TRICS

Public Transport and Parking - The Effect on Mode Choice

Colin Eastman, Associate, JMP Consultants Limited

PPG 13 makes a number of proposal whereby the level of travel demand for travel to work purposes can be reduced. These include:

- *concentrate employment - intensive uses in locations well served by public transport*
- *concentrate higher - density residential development near public transport modes and corridors served by public transport*
- *juxtapose employment and residential uses ... to make it easier for people to live near their work*
- *make provision for cycling and walking.*

This paper reports on a recently completed study to look at how the demand for commuting transport is effected by the provision of public transport and parking space.

1 Background

1.1 The Regional Strategy policy document issued by SERPLAN emphasised the need to relate transport and land use and to seek ways to reduce the overall need to travel. A similar theme was set out in the Government's 1990 Green Paper - *This Common Inheritance* - where the concept of reducing the upward trend in CO_2 emissions was announced.

1.2 In 1992 the Transport Strategy Group of SERPLAN set up a Parking Study which was to look at how parking policy, in association with a comprehensive package of other planning measures, could be used to implement the overall policy of reducing travel demand. As part of this Study a joint collaborative arrangement was made between SERPLAN and TRICS to undertake and analyse surveys of parking demand and modal choice at a range of office developments.

1.3 In total 59 separate sites were included within the survey base. Questionnaires were handed out to some 23,000 employees and responses were obtained from some 14,000; a response rate of some 62 per cent.

1.4 The full list of surveyed sites are presented on a map base in Figure 1.

1.5 The sites were chosen to represent different locations. The categories are relatively crude and are very subjective in nature with the particular allocation to specific groups being open to interpretation. The categories were:-

(i)	Town Centre Core
(ii)	Town Centre
(iii)	Edge of Town
(iv)	Out of Town

1.6 Table 1.1 identifies the number of sites for which data is available within each of these groupings.

Table 1.1 Number of Sites/Surveys by Location

Location Category		Number of Sites	Number of Employees	Number of Survey Responses
1	Town Centre Core	15	9,406	5,482
2	Town Centre	17	5,320	3,647
3	Edge of Town	8	1,938	1,350
4	Out of Town	19	8,570	5,107
All Sites		59	25,234	15,586

Note (1) Includes the response rates from the 11 additional surveys which were not part of the main SERPLAN survey programme.

(2) Survey data not received for sites 11, 12 and 35 (See Figure 1.1).

2 Analysis

Employment Density

2.1 Table 2.1 below sets out the differing pattern of employment densities that occurs across the spectrum of locational categories. The range is very marked with a low value of around 15.6 sq m per employee in the core of the town centres to 25.9 sq m per employee in developments away from the centres. There is a range of over 50 per cent between the employment densities of different areas and, as will be seen from later analysis, this is one of the most important parameters in the consideration of trip generating characteristics. The difference in employment density is likely to be a direct function of land values, ie. the higher the land value the more efficiently one needs to use the space.

Table 2.1 Employment Density by Location

Location	GFA per Employee (sq m)
Town Centre Core	15.6
Town Centre	19.8
Edge of Town	25.9
Out of Town	23.2
All Sites	20.7

Arrival/Departure Patterns

2.2 The analysis indicates that 69 per cent of employees arrived during the peak hour (peak as defined by the individual site, which can vary slightly from the standard 8.00 - 9.00) while a slightly lower figure, 65 per cent, left within the evening peak. The peak half hour period is heavily concentrated in both the morning and evening period with about 44 per cent of employees arriving and leaving. Hence it can be seen that in the morning peak nearly two thirds of the peak hour's journeys are concentrated in just 30 minutes. This relationship was found to be approximately constant across all locational categories.

2.3 A separate analysis was undertaken to compare the arrival and departure patterns for those companies which stated that they operated a flexitime policy and those that did not. About half of the companies interviewed operated some form of flexitime. For these companies it was found that some 65 per cent of employees arrived in the peak hour whereas 75 per cent arrived in the same hour for those companies not operating flexitime a policy. In terms of trip generation rates these differences are significant.

Journey Time

2.4 The average travel time for all employees for their journey to work was found to be 27 minutes. There was, however, a large difference between the average travel time by private transport, at 26 minutes, and the travel time by public transport at an average of 47 minutes.

