%	10	3%	37	3%	31	3%	52	3%	44	3%
A420	129	29%	110	29%	388	29%	330	29%	550	29%	468	29%
	439	100%	**373**	100%	**1,316**	100%	**1,120**	100%	**1,864**	100%	**1,587**	100%
REDUCED CAR MODE SHARE (max 20% car driver) - increase walk, cycle, bus, train & park & ride												
A38(N)/M32	115	24%	98	24%	346	24%	295	24%	490	24%	417	24%
A38(S)/A37	151	31%	129	31%	454	31%	386	31%	643	31%	547	31%
A4(E)/A4018	61	13%	52	13%	183	13%	156	13%	259	13%	221	13%
A4(W)	13	3%	11	3%	39	3%	33	3%	56	3%	47	3%
A420	143	30%	122	30%	430	30%	366	30%	609	30%	519	30%
	484	100%	**412**	100%	**1,452**	100%	**1,236**	100%	**2,057**	100%	**1,751**	100%
REDUCED CAR MODE SHARE (max 15% car driver) - increase walk, cycle, bus, train & park & ride												
A38(N)/M32	127	24%	108	24%	381	24%	325	24%	540	24%	460	24%
A38(S)/A37	164	31%	140	31%	492	31%	419	31%	698	31%	594	31%
A4(E)/A4018	67	13%	57	13%	201	13%	171	13%	284	13%	242	13%
A4(W)	14	3%	12	3%	42	3%	36	3%	59	3%	50	3%
A420	157	30%	134	30%	472	30%	402	30%	669	30%	569	30%
	529	100%	**451**	100%	**1,588**	100%	**1,352**	100%	**2,250**	100%	**1,915**	100%
REDUCED CAR MODE SHARE 5 (max 10% car driver) - increase walk, cycle, bus, train & park & ride												
A38(N)/M32	139	24%	118	24%	417	24%	355	24%	590	24%	502	24%
A38(S)/A37	177	31%	151	31%	531	31%	452	31%	752	31%	640	31%
A4(E)/A4018	73	13%	62	13%	218	13%	186	13%	309	13%	263	13%
A4(W)	15	3%	13	3%	44	3%	38	3%	63	3%	54	3%
A420	171	30%	146	30%	514	30%	437	30%	728	30%	620	30%
	575	100%	**489**	100%	**1,724**	100%	**1,467**	100%	**2,442**	100%	**2,079**	100%

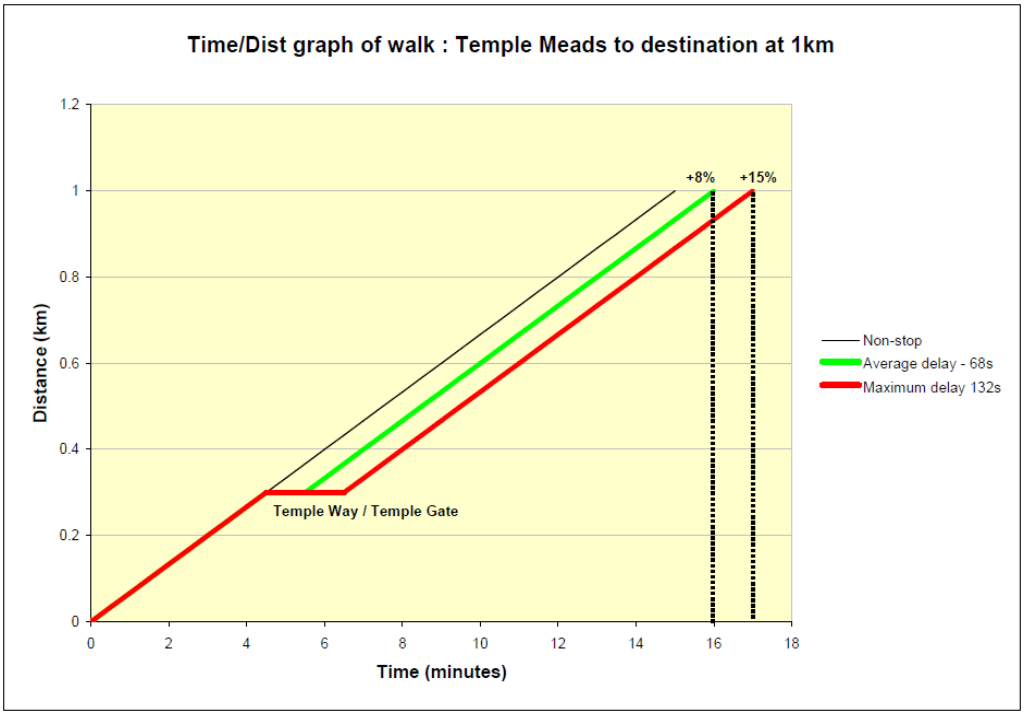
Figure 5.5: Estimates of bus users generated by the Enterprise Zone – by corridor

	4,000 AM Peak ARRIVALS		4,000 PM Peak DEPARTURES		12,000 AM Peak ARRIVALS		12,000 PM Peak DEPARTURES		17,000 AM Peak ARRIVALS		17,000 PM Peak DEPARTURES	
	Bus Trips	%	Bus Trips	%	Bus Trips	%	Bus Trips	%	Bus Trips	%	Bus Trips	%
INITIAL ESTIMATE OF MODE SPLIT (trips to/from Enterprise Zone)												
The Centre	39	12%	33	12%	118	12%	100	12%	167	12%	142	12%
Bus Station	72	23%	61	23%	215	23%	183	23%	304	23%	259	23%
Old Market	96	30%	82	30%	288	30%	245	30%	408	30%	348	30%
Redcliffe Way	108	34%	92	34%	325	34%	276	34%	460	34%	392	34%
	315	100%	**268**	100%	**946**	100%	**805**	100%	**1,340**	100%	**1,140**	100%
REDUCED CAR MODE SHARE (max 30% car driver) - increase walk, cycle, bus, train & park & ride												
The Centre	49	13%	42	13%	148	13%	126	13%	210	13%	178	13%
Bus Station	92	23%	78	23%	276	23%	235	23%	390	23%	332	23%
Old Market	121	31%	103	31%	362	31%	308	31%	512	31%	436	31%
Redcliffe Way	132	33%	112	33%	395	33%	336	33%	560	33%	476	33%
	393	100%	**335**	100%	**1,180**	100%	**1,004**	100%	**1,672**	100%	**1,423**	100%
REDUCED CAR MODE SHARE (max 25% car driver) - increase walk, cycle, bus, train & park & ride												
The Centre	55	13%	47	13%	166	13%	141	13%	234	13%	200	13%
Bus Station	104	24%	88	24%	311	24%	265	24%	440	24%	375	24%
Old Market	135	31%	115	31%	404	31%	344	31%	572	31%	487	31%
Redcliffe Way	145	33%	124	33%	436	33%	371	33%	617	33%	525	33%
	439	100%	**373**	100%	**1,316**	100%	**1,120**	100%	**1,864**	100%	**1,587**	100%
REDUCED CAR MODE SHARE (max 20% car driver) - increase walk, cycle, bus, train & park & ride												
The Centre	61	13%	52	13%	183	13%	156	13%	259	13%	221	13%
Bus Station	115	24%	98	24%	346	24%	295	24%	490	24%	417	24%
Old Market	149	31%	127	31%	446	31%	380	31%	632	31%	538	31%
Redcliffe Way	159	33%	135	33%	477	33%	406	33%	675	33%	575	33%
	484	100%	**412**	100%	**1,452**	100%	**1,236**	100%	**2,057**	100%	**1,751**	100%
REDUCED CAR MODE SHARE (max 15% car driver) - increase walk, cycle, bus, train & park & ride												
The Centre	67	13%	57	13%	201	13%	171	13%	284	13%	242	13%
Bus Station	127	24%	108	24%	381	24%	325	24%	540	24%	460	24%
Old Market	163	31%	139	31%	489	31%	416	31%	693	31%	590	31%
Redcliffe Way	172	33%	147	33%	517	33%	440	33%	733	33%	624	33%
	529	100%	**451**	100%	**1,588**	100%	**1,352**	100%	**2,250**	100%	**1,915**	100%
REDUCED CAR MODE SHARE 5 (max 10% car driver) - increase walk, cycle, bus, train & park & ride												
The Centre	73	13%	62	13%	218	13%	186	13%	309	13%	263	13%
Bus Station	139	24%	118	24%	417	24%	355	24%	590	24%	502	24%
Old Market	177	31%	151	31%	531	31%	452	31%	753	31%	641	31%
Redcliffe Way	186	32%	158	32%	558	32%	475	32%	791	32%	673	32%
	575	100%	**489**	100%	**1,724**	100%	**1,467**	100%	**2,442**	100%	**2,079**	100%

Figure 5.6: Estimates of bus users generated by the Enterprise Zone – by potential Bus Hub

Crossing Temple Way…	4,000 AM Peak ARRIVALS			4,000 PM Peak DEPARTURES			12,000 AM Peak ARRIVALS			12,000 PM Peak DEPARTURES			17,000 AM Peak ARRIVALS			17,000 PM Peak DEPARTURES		
	cross TW	not cross		cross TW	not cross		cross TW	not cross		cross TW	not cross		cross TW	not cross		cross TW	not cross	
INITIAL ESTIMATE OF MODE SPLIT (trips to/from Enterprise Zone)																		
Walkers	217	76	293	185	65	250	652	228	880	555	194	749	924	322	1,246	787	274	1,061
Bus passengers	121	195	315	166	103	268	362	584	946	497	308	805	513	827	1,340	704	436	1,140
Park & Ride users	122	-	122	104	-	104	366	-	366	311	-	311	518	-	518	441	-	441
	460	270	730	454	167	622	1,380	811	2,191	1,363	502	1,865	1,955	1,150	3,104	1,931	711	2,642
REDUCED CAR MODE SHARE (max 30% car driver) - increase walk, cycle, bus, train & park & ride																		
Walkers	234	86	320	199	73	273	703	258	961	598	220	818	996	366	1,362	848	311	1,159
Bus passengers	150	244	393	207	127	335	449	731	1,180	622	382	1,004	636	1,035	1,672	881	542	1,423
Park & Ride users	141	-	141	120	-	120	424	-	424	361	-	361	600	-	600	511	-	511
	525	330	855	527	201	728	1,576	989	2,565	1,581	602	2,183	2,233	1,401	3,634	2,240	853	3,093
REDUCED CAR MODE SHARE (max 25% car driver) - increase walk, cycle, bus, train & park & ride																		
Walkers	244	92	336	208	78	286	733	276	1,008	624	235	858	1,038	391	1,428	883	333	1,216
Bus passengers	167	272	439	232	142	373	500	816	1,316	695	426	1,120	708	1,156	1,864	984	603	1,587
Park & Ride users	153	-	153	130	-	130	458	-	458	389	-	389	648	-	648	552	-	552
	563	364	927	569	220	789	1,690	1,092	2,782	1,708	660	2,368	2,394	1,547	3,941	2,419	935	3,355
REDUCED CAR MODE SHARE (max 20% car driver) - increase walk, cycle, bus, train & park & ride																		
Walkers	254	98	352	216	83	299	762	293	1,055	649	250	898	1,080	416	1,495	919	354	1,273
Bus passengers	184	300	484	256	156	412	551	901	1,452	767	469	1,236	780	1,277	2,057	1,087	664	1,751
Park & Ride users	164	-	164	139	-	139	491	-	491	418	-	418	696	-	696	592	-	592
	601	398	1,000	611	240	851	1,804	1,195	2,999	1,834	719	2,553	2,556	1,693	4,248	2,598	1,018	3,616
REDUCED CAR MODE SHARE (max 15% car driver) - increase walk, cycle, bus, train & park & ride																		
Walkers	264	104	368	225	88	313	792	311	1,103	674	265	939	1,121	441	1,562	955	375	1,330
Bus passengers	200	329	529	280	171	451	601	987	1,588	840	512	1,352	852	1,398	2,250	1,190	725	1,915
Park & Ride users	175	-	175	149	-	149	525	-	525	447	-	447	744	-	744	633	-	633
	639	433	1,072	654	259	912	1,918	1,298	3,216	1,961	777	2,737	2,717	1,838	4,556	2,777	1,100	3,878
REDUCED CAR MODE SHARE 5 (max 10% car driver) - increase walk, cycle, bus, train & park & ride																		
Walkers	274	110	383	233	93	326	821	329	1,150	699	280	979	1,163	466	1,629	990	396	1,387
Bus passengers	217	357	575	304	185	489	652	1,072	1,724	912	555	1,467	924	1,518	2,442	1,293	786	2,079
Park & Ride users	186	-	186	159	-	159	559	-	559	476	-	476	792	-	792	674	-	674
	677	467	1,144	696	278	974	2,032	1,401	3,433	2,087	835	2,922	2,879	1,984	4,863	2,957	1,183	4,139

Figure 5.7: Estimates of pedestrian movements generated by the Enterprise Zone – and crossing Temple Way



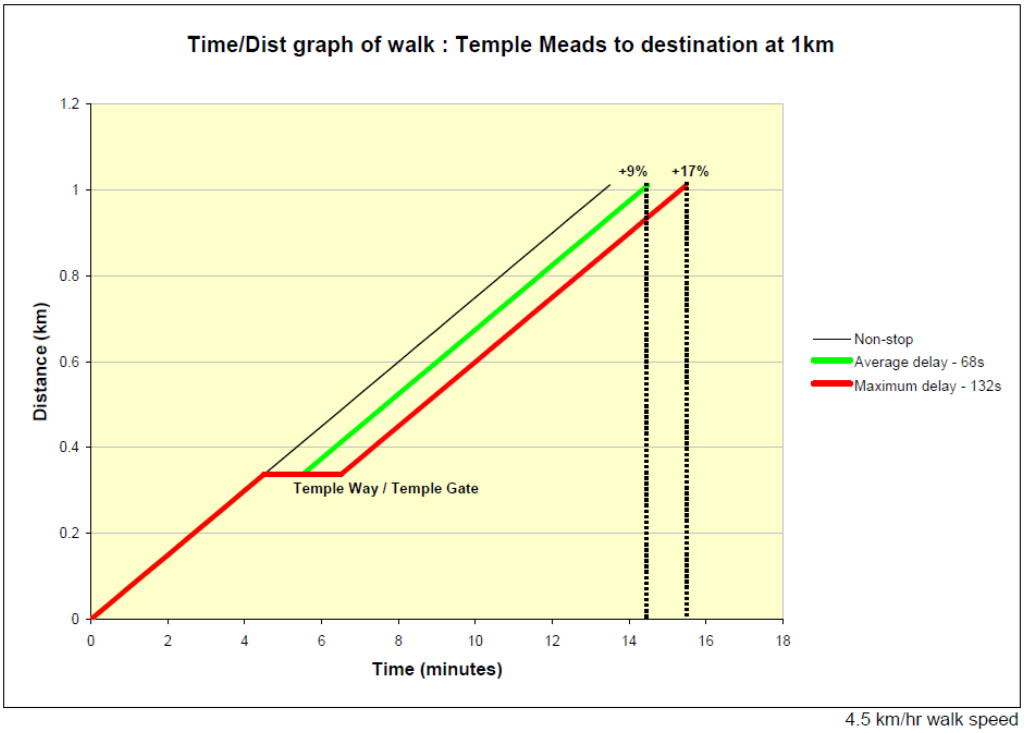


Figure 5.8: Pedestrian delay – time/distance graph for 1km walk from Temple Meads

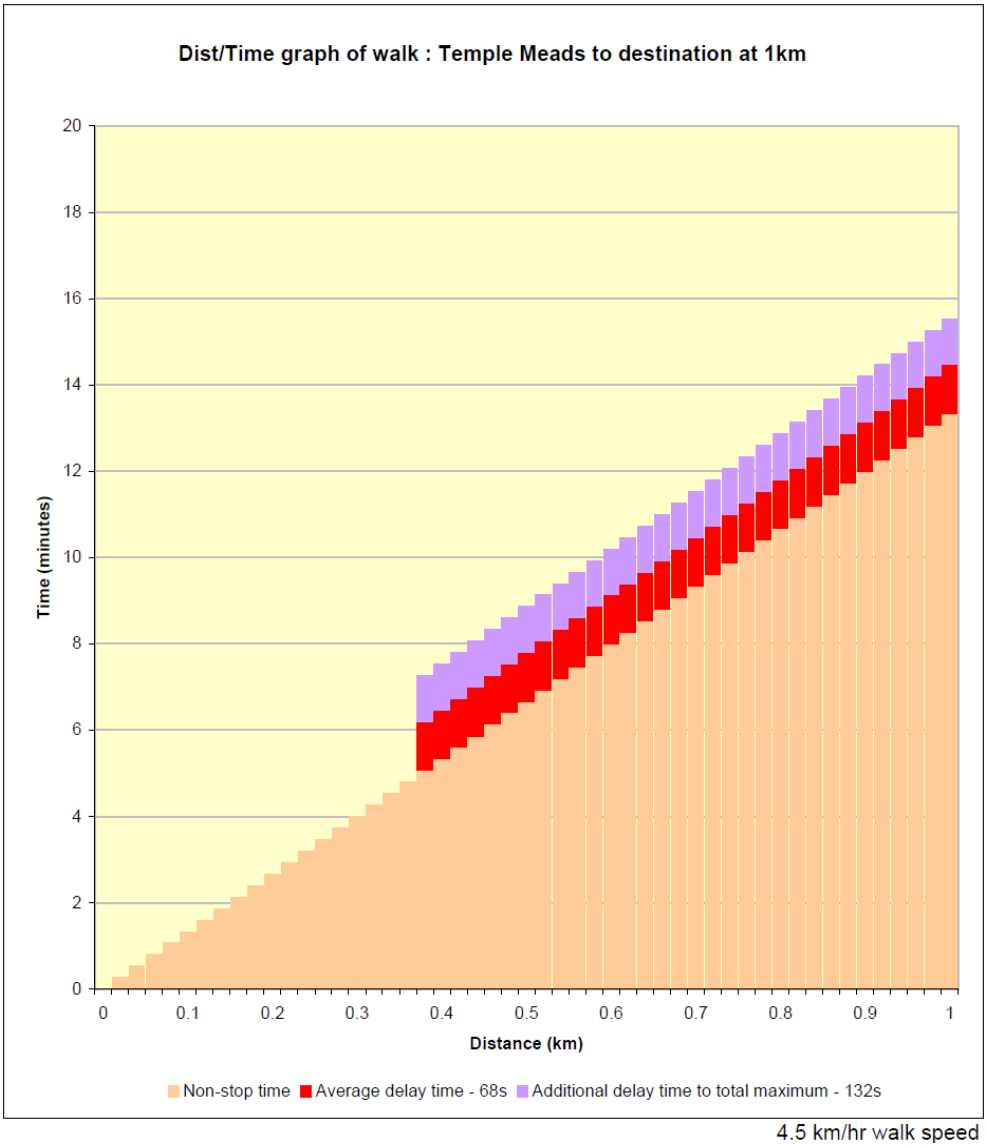


Figure 5.9: Pedestrian delay – distance/time graph showing delay accumulation

6 Enabling transport measures

This report has discussed the EZ in the context of its location in Bristol city centre, including the way that people currently access the city centre for work and the current bus network in the area (Chapter 2). Following on from this, potential trip generation as a result of development at the EZ to accommodate up to 17,000 new employees has been identified (Chapter 3). Analysis (in Chapters 4 and 5) has taken this trip generation forward and considered the potential for different modes of transport to be used for such trips.

These assessments have highlighted that the scale of development envisaged has the potential to generate trips by all modes, the impacts of which would be significant, to the extent that existing networks will not necessarily be able to cope. As such, enabling measures are likely to be required to alleviate, where practical, the effects of EZ generated trips.

Some enabling measures have been identified and assessed so far, and this chapter briefly discusses the main measures assessed. These include measures under the following broad headings:

- Highway access measures – including major options such as Temple Circus underpass to eliminate most through traffic from the junction, various BCC city centre highway proposals and access into and through the EZ (east of the railway);
- Parking;
- Pedestrian/cycle measures – including Temple Circus overbridge, aspirations for the EZ within the context of the city centre and routes within the EZ itself;
- Public transport measures – including Park & Ride (M32 site), rail enhancements (Portway) and innovative approaches to local distribution (ULTRa).

The remainder of this chapter briefly discusses these measures, including (where possible) indicative draft outline costs.

6.1 Highway measures

Various highway measures will be required to provide specific links to areas of the EZ that are currently not well linked to the wider road network. The Bus Rapid Transit investment will be critical to providing modal shift but also in releasing capacity to support growth. This will be complemented by a far wider range of highway interventions to support the transport demands. These are discussed further in the remainder of this section.

In addition, overall traffic management within and around the EZ will have to be augmented to take into account the potentially increased demand for vehicular movements. In particular, parking is an issue that will require close attention. Apart from the increase in demand for spaces, some 500 currently available off-street parking spaces will be lost as a result of sites used as parking (with temporary planning permission) being re-developed, which will not be off-set by spaces in new developments. There is also already significant demand for on-street parking where

available in and around the EZ, and it is understood that Controlled Parking Zones are already under consideration for parts of the EZ or adjoining areas.

6.1.1 City centre proposals

Various schemes have been considered to adjust the movement of traffic and buses in Bristol city centre, though some are yet to be considered in detail. Potential works suggested are shown schematically on Figure 6.1, and include:

- A third lane on Temple Gate west on the approach to Temple Circus, to relieve a pinch point (cost between £0.4m and £0.6m). Remove the link between Temple Gate west and Temple Gate east and join the island site the centre of the existing Temple Circus roundabout, as this segment is less well used than the others of the roundabout. Access to Victoria Street from Temple Way north is possible via Counterslip / Temple Back (cost between £200,000 and £300,000 for works on Temple Circus, plus £0.5m-£0.75m for revisions to Counterslip / Temple Back).
- Exit traffic from Temple Quay heading north on Temple Way would also be affected by the previous point, so it would have to be determined whether this could successfully be catered for in terms of traffic circulating within Temple Quay, with a new link between The Friary and Temple Back East (otherwise such traffic would need to use Bath Bridges to u-turn). Restricting Temple Quay access to 'left out' at Temple Circus and 'right out' at Temple Back East would reduce conflicting movements at Temple Circus (cost between £0.75m and £1.5m).
- Routeing of BRT through the Temple Quay, The Friary. Temple Square and Temple Back East (cost between £250,000 and £500,000).
- Southbound bus lane along Victoria Street approaching Temple Circus (cost between £100,000 and £250,000).
- Alterations to Redcliff Roundabout (that could ultimately be included as part of the AVTM BRT route) – cost between £250,000 and £750,000.
- Temple Meads access ramp changes (cost between £250,000 and £500,000);
- Avon Street junction and route changes (cost between £0.5m and £1.25m); and
- Bath Bridges – remodelling junction (cost between £2m and £3m).

Total cost estimates of these measures range from £6M to £9M. The likely implementation timescale is up to 2015

6.1.2 Access to/through the EZ

The location of the EZ is such that highway access to much of the area east of Temple Meads requires crossing the railway, Floating Harbour or River Avon. Some of these crossings, especially those under the railway, can be restricting, in particular of vehicle height, but also in terms of the width available to provide pedestrian and cycle facilities that are either traffic free or lightly trafficked.

A series of highway access options have been derived that could be considered alongside specific development plans. It is acknowledged that the options are potentially large-scale, but are intended to illustrate what may be feasible, and

required, in order to facilitate development of the less accessible parts of the EZ. Measures include:

- Bath Road / Totterdown Bridge junction re-alignment (cost between £50,000 and £75,000);
- Improve Gas Lane, including crossing under the railway (cost between £0.75m and £5m);
- New link over the Feeder Canal between Short Street and Atlas Street. Maintaining navigable headroom on the Feeder Canal may require lifting, or other moveable, bridge (cost between £6m to £10m); and
- Links into the Diesel Depot site from the A4 Bath Road and Feeder Road/Cattle Market Road (cost approximately £10m).

Total cost estimates of these measures range from £16m to £25m. The likely implementation timescale is up to 2017-2020.

Further direct EZ link measures also identified include

- Link from St.Philip's Causeway to The Friary (Temple Quay) using Day's Road and re-aligned Oxford Street, and including a new crossing over the Floating Harbour (total cost of route between £4m and £6m);
- Link from St.Philip's Causeway to The Dings (south of the railway) through Barton Hill, using Barrow Road, Jarvis Street, Queen Anne Road (under the railway) and Silverthorne Lane (cost between £5m and £12m).

Analysis of these measures to date indicates that they may have merit, but need further investigation into the potential costs and benefits of the measures

Locations of these potential measures are shown on Figure 6.1.

6.1.3 Temple Circus underpass

The main tunnel route considered connects the A4044 Temple Way south of Temple Bridge under the Temple Circus gyratory with the A4 Temple Gate north of the Clarence Road roundabout. The type of tunnel and how it can be built is a function of the environment it is located in. As the tunnel would be located at a shallow depth, a cut and cover tunnel is appropriate. Where possible it is usually less disruptive to construct cut and cover works offline resulting in a permanent alteration to the alignment of the road when complete.

The purpose of the tunnel is to remove traffic from the surface level at Temple Circus in the area of proposed regeneration to improve pedestrian and cycle links to the City Centre from Temple Meads Station and the EZ. Appendix D shows a series of broad visualisations of how such a tunnel could fit into the streetscape. Cost estimates have been made for a main tunnel plus slips as follows:

- The total approximate cost estimated for civil and mechanical & electrical (M&E) works for a main tunnel of length 300m and two 100m approaches is between £44m and £56m.
- Total costs for a similar main tunnel plus an off-slip to the B4053 and to Redcliffe Way is between £65 and £71m.

A 20% contingency has been included in the above estimates. Appendix E contains more details of the cost estimate methodology. This measure has been carefully considered in the context of the EZ, but is unlikely to proceed as a result of cost and implementation considerations.

6.1.4 Other measures

Other specific measures have also been considered, including:

- Callington Road link – this scheme is recognised as an essential as part of the wider Joint Local Transport Plan (JLTP) strategy, but may not provide enough specific benefits for the EZ, being located some distance from the EZ.
- Direct link (slips) from St.Philip's Causeway to Silverthorne Wharf area

These specific measures have also been carefully considered in the context of the EZ, but are unlikely to proceed as a result of cost and implementation considerations.

6.2 Parking

Based on assessments of likely traffic movements and the ability of the highway network to accommodate demand, the overall recommendation within this report is that overall parking provision within the EZ will need to be low, based on around a 10% car mode share. Transport for the EZ should be a public transport led strategy based on rail, Park & Ride, Rapid Transit and bus.

Consideration should be given to the location of parking within the EZ itself and whether there are benefits of consolidating parking into certain locations to reduce some of the barriers to access and to increase the public realm opportunities through the creation of car free areas.

6.3 Pedestrian/cycle measures

Providing high quality walking and cycling links to/from the city centre and public transport hubs will be imperative for the success of the EZ. A number of measures have been considered, and these are discussed further below.

6.3.1 City centre walk/cycle routes

Bristol City Council's (BCC) have supplied the study with a series of aspirations for cycle route enhancements in the EZ and around. These include:

- Already existing and currently proposed signed cycle routes;
- Additional routes that would benefit from cycle lanes;
- Existing routes that could be enhanced for cycling using BCC land;
- Footways that could be enhanced to provide shared walk/cycle facilities; and
- New routes delivered in conjunction with development.

Figure 6.2 shows the routes. A broad estimate of total costs for these measures is in the range of £6m to £10m for full implementation. The likely implementation timescale is up to 2013-2018.

6.3.2 Specific walk routes in the EZ

There are few specific walking routes within the EZ to the east of the railway, other than those that follow the roads, which may not provide attractive walking routes, as there is little frontage activity and mostly light industrial development at present. An exception would be the footway on the north side of Feeder Road, which runs between the road the Feeder Canal. This is a route that BCC's cycle team have identified that would benefit from being enhanced from an on-road cycle lane.

In the section of the EZ between the A4 and the River Avon the only walking route is along the A4 itself. A walkway runs on the north side of the river, but access from this to the EZ is poor. Scope therefore exists to develop a new walking route following the south bank of the river (Figure 6.2).

A 'board walk' type path running from near Temple Meads station along the edge of the HCA Diesel Depot site to the old paintworks site at Arno's Vale is estimated to cost in the range of £3m to £5m. The likely implementation timescale is unknown, and is dependent on the spatial framework.

6.3.3 Other measures – Temple Circus overbridge

A specific scheme to provide a grade-separated walk and cycle link to parts of the EZ has been considered. The location of the EZ around Temple Meads station means that the area is separated from the remainder of the city centre by Temple Way/Temple Gate, and crossing this major road is a key element of many walk journeys to/from the EZ (including walks between the EZ and most bus stops). There is a potential conflict between the need to provide good facilities for these walk movements, with minimum delay, through the existing at-grade crossings and to cater for significant amounts of traffic that use Temple Way/Temple Gate.

As such, a specific measure considered to separate these potentially conflicting movements and requirements is a Temple Circus pedestrian overbridge. The location is shown in Figure 6.2 and indicative visualisations of this bridge are contained in Appendix F. The cost of providing a bridge is estimated at between £5m and £8m. This option will require further consideration.

To briefly summarise the key issues surrounding the bridge:

- In order to provide an attractive route that minimises the need to climb stairs, relatively long ramps are needed to give sufficient clearance for traffic. At a DDA (Disability Discrimination Act) compliant gradient of 1 in 22 or less this requires ramps in excess of 100m length (which could be either straight or curved and without flat sections). These are shown in Appendix F.
- A Temple Circus overbridge, while being well located to provide a link from central areas of Temple Meads and the EZ to the remainder of the city centre, could not cater for all movements.
- At-grade crossing facilities would have to be retained in most (if not all) of the current locations. People continue to cross even if no formal at-grade facilities are provided, which can be hazardous for people and traffic. For instance, options for grade-separated pedestrian movements across Temple Way exist through three subways and a footbridge near Old Market, but the at-grade facilities at the Old Market roundabout are still well used. Likewise, a

pedestrian route exists under Temple Way where it crosses the Floating Harbour (near Temple Back), but the adjacent at-grade crossing is also well used. As such, the full theoretical benefits to traffic and pedestrian flow of pedestrian grade separation across Temple Way are unlikely to be realised.

6.4 Public transport measures

The role of public transport in accessing the EZ is critical, as noted in Chapter 4. In general terms, public transport services will respond to serve the likely demand for travel to the EZ, which could be significant as access to the area by car is unlikely to be unrestricted. Because so much of the development of the city-wide public transport network is already on-going (GBBN and BRT in particular) or subject to significant work elsewhere (rail enhancements), it is not intended that general city-wide bus and rail measures be discussed in detail in this report.

However, the remainder of this section outlines a series of specific measures that could be linked to the EZ.

6.4.1 Bus Rapid Transit

Ongoing major initiatives in the form of the Greater Bristol Bus Network (GBBN) and Bus Rapid Transit (BRT) routes currently being developed are already increasing the attractiveness and capacity of the public transport network. While the BRT network does not directly run through the EZ, the nearest route passes through the western side of Temple Circus between Redcliffe Way and Victoria Street. There is scope for BRT vehicles to run through the Temple Quay area in future, to more directly align with Temple Meads station and the EZ, as noted earlier in this chapter.

Ashton Vale to Temple Meads and the North Fringe to Hengrove Package both provide significant increases in public transport capacity both through direct access and linkages to Park & Ride. The delivery of these in the early phases of the EZ will go some way towards facilitating the early public transport demand and releasing much needed highway capacity through wider modal shift.

The total cost of these schemes is £197m, with the timescale for delivery by 2017.

6.4.2 Greater Bristol Metro rail network

Proposed enhancements to the local rail network (Greater Bristol Metro) will also provide enhanced opportunities for rail travel to the EZ. Ensuring the Greater Bristol Metro is secured as an option through the franchise and then phase 1 delivered within 5 years will be critical to unlocking early phases of the Enterprise Zone.

The total cost of this scheme is £40m (Phase 1 of the Greater Bristol Metro), with the timescale: completion being by 2018 (if it is approved and work commences in 2012).

6.4.3 Park & Ride

Park & Ride plays an important role in facilitating access to Bristol city centre for erstwhile car drivers, reducing the amount of cars travelling to and seeking parking in the city centre. Chapter 4 discussed the way that de facto restrictions on the ability of people to access the EZ by car could manifest in the form of greater public transport use, more walking and cycling, and increased demand for Park & Ride facilities. As the EZ is a regionally important destination, in order for this not to be

skewed to corridors where Park & Ride services currently exist, the key assumption was made that Park & Ride parking and bus services would be available in the M32 corridor.

The North Fringe to Hengrove Package removed the M32 Park and Ride site as part of the value engineering process. This is considered essential in an early phase of the EZ development.

Further expansion and service enhancements may be required at existing sites on A4 Portway, Bath Road and Long Ashton. This will need to be reviewed.

The outline costs for a M32 Park & Ride site, with around 1,500 spaces, including direct access ramps to/from the M32, are around £20m. Timescale for implementation could be achieved by 2017, if it is built as a complementary project to North Fringe Hengrove Package.

6.4.4 Bus hubs and linking services

Critical to getting permeability will be in to invest in the quality of interchange points to provide connectivity from areas of the city such as Old Market, Redcliffe and the City Centre.

There will also be a need to consider enhanced orbital bus connectivity that ensures convenient and efficient interchange.

6.4.5 Portway platform

The Severn Beach Line provides a suburban rail service from Bristol Temple Meads through Clifton and Avonmouth to Severn Beach. Services currently run every 40 minutes from Temple Meads to Avonmouth, with approximately every other service going to Severn Beach itself. Patronage of the line has increased significantly in recent years as a result of increasing the previously ad hoc service that often ran at less than hourly intervals to regular 40 minute intervals (subsidised by Bristol City Council), as well as through the work of the Severnside Community Rail Partnership in promoting the line. The Severn Beach Line is one of the principal elements of the Greater Bristol Metro proposals for enhanced suburban rail services, and would enjoy an increase in services to two trains per hour (regular 30 minute intervals).

Portway Park & Ride site is one of the three existing bus based Park & Ride sites that serve Bristol City Centre. As noted in the previous section of this chapter, Park & Ride is a likely to be a key mechanism providing alternatives for car users wanting to access the EZ, but unable to access or park at the EZ. The Park & Ride site is located immediately adjacent to the Severn Beach Line, between the existing Shirehampton and Avonmouth stations, and as such it is proposed to make the site a dual mode rail and bus Park & Ride.

The railway line is single track at this point and, with no need for passengers to cross the line, a station could be constructed with minimal infrastructure other than a platform and links to the existing Park & Ride site. Recent estimates put the cost at between £350,000 and £500,000 for the cost of a Portway station, for delivery by 2013.

6.4.6 Personal Rapid Transit (PRT) – Ultra

Approaches have been made to Bristol City Council by the makers of the Ultra personal rapid transit (PRT) system with a view to its potential application in Bristol, and in particular in linking the EZ to the city centre in Bristol.

The Ultra PRT system is an automatic on-demand transport system that uses small electric vehicles ('pods') that are automatically controlled on a dedicated guideway. Stations have level entry and are located off-line allowing vehicles to operate non-stop from origin to destination. The vehicles are battery powered and based on conventional automotive technologies. An application of Ultra at London's Heathrow Airport Terminal 5 (serving business parking) is now operational. Figure 6.3 shows publicity pictures of the Ultra system at Heathrow, with 'pods' at a station and on a section of guideway, and the control system.

Figure 6.3: Publicity photographs of the Ultra system at Heathrow

The Ultra system represents a potentially innovative option for linking into and within a high density extension to an existing city centre, like the EZ. As such, Ultra have been asked to consider the capabilities and outline costs of an indicative initial system that could link the Temple Meads station area with the rest of the city centre. This would include information about the scale of system (footprint of stations and alignment, and number of vehicles) that could cater for the sorts of trips the EZ could generate, in particular providing links for bus users to get from bus hubs to the EZ as well as rail users to get between the city centre and Temple Meads station.

Figure 6.4 shows indicative locations of Ultra stations in such an initial system. Future extension of the system could encompass stops within the EZ, for example near St.Philips Causeway on Feeder Rd or the paintworks at Arno's Vale.

No information has yet been provided on potential costs (timescale unknown).

6.5 Initial assessment of measures

Table 6.2 shows a brief summary assessment of each the measures described earlier in this chapter, including outline costs (if known) and the strengths and weaknesses of measures.

NOTE: costs are indicative draft values

Table 6.2: Initial assessment of potential enabling measures

	Measure	Cost	Strength	Weakness	Opportunities	Threats
Highway Measures	**Temple Circus underpass**					
	Cut-and-cover tunnel under the Temple Circus gyratory connecting Temple Way south of Temple Bridge with the Temple Gate north of the Clarence Road roundabout	£44m-£56m (£65m-£71m incl Redcliffe Way slips)	Tunnel would remove traffic from surface level at Temple Circus, to improve public realm as well as pedestrian and cycle links to the city centre from the EZ (and Temple Meads Station)	High cost and potentially significant disruption during construction	Potential development land benefits – release of land, access, value enhanced	Through traffic would be attracted to the Temple Way / Temple Gate route with potential additional pressure on Bath Bridges junctions
	City centre proposals (from BCC)					
	Third lane on Temple Gate west on the approach to Temple Circus	£0.4m-£0.6m	Relieve local pinch point with additional capacity	Space to provide third lane and effect on pedestrian crossing facilities	Re-design of Temple Gate west access to Temple Circus in conjunction with rapid transit proposals could assist	Interaction with rapid transit alignment may restrict this as an option
	Remove the link between Temple Gate west and Temple Gate east and join the island site the centre of the existing Temple Circus roundabout	£200k-£300k for works on Temple Circus, plus £0.5m-£0.75 on Counterslip / Temple Back	Reduces conflicting movements at Temple Circus (limited number of movements use this section of Temple Circus)	Compromises routeing for traffic leaving Temple Quay unless combined with new link through Temple Quay. Requires works on Counterslip / Temple Back	Combination with route through Temple Quay. Potential development land benefits – release of land, access, value enhanced	Practical route through Temple Quay for traffic may not be desirable
	New link between The Friary and Temple Back East in Temple and restricting Temple Quay access to 'left out' at Temple Circus and 'right out' at Temple Back East	£0.75m-£1.5m	Reduces conflicting movements and simplifies operation of Temple Circus and simplifies access to Temple Quay	Requires new traffic route through Temple Quay. Potential conflict between traffic and pedestrian movements in Temple Quay	Enables changes to Temple Circus. Enhance bus links (direct) to Temple Quay	Practical route through Temple Quay for traffic may not be desirable
	Routeing BRT through the Temple Quay	£250k-£0.5m	Provide direct link from EZ (and Temple Meads) to enhanced public transport network	Diversion of existing proposed route adds to journey time	Not yet built, so designs could be amended. Bus based system comparatively easy to adjust route in city centre	Practical route through Temple Quay for rapid transit vehicles may not be achievable/desirable

NOTE: costs are indicative draft values

Table 6.2: Initial assessment of potential enabling measures

	Measure	Cost	Strength	Weakness	Opportunities	Threats
Highway Measures (cont/d)	Southbound bus lane along Victoria Street approaching Temple Circus	£100k-£250k	Provides priority for public transport from city centre towards EZ	Reduced general traffic capacity on Victoria Street could have an impact		
	Alterations to Redcliff Roundabout (that could ultimately be included as part of the AVTM BRT route)	£250k-£750k				
	Various options to amend junctions at Temple Meads, Avon Street, Temple Back and Bath Bridges Temple Meads access ramp Avon Street junction and route changes Bath Bridges – remodelling junction	 £250k-£0.5m £0.5m-£1.25m £2m-£3m	Key junction improvements will benefit all traffic and public transport services	Limited direct scope to make enhancements for EZ traffic	Scope to optimise junctions in assisting access to/from EZ	Improvements for through traffic would not provide additional capacity for EZ traffic
	Access to/through the EZ					
	Bath Road / Totterdown Bridge junction re-alignment	£50k-£75k	Facilitate access to EZ from A4	Amendment to recently completed scheme		Capacity issues on A4 westbound
	Link from St.Philip's Causeway to Temple Quay using Day's Road and Oxford Street, and a new crossing over the Floating Harbour.	£4m-£6m	Links areas of EZ with strategic roads, including providing alternative access to Temple Quay avoiding Temple Way / Temple Gate	Cost (new bridge required). Traffic generation through northern (residential) areas of the Dings. Loss of public amenity space		Uses existing roads with frontage development (including residential, with traffic calming). Potential rat-run opportunity through Temple Quay (in conjunction with Temple Quay traffic routes)
	Link from St.Philip's Causeway to The Dings (south of the railway) through Barton Hill, using Barrow Road, Jarvis Street, Queen Anne Road (under the railway) and Silverthorne Lane.	£5m-£12m	Links areas of EZ with strategic roads and opens up area of EZ for development that is not well connected	Re-opens walk/cycle only bridge under railway (Queen Ann Road) – limited headroom Listed wall along Silverthorne Lane	Limited new infrastructure requirement – corridor exists. Work with Network Rail to link with future re-signalling & electrification works (if appropriate)	Uses existing roads with frontage development (incl limited residential and pedestrian only link)

NOTE: costs are indicative draft values

Table 6.2: Initial assessment of potential enabling measures

	Measure	Cost	Strength	Weakness	Opportunities	Threats
Highway Measures (cont/d)	Improvements to Gas Lane, including crossing under the railway.	£750k-£5m	Improves links to area of EZ not well connected	Existing bridge cannot be significantly altered Listed wall along Gas Lane	Work with Network Rail to link with future re-signalling & electrification works (if appropriate)	Scope to design appropriate solution under railway bridge is unknown
	New link over the Feeder Canal between Short Street and Atlas Street	£6m-£10m	Improves links to area of EZ not well connected	Potentially high cost. Junction required on Feeder Road. Significant use of third party land	Direct funding link with re-development of sites. Enhance pedestrian and cycle links to EZ using new structure	Conflict with use of north Feeder Road for pedestrians and cyclists. Maintaining navigable headroom on the Feeder Canal may require lifting, or other moveable, bridge)
	Links to the Diesel Depot site from the A4 Bath Road and Feeder Road/Cattle Market Road (Cattle Market Road bridge already progressing)	£10m				
Pedestrian & Cycle Measures	**Temple Circus overbridge**					
	Linking Temple Quay (The Friary) with Temple Way (west side) and Victoria Street (south side)	£5m-£8m	A Temple Circus pedestrian overbridge would separate pedestrian and traffic movements	While well located to link from central areas of the EZ to the city centre, the bridge could not cater for all movements. At-grade crossing facilities would have to be retained in most (if not all) of the current locations		Long ramps are needed to give sufficient clearance for traffic (in excess of 100m length), which dictates type of design
	City centre walk/cycle (from BCC)					
	Already existing and currently proposed signed cycle routes (Anvil Street, Gas Lane, Silverthorne Lane, Barton Hill Road, Victoria Avenue, Queen Ann Road, Maze Street)	Estimated total cost of £6m-£10m for all measures…	Joins existing extensive network and removes gaps, opening up EZ for pedestrians and cyclists	Some routes currently not very pleasant for walking and cycling	Links with EZ development through travel plans	Interaction with potential new or enhanced traffic routes to EZ
	Additional routes that would benefit from cycle lanes (Albert Road, Whitby Road)		New on-road routes broadly paralleling off-road routes	On-road cycle lanes in light industrial area. Edge of EZ area		

NOTE: costs are indicative draft values

Table 6.2: Initial assessment of potential enabling measures

	Measure	Cost	Strength	Weakness	Opportunities	Threats
Pedestrian & Cycle Measures (cont/d)	Existing routes that could be enhanced for cycling using BCC land (link Avon Meads to New Brislington Bridge under Feeder Rd and crossing the Feeder)	…estimated total cost of £6-£10m for all measures	New links to southern area of EZ	Infrastructure requirement relatively high and development funding required	Links to wider route plans towards Keynsham and Bath	Peripheral to core of EZ and other routes and proposals provide similar direct EZ links, so less likely to attract EZ developer funding
	Footways that could be enhanced to provide shared walk/cycle facilities (Feeder Road, Clarence Road)		Providing attractive walk/cycle opportunities along existing roads providing direct routes	Construction may be required to strengthen banks of the Feeder	No frontages	Interaction with potential new or enhanced traffic routes to EZ
	New routes delivered in conjunction with development (Post Office site, Floating Harbour pontoon, HCA Diesel Depot site)		New links to otherwise inaccessible sites	Dependant on development taking place	Funding through development	Development does not come forward as anticipated (or at all)
	Specific walk routes in the EZ					
	New walking route following the south bank of the river. A 'board walk' type path running from near Temple Meads station along the edge of the HCA Diesel Depot site to the old paintworks site at Arno's Vale	£3m-£5m	New highly visible route that would also enhance urban realm through pedestrian linkages in the EZ (particularly the eastern extremities)	High cost	Opens up walk access to EZ between the River and A4 Bath Rd	Design issues relating to proximity to river and key development site (Diesel Depot site)
Public Transport Measures	**General measures not specific to the EZ**					
	Ongoing major initiatives in the form of the Greater Bristol Bus Network (GBBN) and Bus Rapid Transit (BRT) routes	BRT £197m	Public transport links to the EZ are very important and GBBN/BRT in particular. Enhancements are happening irrespective of development of the EZ	BRT does not directly serve the EZ, other than at the fringes on Temple Circus	Potential to run BRT through Temple Quay	Practical route through Temple Quay for rapid transit vehicles may not be desirable/achievable

NOTE: costs are indicative draft values

Table 6.2: Initial assessment of potential enabling measures

	Measure	Cost	Strength	Weakness	Opportunities	Threats
Public Transport Measures (cont/d)	Enhancements to the local rail network (Greater Bristol Metro)	Metro £40m (Phase 1)	Public transport links to the EZ are very important and enhanced rail services a key component	Only serves Temple Meads Station directly	Serves whole city and beyond and not just EZ, so linked to wider objectives. Opportunity to use EZ to promote Greater Bristol Metro and vice versa	Greater Bristol Metro is not confirmed. Dependant on changes to the rail network (Filton Bank 4-tracking) and decision to support services through franchise (by DfT and WoE)
	Specific measures outside the EZ					
	M32 Park & Ride – proposals for bus based Park & Ride alongside the M32, located between junctions 1 and 2	approx £20m	Park & Ride is likely to play a key part in serving employment in the city centre and EZ	Cost	Serves city centre and not just EZ, so linked to wider city centre objectives. Opportunity to use EZ to promote M32 P&R and vice versa	No Park & Ride site on M32 would leave a gap in city wide provision
	Portway Park & Ride platform – site is located immediately adjacent to the Severn Beach Line (which would see two trains per hour with the Greater Bristol Metro) and as such it is proposed to make the site a dual mode	£350k-£500k	Low cost addition to the rail network that is not dependant on other changes to the system (such as new services). Access to station via existing P&R site	Limited service at present on Severn Beach Line (40 minutes) with some not able to stop at Portway	Serves not just EZ, linked to wider city objectives (in particular access to Clifton). Intended as demonstration low cost development of rail station through Community Rail Partnership	Escalation of costs through design process could delay progress if funding is limited. Balancing act between revenue abstraction from bus to train and vice versa
	Personal Rapid Transit (PRT) – Ultra The makers of the Ultra PRT system have suggested it to link the EZ to the city centre	tbc	Provides direct link from Temple Meads to city centre (quicker than walking)	Cost is unknown at present but likely to be high. System is unproven in existing city centre location (only one in operation at present at Heathrow Airport)	Potential marquee system to showcase new technology in existing urban area	System may not cope with demand and/or scale of infrastructure needed may be inappropriate for city centre

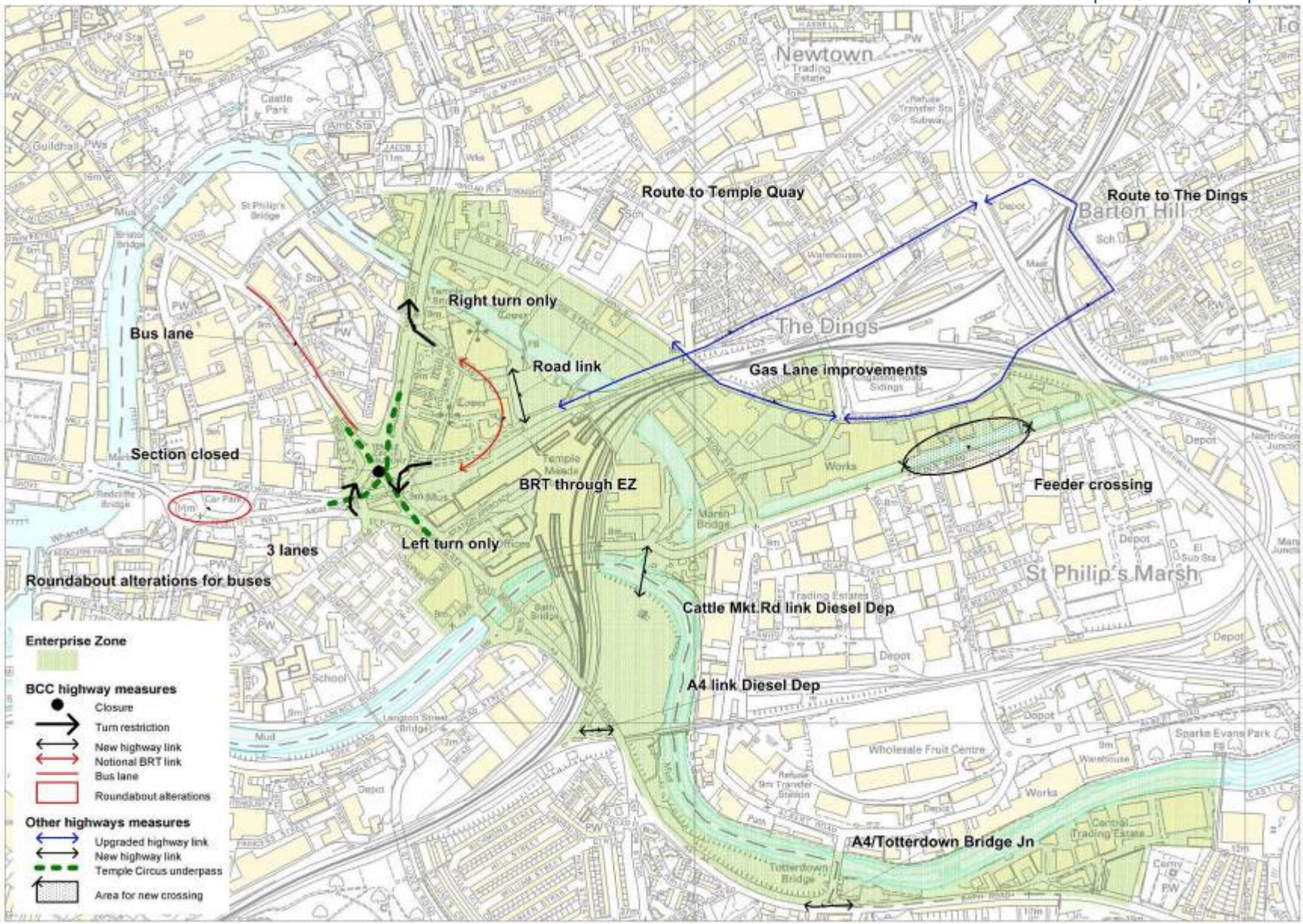


Figure 6.1: Highway measures (incl BCC measures)