2.5 Table 2.2 compares the travel times for each of the different locations. It will be noted that there is no significant difference between any of the area types.

Table 2.2 Mean Journey Time by Modal Choice and by Site Location

Location	Private	Public	Others	All Modes
Town Centre Core	26	43	20	27
Town Centre	27	45	20	28
Edge of Town	28	60	17	29
Out of Town	24	46	14	25
All Sites	26	47	18	27

2.6 While the average journey times are around 26 minutes many employees travel significantly longer. Figure 2 plots the trip length patterns for all sites and it will be seen that the upper quartile value is 30 to 35 minutes and at least 10% of employees travel in excess of 50 minutes.

Parking Provision

2.7 The average car parking provision that existed at the surveyed offices was approximately 45 sq m GFA per space or 0.54 spaces per employee. This varied by type of location as shown in Table 2.3. It should, however, be noted that several companies had significant unused car parking space, which at times meant that there was up to two spaces per employee!

Table 2.3 Average Parking Provision Standard

Location	GFA per Space (sq m)	Spaces per Employee
Town Centre Core	69.4	0.32
Town Centre	48.8	0.53
Edge of Town	35.5	0.83
Out of Town	27.2	0.72
All Sites	44.8	0.54

2.8 Out of the 57 sites that have sufficient data, 10 were found to have parking spaces per employee ratios of above 0.9; ie. effectively at least one parking space per employee. For most of the remaining sites, employees were able to find free on-street parking space within easy walking distance of the office and in only 15 of the sites was there any real restraint on the use of the car imposed by means of parking control. Hence, whilst recognising that the survey is in no way a random selection of establishments, it was found that 85 per cent of all employees within the surveyed businesses were in firms that experienced no restraint on the use of the car by means of lack of parking provision.

2.9 In some of the sites where insufficient parking existed within the curtilage of the site the amount of parking that took place on-street around the development was quiet large. In one case it was noted that out of 159 car users to the office, 29 per cent used the car park while 65 per cent used free on-street parking.

2.10 The amount of parking that occurred in different types of space by locational type is set out below (Table 2.4) where it can be seen that 95% of drivers surveyed are currently able to make use of free spaces.

Table 2.4 Car Parking Type by Location

Location	Percentage of Car Drivers Using		
	Free		Charged
	On-Site	Off-Site	Off-Street
Town Centre Core	56	28	16
Town Centre	76	20	4
Edge of Town	96	3	1
Out of Town	96	4	0
All Sites	83	12	5

Units : Per Cent

Modal Split

2.11 The modal split for the journey to work is illustrated for each area type in the Figure 3. 'Private' is taken to include car driver, car passenger, taxi and motor cycle, whereas 'public' is taken to include bus, train and company coach. 'Others' consist largely of the non-motorised modes of walk and cycle. It will be seen from Figure 3 that the use of the private mode dominates all travel patterns. Even within the core town centre areas some three out of every four employees use private transport. One of the most significant factors is the increase in "Other" trips - largely walk trips - that occur within town centre sites.

Table 2.5 Modal Split by Motorised Modes

Location	Private	Public
Town Centre Core	82	18
Town Centre	92	8
Edge of Town	93	7
Out of Town	97	3
All Sites	91	9

2.12 When motorised modes only are considered it will be noted that typically out of town locations attract 97% of the trips by private car and this reduces to a level of 82% within the town centre cores. This is clearly not a large difference and reflects the fact that the analysis included few sites within heavily restrained areas. However the data base is believed to be an accurate reflection of the typical towns that make up the SERPLAN area and it should be remembered that representative sites where chosen from a number of the major towns within the area including Southampton, Brighton, Guildford, Watford and Chelmsford.

2.13 Figure 4 illustrates the range of modal split values that exist for each locational type. The mean values and standard deviations for each location type are indicated. It will be clear that there is a great deal of overlap between sites and areas. The analysis does, however, indicate a high degree of statistical significance between each category.