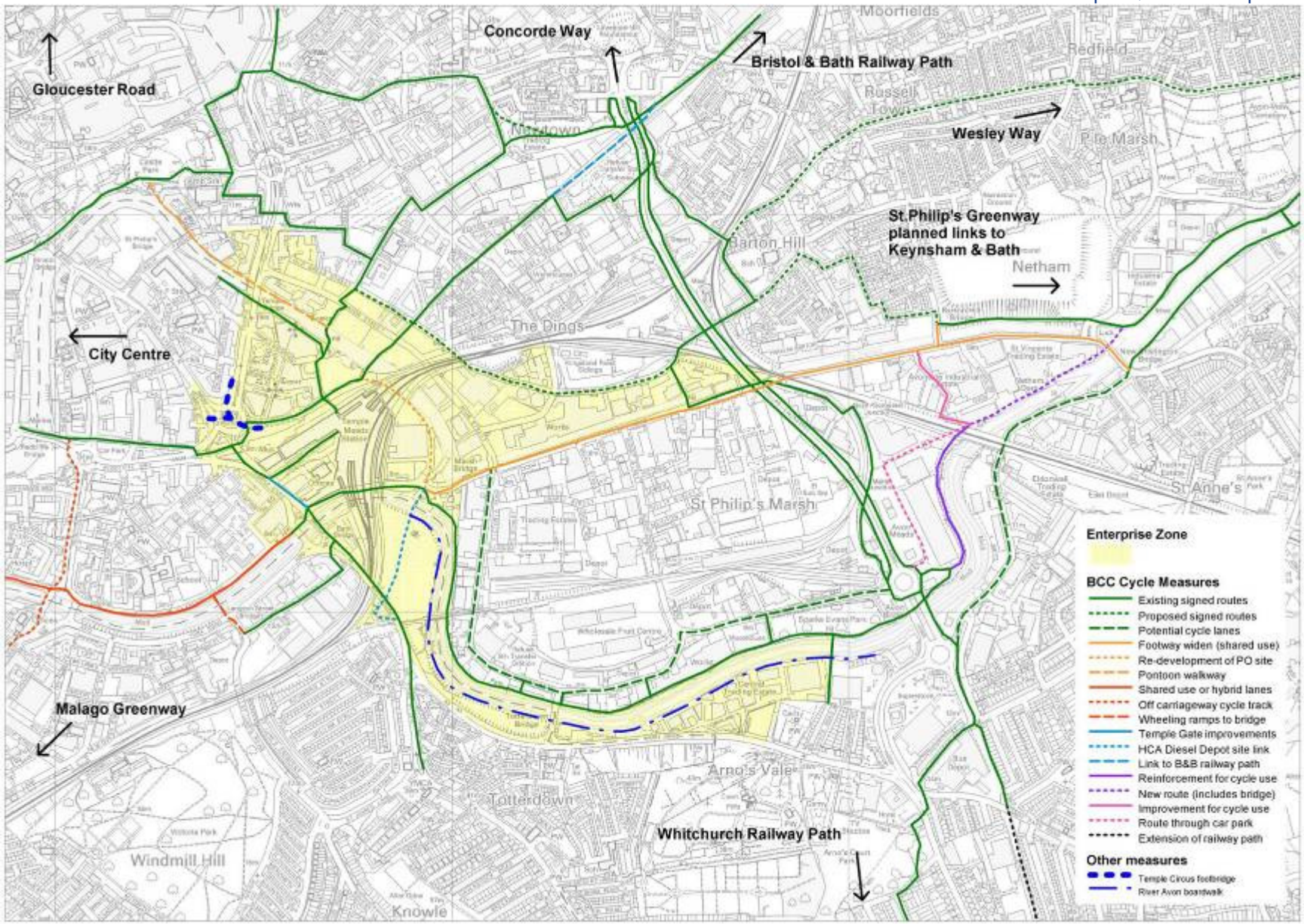


Figure 6.2: Potential cycling routes in/around the EZ (incl BCC measures)

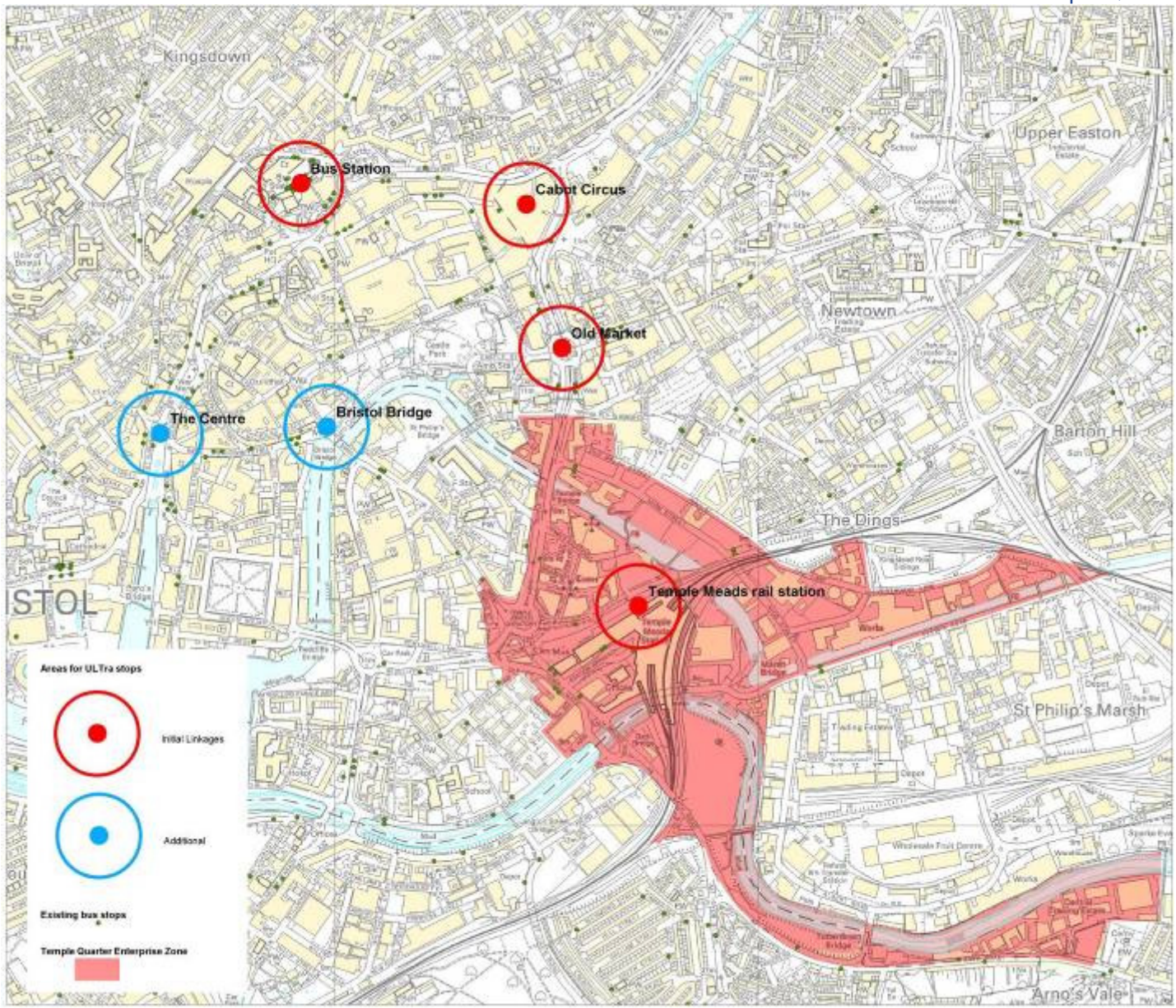


Figure 6.4: Possible Ultra PRT system nodes for an initial system linking the city centre and EZ

7 Concluding remarks

7.1.1 Conclusions

Overall it is clear that there has to be a significant investment in public transport infrastructure to meet the demand for travel to the Enterprise Zone. It is physically difficult and not in keeping with sustainable transport policy to provide additional highway capacity to provide the necessary access. This is not to say that local pinch-points on the highway network could be overcome through physical or technological improvements, but to recognise that to realise the necessary capacity increase would require major highway capacity improvements. These are not realistic, especially when public transport, supported by walking and cycling, has the capability of offering a realistic alternative.

Thus, the schemes proposed in this report concentrate on the improvement to public transport capacity, as well as improving walking and cycling routes for those with shorter journeys. The public transport measures include BRT and conventional bus (including P&R) and the local and sub-regional rail network. The walk and cycle measures seek to address gaps in the current networks and the provision of safe routes.

Over the next 15 to 20 years the potential increase in demand to travel to central Bristol at peak times, to take up the envisaged number of employment places in the Enterprise Zone and the remainder of the city centre, is significant. If this potential is to be realised there has to be a step change in the provision of public transport services. It is recognised that this will require the joint efforts a number of transport operators and network providers. In a deregulated market this represents challenges. But, there are also opportunities to develop the local networks to the mutual benefit of all those involved, as well as the quality of life for those who live and work in and around Bristol

7.1.2 Phasing and next steps

A summary of the outline status of all measures can be found in Figure 7.1. Measures have been classified as 'green', 'amber' or 'red', as follows:

- 'Green' measures are those that are broadly accepted as supporting the EZ, and can be implemented subject to funding, pending detailed analysis and design.
- 'Amber' denotes less clear cut measures, typically being more expensive or complicated. These measures require further investigation for costs and benefits for the EZ.
- 'Red' measures are unlikely to be taken forward, for a combination of reasons relating to their (high) cost and/or difficulty to implement them, and/or they do not adequately support the EZ.

It is currently unclear what the priority enabling measures should be, and indeed some are linked to wider city and region objectives. Simplistically, as the framework for development in the EZ evolves, measures will need to support the build-up of new jobs based on locations. Beyond this, a key priority will be to facilitate linkages to areas of the EZ that are currently under developed

Outline status of EZ enabling transport measures

Highway measures

City centre proposals	
Third lane on Temple Gate west at Temple Circus	
Remove the link between Temple Gate west and Temple Gate east at Temple Circus	
Link: The Friary to Temple Back East ('left out' Temple Circus and 'right out' Temple Back East)	
Route BRT through the Temple Quay	
Southbound bus lane on Victoria Street to Temple Circus	
Alterations to Redcliff Roundabout	
Various options to amend junctions at Temple Meads, Avon Street, Temple Back and Bath Bridges	

Access to/through the EZ	
Bath Road / Totterdown Bridge junction re-alignment	
Improvements to Gas Lane	
New link over the Feeder Canal	
Links to the Diesel Depot site from the A4 Bath Rd and Feeder Rd/Cattle Market Rd	
Link: St.Philip's Causeway to Temple Quay (Day's Rd, Oxford St & new crossing of Floating Hbr)	
Link: St.Philip's Causeway to The Dings S of rly (Barrow Rd, Jarvis St, Queen Anne Rd & S'th La)	

Other measures	
Temple Circus underpass	
Direct slips from St.Philip's Causeway into the EZ	
Callington Road Link	

Pedestrian & cycle measures

City centre walk/cycle routes	
Enhance quality of existing and currently proposed signed routes	
Additional routes for cycle lanes	
Footways enhanced to provide shared walk/cycle facilities	
New routes delivered in conjunction with development	

Specific walk routes in the EZ	
New walking route following the south bank of the river	

Other measures	
Temple Circus pedestrian and cycle over bridge	

Public transport measures

General measures not specific to the EZ	
Bus Rapid Transit (BRT)	
Greater Bristol Metro	
Bus hubs and city centre orbital services	

Specific measures outside the EZ	
M32 Park & Ride	
Portway Park & Ride platform	
Personal Rapid Transit	

Key

'Green' signifies measures that are broadly accepted as supporting the EZ
'Amber' measures require further investigation for costs and benefits
'Red' measures are unlikely to be taken forward for reasons of cost and ability to implement them, and/or they do not adequately support the EZ

Figure 7.1: Outline status of EZ enabling transport measures

Appendix A

Planning Context

Appendix A Planning Context

Enterprise Zone related transport and land use policy documents and notes

Document	Notes
JLTP3	
Walking Strategy for Bristol 2011-2021	• Relevant items from Action Plan • 4. Identify 5 showcase walking routes by March 2012 • 21. Improve PT interchanges, such as Temple Meads Short term: Potential ped enhancement opportunities to be a key consideration of new development proposals (eg access enhancements to TM through any adjacent development) & potential pedestrian enhancement opportunities to be a key consideration in emerging CAAP. Long term: major improvements to ped access and PT interchange facilities at TM
Local Plan	• Core Strategy replaces much of Local Plan, but not site allocations. Adopted Local Plan dates from 1997. The proposals maps for this are not available online, but those for the Local Plan Proposed Alterations 2003 are and are presumed to be broadly similar to each other. • Bath Road Open Space: NE6 Wildlife Network Sites, NE1 Open Space, NE2 Prominent Green Hillside • Former Petrol Filling Station: NE6 Wildlife Network Sites (lower level areas) and areas where existing uses are, for the most part, likely to remain undisturbed (forecourt) • Paintworks etc: EC4A Primarily Industrial & Warehousing • St Philip's Marsh N of Feeder Canal & E of Avon Street: EC4A Primarily Industrial & Warehousing • St Philip's Marsh N of Feeder & W of Avon Street: areas where existing uses are, for the most part, likely to remain undisturbed
LDF Core Strategy Adopted June 2011	• BCS2 Bristol City Centre [relevant sections only] • Bristol City Centre's role as a regional focus will be promoted and strengthened • Development will include mixed uses for offices, residential, retail, leisure, tourism, entertainment and arts and cultural facilities • The city centre boundary will expand into: The St. Philip's area, north of the Feeder Canal; The former diesel depot site, Bath Road • Development up to 2026 will include: Around 150,000m² of net additional high quality office floorspace; The provision of around 7,400 new homes; and Improved transport systems and connectivity, including new public transport, pedestrian and cycling routes and transport hubs. • Continued improvement will be promoted in regeneration areas including Redcliffe and Harbourside and at city centre gateways including Old Market, Stokes Croft, Cumberland Basin and Temple Meads • Design of development will be expected to be of the highest standard in terms of appearance, function, conservation of heritage assets, sustainability and maintaining and enhancing green infrastructure. Key views will be protected. Street design will give priority to pedestrian access, cycling and public transport. New development should include measures to secure public access and routes for walking, cycling and public transport, including access to waterfront areas. Major developments should demonstrate measures to enhance social inclusion and community cohesion, especially in respect of those communities close to the city centre. Opportunities will be taken to reduce the severance of parts of the city centre from neighbouring communities caused by major roads and other physical barriers. Facilities and services, including those of a small scale, which contribute to the diversity and vitality of the city centre will be encouraged and retained.

Document	Notes
LDF Core Strategy Adopted June 2011 (cont/d)	• BCS10 Transport & Access Improvements [relevant sections only] – The council will support the delivery of significant improvements to transport infrastructure to provide an integrated transport system, which improves accessibility within Bristol and supports the proposed levels of development. In particular it will support, subject to environmental impact assessment where appropriate: 1. The implementation of the Greater Bristol Bus Network. 2. The delivery of transport infrastructure improvements, including… Rapid transit routes (Ashton Vale to Emerson's Green and Hengrove to the North Fringe, all via the city centre)… A network of routes to encourage walking and cycling…. 3. Making the best use of existing transport infrastructure through improvement and reshaping of roads and junctions where required to improve accessibility and connectivity and assist regeneration and place shaping. 4. Appropriate demand management and sustainable travel measures. • Development Principles – Without prejudice to the implementation of the major transport schemes listed above, proposals will be determined and schemes will be designed to reflect the following transport user priorities as set out in the Joint Local Transport Plan: a) The pedestrian; b) The cyclist; c) Public transport; d) Access for commercial vehicles; e) Short stay visitors by car; f) The private car. • The needs of disabled people will be considered within all of the above headings. • Development proposals should be located where sustainable travel patterns can be achieved, with more intensive, higher density mixed use development at accessible centres and along or close to main public transport routes. Proposals should minimise the need to travel, especially by private car, and maximise opportunities for the use of walking, cycling and public transport. Developments should be designed and located to ensure the provision of safe streets and reduce as far as possible the negative impacts of vehicles such as excessive volumes, fumes and noise. Proposals should create places and streets where traffic and other activities are integrated and where buildings, spaces and the needs of people shape the area.
LDF Evidence Base Documents	• Employment Land Study Feb 2009
LDF Site Allocations &Development Management	• Option Document published June 2010 • Most of EZ falls within CAAP for which no allocations map is yet available. Exception to this is land south of River Avon & North of Bath Road. • BSA1101 (Bath Road open space W of Totterdown Bridge – 0.9ha for Housing and business (46 dwellings at 50dpa) • BSA1202 (Paintworks Phase 3) 3.9ha for housing and business (197 dwellings at 50dpa) • BSA1210 (Former Petrol Filling Station, Bath Road) 0.5ha for business and housing, or housing alone (24 dwellings at 50dpa)
City Centre Strategy & Area Action Plan	• 2005-2010 • Proposed Areas for formal SPD Adoption – Temple Meads Area Development Framework (S of Friary, E of Temple Gate/Bath Road, N & W of Floating Harbour/Relief Line • Figure 7 – Strategic Movement Network & Summary of Main Transport Proposals 2005-10 • Main PT Interchange: TM • City Centre Loop: Temple Way, Temple Circus, Temple Gate • Main PT Corridors: West Street / Old Market, Temple Way, Victoria Street, Temple Gate, Bath Road, Wells Road, Station Approach, Redcliffe Way • PT Reservation Route: E-W Portwall Lane, Friary, onto land adjacent to railway lines on N side of TM • Non-motor vehicle river crossing (proposed): E of Friary; S of Cattlemarket Road • NCN (Proposed): Waterfront on E side of Floating Harbour N of Cattlemarket Road to Valentine Bridge • Non-motor vehicle routes (proposed): N side of Floating Harbour b/w Passage Street to new river crossing (partially completed); Friary to Days Road over new river crossing; Avon Street to Broad Plain (line proposed NW of providence Place); better links from Old Market to Temple Quay (line proposed north of New Thomas Street)

Document	Notes
City Centre Strategy & Area Action Plan (cont/d)	• 7) Temple Meads : reorganise station approach as part of station improvements, reorganise car parking and bus interchange as part of station improvements. Target date TBA • 20) City centre bus stops: all to be provided with a city bus map and bus stop finder map. Target date: TBA • 27) Proposed Arena Site: improve pedestrian and vehicle access to and from former diesel depot. Target date: 2008 • 28) Brunel Mile: Enhance pedestrian route b/w TM & SS Gt Britain
Supplementary Planning Document 3: Redcliffe Futures	
LDF Central Area Action Plan (AAP)	

Appendix B

Chapter 4 Figures

Appendix B Figures from Chapter 4

Figure 4.1: Potential mode split – restricted car mode share options

No. of employees / Mode / Time Period	Mode Split	4,000		12,000		17,000	
		AM arrival	PM departure	AM arrival	PM departure	AM arrival	PM departure
INITIAL							
Car driver	37.9%	805	685	2414	2055	3420	2911
Car passenger	5.4%	116	98	347	295	491	418
Motorcycle	1.9%	40	34	121	103	171	146
Train	15.3%	326	277	977	831	1384	1178
Bus	15.5%	330	281	989	842	1401	1193
Cycle	7.8%	166	141	497	423	704	599
Walk	13.8%	293	250	880	749	1246	1061
Other	0.4%	9	8	27	23	38	32
Work at home	*1.9%*	*40*	*34*	*121*	*103*	*172*	*146*
Total	*100.0%*	*2124*	*1808*	*6372*	*5424*	*9027*	*7684*
OPTION 1 - max 30% car driver							
Car driver	30.0%	637	542	1912	1627	2708	2305
Car passenger	4.3%	92	78	275	234	389	331
Motorcycle	1.9%	40	34	121	103	171	146
Train	18.2%	386	328	1158	985	1640	1396
Bus	19.3%	410	349	1231	1048	1744	1485
Cycle	9.0%	192	164	576	491	817	695
Walk	14.9%	317	270	952	810	1348	1148
Other	0.4%	9	8	27	23	38	32
Work at home	*1.9%*	*40*	*34*	*121*	*103*	*172*	*146*
Total	*100.0%*	*2124*	*1808*	*6372*	*5424*	*9027*	*7684*
OPTION 2 - max 25% car driver							
Car driver	25.0%	531	452	1593	1356	2257	1921
Car passenger	3.6%	76	65	229	195	324	276
Motorcycle	1.9%	40	34	121	103	171	146
Train	20.0%	424	361	1272	1082	1801	1533
Bus	21.7%	460	392	1381	1176	1957	1666
Cycle	9.8%	209	178	627	534	889	756
Walk	15.7%	334	284	1002	853	1419	1208
Other	0.4%	9	8	27	23	38	32
Work at home	*1.9%*	*40*	*34*	*121*	*103*	*172*	*146*
Total	*100.0%*	*2124*	*1808*	*6372*	*5424*	*9027*	*7684*
OPTION 3 - max 20% car driver							
Car driver	20.0%	425	362	1274	1085	1805	1537
Car passenger	2.9%	61	52	183	156	259	221
Motorcycle	1.9%	40	34	121	103	171	146
Train	21.7%	462	393	1386	1180	1963	1671
Bus	24.0%	510	434	1531	1303	2169	1847
Cycle	10.6%	226	192	678	577	960	817
Walk	16.5%	350	298	1051	895	1489	1267
Other	0.4%	9	8	27	23	38	32
Work at home	*1.9%*	*40*	*34*	*121*	*103*	*172*	*146*
Total	*100.0%*	*2124*	*1808*	*6372*	*5424*	*9027*	*7684*
OPTION 4 - max 15% car driver							
Car driver	15.0%	319	271	956	814	1354	1153
Car passenger	2.2%	46	39	137	117	195	166
Motorcycle	1.9%	40	34	121	103	171	146
Train	23.5%	500	426	1500	1277	2125	1809
Bus	26.4%	561	477	1682	1431	2382	2028
Cycle	11.4%	243	207	729	620	1032	879
Walk	17.3%	367	312	1100	937	1559	1327
Other	0.4%	9	8	27	23	38	32
Work at home	*1.9%*	*40*	*34*	*121*	*103*	*172*	*146*
Total	*100.0%*	*2124*	*1808*	*6372*	*5424*	*9027*	*7684*
OPTION 5 - max 10% car driver							
Car driver	10.0%	212	181	637	542	903	768
Car passenger	1.4%	31	26	92	78	130	110
Motorcycle	1.9%	40	34	121	103	171	146
Train	25.3%	538	458	1614	1374	2286	1946
Bus	28.7%	611	520	1832	1559	2595	2209
Cycle	12.2%	260	221	779	663	1104	940
Walk	18.0%	383	326	1150	979	1629	1386
Other	0.4%	9	8	27	23	38	32
Work at home	*1.9%*	*40*	*34*	*121*	*103*	*172*	*146*
Total	*100.0%*	*2124*	*1808*	*6372*	*5424*	*9027*	*7684*

Figure 4.2a: Potential mode split & origins/destinations– restricted car mode share options

4,000 AM Peak - arrivals

Origin / Destination in…	Car-Driver	Car-Pass	M-cycle	Train	Bus	Bicycle	On Foot	Other	
INITIAL									
Bristol City Centre	27	4	1	6	14	16	106	9	183
Clifton & Redland	54	8	2	4	20	37	98	-	223
North Bristol (inc Bradley Stoke)	119	18	8	18	58	26	14	-	260
East Bristol (inc Kingswood)	148	28	10	9	93	38	18	-	343
South Bristol	115	26	7	2	91	41	57	-	339
Bath & Kenysham	26	2	2	62	12	2	-	-	106
South Wales	25	3	0	44	2	-	-	-	75
Weston-super-Mare & Yatton	44	5	2	49	8	-	-	-	109
North of Bristol	77	7	3	23	11	1	-	-	122
East of Bristol	25	1	0	53	-	-	-	-	79
South of Bristol	26	2	1	6	3	-	-	-	38
West of Bristol	109	12	4	44	17	5	-	-	191
Other	9	1	-	6	1	-	1	-	17
	805	116	40	326	330	166	293	9	2,084
OPTION 1 - max 30% car driver									
Bristol City Centre	21	3	1	6	14	17	111	9	183
Clifton & Redland	42	6	2	5	22	41	106	-	223
North Bristol (inc Bradley Stoke)	93	14	8	23	73	33	17	-	260
East Bristol (inc Kingswood)	115	21	10	11	118	47	21	-	343
South Bristol	89	20	7	2	110	46	64	-	339
Bath & Kenysham	21	2	2	67	13	2	-	-	106
South Wales	19	2	0	50	3	-	-	-	75
Weston-super-Mare & Yatton	34	4	2	58	10	-	-	-	109
North of Bristol	60	5	3	35	16	2	-	-	122
East of Bristol	19	1	0	58	-	-	-	-	79
South of Bristol	20	1	1	8	7	-	-	-	38
West of Bristol	85	9	4	58	27	7	-	-	191
Other	7	0	-	8	1	-	1	-	17
	625	90	40	390	415	194	321	9	2,084
OPTION 2 - max 25% car driver									
Bristol City Centre	18	3	1	6	15	17	114	9	183
Clifton & Redland	35	5	2	5	23	42	111	-	223
North Bristol (inc Bradley Stoke)	77	11	8	26	82	37	19	-	260
East Bristol (inc Kingswood)	96	18	10	12	133	52	23	-	343
South Bristol	74	17	7	2	120	50	68	-	339
Bath & Kenysham	17	1	2	69	15	2	-	-	106
South Wales	16	2	0	54	3	-	-	-	75
Weston-super-Mare & Yatton	29	4	2	64	11	-	-	-	109
North of Bristol	50	5	3	42	20	3	-	-	122
East of Bristol	16	0	0	62	-	-	-	-	79
South of Bristol	17	1	1	10	9	-	-	-	38
West of Bristol	71	8	4	67	33	9	-	-	191
Other	6	0	-	9	1	-	1	-	17
	521	75	40	427	464	211	337	9	2,084
OPTION 3 - max 20% car driver									
Bristol City Centre	14	2	1	6	15	17	117	9	183
Clifton & Redland	28	4	2	5	24	44	116	-	223
North Bristol (inc Bradley Stoke)	62	9	8	29	91	40	20	-	260
East Bristol (inc Kingswood)	76	14	10	14	147	57	25	-	343
South Bristol	59	13	7	2	131	53	72	-	339
Bath & Kenysham	14	1	2	71	16	2	-	-	106
South Wales	13	2	0	57	3	-	-	-	75
Weston-super-Mare & Yatton	23	3	2	69	12	-	-	-	109
North of Bristol	40	4	3	49	23	3	-	-	122
East of Bristol	13	0	0	65	-	-	-	-	79
South of Bristol	14	1	1	11	11	-	-	-	38
West of Bristol	57	6	4	75	39	10	-	-	191
Other	4	0	-	9	1	-	1	-	17
	417	60	40	465	513	227	352	9	2,084
OPTION 4 - max 15% car driver									
Bristol City Centre	11	2	1	6	15	18	121	9	183
Clifton & Redland	21	3	2	5	25	46	121	-	223
North Bristol (inc Bradley Stoke)	46	7	8	33	101	44	22	-	260
East Bristol (inc Kingswood)	57	11	10	15	162	62	27	-	343
South Bristol	45	10	7	3	142	56	76	-	339
Bath & Kenysham	10	1	2	74	17	2	-	-	106
South Wales	10	1	0	60	3	-	-	-	75
Weston-super-Mare & Yatton	17	2	2	75	13	-	-	-	109
North of Bristol	30	3	3	56	27	4	-	-	122
East of Bristol	10	0	0	68	-	-	-	-	79
South of Bristol	10	1	1	13	14	-	-	-	38
West of Bristol	42	5	4	83	44	12	-	-	191
Other	3	0	-	10	2	-	2	-	17
	313	45	40	502	563	244	368	9	2,084
OPTION 5 - max 10% car driver									
Bristol City Centre	7	1	1	7	16	18	124	9	183
Clifton & Redland	14	2	2	6	26	48	126	-	223
North Bristol (inc Bradley Stoke)	31	5	8	36	110	48	24	-	260
East Bristol (inc Kingswood)	38	7	10	16	176	67	29	-	343
South Bristol	30	7	7	3	153	60	80	-	339
Bath & Kenysham	7	1	2	76	18	2	-	-	106
South Wales	6	1	0	64	3	-	-	-	75
Weston-super-Mare & Yatton	11	1	2	80	14	-	-	-	109
North of Bristol	20	2	3	63	30	4	-	-	122
East of Bristol	6	0	0	72	-	-	-	-	79
South of Bristol	7	0	1	14	16	-	-	-	38
West of Bristol	28	3	4	92	50	13	-	-	191
Other	2	0	-	11	2	-	2	-	17
	208	30	40	539	612	260	384	9	2,084

Figure 4.2b: Potential mode split & origins/destinations– restricted car mode share options

4,000 PM Peak - departures

Origin / Destination in…	Car-Driver	Car-Pass	M-cycle	Train	Bus	Bicycle	On Foot	Other	
INITIAL									
Bristol City Centre	23	4	1	5	12	13	90	8	156
Clifton & Redland	46	6	1	4	17	32	83	-	190
North Bristol (inc Bradley Stoke)	101	15	6	15	49	22	12	-	221
East Bristol (inc Kingswood)	126	23	9	7	79	32	15	-	292
South Bristol	98	22	6	2	78	35	48	-	288
Bath & Kenysham	22	2	1	53	10	1	-	-	90
South Wales	21	3	0	38	2	-	-	-	64
Weston-super-Mare & Yatton	38	5	2	42	7	-	-	-	93
North of Bristol	66	6	2	20	9	1	-	-	104
East of Bristol	21	1	0	45	-	-	-	-	67
South of Bristol	22	2	1	5	3	-	-	-	33
West of Bristol	93	10	4	37	14	4	-	-	162
Other	7	0	-	5	1	-	1	-	14
	685	98	34	277	281	141	250	8	1,774
OPTION 1 - max 30% car driver									
Bristol City Centre	18	3	1	5	12	14	95	8	156
Clifton & Redland	36	5	1	4	19	34	91	-	190
North Bristol (inc Bradley Stoke)	79	12	6	20	62	28	14	-	221
East Bristol (inc Kingswood)	98	18	9	9	101	40	18	-	292
South Bristol	76	17	6	2	93	39	54	-	288
Bath & Kenysham	17	1	1	57	11	2	-	-	90
South Wales	16	2	0	43	2	-	-	-	64
Weston-super-Mare & Yatton	29	4	2	50	8	-	-	-	93
North of Bristol	51	5	2	30	14	2	-	-	104
East of Bristol	16	0	0	50	-	-	-	-	67
South of Bristol	17	1	1	7	6	-	-	-	33
West of Bristol	72	8	4	50	23	6	-	-	162
Other	6	0	-	6	1	-	1	-	14
	532	76	34	332	353	165	273	8	1,774
OPTION 2 - max 25% car driver									
Bristol City Centre	15	2	1	5	12	14	97	8	156
Clifton & Redland	30	4	1	4	19	36	95	-	190
North Bristol (inc Bradley Stoke)	66	10	6	22	70	31	16	-	221
East Bristol (inc Kingswood)	81	15	9	10	113	44	20	-	292
South Bristol	63	14	6	2	103	42	58	-	288
Bath & Kenysham	15	1	1	59	12	2	-	-	90
South Wales	14	2	0	46	2	-	-	-	64
Weston-super-Mare & Yatton	24	3	2	54	9	-	-	-	93
North of Bristol	43	4	2	36	17	2	-	-	104
East of Bristol	14	0	0	53	-	-	-	-	67
South of Bristol	14	1	1	8	8	-	-	-	33
West of Bristol	60	6	4	57	28	7	-	-	162
Other	5	0	-	7	1	-	1	-	14
	443	64	34	364	395	179	286	8	1,774
OPTION 3 - max 20% car driver									
Bristol City Centre	12	2	1	5	13	15	100	8	156
Clifton & Redland	24	3	1	4	20	38	99	-	190
North Bristol (inc Bradley Stoke)	53	8	6	25	78	34	17	-	221
East Bristol (inc Kingswood)	65	12	9	12	125	48	21	-	292
South Bristol	51	11	6	2	112	45	61	-	288
Bath & Kenysham	12	1	1	61	13	2	-	-	90
South Wales	11	1	0	49	2	-	-	-	64
Weston-super-Mare & Yatton	20	2	2	59	10	-	-	-	93
North of Bristol	34	3	2	42	20	3	-	-	104
East of Bristol	11	0	0	55	-	-	-	-	67
South of Bristol	12	1	1	10	10	-	-	-	33
West of Bristol	48	5	4	64	33	9	-	-	162
Other	4	0	-	8	1	-	1	-	14
	355	51	34	396	437	193	300	8	1,774
OPTION 4 - max 15% car driver									
Bristol City Centre	9	1	1	6	13	15	103	8	156
Clifton & Redland	18	3	1	5	21	39	103	-	190
North Bristol (inc Bradley Stoke)	39	6	6	28	86	38	19	-	221
East Bristol (inc Kingswood)	49	9	9	13	138	53	23	-	292
South Bristol	38	9	6	2	121	48	65	-	288
Bath & Kenysham	9	1	1	63	14	2	-	-	90
South Wales	8	1	0	51	3	-	-	-	64
Weston-super-Mare & Yatton	15	2	2	64	11	-	-	-	93
North of Bristol	26	2	2	48	23	3	-	-	104
East of Bristol	8	0	0	58	-	-	-	-	67
South of Bristol	9	1	1	11	12	-	-	-	33
West of Bristol	36	4	4	71	38	10	-	-	162
Other	3	0	-	9	1	-	1	-	14
	266	38	34	427	479	208	314	8	1,774
OPTION 5 - max 10% car driver									
Bristol City Centre	6	1	1	6	13	16	105	8	156
Clifton & Redland	12	2	1	5	22	41	108	-	190
North Bristol (inc Bradley Stoke)	26	4	6	30	93	41	20	-	221
East Bristol (inc Kingswood)	33	6	9	14	150	57	24	-	292
South Bristol	25	6	6	2	130	51	68	-	288
Bath & Kenysham	6	0	1	65	15	2	-	-	90
South Wales	5	1	0	54	3	-	-	-	64
Weston-super-Mare & Yatton	10	1	2	68	12	-	-	-	93
North of Bristol	17	2	2	54	26	4	-	-	104
East of Bristol	5	0	0	61	-	-	-	-	67
South of Bristol	6	0	1	12	13	-	-	-	33
West of Bristol	24	3	4	78	43	11	-	-	162
Other	2	0	-	10	1	-	1	-	14
	177	25	34	459	521	222	327	8	1,774

Figure 4.2c: Potential mode split & origins/destinations– restricted car mode share options

12,000 AM Peak - arrivals

Origin / Destination in…	Car-Driver	Car-Pass	M-cycle	Train	Bus	Bicycle	On Foot	Other	
INITIAL									
Bristol City Centre	82	13	4	17	41	47	318	27	549
Clifton & Redland	163	23	5	13	60	112	293	-	670
North Bristol (inc Bradley Stoke)	357	53	23	54	173	79	41	-	780
East Bristol (inc Kingswood)	443	83	30	26	280	114	54	-	1,030
South Bristol	344	78	22	6	273	122	171	-	1,016
Bath & Kenysham	79	6	5	187	35	5	-	-	317
South Wales	74	9	1	133	7	-	-	-	224
Weston-super-Mare & Yatton	133	16	6	146	25	-	-	-	326
North of Bristol	232	21	9	69	32	4	-	-	366
East of Bristol	74	2	1	158	-	-	-	-	236
South of Bristol	79	5	3	17	10	-	-	-	115
West of Bristol	327	35	12	132	51	14	-	-	572
Other	26	2	-	18	3	-	3	-	51
	2,414	347	121	977	989	497	880	27	6,251
OPTION 1 - max 30% car driver									
Bristol City Centre	63	10	4	18	43	50	334	27	549
Clifton & Redland	127	18	5	14	66	122	319	-	670
North Bristol (inc Bradley Stoke)	278	41	23	70	220	98	50	-	780
East Bristol (inc Kingswood)	344	64	30	33	354	140	64	-	1,030
South Bristol	268	60	22	6	329	139	192	-	1,016
Bath & Kenysham	62	5	5	200	40	6	-	-	317
South Wales	57	7	1	150	8	-	-	-	224
Weston-super-Mare & Yatton	103	13	6	175	30	-	-	-	326
North of Bristol	180	16	9	105	49	6	-	-	366
East of Bristol	58	2	1	175	-	-	-	-	236
South of Bristol	61	4	3	25	21	-	-	-	115
West of Bristol	254	27	12	175	81	22	-	-	572
Other	20	1	-	23	3	-	3	-	51
	1,875	269	121	1,170	1,244	583	962	27	6,251
OPTION 2 - max 25% car driver									
Bristol City Centre	53	9	4	18	44	51	343	27	549
Clifton & Redland	106	15	5	15	69	127	334	-	670
North Bristol (inc Bradley Stoke)	231	34	23	79	247	110	56	-	780
East Bristol (inc Kingswood)	287	54	30	37	398	155	69	-	1,030
South Bristol	223	50	22	7	361	149	204	-	1,016
Bath & Kenysham	51	4	5	207	44	6	-	-	317
South Wales	48	6	1	161	8	-	-	-	224
Weston-super-Mare & Yatton	86	11	6	191	32	-	-	-	326
North of Bristol	150	14	9	126	60	8	-	-	366
East of Bristol	48	1	1	185	-	-	-	-	236
South of Bristol	51	3	3	30	28	-	-	-	115
West of Bristol	212	23	12	200	98	26	-	-	572
Other	17	1	-	26	4	-	4	-	51
	1,563	224	121	1,282	1,392	632	1,010	27	6,251
OPTION 3 - max 20% car driver									
Bristol City Centre	42	7	4	19	45	52	352	27	549
Clifton & Redland	85	12	5	15	72	132	349	-	670
North Bristol (inc Bradley Stoke)	185	27	23	88	274	121	61	-	780
East Bristol (inc Kingswood)	229	43	30	41	441	171	75	-	1,030
South Bristol	178	40	22	7	394	159	216	-	1,016
Bath & Kenysham	41	3	5	214	47	7	-	-	317
South Wales	38	5	1	171	9	-	-	-	224
Weston-super-Mare & Yatton	69	9	6	208	35	-	-	-	326
North of Bristol	120	11	9	148	70	9	-	-	366
East of Bristol	39	1	1	195	-	-	-	-	236
South of Bristol	41	3	3	34	34	-	-	-	115
West of Bristol	170	18	12	225	116	31	-	-	572
Other	13	1	-	28	4	-	4	-	51
	1,250	180	121	1,394	1,540	682	1,057	27	6,251
OPTION 4 - max 15% car driver									
Bristol City Centre	32	5	4	19	46	54	362	27	549
Clifton & Redland	63	9	5	16	75	138	364	-	670
North Bristol (inc Bradley Stoke)	139	20	23	98	302	132	66	-	780
East Bristol (inc Kingswood)	172	32	30	44	485	186	80	-	1,030
South Bristol	134	30	22	8	426	169	228	-	1,016
Bath & Kenysham	31	2	5	222	50	7	-	-	317
South Wales	29	4	1	181	9	-	-	-	224
Weston-super-Mare & Yatton	52	6	6	224	38	-	-	-	326
North of Bristol	90	8	9	169	80	11	-	-	366
East of Bristol	29	1	1	205	-	-	-	-	236
South of Bristol	31	2	3	39	41	-	-	-	115
West of Bristol	127	14	12	250	133	35	-	-	572
Other	10	1	-	31	5	-	5	-	51
	938	135	121	1,506	1,688	732	1,105	27	6,251
OPTION 5 - max 10% car driver									
Bristol City Centre	21	3	4	20	47	55	371	27	549
Clifton & Redland	42	6	5	17	78	143	379	-	670
North Bristol (inc Bradley Stoke)	93	14	23	107	329	144	72	-	780
East Bristol (inc Kingswood)	115	21	30	48	528	201	86	-	1,030
South Bristol	89	20	22	8	458	179	240	-	1,016
Bath & Kenysham	21	2	5	229	53	7	-	-	317
South Wales	19	2	1	192	10	-	-	-	224
Weston-super-Mare & Yatton	34	4	6	241	41	-	-	-	326
North of Bristol	60	5	9	190	90	12	-	-	366
East of Bristol	19	1	1	215	-	-	-	-	236
South of Bristol	20	1	3	43	47	-	-	-	115
West of Bristol	85	9	12	275	150	40	-	-	572
Other	7	0	-	34	5	-	5	-	51
	625	90	121	1,618	1,837	781	1,153	27	6,251

Figure 4.2d: Potential mode split & origins/destinations– restricted car mode share options

12,000 PM Peak - departures

Origin / Destination in…	Car-Driver	Car-Pass	M-cycle	Train	Bus	Bicycle	On Foot	Other	
INITIAL									
Bristol City Centre	69	11	4	15	35	40	271	23	468
Clifton & Redland	139	19	4	11	51	96	250	-	570
North Bristol (inc Bradley Stoke)	304	45	19	46	147	67	35	-	664
East Bristol (inc Kingswood)	377	70	26	22	238	97	46	-	876
South Bristol	293	66	19	5	233	104	145	-	865
Bath & Kenysham	67	5	4	159	30	4	-	-	270
South Wales	63	8	1	113	6	-	-	-	191
Weston-super-Mare & Yatton	113	14	5	125	21	-	-	-	278
North of Bristol	197	18	7	59	27	3	-	-	312
East of Bristol	63	2	1	135	-	-	-	-	201
South of Bristol	67	5	3	15	9	-	-	-	98
West of Bristol	279	30	11	112	43	12	-	-	487
Other	22	1	-	15	2	-	2	-	43
	2,055	295	103	831	842	423	749	23	5,321
OPTION 1 - max 30% car driver									
Bristol City Centre	54	9	4	15	36	42	284	23	468
Clifton & Redland	108	15	4	12	56	103	272	-	570
North Bristol (inc Bradley Stoke)	236	35	19	60	187	84	43	-	664
East Bristol (inc Kingswood)	293	55	26	28	302	119	54	-	876
South Bristol	228	51	19	6	280	118	163	-	865
Bath & Kenysham	52	4	4	170	34	5	-	-	270
South Wales	49	6	1	128	6	-	-	-	191
Weston-super-Mare & Yatton	88	11	5	149	25	-	-	-	278
North of Bristol	153	14	7	90	42	5	-	-	312
East of Bristol	49	1	1	149	-	-	-	-	201
South of Bristol	52	4	3	21	18	-	-	-	98
West of Bristol	216	23	11	149	69	19	-	-	487
Other	17	1	-	19	3	-	3	-	43
	1,596	229	103	996	1,059	496	819	23	5,321
OPTION 2 - max 25% car driver									
Bristol City Centre	45	7	4	16	37	43	292	23	468
Clifton & Redland	90	13	4	12	58	108	285	-	570
North Bristol (inc Bradley Stoke)	197	29	19	67	210	93	47	-	664
East Bristol (inc Kingswood)	244	46	26	31	339	132	59	-	876
South Bristol	190	43	19	6	308	127	173	-	865
Bath & Kenysham	44	4	4	176	37	5	-	-	270
South Wales	41	5	1	137	7	-	-	-	191
Weston-super-Mare & Yatton	73	9	5	163	28	-	-	-	278
North of Bristol	128	12	7	108	51	7	-	-	312
East of Bristol	41	1	1	158	-	-	-	-	201
South of Bristol	43	3	3	25	24	-	-	-	98
West of Bristol	180	19	11	170	83	22	-	-	487
Other	14	1	-	22	3	-	3	-	43
	1,330	191	103	1,091	1,185	538	859	23	5,321
OPTION 3 - max 20% car driver									
Bristol City Centre	36	6	4	16	38	45	300	23	468
Clifton & Redland	72	10	4	13	61	113	297	-	570
North Bristol (inc Bradley Stoke)	158	23	19	75	234	103	52	-	664
East Bristol (inc Kingswood)	195	36	26	35	376	145	64	-	876
South Bristol	152	34	19	6	335	135	184	-	865
Bath & Kenysham	35	3	4	182	40	6	-	-	270
South Wales	33	4	1	146	7	-	-	-	191
Weston-super-Mare & Yatton	59	7	5	177	30	-	-	-	278
North of Bristol	102	9	7	126	60	8	-	-	312
East of Bristol	33	1	1	166	-	-	-	-	201
South of Bristol	35	2	3	29	29	-	-	-	98
West of Bristol	144	16	11	192	98	26	-	-	487
Other	11	1	-	24	4	-	4	-	43
	1,064	153	103	1,187	1,311	580	900	23	5,321
OPTION 4 - max 15% car driver									
Bristol City Centre	27	4	4	17	39	46	308	23	468
Clifton & Redland	54	8	4	14	63	117	310	-	570
North Bristol (inc Bradley Stoke)	118	17	19	83	257	113	57	-	664
East Bristol (inc Kingswood)	146	27	26	38	413	158	68	-	876
South Bristol	114	26	19	7	362	144	194	-	865
Bath & Kenysham	26	2	4	189	43	6	-	-	270
South Wales	24	3	1	154	8	-	-	-	191
Weston-super-Mare & Yatton	44	5	5	191	32	-	-	-	278
North of Bristol	77	7	7	143	68	9	-	-	312
East of Bristol	25	1	1	174	-	-	-	-	201
South of Bristol	26	2	3	33	35	-	-	-	98
West of Bristol	108	12	11	213	113	30	-	-	487
Other	9	1	-	26	4	-	4	-	43
	798	115	103	1,282	1,437	623	941	23	5,321
OPTION 5 - max 10% car driver									
Bristol City Centre	18	3	4	17	40	47	316	23	468
Clifton & Redland	36	5	4	14	66	122	323	-	570
North Bristol (inc Bradley Stoke)	79	12	19	91	280	122	61	-	664
East Bristol (inc Kingswood)	98	18	26	41	449	171	73	-	876
South Bristol	76	17	19	7	390	152	204	-	865
Bath & Kenysham	17	1	4	195	45	6	-	-	270
South Wales	16	2	1	163	8	-	-	-	191
Weston-super-Mare & Yatton	29	4	5	205	35	-	-	-	278
North of Bristol	51	5	7	161	77	11	-	-	312
East of Bristol	16	0	1	183	-	-	-	-	201
South of Bristol	17	1	3	37	40	-	-	-	98
West of Bristol	72	8	11	234	128	34	-	-	487
Other	6	0	-	29	4	-	4	-	43
	532	76	103	1,377	1,563	665	981	23	5,321

Figure 4.2e: Potential mode split & origins/destinations– restricted car mode share options

17,000 AM Peak - arrivals

Origin / Destination in…	Car-Driver	Car-Pass	M-cycle	Train	Bus	Bicycle	On Foot	Other	
INITIAL									
Bristol City Centre	116	19	6	24	58	67	450	38	778
Clifton & Redland	231	32	7	18	85	159	416	-	949
North Bristol (inc Bradley Stoke)	506	75	32	76	245	112	58	-	1,105
East Bristol (inc Kingswood)	628	117	43	37	396	161	76	-	1,459
South Bristol	488	110	31	8	387	173	242	-	1,439
Bath & Kenysham	112	9	7	265	49	7	-	-	449
South Wales	105	13	2	188	10	-	-	-	318
Weston-super-Mare & Yatton	188	23	8	207	35	-	-	-	462
North of Bristol	328	30	12	98	45	5	-	-	519
East of Bristol	106	3	1	224	-	-	-	-	334
South of Bristol	111	8	4	25	15	-	-	-	163
West of Bristol	464	50	18	187	72	20	-	-	810
Other	37	2	-	26	4	-	4	-	72
	3,420	491	171	1,384	1,401	704	1,246	38	8,855
OPTION 1 - max 30% car driver									
Bristol City Centre	90	15	6	25	60	70	473	38	778
Clifton & Redland	180	25	7	20	93	172	452	-	949
North Bristol (inc Bradley Stoke)	393	58	32	99	312	139	71	-	1,105
East Bristol (inc Kingswood)	488	91	43	47	502	199	90	-	1,459
South Bristol	379	85	31	9	466	197	271	-	1,439
Bath & Kenysham	87	7	7	283	57	8	-	-	449
South Wales	81	10	2	213	11	-	-	-	318
Weston-super-Mare & Yatton	146	18	8	248	42	-	-	-	462
North of Bristol	255	23	12	149	70	9	-	-	519
East of Bristol	82	2	1	248	-	-	-	-	334
South of Bristol	87	6	4	36	30	-	-	-	163
West of Bristol	360	39	18	248	114	31	-	-	810
Other	29	2	-	32	5	-	5	-	72
	2,657	382	171	1,657	1,763	825	1,363	38	8,855
OPTION 2 - max 25% car driver									
Bristol City Centre	75	12	6	26	62	72	486	38	778
Clifton & Redland	150	21	7	21	97	180	474	-	949
North Bristol (inc Bradley Stoke)	328	48	32	112	350	155	79	-	1,105
East Bristol (inc Kingswood)	406	76	43	52	564	220	98	-	1,459
South Bristol	316	71	31	10	512	211	288	-	1,439
Bath & Kenysham	73	6	7	293	62	9	-	-	449
South Wales	68	8	2	228	12	-	-	-	318
Weston-super-Mare & Yatton	122	15	8	271	46	-	-	-	462
North of Bristol	213	19	12	179	85	11	-	-	519
East of Bristol	68	2	1	262	-	-	-	-	334
South of Bristol	72	5	4	42	39	-	-	-	163
West of Bristol	300	32	18	283	139	37	-	-	810
Other	24	1	-	36	5	-	6	-	72
	2,214	318	171	1,816	1,972	896	1,430	38	8,855
OPTION 3 - max 20% car driver									
Bristol City Centre	60	10	6	27	64	74	499	38	778
Clifton & Redland	120	17	7	22	101	188	495	-	949
North Bristol (inc Bradley Stoke)	262	39	32	125	389	171	86	-	1,105
East Bristol (inc Kingswood)	325	61	43	58	625	242	106	-	1,459
South Bristol	253	57	31	10	558	225	305	-	1,439
Bath & Kenysham	58	5	7	304	66	9	-	-	449
South Wales	54	7	2	242	12	-	-	-	318
Weston-super-Mare & Yatton	98	12	8	295	50	-	-	-	462
North of Bristol	170	16	12	209	99	13	-	-	519
East of Bristol	55	2	1	276	-	-	-	-	334
South of Bristol	58	4	4	48	48	-	-	-	163
West of Bristol	240	26	18	319	164	44	-	-	810
Other	19	1	-	40	6	-	6	-	72
	1,771	254	171	1,975	2,182	966	1,498	38	8,855
OPTION 4 - max 15% car driver									
Bristol City Centre	45	7	6	27	65	76	512	38	778
Clifton & Redland	90	13	7	23	106	195	516	-	949
North Bristol (inc Bradley Stoke)	197	29	32	138	427	187	94	-	1,105
East Bristol (inc Kingswood)	244	45	43	63	687	263	114	-	1,459
South Bristol	190	43	31	11	603	239	322	-	1,439
Bath & Kenysham	44	4	7	314	71	10	-	-	449
South Wales	41	5	2	257	13	-	-	-	318
Weston-super-Mare & Yatton	73	9	8	318	54	-	-	-	462
North of Bristol	128	12	12	239	114	15	-	-	519
East of Bristol	41	1	1	290	-	-	-	-	334
South of Bristol	43	3	4	55	57	-	-	-	163
West of Bristol	180	19	18	354	188	50	-	-	810
Other	14	1	-	44	7	-	7	-	72
	1,328	191	171	2,133	2,392	1,036	1,565	38	8,855
OPTION 5 - max 10% car driver									
Bristol City Centre	30	5	6	28	67	78	525	38	778
Clifton & Redland	60	8	7	24	110	203	537	-	949
North Bristol (inc Bradley Stoke)	131	19	32	151	466	203	102	-	1,105
East Bristol (inc Kingswood)	163	30	43	68	748	285	122	-	1,459
South Bristol	126	28	31	12	649	253	339	-	1,439
Bath & Kenysham	29	2	7	325	76	11	-	-	449
South Wales	27	3	2	271	14	-	-	-	318
Weston-super-Mare & Yatton	49	6	8	341	58	-	-	-	462
North of Bristol	85	8	12	269	128	17	-	-	519
East of Bristol	27	1	1	304	-	-	-	-	334
South of Bristol	29	2	4	61	66	-	-	-	163
West of Bristol	120	13	18	389	213	57	-	-	810
Other	10	1	-	48	7	-	7	-	72
	886	127	171	2,292	2,602	1,107	1,633	38	8,855

Figure 4.2f: Potential mode split & origins/destinations– restricted car mode share options