Modal Split and Parking Provision

2.14 Analysis was undertaken to attempt to relate modal split to the availability of parking. As has been illustrated above it is not realistic to consider parking provision to be solely a function of parking that occurs within the curtilage of the site as there is frequently free on-street parking that can be considered to be just as accessible as that within the site. From the previous analysis it was noted that only about 15 of the sites experienced any form of parking restraint. Figure 5 illustrates a graph of the percentage of drivers that used free parking space (the best proxy for parking availability) and the level of private transport modal split. While the graph illustrates a concentration of sites in one corner there is a pattern that emerges (albeit with a low statistical relationship) with reducing levels of free parking leading to reducing levels of car usage.

Modal Split and Public Transport Provision

2.15 There are a number of different ways that public transport accessibility could be defined. As the journey to work trips are relatively long (an average of 30 minutes for car trips and 45 minutes for public transport trips) it was felt that some recognition of the scale of the network coverage was likely to be more important than an assessment of the number of bus or train services passing the site. It was, therefore, decided to define public transport accessibility as the relative catchment area population that could be reached within a set travel time by public transport compared with the size of the area that could be reached in the same time by private transport.

2.16 The definition of the catchment areas was undertaken either by the County Council or by the Study Team. A few simple rules were used to produce as much consistency as possible. These were:

Private transport travel times to be based on typical peak period travel conditions.

Public transport travel times were based on:

- including bus services within 10 minutes walk or train services within 15 minutes walk
- excluding bus services with a service of 2 or less buses per hour
- assume 5 minutes wait time
- assume 5 minutes for every interchange
- assume timetabled travel times
- assume a maximum of 10 minutes walk from bus or 15 minutes walk from train at the home end.

Catchment areas population were calculated from 1991 census data based on parish or approximate sub-division of district level.

2.17 It was necessary to define catchment areas prior to the initial analysis of the survey results and hence a value of 45 minutes by both car and public transport were chosen. Catchment area populations were defined for each of the 59 sites.

2.18 Public transport accessibility was, therefore, defined as:

$$\text{Public transport accessibility} = \frac{P_{PUB45}}{P_{PUB45} + P_{PRIV45}}$$

where P_{PUB45} *is the population within 45 minutes travel time by public transport*
P_{PRIV45} *is the population within 45 minutes travel time by private transport.*

2.19 Figure 6 shows typical catchment areas for four different sites. It is clear from the illustrations and from tabulation that generally the catchment area by car is many times greater than that by public transport, that is, within a given 45 minutes travel time many more people have the opportunity of travelling to a site by car than by public transport.

2.20 Figure 7 illustrates the relationship between pubic transport accessibility and modal split. Unfortunately the relationship is not clear as so much of the data occurs in the top corner and there is insufficient spread of data. More data from Inner London areas would help establish any relationship. However, it should be noted that the database contains sites from part of the Outer London Boroughs where 6 sites from the London Borough of Hillingdon merge indistinguishably with sites from other town centres.

3 Summary of Survey Results

3.1 The analysis of the data recorded the following (not all of these conclusions have been fully explained in the text of this synoptic report):

- the employment densities within buildings is much higher in town centre areas than out-of-town areas with a GFA of 16 sq m per employee in core town centre areas rising to 26 sq m GFA per employee in areas outside the town centre
- about 70% of employees arrive at work in the peak hour while 65% leave in the evening peak
- the average trip length for the journey to work is 26 minutes by private transport and 47 minutes by public transport
- trip lengths do not seem to differ significantly by area
- approximately 25 per cent of work trips are over 35 minutes in length and 10 per cent are over 50 minutes
- the percentage of trips as passengers does not differ much by area, the average figure being 12 per cent
- about 9% of travellers claim to be in some organised form of car sharing
- there is a significant increase in "walk" trips in town centre locations
- the average modal split (motorised modes) for out of town developments is 97 per cent to car and this drops to 82 per cent in town centre cores
- the average car parking provision in out of town locations was 1 space per 27 sq m, in town centre locations this fell to 1 space per 69 sq m
- public transport accessibility was defined on the basis of catchment areas within 45 minutes travel time
- the public transport accessibility index is of the same order of magnitude as the public transport usage.

3.2 Further analysis suggested that:

- the use of flexitime hours contributed to the "spreading" of peak hour arrival and departure patterns
- only a maximum of 15 sites experienced any form of car parking restraint and many employees made use of free on-street parking spaces if insufficient space existed on-site.