17,000 PM Peak - departures

Origin / Destination in…	Car-Driver	Car-Pass	M-cycle	Train	Bus	Bicycle	On Foot	Other	
INITIAL									
Bristol City Centre	98	16	5	21	49	57	383	32	662
Clifton & Redland	197	28	6	15	73	135	354	-	808
North Bristol (inc Bradley Stoke)	431	64	27	65	209	95	49	-	941
East Bristol (inc Kingswood)	534	100	36	32	337	137	65	-	1,242
South Bristol	415	93	26	7	330	147	206	-	1,225
Bath & Kenysham	96	8	6	225	42	6	-	-	382
South Wales	89	11	2	160	8	-	-	-	270
Weston-super-Mare & Yatton	160	20	7	176	30	-	-	-	393
North of Bristol	279	26	10	84	38	4	-	-	442
East of Bristol	90	3	1	191	-	-	-	-	284
South of Bristol	95	6	4	21	13	-	-	-	138
West of Bristol	395	43	15	159	61	17	-	-	689
Other	31	2	-	22	3	-	3	-	62
	2,911	418	146	1,178	1,193	599	1,061	32	7,538
OPTION 1 - max 30% car driver									
Bristol City Centre	76	13	5	22	51	60	403	32	662
Clifton & Redland	153	21	6	17	79	147	385	-	808
North Bristol (inc Bradley Stoke)	335	49	27	84	265	119	60	-	941
East Bristol (inc Kingswood)	415	77	36	40	427	169	77	-	1,242
South Bristol	323	73	26	8	397	168	231	-	1,225
Bath & Kenysham	74	6	6	241	49	7	-	-	382
South Wales	69	9	2	181	9	-	-	-	270
Weston-super-Mare & Yatton	125	15	7	211	36	-	-	-	393
North of Bristol	217	20	10	127	60	8	-	-	442
East of Bristol	70	2	1	211	-	-	-	-	284
South of Bristol	74	5	4	30	26	-	-	-	138
West of Bristol	307	33	15	211	97	26	-	-	689
Other	24	1	-	28	4	-	4	-	62
	2,261	325	146	1,411	1,500	703	1,160	32	7,538
OPTION 2 - max 25% car driver									
Bristol City Centre	64	11	5	22	53	61	414	32	662
Clifton & Redland	127	18	6	18	83	153	403	-	808
North Bristol (inc Bradley Stoke)	279	41	27	95	298	132	67	-	941
East Bristol (inc Kingswood)	346	65	36	44	480	187	83	-	1,242
South Bristol	269	61	26	8	436	179	246	-	1,225
Bath & Kenysham	62	5	6	250	53	7	-	-	382
South Wales	58	7	2	194	10	-	-	-	270
Weston-super-Mare & Yatton	104	13	7	231	39	-	-	-	393
North of Bristol	181	17	10	153	72	9	-	-	442
East of Bristol	58	2	1	223	-	-	-	-	284
South of Bristol	61	4	4	36	34	-	-	-	138
West of Bristol	256	28	15	241	118	32	-	-	689
Other	20	1	-	31	5	-	5	-	62
	1,885	271	146	1,546	1,679	762	1,217	32	7,538
OPTION 3 - max 20% car driver									
Bristol City Centre	51	8	5	23	54	63	425	32	662
Clifton & Redland	102	14	6	19	86	160	421	-	808
North Bristol (inc Bradley Stoke)	223	33	27	107	331	146	74	-	941
East Bristol (inc Kingswood)	277	52	36	49	532	206	90	-	1,242
South Bristol	215	48	26	9	475	191	260	-	1,225
Bath & Kenysham	49	4	6	259	57	8	-	-	382
South Wales	46	6	2	206	10	-	-	-	270
Weston-super-Mare & Yatton	83	10	7	251	42	-	-	-	393
North of Bristol	145	13	10	178	84	11	-	-	442
East of Bristol	47	1	1	235	-	-	-	-	284
South of Bristol	49	3	4	41	41	-	-	-	138
West of Bristol	204	22	15	271	139	37	-	-	689
Other	16	1	-	34	5	-	5	-	62
	1,508	217	146	1,681	1,858	822	1,275	32	7,538
OPTION 4 - max 15% car driver									
Bristol City Centre	38	6	5	23	56	65	436	32	662
Clifton & Redland	76	11	6	19	90	166	439	-	808
North Bristol (inc Bradley Stoke)	167	25	27	118	364	159	80	-	941
East Bristol (inc Kingswood)	208	39	36	54	584	224	97	-	1,242
South Bristol	161	36	26	9	513	203	274	-	1,225
Bath & Kenysham	37	3	6	267	61	8	-	-	382
South Wales	35	4	2	219	11	-	-	-	270
Weston-super-Mare & Yatton	62	8	7	271	46	-	-	-	393
North of Bristol	109	10	10	203	97	13	-	-	442
East of Bristol	35	1	1	247	-	-	-	-	284
South of Bristol	37	3	4	47	49	-	-	-	138
West of Bristol	153	17	15	301	160	43	-	-	689
Other	12	1	-	37	6	-	6	-	62
	1,131	162	146	1,816	2,036	882	1,332	32	7,538
OPTION 5 - max 10% car driver									
Bristol City Centre	25	4	5	24	57	66	447	32	662
Clifton & Redland	51	7	6	20	94	173	457	-	808
North Bristol (inc Bradley Stoke)	112	16	27	129	397	173	87	-	941
East Bristol (inc Kingswood)	138	26	36	58	637	242	104	-	1,242
South Bristol	108	24	26	10	552	215	289	-	1,225
Bath & Kenysham	25	2	6	276	64	9	-	-	382
South Wales	23	3	2	231	12	-	-	-	270
Weston-super-Mare & Yatton	42	5	7	291	49	-	-	-	393
North of Bristol	72	7	10	229	109	15	-	-	442
East of Bristol	23	1	1	259	-	-	-	-	284
South of Bristol	25	2	4	52	57	-	-	-	138
West of Bristol	102	11	15	332	181	48	-	-	689
Other	8	0	-	41	6	-	6	-	62
	754	108	146	1,951	2,215	942	1,390	32	7,538

Figure 4.3: Potential mode split with Park & Ride – restricted car mode share options

No. of employees	4,000		12,000		17,000	
Mode / Time Period	AM arrival	PM departure	AM arrival	PM departure	AM arrival	PM departure
INITIAL MODE SPLIT						
Car driver	746	635	2,238	1,905	3,171	2,699
Car pass	109	93	327	278	463	394
M-cycle	40	34	121	103	171	146
Other	9	8	27	23	38	32
P&R - Brislington	33	28	100	85	141	120
P&R - Long Ashton	25	21	76	64	107	91
P&R - Portway	22	19	66	56	93	79
P&R - M32	42	35	125	106	176	150
Bus	315	268	946	805	1,340	1,140
Train	283	241	850	724	1,204	1,025
Bicycle	166	141	497	423	704	599
On foot	293	250	880	749	1,246	1,061
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538
OPTION 1 - max 30% car driver						
Car driver	567	482	1,700	1,447	2,408	2,050
Car pass	83	71	249	212	353	301
M-cycle	40	34	121	103	171	146
Other	9	8	27	23	38	32
P&R - Brislington	38	32	113	97	161	137
P&R - Long Ashton	29	25	88	75	125	107
P&R - Portway	26	22	78	66	110	94
P&R - M32	48	41	144	123	204	174
Bus	393	335	1,180	1,004	1,672	1,423
Train	337	287	1,011	860	1,432	1,219
Bicycle	193	164	579	493	820	698
On foot	320	273	961	818	1,362	1,159
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538
OPTION 2 - max 25% car driver						
Car driver	462	394	1,387	1,181	1,965	1,673
Car pass	68	58	205	174	290	247
M-cycle	40	34	121	103	171	146
Other	9	8	27	23	38	32
P&R - Brislington	40	34	121	103	172	146
P&R - Long Ashton	32	27	96	82	136	116
P&R - Portway	28	24	85	72	120	102
P&R - M32	52	44	155	132	220	187
Bus	439	373	1,316	1,120	1,864	1,587
Train	368	313	1,104	939	1,564	1,331
Bicycle	209	178	626	533	887	755
On foot	336	286	1,008	858	1,428	1,216
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538
OPTION 3 - max 20% car driver						
Car driver	358	305	1,075	915	1,522	1,296
Car pass	53	45	160	136	226	193
M-cycle	40	34	121	103	171	146
Other	9	8	27	23	38	32
P&R - Brislington	43	37	129	110	183	156
P&R - Long Ashton	34	29	103	88	146	125
P&R - Portway	31	26	92	78	130	111
P&R - M32	56	47	167	142	236	201
Bus	484	412	1,452	1,236	2,057	1,751
Train	399	340	1,197	1,019	1,695	1,443
Bicycle	224	191	673	573	954	812
On foot	352	299	1,055	898	1,495	1,273
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538
OPTION 4 - max 15% car driver						
Car driver	254	216	762	649	1,080	919
Car pass	38	33	115	98	163	138
M-cycle	40	34	121	103	171	146
Other	9	8	27	23	38	32
P&R - Brislington	46	39	137	117	194	165
P&R - Long Ashton	37	31	111	94	157	134
P&R - Portway	33	28	99	84	140	120
P&R - M32	59	50	178	151	252	214
Bus	529	451	1,588	1,352	2,250	1,915
Train	430	366	1,290	1,098	1,827	1,556
Bicycle	240	205	721	614	1,021	869
On foot	368	313	1,103	939	1,562	1,330
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538
OPTION 5 - max 10% car driver						
Car driver	150	128	449	383	637	542
Car pass	23	20	70	59	99	84
M-cycle	40	34	121	103	171	146
Other	9	8	27	23	38	32
P&R - Brislington	48	41	145	124	206	175
P&R - Long Ashton	39	34	118	101	168	143
P&R - Portway	35	30	106	90	151	128
P&R - M32	63	54	189	161	268	228
Bus	575	489	1,724	1,467	2,442	2,079
Train	461	392	1,383	1,177	1,959	1,668
Bicycle	256	218	768	654	1,088	926
On foot	383	326	1,150	979	1,629	1,387
Total (excl work at home)	2,084	1,774	6,251	5,321	8,855	7,538

Figure 4.4a: Potential Park & Ride use – restricted car mode share options

4,000 AM Peak - arrivals

Origin / Destination in…	Car driver	Car pass	M-cycle	Other	P&R-Bri	P&R-LoA	P&R-Pow	P&R-M32	Bus	Train	Bicycle	On foot	
INITIAL MODE SPLIT													
Bristol City Centre	27	4	1	9	-	-	-	-	14	6	16	106	183
Clifton & Redland	54	8	2	-	-	-	-	-	20	4	37	98	223
North Bristol (inc Bradley Stoke)	114	17	8	-	-	-	4	6	55	16	26	14	260
East Bristol (inc Kingswood)	144	27	10	-	6	-	-	-	91	9	38	18	343
South Bristol	111	25	7	-	7	-	-	-	88	2	41	57	339
Bath & Kenysham	22	2	2	-	15	-	-	-	10	53	2	-	106
South Wales	21	3	0	-	-	-	-	11	2	38	-	-	75
Weston-super-Mare & Yatton	38	5	2	-	-	11	5	-	7	41	-	-	109
North of Bristol	67	6	3	-	-	-	-	15	9	20	1	-	122
East of Bristol	21	1	0	-	2	-	-	9	-	45	-	-	79
South of Bristol	23	2	1	-	3	1	-	-	3	5	-	-	38
West of Bristol	93	10	4	-	-	13	13	-	14	38	5	-	191
Other	*9*	*1*	-	-	-	-	-	-	*1*	*6*	-	*1*	17
	746	109	40	9	33	25	22	42	315	283	166	293	2,084
OPTION 1 - max 30% car driver													
Bristol City Centre	21	3	1	9	-	-	-	-	14	6	17	111	183
Clifton & Redland	42	6	2	-	-	-	-	-	22	5	41	106	223
North Bristol (inc Bradley Stoke)	87	13	8	-	-	-	4	7	70	21	33	17	260
East Bristol (inc Kingswood)	111	21	10	-	7	-	-	-	115	11	47	21	343
South Bristol	86	19	7	-	8	-	-	-	106	2	46	64	339
Bath & Kenysham	17	1	2	-	17	-	-	-	11	56	2	-	106
South Wales	15	2	0	-	-	-	-	12	2	42	-	-	75
Weston-super-Mare & Yatton	28	3	2	-	-	12	6	-	8	49	-	-	109
North of Bristol	50	5	3	-	-	-	-	18	14	30	2	-	122
East of Bristol	16	0	0	-	2	-	-	10	-	50	-	-	79
South of Bristol	17	1	1	-	4	2	-	-	6	7	-	-	38
West of Bristol	69	7	4	-	-	16	16	-	22	50	7	-	191
Other	*7*	*0*	-	-	-	-	-	-	*1*	*8*	-	*1*	17
	567	83	40	9	38	29	26	48	393	337	193	320	2,084
OPTION 2 - max 25% car driver													
Bristol City Centre	18	3	1	9	-	-	-	-	15	6	17	114	183
Clifton & Redland	35	5	2	-	-	-	-	-	23	5	42	111	223
North Bristol (inc Bradley Stoke)	72	11	8	-	-	-	5	8	79	24	36	18	260
East Bristol (inc Kingswood)	92	17	10	-	8	-	-	-	129	12	51	23	343
South Bristol	71	16	7	-	9	-	-	-	116	2	49	68	339
Bath & Kenysham	13	1	2	-	17	-	-	-	12	58	2	-	106
South Wales	12	2	0	-	-	-	-	13	2	45	-	-	75
Weston-super-Mare & Yatton	22	3	2	-	-	13	6	-	9	53	-	-	109
North of Bristol	40	4	3	-	-	-	-	20	17	36	2	-	122
East of Bristol	13	0	0	-	2	-	-	11	-	53	-	-	79
South of Bristol	14	1	1	-	5	2	-	-	8	9	-	-	38
West of Bristol	55	6	4	-	-	17	17	-	27	56	8	-	191
Other	*6*	*0*	-	-	-	-	-	-	*1*	*9*	-	*1*	17
	462	68	40	9	40	32	28	52	439	368	209	336	2,084
OPTION 3 - max 20% car driver													
Bristol City Centre	14	2	1	9	-	-	-	-	15	6	17	117	183
Clifton & Redland	28	4	2	-	-	-	-	-	24	5	44	116	223
North Bristol (inc Bradley Stoke)	57	8	8	-	-	-	5	8	87	27	40	20	260
East Bristol (inc Kingswood)	73	14	10	-	8	-	-	-	143	13	56	25	343
South Bristol	56	13	7	-	10	-	-	-	127	2	53	71	339
Bath & Kenysham	10	1	2	-	18	-	-	-	13	60	2	-	106
South Wales	9	1	0	-	-	-	-	14	2	48	-	-	75
Weston-super-Mare & Yatton	16	2	2	-	-	14	7	-	10	58	-	-	109
North of Bristol	30	3	3	-	-	-	-	22	20	41	3	-	122
East of Bristol	9	0	0	-	2	-	-	11	-	55	-	-	79
South of Bristol	10	1	1	-	5	2	-	-	9	10	-	-	38
West of Bristol	41	4	4	-	-	18	19	-	32	63	9	-	191
Other	*4*	*0*	-	-	-	-	-	-	*1*	*9*	-	*1*	17
	358	53	40	9	43	34	31	56	484	399	224	352	2,084
OPTION 4 - max 15% car driver													
Bristol City Centre	11	2	1	9	-	-	-	-	15	6	18	121	183
Clifton & Redland	21	3	2	-	-	-	-	-	25	5	46	121	223
North Bristol (inc Bradley Stoke)	41	6	8	-	-	-	5	9	96	29	43	22	260
East Bristol (inc Kingswood)	54	10	10	-	9	-	-	-	157	14	61	27	343
South Bristol	41	9	7	-	10	-	-	-	137	3	56	75	339
Bath & Kenysham	6	1	2	-	19	-	-	-	14	62	2	-	106
South Wales	6	1	0	-	-	-	-	15	3	51	-	-	75
Weston-super-Mare & Yatton	11	1	2	-	-	15	7	-	11	62	-	-	109
North of Bristol	20	2	3	-	-	-	-	24	23	47	3	-	122
East of Bristol	6	0	0	-	2	-	-	12	-	58	-	-	79
South of Bristol	7	0	1	-	5	2	-	-	11	11	-	-	38
West of Bristol	27	3	4	-	-	20	21	-	36	70	10	-	191
Other	*3*	*0*	-	-	-	-	-	-	*2*	*10*	-	*2*	17
	254	38	40	9	46	37	33	59	529	430	240	368	2,084
OPTION 5 - max 10% car driver													
Bristol City Centre	7	1	1	9	-	-	-	-	16	7	18	124	183
Clifton & Redland	14	2	2	-	-	-	-	-	26	6	48	126	223
North Bristol (inc Bradley Stoke)	26	4	8	-	-	-	6	10	104	32	47	24	260
East Bristol (inc Kingswood)	35	7	10	-	10	-	-	-	171	16	66	29	343
South Bristol	26	6	7	-	11	-	-	-	147	3	59	79	339
Bath & Kenysham	3	0	2	-	20	-	-	-	15	64	2	-	106
South Wales	3	0	0	-	-	-	-	15	3	53	-	-	75
Weston-super-Mare & Yatton	5	1	2	-	-	16	7	-	11	67	-	-	109
North of Bristol	10	1	3	-	-	-	-	26	26	53	4	-	122
East of Bristol	3	0	0	-	2	-	-	12	-	61	-	-	79
South of Bristol	3	0	1	-	6	2	-	-	13	13	-	-	38
West of Bristol	13	1	4	-	-	21	22	-	41	77	12	-	191
Other	*2*	*0*	-	-	-	-	-	-	*2*	*11*	-	*2*	17
	150	23	40	9	48	39	35	63	575	461	256	383	2,084

Figure 4.4b: Potential Park & Ride use – restricted car mode share options

4,000 PM Peak - departures

Origin / Destination in…	Car driver	Car pass	M-cycle	Other	P&R-Bri	P&R-LoA	P&R-Pow	P&R-M32	Bus	Train	Bicycle	On foot	
INITIAL MODE SPLIT													
Bristol City Centre	23	4	1	8	-	-	-	-	12	5	13	90	156
Clifton & Redland	46	6	1	-	-	-	-	-	17	4	32	83	190
North Bristol (inc Bradley Stoke)	97	14	6	-	-	-	3	5	47	14	22	12	221
East Bristol (inc Kingswood)	123	23	9	-	5	-	-	-	78	7	32	15	292
South Bristol	95	21	6	-	6	-	-	-	75	2	35	48	288
Bath & Kenysham	19	2	1	-	13	-	-	-	8	45	1	-	90
South Wales	18	2	0	-	-	-	-	9	2	32	-	-	64
Weston-super-Mare & Yatton	32	4	2	-	-	9	4	-	6	35	-	-	93
North of Bristol	57	5	2	-	-	-	-	13	8	17	1	-	104
East of Bristol	18	1	0	-	1	-	-	8	-	39	-	-	67
South of Bristol	19	1	1	-	3	1	-	-	3	4	-	-	33
West of Bristol	79	9	4	-	-	11	11	-	12	32	4	-	162
Other	*7*	*0*	-	-	-	-	-	-	*1*	*5*	-	*1*	14
	635	93	34	8	28	21	19	35	268	241	141	250	1,774
OPTION 1 - max 30% car driver													
Bristol City Centre	18	3	1	8	-	-	-	-	12	5	14	95	156
Clifton & Redland	36	5	1	-	-	-	-	-	19	4	34	91	190
North Bristol (inc Bradley Stoke)	74	11	6	-	-	-	4	6	60	18	28	14	221
East Bristol (inc Kingswood)	95	18	9	-	6	-	-	-	98	9	40	18	292
South Bristol	73	16	6	-	7	-	-	-	90	2	39	54	288
Bath & Kenysham	14	1	1	-	14	-	-	-	10	48	2	-	90
South Wales	13	2	0	-	-	-	-	11	2	36	-	-	64
Weston-super-Mare & Yatton	24	3	2	-	-	10	5	-	7	42	-	-	93
North of Bristol	43	4	2	-	-	-	-	16	12	25	2	-	104
East of Bristol	13	0	0	-	2	-	-	9	-	42	-	-	67
South of Bristol	14	1	1	-	4	1	-	-	5	6	-	-	33
West of Bristol	59	6	4	-	-	13	13	-	19	42	6	-	162
Other	*6*	*0*	-	-	-	-	-	-	*1*	*6*	-	*1*	14
	482	71	34	8	32	25	22	41	335	287	164	273	1,774
OPTION 2 - max 25% car driver													
Bristol City Centre	15	2	1	8	-	-	-	-	12	5	14	97	156
Clifton & Redland	30	4	1	-	-	-	-	-	19	4	36	95	190
North Bristol (inc Bradley Stoke)	61	9	6	-	-	-	4	7	67	20	31	16	221
East Bristol (inc Kingswood)	79	15	9	-	7	-	-	-	110	10	44	20	292
South Bristol	60	14	6	-	8	-	-	-	99	2	42	58	288
Bath & Kenysham	11	1	1	-	15	-	-	-	10	50	2	-	90
South Wales	10	1	0	-	-	-	-	11	2	38	-	-	64
Weston-super-Mare & Yatton	19	2	2	-	-	11	5	-	8	46	-	-	93
North of Bristol	34	3	2	-	-	-	-	17	15	30	2	-	104
East of Bristol	11	0	0	-	2	-	-	9	-	45	-	-	67
South of Bristol	12	1	1	-	4	2	-	-	7	7	-	-	33
West of Bristol	47	5	4	-	-	14	15	-	23	48	7	-	162
Other	*5*	*0*	-	-	-	-	-	-	*1*	*7*	-	*1*	14
	394	58	34	8	34	27	24	44	373	313	178	286	1,774
OPTION 3 - max 20% car driver													
Bristol City Centre	12	2	1	8	-	-	-	-	13	5	15	100	156
Clifton & Redland	24	3	1	-	-	-	-	-	20	4	38	99	190
North Bristol (inc Bradley Stoke)	48	7	6	-	-	-	4	7	74	23	34	17	221
East Bristol (inc Kingswood)	62	12	9	-	7	-	-	-	122	11	48	21	292
South Bristol	48	11	6	-	8	-	-	-	108	2	45	61	288
Bath & Kenysham	8	1	1	-	15	-	-	-	11	51	2	-	90
South Wales	8	1	0	-	-	-	-	12	2	41	-	-	64
Weston-super-Mare & Yatton	14	2	2	-	-	12	6	-	8	49	-	-	93
North of Bristol	26	2	2	-	-	-	-	19	17	35	2	-	104
East of Bristol	8	0	0	-	2	-	-	10	-	47	-	-	67
South of Bristol	9	1	1	-	4	2	-	-	8	9	-	-	33
West of Bristol	35	4	4	-	-	16	16	-	27	54	8	-	162
Other	*4*	*0*	-	-	-	-	-	-	*1*	*8*	-	*1*	14
	305	45	34	8	37	29	26	47	412	340	191	299	1,774
OPTION 4 - max 15% car driver													
Bristol City Centre	9	1	1	8	-	-	-	-	13	6	15	103	156
Clifton & Redland	18	3	1	-	-	-	-	-	21	5	39	103	190
North Bristol (inc Bradley Stoke)	35	5	6	-	-	-	5	8	82	25	37	19	221
East Bristol (inc Kingswood)	46	9	9	-	8	-	-	-	134	12	52	23	292
South Bristol	35	8	6	-	9	-	-	-	116	2	47	64	288
Bath & Kenysham	5	0	1	-	16	-	-	-	12	53	2	-	90
South Wales	5	1	0	-	-	-	-	12	2	43	-	-	64
Weston-super-Mare & Yatton	9	1	2	-	-	13	6	-	9	53	-	-	93
North of Bristol	17	2	2	-	-	-	-	20	20	40	3	-	104
East of Bristol	5	0	0	-	2	-	-	10	-	49	-	-	67
South of Bristol	6	0	1	-	5	2	-	-	9	10	-	-	33
West of Bristol	23	2	4	-	-	17	18	-	31	59	9	-	162
Other	*3*	*0*	-	-	-	-	-	-	*1*	*9*	-	*1*	14
	216	33	34	8	39	31	28	50	451	366	205	313	1,774
OPTION 5 - max 10% car driver													
Bristol City Centre	6	1	1	8	-	-	-	-	13	6	16	105	156
Clifton & Redland	12	2	1	-	-	-	-	-	22	5	41	108	190
North Bristol (inc Bradley Stoke)	22	3	6	-	-	-	5	8	89	27	40	20	221
East Bristol (inc Kingswood)	30	6	9	-	8	-	-	-	146	13	56	24	292
South Bristol	22	5	6	-	9	-	-	-	125	2	50	67	288
Bath & Kenysham	2	0	1	-	17	-	-	-	13	55	2	-	90
South Wales	2	0	0	-	-	-	-	13	2	45	-	-	64
Weston-super-Mare & Yatton	4	1	2	-	-	14	6	-	10	57	-	-	93
North of Bristol	9	1	2	-	-	-	-	22	22	45	3	-	104
East of Bristol	2	0	0	-	2	-	-	11	-	52	-	-	67
South of Bristol	3	0	1	-	5	2	-	-	11	11	-	-	33
West of Bristol	11	1	4	-	-	18	19	-	35	65	10	-	162
Other	*2*	*0*	-	-	-	-	-	-	*1*	*10*	-	*1*	14
	128	20	34	8	41	34	30	54	489	392	218	326	1,774

Figure 4.4c: Potential Park & Ride use – restricted car mode share options

12,000 AM Peak - arrivals

Origin / Destination in…	Car driver	Car pass	M-cycle	Other	P&R-Bri	P&R-LoA	P&R-Pow	P&R-M32	Bus	Train	Bicycle	On foot	
INITIAL MODE SPLIT													
Bristol City Centre	82	13	4	27	-	-	-	-	41	17	47	318	549
Clifton & Redland	163	23	5	-	-	-	-	-	60	13	112	293	670
North Bristol (inc Bradley Stoke)	342	50	23	-	-	-	11	18	166	49	79	41	780
East Bristol (inc Kingswood)	433	81	30	-	18	-	-	-	274	26	114	54	1,030
South Bristol	334	75	22	-	21	-	-	-	265	6	122	171	1,016
Bath & Kenysham	67	5	5	-	46	-	-	-	29	159	5	-	317
South Wales	63	8	1	-	-	-	-	33	6	113	-	-	224
Weston-super-Mare & Yatton	113	14	6	-	-	32	16	-	21	124	-	-	326
North of Bristol	202	19	9	-	-	-	-	45	28	60	4	-	366
East of Bristol	64	2	1	-	5	-	-	28	-	136	-	-	236
South of Bristol	69	5	3	-	10	4	-	-	9	16	-	-	115
West of Bristol	280	30	12	-	-	39	39	-	43	114	14	-	572
Other	*26*	*2*	-	-	-	-	-	-	*3*	*18*	-	*3*	51
	2,238	327	121	27	100	76	66	125	946	850	497	880	6,251
OPTION 1 - max 30% car driver													
Bristol City Centre	63	10	4	27	-	-	-	-	43	18	50	334	549
Clifton & Redland	127	18	5	-	-	-	-	-	66	14	122	319	670
North Bristol (inc Bradley Stoke)	262	39	23	-	-	-	13	21	211	64	98	50	780
East Bristol (inc Kingswood)	334	63	30	-	21	-	-	-	346	32	140	64	1,030
South Bristol	257	58	22	-	24	-	-	-	318	6	138	191	1,016
Bath & Kenysham	50	4	5	-	50	-	-	-	34	169	6	-	317
South Wales	46	6	1	-	-	-	-	37	6	127	-	-	224
Weston-super-Mare & Yatton	83	10	6	-	-	37	18	-	25	147	-	-	326
North of Bristol	150	14	9	-	-	-	-	55	43	90	6	-	366
East of Bristol	47	1	1	-	6	-	-	31	-	150	-	-	236
South of Bristol	51	3	3	-	12	5	-	-	18	22	-	-	115
West of Bristol	207	22	12	-	-	47	47	-	67	149	20	-	572
Other	*20*	*1*	-	-	-	-	-	-	*3*	*23*	-	*3*	51
	1,700	249	121	27	113	88	78	144	1,180	1,011	579	961	6,251
OPTION 2 - max 25% car driver													
Bristol City Centre	53	9	4	27	-	-	-	-	44	18	51	343	549
Clifton & Redland	106	15	5	-	-	-	-	-	69	15	127	334	670
North Bristol (inc Bradley Stoke)	216	32	23	-	-	-	14	23	236	72	109	55	780
East Bristol (inc Kingswood)	277	52	30	-	23	-	-	-	388	36	154	69	1,030
South Bristol	213	48	22	-	26	-	-	-	349	7	148	203	1,016
Bath & Kenysham	39	3	5	-	52	-	-	-	37	175	6	-	317
South Wales	37	5	1	-	-	-	-	39	7	135	-	-	224
Weston-super-Mare & Yatton	66	8	6	-	-	40	19	-	27	160	-	-	326
North of Bristol	120	11	9	-	-	-	-	60	52	107	7	-	366
East of Bristol	38	1	1	-	6	-	-	32	-	158	-	-	236
South of Bristol	41	3	3	-	14	5	-	-	23	26	-	-	115
West of Bristol	165	18	12	-	-	51	52	-	81	169	24	-	572
Other	*17*	*1*	-	-	-	-	-	-	*4*	*26*	-	*4*	51
	1,387	205	121	27	121	96	85	155	1,316	1,104	626	1,008	6,251
OPTION 3 - max 20% car driver													
Bristol City Centre	42	7	4	27	-	-	-	-	45	19	52	352	549
Clifton & Redland	85	12	5	-	-	-	-	-	72	15	132	349	670
North Bristol (inc Bradley Stoke)	170	25	23	-	-	-	15	25	262	80	120	61	780
East Bristol (inc Kingswood)	220	41	30	-	25	-	-	-	430	40	169	75	1,030
South Bristol	168	38	22	-	29	-	-	-	380	7	158	214	1,016
Bath & Kenysham	29	2	5	-	54	-	-	-	39	181	6	-	317
South Wales	27	3	1	-	-	-	-	41	7	143	-	-	224
Weston-super-Mare & Yatton	49	6	6	-	-	42	20	-	29	174	-	-	326
North of Bristol	90	8	9	-	-	-	-	66	60	124	8	-	366
East of Bristol	28	1	1	-	6	-	-	34	-	166	-	-	236
South of Bristol	31	2	3	-	15	6	-	-	28	30	-	-	115
West of Bristol	122	13	12	-	-	55	57	-	95	189	28	-	572
Other	*13*	*1*	-	-	-	-	-	-	*4*	*28*	-	*4*	51
	1,075	160	121	27	129	103	92	167	1,452	1,197	673	1,055	6,251
OPTION 4 - max 15% car driver													
Bristol City Centre	32	5	4	27	-	-	-	-	46	19	54	362	549
Clifton & Redland	63	9	5	-	-	-	-	-	75	16	138	364	670
North Bristol (inc Bradley Stoke)	123	18	23	-	-	-	16	27	288	88	130	66	780
East Bristol (inc Kingswood)	162	30	30	-	27	-	-	-	472	43	184	80	1,030
South Bristol	124	28	22	-	31	-	-	-	411	8	167	226	1,016
Bath & Kenysham	19	2	5	-	57	-	-	-	42	187	7	-	317
South Wales	18	2	1	-	-	-	-	44	8	152	-	-	224
Weston-super-Mare & Yatton	32	4	6	-	-	45	21	-	32	187	-	-	326
North of Bristol	60	6	9	-	-	-	-	71	69	141	10	-	366
East of Bristol	18	1	1	-	6	-	-	35	-	174	-	-	236
South of Bristol	21	1	3	-	16	6	-	-	33	34	-	-	115
West of Bristol	80	9	12	-	-	59	62	-	109	210	31	-	572
Other	*10*	*1*	-	-	-	-	-	-	*5*	*31*	-	*5*	51
	762	115	121	27	137	111	99	178	1,588	1,290	721	1,103	6,251
OPTION 5 - max 10% car driver													
Bristol City Centre	21	3	4	27	-	-	-	-	47	20	55	371	549
Clifton & Redland	42	6	5	-	-	-	-	-	78	17	143	379	670
North Bristol (inc Bradley Stoke)	77	11	23	-	-	-	17	29	313	97	141	71	780
East Bristol (inc Kingswood)	105	20	30	-	29	-	-	-	514	47	199	86	1,030
South Bristol	79	18	22	-	33	-	-	-	441	8	177	238	1,016
Bath & Kenysham	9	1	5	-	59	-	-	-	44	193	7	-	317
South Wales	8	1	1	-	-	-	-	46	8	160	-	-	224
Weston-super-Mare & Yatton	14	2	6	-	-	48	22	-	34	200	-	-	326
North of Bristol	30	3	9	-	-	-	-	77	78	159	11	-	366
East of Bristol	9	0	1	-	7	-	-	37	-	182	-	-	236
South of Bristol	10	1	3	-	18	7	-	-	38	38	-	-	115
West of Bristol	38	4	12	-	-	63	67	-	123	230	35	-	572
Other	*7*	*0*	-	-	-	-	-	-	*5*	*34*	-	*5*	51
	449	70	121	27	145	118	106	189	1,724	1,383	768	1,150	6,251

Figure 4.4d: Potential Park & Ride use – restricted car mode share options

12,000 PM Peak - departures

Origin / Destination in…	Car driver	Car pass	M-cycle	Other	P&R-Bri	P&R-LoA	P&R-Pow	P&R-M32	Bus	Train	Bicycle	On foot	
INITIAL MODE SPLIT													
Bristol City Centre	69	11	4	23	-	-	-	-	35	15	40	271	468
Clifton & Redland	139	19	4	-	-	-	-	-	51	11	96	250	570
North Bristol (inc Bradley Stoke)	291	43	19	-	-	-	9	15	142	42	67	35	664
East Bristol (inc Kingswood)	369	69	26	-	15	-	-	-	233	22	97	46	876
South Bristol	285	64	19	-	18	-	-	-	226	5	104	145	865
Bath & Kenysham	57	5	4	-	39	-	-	-	25	135	4	-	270
South Wales	54	7	1	-	-	-	-	28	5	96	-	-	191
Weston-super-Mare & Yatton	96	12	5	-	-	27	13	-	18	106	-	-	278
North of Bristol	172	16	7	-	-	-	-	39	24	51	3	-	312
East of Bristol	54	2	1	-	4	-	-	24	-	116	-	-	201
South of Bristol	58	4	3	-	9	3	-	-	8	13	-	-	98
West of Bristol	238	26	11	-	-	34	33	-	37	97	12	-	487
Other	*22*	*1*	-	-	-	-	-	-	*2*	*15*	-	*2*	43
	1,905	278	103	23	85	64	56	106	805	724	423	749	5,321
OPTION 1 - max 30% car driver													
Bristol City Centre	54	9	4	23	-	-	-	-	36	15	42	284	468
Clifton & Redland	108	15	4	-	-	-	-	-	56	12	103	272	570
North Bristol (inc Bradley Stoke)	223	33	19	-	-	-	11	18	179	54	83	43	664
East Bristol (inc Kingswood)	285	53	26	-	18	-	-	-	295	27	119	54	876
South Bristol	219	49	19	-	21	-	-	-	271	5	118	163	865
Bath & Kenysham	42	3	4	-	42	-	-	-	29	144	5	-	270
South Wales	39	5	1	-	-	-	-	32	5	108	-	-	191
Weston-super-Mare & Yatton	71	9	5	-	-	31	15	-	21	125	-	-	278
North of Bristol	128	12	7	-	-	-	-	47	37	76	5	-	312
East of Bristol	40	1	1	-	5	-	-	26	-	127	-	-	201
South of Bristol	43	3	3	-	11	4	-	-	15	19	-	-	98
West of Bristol	176	19	11	-	-	40	40	-	57	127	17	-	487
Other	*17*	*1*	-	-	-	-	-	-	*3*	*19*	-	*3*	43
	1,447	212	103	23	97	75	66	123	1,004	860	493	818	5,321
OPTION 2 - max 25% car driver													
Bristol City Centre	45	7	4	23	-	-	-	-	37	16	43	292	468
Clifton & Redland	90	13	4	-	-	-	-	-	58	12	108	285	570
North Bristol (inc Bradley Stoke)	184	27	19	-	-	-	12	20	201	61	93	47	664
East Bristol (inc Kingswood)	236	44	26	-	20	-	-	-	330	31	131	59	876
South Bristol	181	41	19	-	23	-	-	-	297	6	126	173	865
Bath & Kenysham	34	3	4	-	44	-	-	-	31	149	5	-	270
South Wales	31	4	1	-	-	-	-	33	6	115	-	-	191
Weston-super-Mare & Yatton	56	7	5	-	-	34	16	-	23	137	-	-	278
North of Bristol	102	9	7	-	-	-	-	51	44	91	6	-	312
East of Bristol	32	1	1	-	5	-	-	28	-	134	-	-	201
South of Bristol	35	2	3	-	12	5	-	-	20	22	-	-	98
West of Bristol	140	15	11	-	-	43	44	-	69	144	20	-	487
Other	*14*	*1*	-	-	-	-	-	-	*3*	*22*	-	*3*	43
	1,181	174	103	23	103	82	72	132	1,120	939	533	858	5,321
OPTION 3 - max 20% car driver													
Bristol City Centre	36	6	4	23	-	-	-	-	38	16	45	300	468
Clifton & Redland	72	10	4	-	-	-	-	-	61	13	113	297	570
North Bristol (inc Bradley Stoke)	144	21	19	-	-	-	13	22	223	68	102	52	664
East Bristol (inc Kingswood)	187	35	26	-	21	-	-	-	366	34	144	64	876
South Bristol	143	32	19	-	24	-	-	-	323	6	134	183	865
Bath & Kenysham	25	2	4	-	46	-	-	-	33	154	5	-	270
South Wales	23	3	1	-	-	-	-	35	6	122	-	-	191
Weston-super-Mare & Yatton	42	5	5	-	-	36	17	-	25	148	-	-	278
North of Bristol	77	7	7	-	-	-	-	56	51	106	7	-	312
East of Bristol	24	1	1	-	5	-	-	29	-	141	-	-	201
South of Bristol	26	2	3	-	13	5	-	-	24	26	-	-	98
West of Bristol	104	11	11	-	-	47	48	-	81	161	23	-	487
Other	*11*	*1*	-	-	-	-	-	-	*4*	*24*	-	*4*	43
	915	136	103	23	110	88	78	142	1,236	1,019	573	898	5,321
OPTION 4 - max 15% car driver													
Bristol City Centre	27	4	4	23	-	-	-	-	39	17	46	308	468
Clifton & Redland	54	8	4	-	-	-	-	-	63	14	117	310	570
North Bristol (inc Bradley Stoke)	105	15	19	-	-	-	14	23	245	75	111	56	664
East Bristol (inc Kingswood)	138	26	26	-	23	-	-	-	402	37	157	68	876
South Bristol	105	24	19	-	26	-	-	-	349	7	142	193	865
Bath & Kenysham	16	1	4	-	48	-	-	-	36	159	6	-	270
South Wales	15	2	1	-	-	-	-	37	7	129	-	-	191
Weston-super-Mare & Yatton	27	3	5	-	-	38	18	-	27	159	-	-	278
North of Bristol	51	5	7	-	-	-	-	61	59	120	8	-	312
East of Bristol	16	0	1	-	6	-	-	30	-	148	-	-	201
South of Bristol	17	1	3	-	14	6	-	-	28	29	-	-	98
West of Bristol	68	7	11	-	-	50	53	-	93	178	27	-	487
Other	*9*	*1*	-	-	-	-	-	-	*4*	*26*	-	*4*	43
	649	98	103	23	117	94	84	151	1,352	1,098	614	939	5,321
OPTION 5 - max 10% car driver													
Bristol City Centre	18	3	4	23	-	-	-	-	40	17	47	316	468
Clifton & Redland	36	5	4	-	-	-	-	-	66	14	122	323	570
North Bristol (inc Bradley Stoke)	66	10	19	-	-	-	15	25	267	82	120	61	664
East Bristol (inc Kingswood)	89	17	26	-	25	-	-	-	437	40	169	73	876
South Bristol	67	15	19	-	28	-	-	-	376	7	150	202	865
Bath & Kenysham	7	1	4	-	50	-	-	-	38	164	6	-	270
South Wales	7	1	1	-	-	-	-	39	7	136	-	-	191
Weston-super-Mare & Yatton	12	2	5	-	-	41	19	-	29	170	-	-	278
North of Bristol	26	2	7	-	-	-	-	66	66	135	9	-	312
East of Bristol	7	0	1	-	6	-	-	32	-	155	-	-	201
South of Bristol	9	1	3	-	15	6	-	-	33	32	-	-	98
West of Bristol	32	3	11	-	-	54	57	-	105	196	30	-	487
Other	*6*	*0*	-	-	-	-	-	-	*4*	*29*	-	*4*	43
	383	59	103	23	124	101	90	161	1,467	1,177	654	979	5,321

Figure 4.4e: Potential Park & Ride use – restricted car mode share options

17,000 AM Peak - arrivals

Origin / Destination in…	Car driver	Car pass	M-cycle	Other	P&R-Bri	P&R-LoA	P&R-Pow	P&R-M32	Bus	Train	Bicycle	On foot	
INITIAL MODE SPLIT													
Bristol City Centre	116	19	6	38	-	-	-	-	58	24	67	450	778
Clifton & Redland	231	32	7	-	-	-	-	-	85	18	159	416	949
North Bristol (inc Bradley Stoke)	485	71	32	-	-	-	16	25	236	70	112	58	1,105
East Bristol (inc Kingswood)	614	115	43	-	25	-	-	-	388	37	161	76	1,459
South Bristol	474	107	31	-	29	-	-	-	376	8	173	242	1,439
Bath & Kenysham	95	8	7	-	65	-	-	-	42	225	7	-	449
South Wales	89	11	2	-	-	-	-	47	8	160	-	-	318
Weston-super-Mare & Yatton	160	20	8	-	-	46	22	-	30	176	-	-	462
North of Bristol	286	26	12	-	-	-	-	64	40	85	5	-	519
East of Bristol	91	3	1	-	7	-	-	40	-	192	-	-	334
South of Bristol	97	7	4	-	14	5	-	-	13	22	-	-	163
West of Bristol	397	43	18	-	-	56	55	-	61	161	20	-	810
Other	*37*	*2*	-	-	-	-	-	-	*4*	*26*	-	*4*	72
	3,171	463	171	38	141	107	93	176	1,340	1,204	704	1,246	8,855
OPTION 1 - max 30% car driver													
Bristol City Centre	90	15	6	38	-	-	-	-	60	25	70	473	778
Clifton & Redland	180	25	7	-	-	-	-	-	93	20	172	452	949
North Bristol (inc Bradley Stoke)	372	55	32	-	-	-	18	30	298	90	139	71	1,105
East Bristol (inc Kingswood)	474	89	43	-	30	-	-	-	490	46	198	90	1,459
South Bristol	365	82	31	-	34	-	-	-	451	9	196	271	1,439
Bath & Kenysham	70	6	7	-	71	-	-	-	48	239	8	-	449
South Wales	66	8	2	-	-	-	-	53	9	180	-	-	318
Weston-super-Mare & Yatton	118	15	8	-	-	52	25	-	35	209	-	-	462
North of Bristol	213	20	12	-	-	-	-	78	61	127	8	-	519
East of Bristol	67	2	1	-	8	-	-	44	-	212	-	-	334
South of Bristol	72	5	4	-	18	7	-	-	25	32	-	-	163
West of Bristol	293	31	18	-	-	66	67	-	95	211	29	-	810
Other	*29*	*2*	-	-	-	-	-	-	*5*	*32*	-	*5*	72
	2,408	353	171	38	161	125	110	204	1,672	1,432	820	1,362	8,855
OPTION 2 - max 25% car driver													
Bristol City Centre	75	12	6	38	-	-	-	-	62	26	72	486	778
Clifton & Redland	150	21	7	-	-	-	-	-	97	21	180	474	949
North Bristol (inc Bradley Stoke)	306	45	32	-	-	-	20	33	335	102	154	78	1,105
East Bristol (inc Kingswood)	392	73	43	-	33	-	-	-	550	51	219	98	1,459
South Bristol	302	68	31	-	37	-	-	-	494	10	210	287	1,439
Bath & Kenysham	56	5	7	-	74	-	-	-	52	248	8	-	449
South Wales	52	6	2	-	-	-	-	56	10	192	-	-	318
Weston-super-Mare & Yatton	94	12	8	-	-	56	27	-	38	227	-	-	462
North of Bristol	171	16	12	-	-	-	-	86	73	152	10	-	519
East of Bristol	53	2	1	-	8	-	-	46	-	223	-	-	334
South of Bristol	58	4	4	-	19	8	-	-	33	37	-	-	163
West of Bristol	233	25	18	-	-	72	74	-	115	239	34	-	810
Other	*24*	*1*	-	-	-	-	-	-	*5*	*36*	-	*6*	72
	1,965	290	171	38	172	136	120	220	1,864	1,564	887	1,428	8,855
OPTION 3 - max 20% car driver													
Bristol City Centre	60	10	6	38	-	-	-	-	64	27	74	499	778
Clifton & Redland	120	17	7	-	-	-	-	-	101	22	188	495	949
North Bristol (inc Bradley Stoke)	240	35	32	-	-	-	22	36	371	113	169	86	1,105
East Bristol (inc Kingswood)	311	58	43	-	36	-	-	-	609	56	240	106	1,459
South Bristol	238	54	31	-	40	-	-	-	538	10	223	304	1,439
Bath & Kenysham	41	3	7	-	77	-	-	-	56	256	9	-	449
South Wales	39	5	2	-	-	-	-	59	10	203	-	-	318
Weston-super-Mare & Yatton	69	9	8	-	-	60	28	-	42	246	-	-	462
North of Bristol	128	12	12	-	-	-	-	93	85	176	12	-	519
East of Bristol	40	1	1	-	9	-	-	48	-	235	-	-	334
South of Bristol	44	3	4	-	21	8	-	-	40	43	-	-	163
West of Bristol	173	19	18	-	-	78	81	-	135	268	39	-	810
Other	*19*	*1*	-	-	-	-	-	-	*6*	*40*	-	*6*	72
	1,522	226	171	38	183	146	130	236	2,057	1,695	954	1,495	8,855
OPTION 4 - max 15% car driver													
Bristol City Centre	45	7	6	38	-	-	-	-	65	27	76	512	778
Clifton & Redland	90	13	7	-	-	-	-	-	106	23	195	516	949
North Bristol (inc Bradley Stoke)	175	26	32	-	-	-	23	39	408	125	185	93	1,105
East Bristol (inc Kingswood)	230	43	43	-	39	-	-	-	669	62	261	114	1,459
South Bristol	175	39	31	-	43	-	-	-	582	11	237	320	1,439
Bath & Kenysham	27	2	7	-	80	-	-	-	59	265	9	-	449
South Wales	25	3	2	-	-	-	-	62	11	215	-	-	318
Weston-super-Mare & Yatton	45	6	8	-	-	64	30	-	45	265	-	-	462
North of Bristol	86	8	12	-	-	-	-	101	98	200	14	-	519
East of Bristol	26	1	1	-	9	-	-	50	-	246	-	-	334
South of Bristol	29	2	4	-	23	9	-	-	47	48	-	-	163
West of Bristol	113	12	18	-	-	84	87	-	154	297	44	-	810
Other	*14*	*1*	-	-	-	-	-	-	*7*	*44*	-	*7*	72
	1,080	163	171	38	194	157	140	252	2,250	1,827	1,021	1,562	8,855
OPTION 5 - max 10% car driver													
Bristol City Centre	30	5	6	38	-	-	-	-	67	28	78	525	778
Clifton & Redland	60	8	7	-	-	-	-	-	110	24	203	537	949
North Bristol (inc Bradley Stoke)	109	16	32	-	-	-	25	41	444	137	200	101	1,105
East Bristol (inc Kingswood)	148	28	43	-	41	-	-	-	728	67	282	121	1,459
South Bristol	112	25	31	-	47	-	-	-	625	12	250	337	1,439
Bath & Kenysham	12	1	7	-	83	-	-	-	63	273	10	-	449
South Wales	11	1	2	-	-	-	-	65	11	226	-	-	318
Weston-super-Mare & Yatton	21	3	8	-	-	68	32	-	48	284	-	-	462
North of Bristol	43	4	12	-	-	-	-	109	110	225	16	-	519
East of Bristol	12	0	1	-	10	-	-	53	-	258	-	-	334
South of Bristol	15	1	4	-	25	10	-	-	54	54	-	-	163
West of Bristol	53	6	18	-	-	90	94	-	174	326	49	-	810
Other	*10*	*1*	-	-	-	-	-	-	7	*48*	-	7	72
	637	99	171	38	206	168	151	268	2,442	1,959	1,088	1,629	8,855

Figure 4.4f: Potential Park & Ride use – restricted car mode share options

17,000 PM Peak - departures

Origin / Destination in…	Car driver	Car pass	M-cycle	Other	P&R-Bri	P&R-LoA	P&R-Pow	P&R-M32	Bus	Train	Bicycle	On foot	
INITIAL MODE SPLIT													
Bristol City Centre	98	16	5	32	-	-	-	-	49	21	57	383	662
Clifton & Redland	197	28	6	-	-	-	-	-	73	15	135	354	808
North Bristol (inc Bradley Stoke)	413	61	27	-	-	-	13	22	201	60	95	49	941
East Bristol (inc Kingswood)	522	98	36	-	21	-	-	-	330	31	137	65	1,242
South Bristol	403	91	26	-	25	-	-	-	320	7	147	206	1,225
Bath & Kenysham	81	7	6	-	56	-	-	-	36	191	6	-	382
South Wales	76	9	2	-	-	-	-	40	7	136	-	-	270
Weston-super-Mare & Yatton	136	17	7	-	-	39	19	-	25	150	-	-	393
North of Bristol	244	22	10	-	-	-	-	55	34	72	4	-	442
East of Bristol	77	2	1	-	6	-	-	34	-	164	-	-	284
South of Bristol	83	6	4	-	12	5	-	-	11	19	-	-	138
West of Bristol	338	36	15	-	-	48	47	-	52	137	17	-	689
Other	*31*	*2*	-	-	-	-	-	-	*3*	*22*	-	*3*	62
	2,699	394	146	32	120	91	79	150	1,140	1,025	599	1,061	7,538
OPTION 1 - max 30% car driver													
Bristol City Centre	76	13	5	32	-	-	-	-	51	22	60	403	662
Clifton & Redland	153	21	6	-	-	-	-	-	79	17	147	385	808
North Bristol (inc Bradley Stoke)	316	47	27	-	-	-	16	26	254	77	118	60	941
East Bristol (inc Kingswood)	403	75	36	-	26	-	-	-	417	39	168	77	1,242
South Bristol	310	70	26	-	29	-	-	-	384	8	167	230	1,225
Bath & Kenysham	60	5	6	-	60	-	-	-	41	204	7	-	382
South Wales	56	7	2	-	-	-	-	45	8	153	-	-	270
Weston-super-Mare & Yatton	100	12	7	-	-	45	21	-	30	177	-	-	393
North of Bristol	181	17	10	-	-	-	-	66	52	108	7	-	442
East of Bristol	57	2	1	-	7	-	-	37	-	180	-	-	284
South of Bristol	62	4	4	-	15	6	-	-	21	27	-	-	138
West of Bristol	250	27	15	-	-	56	57	-	81	179	24	-	689
Other	*24*	*1*	-	-	-	-	-	-	*4*	*28*	-	*4*	62
	2,050	301	146	32	137	107	94	174	1,423	1,219	698	1,159	7,538
OPTION 2 - max 25% car driver													
Bristol City Centre	64	11	5	32	-	-	-	-	53	22	61	414	662
Clifton & Redland	127	18	6	-	-	-	-	-	83	18	153	403	808
North Bristol (inc Bradley Stoke)	261	38	27	-	-	-	17	28	285	87	131	67	941
East Bristol (inc Kingswood)	334	62	36	-	28	-	-	-	468	43	186	83	1,242
South Bristol	257	58	26	-	32	-	-	-	421	8	178	244	1,225
Bath & Kenysham	48	4	6	-	63	-	-	-	44	211	7	-	382
South Wales	44	6	2	-	-	-	-	47	8	163	-	-	270
Weston-super-Mare & Yatton	80	10	7	-	-	48	23	-	33	193	-	-	393
North of Bristol	145	13	10	-	-	-	-	73	62	129	9	-	442
East of Bristol	45	1	1	-	7	-	-	39	-	190	-	-	284
South of Bristol	49	3	4	-	16	6	-	-	28	32	-	-	138
West of Bristol	199	21	15	-	-	61	63	-	98	204	29	-	689
Other	*20*	*1*	-	-	-	-	-	-	*5*	*31*	-	*5*	62
	1,673	247	146	32	146	116	102	187	1,587	1,331	755	1,216	7,538
OPTION 3 - max 20% car driver													
Bristol City Centre	51	8	5	32	-	-	-	-	54	23	63	425	662
Clifton & Redland	102	14	6	-	-	-	-	-	86	19	160	421	808
North Bristol (inc Bradley Stoke)	205	30	27	-	-	-	18	30	316	97	144	73	941
East Bristol (inc Kingswood)	265	50	36	-	30	-	-	-	519	48	204	90	1,242
South Bristol	203	46	26	-	34	-	-	-	458	9	190	259	1,225
Bath & Kenysham	35	3	6	-	66	-	-	-	47	218	8	-	382
South Wales	33	4	2	-	-	-	-	50	9	173	-	-	270
Weston-super-Mare & Yatton	59	7	7	-	-	51	24	-	35	209	-	-	393
North of Bristol	109	10	10	-	-	-	-	80	73	150	10	-	442
East of Bristol	34	1	1	-	7	-	-	41	-	200	-	-	284
South of Bristol	37	2	4	-	18	7	-	-	34	36	-	-	138
West of Bristol	148	16	15	-	-	66	69	-	115	228	33	-	689
Other	*16*	*1*	-	-	-	-	-	-	*5*	*34*	-	*5*	62
	1,296	193	146	32	156	125	111	201	1,751	1,443	812	1,273	7,538
OPTION 4 - max 15% car driver													
Bristol City Centre	38	6	5	32	-	-	-	-	56	23	65	436	662
Clifton & Redland	76	11	6	-	-	-	-	-	90	19	166	439	808
North Bristol (inc Bradley Stoke)	149	22	27	-	-	-	20	33	347	106	157	79	941
East Bristol (inc Kingswood)	196	37	36	-	33	-	-	-	569	52	222	97	1,242
South Bristol	149	34	26	-	37	-	-	-	495	9	202	273	1,225
Bath & Kenysham	23	2	6	-	68	-	-	-	50	225	8	-	382
South Wales	21	3	2	-	-	-	-	53	9	183	-	-	270
Weston-super-Mare & Yatton	38	5	7	-	-	54	26	-	38	225	-	-	393
North of Bristol	73	7	10	-	-	-	-	86	83	171	12	-	442
East of Bristol	22	1	1	-	8	-	-	43	-	210	-	-	284
South of Bristol	25	2	4	-	20	8	-	-	40	41	-	-	138
West of Bristol	96	10	15	-	-	71	74	-	132	253	38	-	689
Other	*12*	*1*	-	-	-	-	-	-	*6*	*37*	-	*6*	62
	919	138	146	32	165	134	120	214	1,915	1,556	869	1,330	7,538
OPTION 5 - max 10% car driver													
Bristol City Centre	25	4	5	32	-	-	-	-	57	24	66	447	662
Clifton & Redland	51	7	6	-	-	-	-	-	94	20	173	457	808
North Bristol (inc Bradley Stoke)	93	14	27	-	-	-	21	35	378	116	170	86	941
East Bristol (inc Kingswood)	126	24	36	-	35	-	-	-	620	57	240	103	1,242
South Bristol	95	21	26	-	40	-	-	-	532	10	213	287	1,225
Bath & Kenysham	10	1	6	-	71	-	-	-	54	232	8	-	382
South Wales	10	1	2	-	-	-	-	55	10	193	-	-	270
Weston-super-Mare & Yatton	17	2	7	-	-	58	27	-	41	241	-	-	393
North of Bristol	37	3	10	-	-	-	-	93	94	191	13	-	442
East of Bristol	11	0	1	-	8	-	-	45	-	219	-	-	284
South of Bristol	12	1	4	-	21	9	-	-	46	46	-	-	138
West of Bristol	45	5	15	-	-	76	80	-	148	277	42	-	689
Other	*8*	*0*	-	-	-	-	-	-	*6*	*41*	-	*6*	62
	542	84	146	32	175	143	128	228	2,079	1,668	926	1,387	7,538

Appendix C

Rail Issues

Appendix C Rail Issues

C.1 Existing rail-related policies and plans

A number of initiatives and policies consider development of rail services at Bristol Temple Meads station. As it is the focal station for the West of England region, these include plans across the region, as well as the wider national rail network. Key elements that frame rail development that are discussed in this technical note include:

- Joint Local Transport Plan for the West of England area;
- Great Western Route Utilisation Strategy;
- Great Western passenger franchise renewal;
- Network Rail funding agreements – Control Period 5;
- Electrification of the Great Western Main line;
- InterCity Express Programme; and
- Bristol Temple Meads enhancement plans.

C.1.1 Joint Local Transport Plan for the West of England (JLTP)

The Joint Local Transport Plan (JLTP) for the West of England (WoE) area (published in March 2011) identifies a few headline facts about rail usage in the WoE area:

- Rail use accounts for 1.5% of journeys to work rising to 15% on key corridors such as Bath to Bristol (2001 Census);
- Rail passengers increased by 56% between 2004 and 2009;
- Severn Beach railway line passengers rose by 41% 2006 to 2009 (WoE Annual Rail Survey);
- There are capacity and service frequency issues on a number of routes; and
- Re-instating the line to Portishead is a key future aim.

As a result, on-going aspirations and plans for the rail network areset out in the JLTP in the form of a vision for the WoE rail network. This is illustrated in Figure C.1.

Also in the JLTP is reference to a 'Rail Memorandum of Understanding' (MoU) between the West of England local authorities, Network Rail, First Great Western, CrossCountry and South West Trains being set out in July 2010. The aim of this MoU is to promote coordination between the various bodies involved with and interested in rail development in the region. An Action Plan was subsequently drawn up, setting out ideas to reduce overcrowding, increase patronage and increase capacity, through short, medium and long term proposals for new and enhanced services, rolling stock and infrastructure, including schemes in the rail vision.

The proposals in the JLTP rail vision, along with others suggested in various documents produced by a variety of organisations are included in the (on-going) WoE Strategic Rail Review Study.

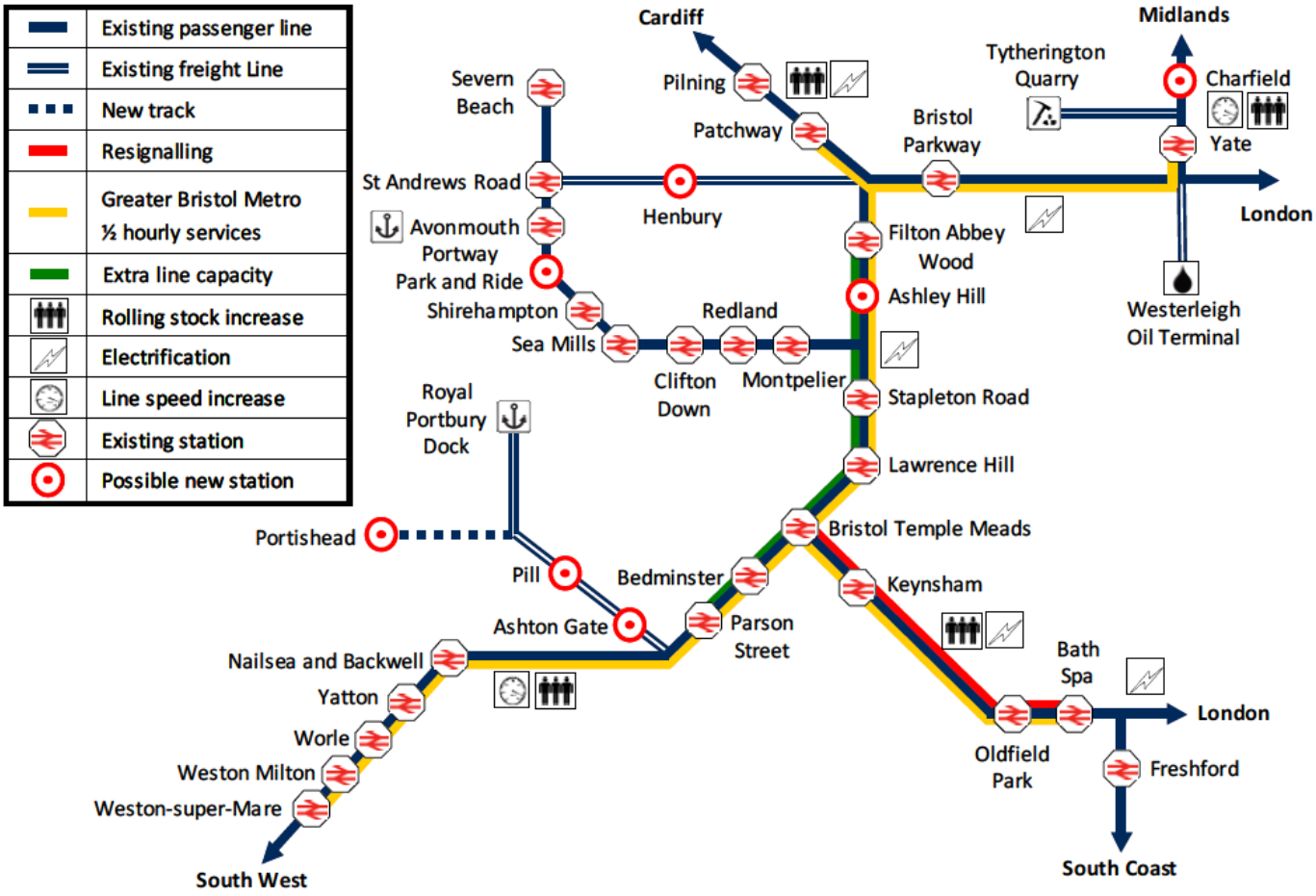


Figure C.1: JLTP aspirations for rail in the West of England area

C.1.2 Great Western Route Utilisation Strategy (GW RUS)

The Great Western Route Utilisation Strategy (March 2010) covers a 10-year period from 2009 to 2019. The RUS gives Network Rail's recommendations for development and delivery of service changes, as well as infrastructure renewal and enhancement. It should be noted that while the RUS is taken into account by the Government in the development of specifications for the franchise renewal process and also contribute to development of the HLOS for CP5, the RUS recommendations are not binding on Government. Proposals in the RUS are still subject to value for money and affordability considerations and identification and confirmation of funding sources.

The GW RUS contains a number of recommendations in the Bristol area. Specific reference is made to train lengthening and enhancement of various cross Bristol services (some new vehicles have already been secured) and infrastructure capacity enhancement between Temple Meads and Filton and Temple Meads and Parson Street. The RUS also supports the electrification and IEP programmes.

RUS proposals are also included in the West of England Strategic Rail Review Study.

C.1.3 Franchise Renewal

The main train operating company (TOC) of passenger rail services in the WoE area is currently First Great Western (FGW). The current franchise was let on 31 March 2006 for 10 years, but the last 3 years were subject to a termination review. As such, FGW decided in 2011 not to seek to retain the franchise for the maximum term of 10 years and exercised the option to terminate the franchise in 2013.

As a result a new franchise is due to begin in April 2013, though a new franchisee is yet to be appointed. The DfT is currently going through the process of determining the content of the franchise in detail, as well as seeking pre-qualification from potential bidders. The timetable for renewal is as follows:

- December 2011/January 2012 – advertise franchise and issue pre-qualification documentation;
- December 2011-March 2012 – stakeholder consultation period;
- February/March 2012 – bidders submit pre-qualification response;
- March 2012 – prepare invitation to tender (ITT);
- May 2012 – issue ITT;
- August 2012 – bid submission;
- August-December 2012 – bid evaluation, negotiation, approved and award; and
- April 2013 – new franchise starts.

The new franchise is currently proposed to be 15 years, though it should be noted that the duration is not confirmed and may change. As a result of its timing (notionally from 2013 to 2028) it will encompass major changes to the operation of services as a result of infrastructure initiatives in its area of coverage. While this includes transfer of many suburban services into Paddington to Crossrail, commencing in May 2018 and finishing in December 2019, this is remote to Bristol, the knock-on effects of changes to the operations to tracks on the approach to Paddington will be felt through timetable planning. Of far greater specific relevance to the Bristol area are electrification plans – these are discussed further below.

As part of franchise consultation, and in particular prior to inclusion (or otherwise) in detailed specifications of the ITT, specific routes and service levels to be included in the franchise are being considered by the DfT. The consultation document notes, for instance, that there are a number of services currently operating that were not in the specification of the current franchise (not least the popular augmented services on the Severn Beach line). The DfT effectively asks through the consultation process whether these, and any other existing additional services, as well as further proposals for new services and station openings, should be specifically include in the future franchise specification. This may not include a minimum service level as previous franchises have had.

The various proposals in the LTP rail vision (and elsewhere) are being considered by the WoE Strategic Rail Review Study in order to feed into the franchise renewal consultation debate as a specific and prioritised set of potential enhancements to rail services in the WOE area.

C.1.4 Network Rail funding – Control Period 5 (CP5)

The rail industry is funded through a series of agreements between the government and organisations charged with running the railway. Network Rail owns and is responsible for all infrastructure of the national rail network. It receives income in from three main sources; payments to use the rail network from train operators (passenger and freight), direct government grants and other commercial (non-rail) revenue. This income has to pay for day-to-day operations, maintenance and enhancements, and (crucially) repayment of borrowing. Funding for enhancements typically uses borrowing supported by increasing Network Rail's 'value' (the Regulatory Asset Base), payments for which are largely funded by government. Train operating company charges are largely related to service levels built into franchise agreements.

Overall government financial responsibility for the railways is determined through a process where the Department for Transport (DfT) specifies the amount of money it is willing to commit to the railway over a forthcoming 5-year 'Control Period' (the Statement of Funds Available or SoFA), which via an Initial Industry Plan ultimately results in a High Level Output Specification (HLOS) of outputs the government requires from the rail industry. The current Control Period 4 (CP4) is the agreed financial provision from the Government to the railway that runs from April 2009 to March 2014. The next Control Period (CP5) runs from April 2014 to March 2019.

The Initial Industry Plan for CP5 was published in late 2011 and the DfT intends to publish the next High Level Output Specification (HLOS) in July 2012. This will make clear the outputs the Government requires from the rail industry in CP5. The HLOS (and subsequently CP5) should include a continuing commitment to electrification of the GWML. The HLOS could additionally include enhancement projects such as Temple Meads enhancements (see below) and the Portishead line.

C.1.5 Electrification of the Great Western Main Line

Electrification of the Great Western Main Line (GWML) from London (Airport Junction) to Bristol, Oxford and Newbury is expected to be complete by December 2016, with Cardiff by December 2017. Onwards electrification to Swansea was not included in the initial scheme electrification scheme, but may still be implemented, and if so would be on a similar timescale to Cardiff.

The status of electrification of the GWML should be relatively secure. Early works are committed in CP4. However, as the aforementioned completion dates indicate, the work to complete electrification will continue into CP5, which will run from April 2014 to March 2019. While details of commitments in CP5 are not yet confirmed as CP5 is currently under preparation, electrification is still considered to be a firm commitment.

It is anticipated that electric trains will be used for services between London and Bristol/South Wales. As the railway to the west of Bristol and Cardiff (or Swansea) will not be electrified, trains will continue to be diesel powered on these lines. How this is accomplished operationally for through services is unclear (see InterCity Express Programme below). However, it is reasonably certain that local services through Bristol Temple Meads will continue to be diesel powered for the foreseeable future.

C.1.6 InterCity Express Programme (IEP)

The InterCity Express Programme (IEP) was conceived as a future train for intercity routes in the UK, and is distinct from electrification plans for the GWML as it not only predates these plans in concept, but was intended to provide new trains for more than just the GWML. Several versions of IEP are planned, initially including diesel, electric and bi-mode propulsion marshalled into sets with different numbers of vehicles. Prior to electrification plans for the GWML, IEP diesel trains would have replaced HSTs on all Great Western services, but now that GWML electrification is being taken forward, diesel IEPs are unlikely to be built, and it is intended that a combination of electric and bi-mode IEP trains will be used on Great Western services.

Electric IEPs should be deployed on services between London Paddington and Bristol and South Wales from May 2018. Services from Bristol Temple Meads will run via Bath Spa (broadly as at present with 2 per hour stopping at the main stations to Paddington) and an additional 2 trains per hour as a 'flyer' service stopping only at Bristol Parkway (taking around 20 minutes less than the Bath Spa routeing); the rationale of this being to separate the Bristol-London market from intermediate movements, thus gaining significant extra capacity for both Bristol-London passengers and other trips. Bi-mode IEP sets would operate to Weston-super-Mare, Cheltenham, Worcester/Hereford and on non-electrified sections in South Wales.

The IEP programme is not without its detractors however, and questions have been asked as to its overall value as its scope has evolved, particularly with GWML electrification changing fleet requirements. Detailed implementation of IEP is yet to be confirmed, and further deployment beyond that initially envisaged on the Great Western is not certain. For instance, it is not clear whether bi-mode IEPs will run to Plymouth and Penzance, and upgraded IC125 HSTs may be retained on these services for some time to come.

C.1.7 Bristol Temple Meads enhancements

Network Rail is currently considering options for works at Bristol Temple Meads to enhance the station for passengers in a number of ways of ways, and a 'High Level Option Assessment Report (GRIP Level 2)' was prepared in 2009 to consider options for works at the station.[4]

A key driver for this initiative comes from the desire of stakeholders in the station to see Bristol Temple Meads developed as an appropriate 'gateway' to the city, coupled with recent and proposed developments around the station which will have (or are already having) an impact on use of and locality around the station, and are largely outside the control of Network Rail. With its current layout, and increases in rail demand in recent years, Bristol Temple Meads station is also already suffering from passenger capacity issues. Indeed, it is one of the busiest non-terminus stations on the

[4] Bristol Temple Meads Enhancement Plans, High Level Option Assessment Report (GRIP Level 2), Network Rail, March 2009. Note that this report did not consider operational railway issues at Temple Meads, such as signalling, pathing and platform use by train services at the station

network and considered by Network Rail to be the 6th most congested station with serious passenger congestion pinch points.

As a result of increasing demand for rail in general, development focus in Bristol and the effects of new services proposed as part of electrification, forecasts indicate that passenger throughout at Temple Meads could increase by over 40% in the next 10 years or so.

It should be noted that the initial impetus for the development of plans to enhance Bristol Temple Meads pre-dates firm plans for electrification of the GWML. As well as changing the potential operational requirements of the station, this means that the initial forecasts used in the GRIP 2 study have been increased from 30% to 40% in subsequent follow-up assessments.

2009 GRIP 2 Report

The overall aims of the proposals considered by the GRIP 2 report were to create a world class gateway to Bristol City centre and the wider Bristol area and blend the grade 1 listed Bristol Temple Meads station with the Temple Quay development area. In doing so, station congestion should be reduced and access/egress to the station improved, as well as facilities at the station being enhanced to improve the operational performance of the station and overall transport interchange facilities. Within this, specific options were developed to:

- Improve passenger flow outside the station, and transport interchange associated with it;
- Improve passenger flow inside the station;
- Utilise the Digby Wyatt shed (the former terminal platform area to the west of the current through platforms) for station access and retail facilities;
- Provide additional station accesses;
- Provide more opportunities for excess fare sales; and
- Enhance passenger comfort at the Taunton end of platforms.

A number of detailed solutions have been developed for pedestrian movements in the station, including three potential new accesses to the 'paid' station area – west to Temple Quay, opening up the existing (disused) 'Queen's Entrance' to the station forecourt and east to the former Post Office site (using a disused section of the passenger subway). Additional stair and/or escalator links to the passenger subway were also considered, as well as extending the passenger subway west to link with undercroft development of arches beneath the station approach ramp and on to retail and station facilities in the Digby Wyatt shed.

To deal with station forecourt congestion issues, separation of vehicular access was considered, with private vehicle access for parking and pick-up/drop-off being consolidated off The Friary in Temple Quay and the approach ramp being restricted to buses and taxis only. Space for around 2,750 sq.m of passenger and retail facilities has been identified in the Digby Wyatt shed.

Updating the 2009 assessments

Subsequent to the GRIP 2 report being prepared, proposals for electrification of the GWML have come to the fore. This will necessarily require physical works at the station, if only to provide overhead wiring for electric trains. However, as part of the electrification process, and wider initiatives to enhance train services in the Bristol area, railway operational aspects at Bristol Temple Meads are also now being considered. This could include infrastructure enhancements such as re-modelling Bristol East Junction, Filton Bank 4-tracking and re-signalling in the area.

Note that these potential enhancements are not part of the electrification programme that has been approved to date. However, there are benefits in carrying out such work at the same time as electrification and as such these schemes may go ahead. In order to fund this, these schemes would need to be included in the HLOS for CP5 funding. Network Rail is currently working towards this, subject to studies indicating there is a case for inclusion of such schemes.

A specific station-related proposal is the option to re-introduce tracks to the Digby Wyatt and Brunel train sheds to cater for longer trains. This is notionally aimed at post electrification IEPs (up to 10-car), and specifically (though not necessarily exclusively) the proposed pair of 'fast' services per hour to London via Bristol Parkway. The proposals being studies would actually provide two platforms – platforms 1' and '0'.

Initial work by Network Rail indicate it is feasible to do so by either extending the existing short platform 1 north out of the station without using part of the Brunel shed, or using the Brunel shed and not extending north. Network Rail prefer the latter, as it is better for future-proofing, leaving the space outside the station available if longer trains were used in future. In either option, the signal box currently located at the end of the existing platform 1 has to be removed, which is linked to re-signalling.

Network Rail is likely to include the Platform 0/1 scheme in a bid for CP5 funding. However, as this would impact on some of the options considered by the earlier GRIP 2 report, Network Rail are currently assessing this option on pedestrian movements and assessments of options to provide access station (especially as around 40% of passengers entering/leaving the station use the Temple Quay entrance which will be severed by Platforms 0/1). This work is due to be completed in March 2012.

C.1.8 Timing and future initiatives

It can be seen from the various initiatives that are currently underway in the Bristol area, that there is a significant confluence of elements over the next 5 years or so, with most of the major decisions being taken in 2012 as a result of discussions and analyses currently underway. Inclusion within this of electrification at Bristol Temple Meads is of particular note, as this will require changes to the operation of the station, linked with the need to accommodate new electric services and known issues of capacity and usage. Physical works will (probably) not simply be confined to overhead wiring for power. As such, there is a great opportunity to link development around the station in the EZ to changes at the station itself.

Indeed, Network Rail may ultimately develop an overall area enhancement package of measures, in a similar vein to that currently being implemented at Reading (albeit

not quite as big in scope or cost), bringing together electrification, re-modelling Bristol East, 4-track Filton Bank, Platforms 0/1, new subways/entrances for passengers, etc. However, as nothing beyond electrification is funded yet, at the moment the only confirmed works is that passive provision will be made for these various options in electrification works.

Note that in light of the large number of options and enhancements in the Bristol area, a specific Bristol Area RUS is likely to be prepared at some point in the future to bring all the proposals together.

C.2 Current rail use

Rail travel information for Bristol Temple Meads (BTM) station is available in some detail from the National Rail Travel Survey (NRTS) and Office of Rail Regulation (ORR) station usage statistics. The former contains details of true trip origin and destination (to broad areas), as well as regularity of trip and purpose of the journey.

Table C.1 shows a matrix of movements derived from NRTS data for Bristol Temple Meads. This shows the true origin and destination of rail users at Bristol Temple Meads from surveys that fed into the NRTS. Note that this matrix represents both out and back portions of return journeys. Unsurprisingly, this table indicates that central Bristol is the dominant location for destinations rail users, though other areas within the city are also significant (particularly as origins). Outside the city, Bath, London and South Wales are the next most important origins/destinations of rail users.

Table C.2 illustrates that work-related trips dominate at Bristol Temple Meads, with around 75% of trips being to a workplace. Note that the NRTS does not specifically identify whether trips are commuting or on employer's business, just whether a destination is a 'regular' or 'other' workplace, so either category could include commuting to a base location or business visits elsewhere.

Table C.3 shows access modes for people using Bristol Temple Meads rail station. This shows access mode for those whose origin station is Bristol Temple Meads, as well as an overall figure that also includes all trips to/from Bristol Temple Meads (hence this second set includes a larger proportion using Underground). These figures indicate that the dominant access method to Temple Meads is on foot, with car access comparatively less important than bus and taxi access. However, care should be taken when considering these figures, as some of the trips that the NRTS indicates as 'originating' from Bristol Temple Meads (or indeed any station) may actually be a return leg of a trip, where the ticket used is a season or pair of singles. For instance, ORR figures indicate that around 21% of users of Bristol Temple Meads have season tickets (2009-10). This means that walk access is probably over-stated.

Table C.4 shows some demographic information pertaining to users of Bristol Temple Meads station, in particular the number of cars owned by households of rail travellers, as well as the household income groups that they fall into. Only around 15% of rail users at Bristol Temple Meads do not have a car available to them, which is lower than the overall figure for the UK of 25%.[5] This accords with the income

[5] National Statistics 'Social Trends 41: Transport', Feb 2011

distribution of users, which indicates that travellers are predominantly from the middle to higher income groups.

Table C.5 shows station usage statistics for stations in the Bristol area over the period 2004/05 to 2009/10.This illustrates that rail usage has grown substantially in Bristol over this period, with patronage on some lines having gone up several times the original figures, albeit from a low base. However, note that Bristol Temple Meads itself has already seen an increase of almost 40% in users. This is manifest in overcrowding in the station at peak times, as well as on trains. ORR's PIXC (passengers in excess of capacity) figures indicate that Bristol Temple Meads has over 20% of arriving services in the AM peak with standing passengers (25% in the PM peak), accounting for around 5% of all passengers on the trains.

C.3 Rail network performance

In the rail context, pinch points are hard to specifically pinpoint. In a sense, anywhere that trains stop or lines split/join at junctions is a potential pinch point depending on desired routes and service levels, especially if aspirations exceed the ability of the network to accommodate the train paths needed beyond an operationally feasible and robust level.

The GW RUS sets out proposals to deal with some known sections or locations where capacity is an issue (such as Bristol Temple Meads to Filton).

In understanding the performance of the network with a view to prioritising future enhancements, operational constraints form the basis of both proposals to overcome them or limitations in future services. For example, Filton Bank to Bristol Parkway is currently 2-track, which limits the number of additional services across the entire greater Bristol network, impacting on aspirations for more frequent trains on most routes that pass through BTM (which is most routes). Expansion of Filton Bank to 3 or 4-track was recommended in the GW RUS and is likely happen (and should be able to do so within the existing railway boundary). This could either be as part of the electrification programme or beforehand, but it is not yet officially 'committed'.

Another, more general example is the desire for new stations. Even with expanded capacity on Filton Bank, electrification, signalling changes and swifter rolling stock, there will still be a limit to the number of stations on 2-track sections (such as Bristol to Bath) with a mix of long and short distance passenger services and freight.

As has already been discussed in this Technical Note, many of the current capacity limitations are being considered for solutions and enhancements as part of other schemes (such as electrification). A key element of the on-going West of England Rail Review study on rail network usage is to understand the use of rail capacity through Bristol Temple Meads to develop (and prioritise) workable combinations of rail service enhancements. The resulting proposals in turn feed into the consultation and assessment process for re-letting the Great Western rail franchising (in 2013) and electrification of the Great Western Main Line from London to Bristol and South Wales (from 2016 onwards). As such, more information will also become clear through the WoE rail review study.

NRTS - rail users from…
Bristol Temple Meads

ORIGIN		DESTINATION: Central Bristol	South Bristol	Clifton/Redland	Eastville	Avonmouth	Filton/Stoke Gifford	Long Ashton	Kingswood	Thornbury/Almondsbury	Yate/Winterbourne/Chipping Sodbury	Keynsham/Saltford	Bath	Nailsea & Clevedon	Portbury corridor	Portishead	Yatton	Weston-super-Mare	North Somerset	Wiltshire/Swindon	Gloucestershire	Somerset	South West (other)	South Wales	London	South East	Midlands	N.Eng, N.Wales & Scotland	NRTS - rail users - typical weekday
Central Bristol	Bristol	13	6	30	24	15	186	-	38	22	86	55	488	142	-	4	135	343	25	514	213	168	268	544	385	213	136	101	4,152
South Bristol	Bristol	6	-	2	1	2	28	-	-	1	10	-	169	0	-	-	6	72	-	102	17	39	47	83	151	142	33	25	940
Clifton/Redland	Bristol	36	5	-	6	-	9	-	4	-	1	-	320	1	-	-	21	20	-	156	65	37	100	162	320	185	90	101	1,637
Eastville	Bristol	23	15	5	6	1	59	-	-	-	20	6	219	23	-	3	29	153	2	107	46	71	44	220	146	120	82	61	1,461
Avonmouth	Bristol	15	3	-	1	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	9	-	16	-	-	-	5	52
Filton/Stoke Gifford	Bristol/S.Glos	188	28	6	51	-	-	2	2	-	-	9	8	18	-	-	2	-	-	4	-	-	-	4	11	5	-	2	339
Long Ashton	Bristol/N.Som	-	-	-	-	-	2	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	2	5	11	-	-	-	26
Kingswood	S.Glos	38	-	4	-	4	-	-	-	-	-	-	-	-	-	-	-	2	-	5	-	6	11	13	13	-	17	9	122
Thornbury/Almondsbury	S.Glos	24	4	-	-	-	-	-	-	-	-	-	4	1	-	-	-	-	-	4	-	-	5	-	2	1	-	-	45
Yate/Winterbourne/Chipping Sodbury	S.Glos	86	10	1	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	3	-	-	136
Keynsham/Saltford	B&NES	63	-	-	6	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	16	2	-	102
Bath	B&NES	494	161	306	231	-	8	7	-	4	-	-	-	19	-	-	-	-	-	-	-	-	1	-	11	1	-	-	1,243
Nailsea & Clevedon	N.Somerset	140	0	1	26	-	8	-	-	1	-	-	10	-	-	-	-	-	-	12	3	8	12	30	-	22	14	-	287
Portbury corridor	N.Somerset	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	6	-	-	-	12
Portishead	N.Somerset	4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	16	-	-	27
Yatton	N.Somerset	162	6	5	32	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	23	17	5	3	257
Weston-super-Mare	N.Somerset	347	46	40	154	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	611
North Somerset	(other areas)	25	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7	13	9	-	-	58
Wiltshire/Swindon		512	106	149	118	-	4	-	5	4	-	-	-	14	-	-	-	-	-	7	-	-	-	-	-	16	4	-	941
Gloucestershire		233	22	82	61	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	16	-	-	-	-	-	417
Somerset		194	34	40	88	9	-	-	6	-	-	-	-	8	4	-	-	-	1	-	-	-	-	1	15	1	8	23	432
South West (other)		299	57	85	51	-	-	2	11	5	1	-	1	25	3	3	-	-	-	-	16	-	-	6	-	-	-	-	565
South Wales		561	98	167	230	16	4	5	13	-	-	-	8	25	-	-	7	-	7	-	-	1	-	-	9	-	-	6	1,156
London		368	142	307	146	-	6	11	29	2	-	7	11	3	6	1	23	19	13	-	-	15	-	9	-	-	-	23	1,140
South East		226	153	194	130	-	5	-	-	11	3	16	1	4	-	16	17	-	9	16	-	1	6	-	-	-	-	-	807
Midlands		128	24	107	80	-	-	-	20	-	-	2	-	14	-	-	5	-	-	4	-	8	-	-	-	-	-	9	403
N.Eng, N.Wales & Scotland		116	37	122	68	5	3	-	9	-	-	-	-	-	-	-	6	-	-	-	-	21	-	6	23	6	9	-	432
		4,299	958	1,652	1,538	51	333	26	144	52	122	95	1,244	301	13	27	250	610	58	933	360	391	530	1,106	1,164	774	401	367	17,799
																												True O-D not indicated	48
																												Total	17,847

Table C.1: NRTS Rail Users at Bristol Temple Meads – true origins and destinations by sector (2010 daily trips)

Journey Purpose		Regularity of making the journey	
Between home and usual workplace	49.80%	5 or more days a week	40.20%
To/ from Other workplace	24.70%	2-4 days a week	16.00%
All other purposes	21.50%	Once a week	4.00%
School/college/university as a student/ Accompanying a pupil	3.90%	1-3 times a week	9.40%
		Less than once a month	15.50%
		First time have made this journey	15.00%

Table C.2: NRTS Rail Users at Bristol Temple Meads – journey purpose & regularity

Access mode (BTM as origin station)		Overall access mode of all users at BTM	
Walked	56.70%	Walked	49.20%
Bus/coach	17.10%	Bus/coach	12.30%
Car (parked at or near the station)	3.50%	Car (parked at or near the station)	13.10%
Car (dropped off by someone)	5.10%	Car (dropped off by someone)	8.80%
Motorcycle	0.10%	Motorcycle	0.10%
Bicycle	6.60%	Bicycle	5.90%
Taxi/minicab	10.60%	Taxi/minicab	7.30%
Underground/Light Rail/Metros/Trams	0.20%	Underground/Light Rail/Metros/Trams	3.20%
Other	0.00%	Other	0.10%

Table C.3: NRTS Rail Users at Bristol Temple Meads – access/egress mode

Car ownership of travellers		Household income level	
None	15.50%	Below £7,000	3.20%
One	45.60%	£7,000 – £12,500	4.30%
Two	30.40%	£12,501 – £17,500	6.30%
Three	6.80%	£17,501 – £35,000	31.20%
More than three	1.70%	£35,001 – £50,000	28.30%
		£50,001 – £75,000	16.10%
		More than £75,000	10.60%

Table C.4: NRTS Rail Users at Bristol Temple Meads – demographic information

Station Entries & Exits - annual figures 2004-05 to 2009-10

Station	2009-10 entries & exits	Full Price Tickets %	Season Ticket %	Reduced Price Tickets %	5 yr p.a. rate	5 yr change	1 yr change	2008-09 entries & exits	2007-08 entries & exits	2006-07 entries & exits	2005-06 entries & exits	2004-05 entries & exits
Avonmouth	68,448	65.4%	28.7%	5.8%	15.1%	102.4%	10.5%	61,948	44,468	47,834	43,365	33,815
Bedminster	69,898	38.1%	34.4%	27.4%	16.6%	115.1%	19.1%	58,690	43,145	43,379	40,917	32,489
Bristol Parkway	2,041,548	28.9%	19.4%	51.7%	7.0%	40.2%	-2.0%	2,084,200	1,897,941	1,789,848	1,633,280	1,456,350
Bristol Temple Meads	7,875,686	25.6%	21.1%	53.3%	6.9%	39.6%	0.6%	7,829,628	7,082,102	6,548,859	6,066,239	5,641,372
Clifton Down	361,828	51.4%	39.1%	9.5%	20.6%	155.1%	28.4%	281,876	204,397	180,656	153,027	141,838
Filton Abbey Wood	598,032	40.5%	43.7%	15.8%	9.6%	58.4%	11.4%	536,958	457,611	410,630	401,325	377,552
Lawrence Hill	74,876	61.6%	20.8%	17.6%	10.0%	61.0%	11.2%	67,338	55,730	68,371	55,865	46,508
Montpelier	96,114	55.4%	25.0%	19.6%	8.1%	47.6%	13.3%	84,834	60,629	76,969	73,573	65,108
Parson Street	57,374	33.9%	33.9%	32.2%	51.3%	693.4%	22.9%	46,670	32,511	19,172	14,293	7,231
Patchway	49,812	53.3%	32.1%	14.6%	17.5%	124.4%	10.0%	45,280	44,929	42,463	33,957	22,202
Redland	86,426	49.0%	30.1%	20.9%	11.5%	72.6%	0.2%	86,234	61,394	66,852	55,529	50,063
Sea Mills	41,680	55.1%	33.9%	11.0%	4.1%	22.2%	14.6%	36,358	33,222	40,786	36,411	34,113
Severn Beach	88,504	35.5%	62.8%	1.7%	24.7%	202.1%	18.5%	74,712	54,034	38,202	37,088	29,295
Shirehampton	35,758	70.4%	18.0%	11.6%	3.8%	20.6%	4.3%	34,292	30,893	38,493	31,539	29,645
St.Andrew's Road	3,942	35.0%	51.6%	13.4%	-4.5%	-20.7%	10.1%	3,582	3,183	5,518	8,008	4,969
Stapleton Road	111,532	61.9%	17.3%	20.8%	8.8%	52.4%	7.7%	103,576	72,182	98,446	86,997	73,202

Table C.5: ORR Station Usage statistics (includes interchange)

Appendix D

Temple Circus underpass – visualisation

Appendix D Temple Circus Underpass – visualisation

General overview of Temple Circus showing all tunnel portals (view from west)

Temple Way portal (view from north)

Temple Way portal and Temple Circus (view from south)

Redcliffe Way portal (view from north-west)

Temple Gate portal and Temple Meads ramp (view from east)

Appendix E

Temple Circus Underpass – cost estimates

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Appendix E Temple Circus Underpass – cost estimates

E.1 Introduction

This technical note provides a high level cost estimate for the construction of a road underpass at Temple Circus. The purpose of the tunnel is to remove traffic from the surface level at Temple Circus in the area of proposed regeneration to improve pedestrian and cycle links to the City Centre from Temple Meads Station and the EZ. The location of the tunnel and potential portal locations are shown in Figure E.1. In order to provide a meaningful cost estimate for the construction of a tunnelled road underpass it is necessary to have an approximate understanding of at least the following issues:

- The length of the tunnel, determined by the position of the portals;
- The internal size, determined by the number of traffic lanes in each direction;
- An understanding of the internal servicing functions within the tunnel, determined primarily by an estimate of the number and type of vehicles the tunnel would likely convey; and
- Any other functions slip roads that may be desired.

Assumptions have been made in deriving the above to derive the likely layout for a tunnel in this location. These are summarised in section 3. The layout assumed is shown in Figure E.1.

E.2 Forms of construction

E.2.1 General and alignment

The main tunnel route considered connects the A4044 Temple Way south of Temple Bridge under the Temple Circus gyratory with the A4 Temple Gate north of the Clarence Road roundabout.

The tunnel will be located at a shallow depth and hence a cut and cover tunnel is appropriate. The type of tunnel and how it can be built is a function of the environment it is located in. Where possible it is usually less disruptive to construct cut and cover works offline resulting in a permanent alteration to the alignment of the road when complete. However, at this location there are new high rise office buildings on both sides of the Temple Way. Therefore construction would need to take place on the current road alignment and a system of temporary traffic diversions would be required.

The assumed alignment of the tunnel structures is shown in Figure E.1. The blue section represents a main tunnel of approximately 300m length. It is also assumed that the alignment will need to avoid the Clock Tower Yard building. This may affect feasibility of the scheme as the turning radius of the tunnel will be affected impinging on sight lines. If the tunnel needs to be aligned under this building then further works to maintain the building in its current position will be needed; these costs have not been considered at this stage.

E.2.2 Portal locations

The portals locations are a key part of the feasibility and requirements of the scheme. An assumption on these has been made to derive potential tunnel costs and these give rise to the overall tunnelled section of 300m as shown in blue in Figure E.1. It would appear feasible to reduce this length by moving the north portal southwards on Temple Way and hence reducing overall cost.

The tunnel length needs to consider the approach structures to take the roadway below ground. An approximate gradient of 6% has been assumed. This results in approach ramps of about 100m length including sag and crest curves, as shown in green in Figure E.1. The tie-in of these ramps to the existing road network is a critical area for any feasibility study. A tunnel excavation depth of about 10m has been assumed. Additional off-slips have also been considered as shown in red in Figure E.1. These are off slips only for traffic heading north.

E.2.3 Tunnel size

A cut and cover tunnel cross section is shown nominally in Figure E.2, though a central wall is not shown. There is likely to be a central wall both for structural reasons and for ventilation purposes. This is the normal form of construction for safe road tunnels. The walls will probably be constructed as embedded walls with an internal finish. There would also be a requirement for side walkways for safety reasons. The overall width for a two lane dual carriageway would be of the order of 24m overall. This is similar to other road tunnels of this type. This does not allow for any third lane/hard shoulder or slow crawler lanes.

It is assumed for this estimate that the roof slab of the tunnel will not be loaded by buildings loads. It is, of course, perfectly feasible to design the tunnel for such building loads and it is often done, to increase substantially the value of the land over the tunnel area, although it is not assumed in this report.

E.3 Cost estimates

E.3.1 Method of estimating

Two methods of assessing a cost estimate have been used:

- Unit-cost based assessment of a proposed tunnel length of 300m and the approaches and the potential slip roads. The method used is based on assessing the principal cost items associated with the anticipated tunnel form and length, as discussed above.
- The second method is based on the overall costs of tunnels and the regression lines used in TRRL Report 252. [6]

[6] TRRL Report 252 'Study of costs of cut and cover tunnel construction' by the Dept. of Transport, 1991. This report made an extensive study of the costs of tunnels both constructed and those proposed and estimated. The general approach used is adopted here. The TRRL report was prepared in 1991 with costs at a baseline of 1988. Estimates made in this report use costs adjusted to 2012 values.

Unit costs

This section identifies costs for unit metre lengths of tunnel. These figures may be used as an approximate estimate for different lengths of tunnel between 200m and 500m. Table E.1 shows civil engineering costs (£'000 per m).

Item unit	**Main tunnel** 2 x 2 lanes £x1000/m	**Main tunnel approaches** 2 x 2 lanes £x1000/m	**Secondary slip tunnels** 1 lane £x1000/m	**Secondary slip approach** 2 x 1 lane £x1000/m
Excavation	15	7	10	5
Walls	20	10	10	5
Roof and base	15	8	12	7
Roadway/finishes	10	10	7	7
Buildings & features	2	1	2	1
Environmental & Traffic diversions	10	10	10	10
TOTALS	72	46	51	35

Table E.1: Civil engineering costs

The TRRL report provides estimates of the unit cost of the Mechanical and Electrical (M&E) works for cut and cover tunnels, including lighting, ventilation, power, pumping, monitoring and safety equipment. The requirements for each of these items can vary considerably depending on several issues. Two of the key issues are the length of the tunnel and the number of vehicles using it per day. These determine the class of the tunnel as stated in BD 79 Road Tunnel Design.

The costs for M&E works vary from approximately 10% to 35% of the total tunnel costs. At this location it is anticipated that for a relatively short tunnel (less than 500m) the requirement for ventilation plant may possibly be avoided. However an approximate allowance of 20% of civil costs is used for the total M&E costs. Table E.2 shows M&E costs (£'000 per m).

Item unit	**Main tunnel** 2 x 2 lanes £x1000/m	**Main tunnel approaches** 2 x 2 lanes £x1000/m	**Secondary slip tunnels** 1 lane £x1000/m	**Secondary slip approach** 2 x 1 lane £x1000/m
Total M&E costs =20% of civil totals	14	9	10	7

Table E.2: M&E costs

E.3.2 Total costs

The total costs of elements of the proposed tunnel are shown in Table E.3.

Item amount	**Main tunnel** 2 x 2 lanes 300m	**Main tunnel approaches** 2 x 2 lanes 2 x 100m	**Secondary slip tunnels** 1 lane 100m	**Secondary slip approach** 2 x 1 lane 2 x 100m
Excavation	4,500	1,400	1,000	2,000
Walls	6,000	2,000	1,200	2,400
Roof and base	4,500	1,600	700	1,400
Roadway/finishes	3,000	2,000	200	100
Buildings & features	600	200	1,000	2,000
Environmental & Traffic diversions	3,000	2,000	1,000	2,000
Total Civil costs	21,600	9,200	5,100	10,200
M&E costs	4,320	1,840	1,020	2,040
TOTAL COSTS	25,900 **£25.9m**	11,000 **£11.0m**	6,100 **£6.1m**	12,200 **£12.2m**

Table E.3: Estimated total tunnel costs (2012 costs in £'000s unless indicated)

The total cost estimate using unit costs (including civil and M&E elements) for the main tunnel of 300m is therefore approximately £36m. The total cost for the main tunnel plus both slip roads is approximately £54m.

E.3.3 Cost estimate using regression lines

This is an alternative method of estimating using regression lines as presented in the TRRL report. Costs are determined based on length, width and cross sectional area as follows:

- Civil costs for main tunnel based on 24m width:
  - Tunnel length – for a tunnel of 300m the cost varies between £2.3k/m² and £6.9k/m². This gives a total average cost = £33m
  - Main Tunnel Approach lengths – for embedded walls, 100m length, average height 5m, the retaining walls (2No.) cost is £30k/m. The total cost (for 200m in length) = £6m
- Civil costs for slip roads and secondary tunnel and based on 8m width:
  - Tunnel length – for tunnel of 100m the cost varies between £2.3k/m² and £6.9k/m². This gives a total average cost = £3.7m
  - Main Tunnel Approach lengths – for embedded walls, 100m length avg. height 5m the average retaining walls (4No.) cost is £30k/m. The total average cost (200m) = £6m

The total civil costs for the main tunnel are £39m (with M&E costs this rises to £47m). This compares with the earlier £36m estimate (including M&E). The total civil costs for the main tunnel and the two slip roads are £49m (£59m with M&E). This compares with the earlier £54m estimate (which includes M&E).

E.4 Discussion

E.4.1 Exclusions

The following elements were excluded from the estimates:

- Costs over and above the norm for traffic diversions. At this location, being in congested central urban area, it may be necessary to increase the allowance made for this item to maintain a normal operating environment for traffic. This may be considered as approximately a further 5% to 15% of project costs.
- Protection of buildings and other enabling works from construction effects. This may be considered as approximately a further 5% of project costs.

Other costs not specifically considered include the operation and maintenance costs, though for a short tunnel of 200m to 400m these costs will be relatively low (in addition to normal road maintenance costs).

At the portals there will be a reduction in air quality. The detrimental effect of this on land values has not been considered. Conversely, the increase in land value over the tunnel has also not been considered.

E.4.2 Summary of estimates

Main tunnel

The total civil plus M&E cost of providing a dual 2 lane tunnel is approximately £86,000 per m length. With a 20% allowance this rises to £103,000 per m. The total civil plus M&E cost for a 300m length main tunnel, plus northern and southern approaches, is in the range of £37m to £47m. An allowance at this stage of 20% would give a cost estimate of approximately £44 to £56m.

Main tunnel plus potential slip roads

The total civil plus M&E cost for a 300m length main tunnel plus northern and southern approaches and two additional off-slip roads is in the range £54m to £59m. Adding the 20% allowance at this stage gives a total cost estimate of approximately £65 to £71m.

Note that the above cost estimates include an allowance for preliminaries within a contract.

Figure E.1: Assumed alignment of Temple Circus tunnel structures

(see next page)

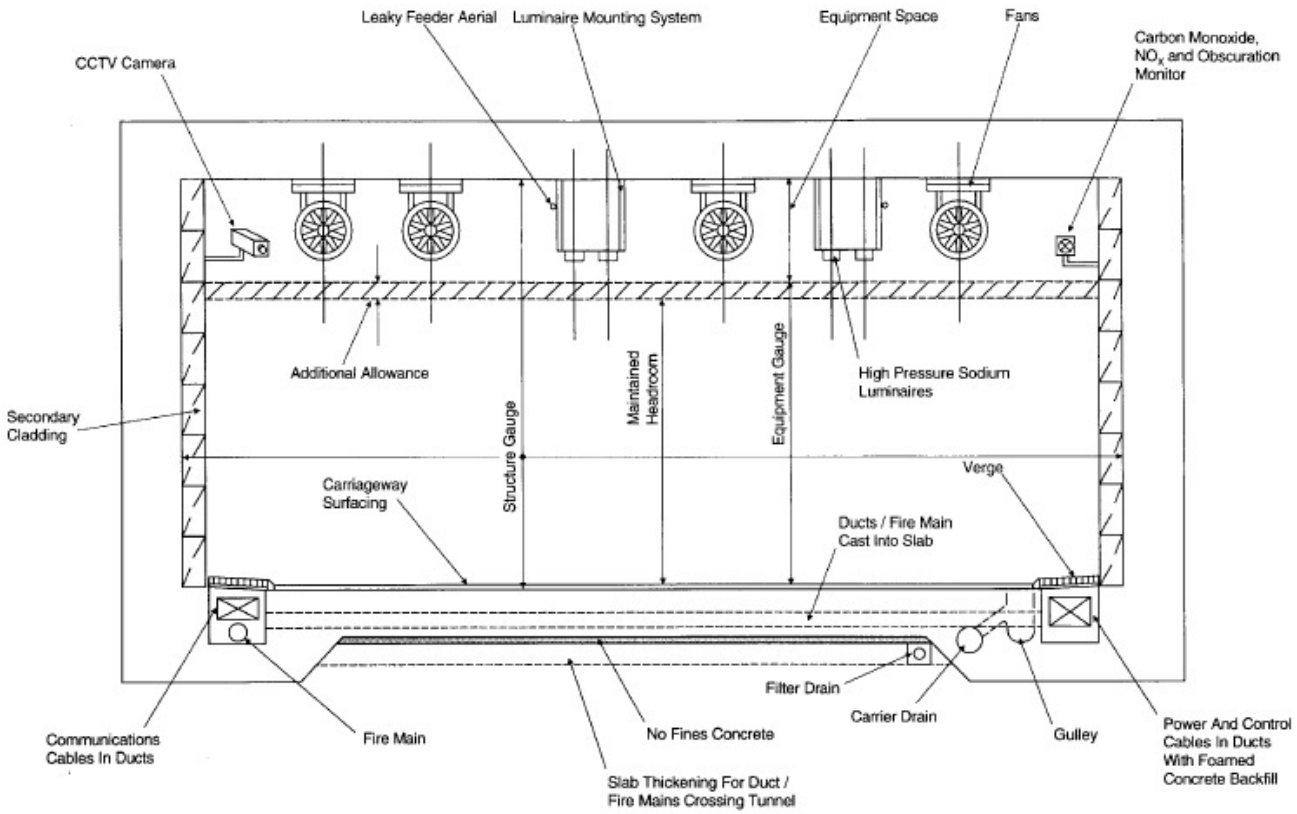

Figure E.2: Typical cut and cover tunnel section (looking in the direction of traffic flow)

NOTE: costs are indicative draft values

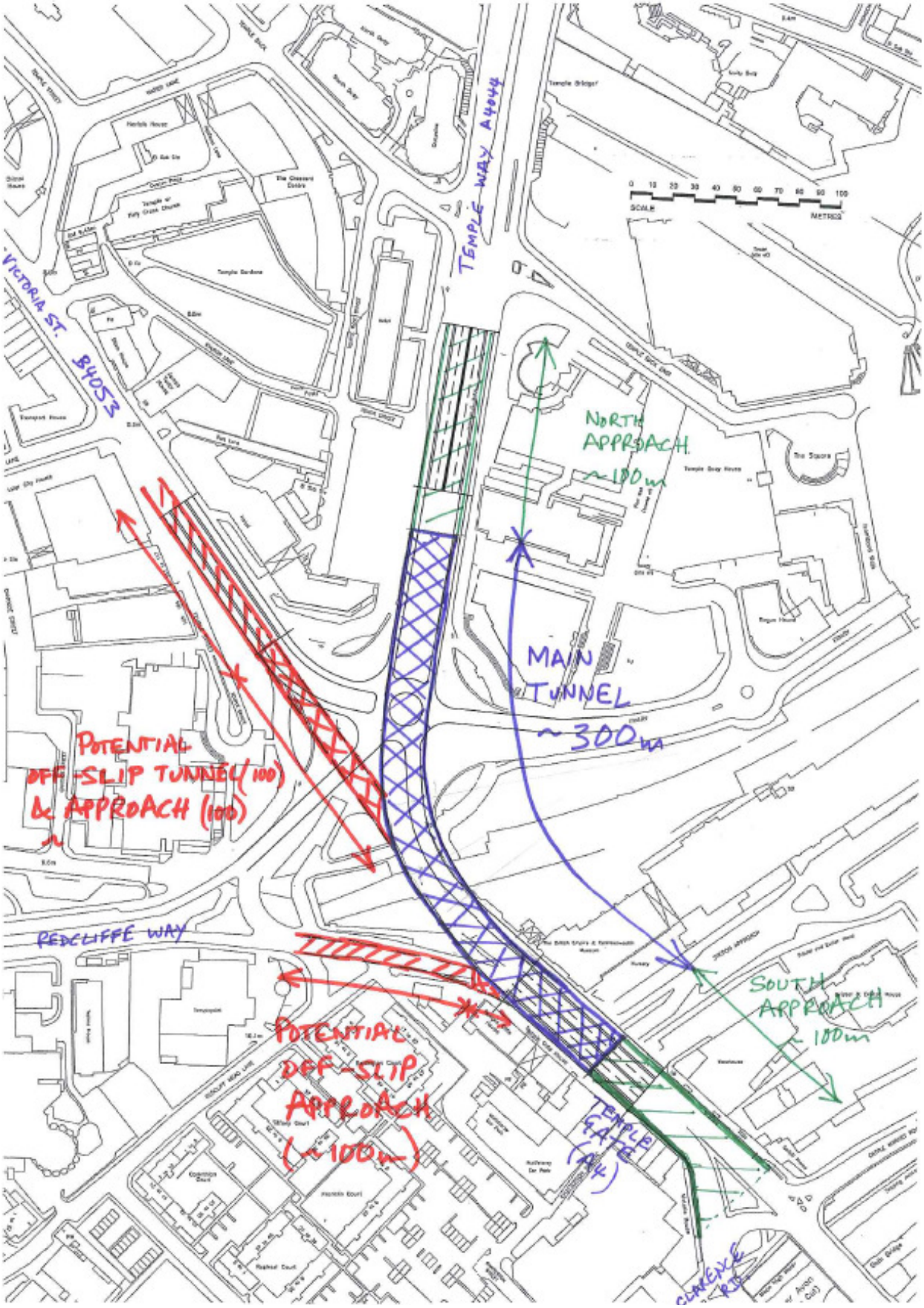

Figure E.1: Assumed alignment of Temple Circus tunnel structures

Appendix F

Temple Circus Footbridge – visualisation

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Appendix F Temple Circus Footbridge – visualisation

Temple Circus Footbridge general view – from Redcliffe Way

Ramp on Temple Way – looking south

Temple Circus Footbridge general view – from Temple Gate

Temple Circus with footbridge – from Temple Gate (south)

Temple Circus with footbridge – from Victoria Street

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