3.3 The study has identified a number of areas where further research work could be usefully carried out, these include:

- look at further sites in more restrained areas
- look at areas such as Oxford to assess the effect of parking restraint being applied over a long period

- look at individual companies who have recently relocated in order to assess "before and after" travel patterns.

4 Discussion

4.1 This study was designed to assess how the application of the "carrot and the stick", that is, public transport provision and parking restraint, might effect modal split for the journey to work. The range of the results obtained, with only one site exhibiting a modal split to public transport of greater than 25%, limits the full range of analysis that would have been more helpful. However, the study has provided a wealth of data and provides this opportunity to discuss a few theories and issues that are relevant to the current debate finding ways to reduce the need to travel.

The Effect of Employment Density

4.2 As identified in the previous sections the utilisation of office space has a marked effect on trip generation. If one takes as an example a 10,000 sq m office development and compares its theoretical trip generation characteristics for different locations it is found that the block attracts more trips in a town centre location than in an out of town location. Based on the data derived from the surveys the 10,000 sq m block in the central area attracts 425 car trips while the same block in an out of town area would only generate 350 car trips. The workings are given in the following table.

Table 4.1 Trip Generation by Location

Area	Assume 10,000 sq m Office				
	Employment Density sq m/ Employees	Number of Employees	Modal Split By Private	Number of Trips by Car	Number of Car Trips (i)
Town Centre Core	15.6	540	82%	525	425
Town Centre	19.8	505	92%	465	400
Edge of Town/Suburban	25.9	385	93%	360	320
Out of Town	23.2	430	97%	415	350

Note (i) Assumes car occupancy figures

4.3 This series of assumptions is not just a theoretical presentation of the data, the results of the surveys identified a similar pattern with car driver trip rates being found to be as follows:

Table 4.2 Car Trips, per Day, by Location

Location	Journey To Work Car Trips per Day per 100m² GFA
Town Centre Core	4.36
Town Centre	3.97
Edge of Town/Suburban	3.30
Out of Town	3.72
All Sites	3.95

4.4 It can, therefore, be seen that the effect of employment densities carries more weight than the change of modal split. Hence, it can be concluded that offices in town centres generally generate more trips than similar sized offices on the edge of towns.

The Effect of Journey Times

4.5 Not surprisingly the analysis has identified that journey to work by public transport takes, on average 50% longer than journeys by car. Typically the public transport journey involves an additional 40 minutes of travel a day.

4.6 This extra travel time is a considerable erosion of the employees' spare time. If one assumes that the average person sleeps for 8 hours, is at work for 9 hours and travels for 1 hour, this extra 40 minutes of travel by public transport consumes some 10% of the remaining time. In the widest context of the environmental assessment of transport this must be seen to be of considerable disadvantage. This loss of "disposable" or "free time" has a direct effect on the quality of life of the person involved and their family.

4.7 It should also be noted that it is frequently the most disadvantaged section of the community that do not have the luxury of having a car that need to spend this extra time travelling.

The Role of Public Transport

4.8 The general perception of the solution to rising car use is that developments should be located at existing centres served by public transport and that public transport should be enhanced so as to encourage a significant shift of modal split.

4.9 It is worth looking at a few typical sites included within the study to see what sort of level of change in public transport provision might be necessary to bring about a change in public transport usage. The 4 sites in Figure 6, illustrated to the same scale, show the extent of the public transport network that currently exists for typical sites with 98%, 91%, 81% and 53% modal split by car. Although every site has particular characteristics that effect the modal choice, these sites were chosen as being typical.

4.10 It can be seen from the illustrations the extent of the increase in public transport network that would be required to make any significant reduction in the use of the car (all other issues being constant). To reduce car use from 98% to 81% the public transport network at site one would need to look like that of Site 3 and to reduce car use to 53% the network would need to look like Site 4. Such wholesale increase in the provision of public transport is an unrealistic proposition. Other than the costs of the capital works being well beyond anything that is reasonable, the environmental impact of building new rail links and highways to carry bus routes would be an unacceptable intrusion on the environment of the locality.

The Role of Parking Restraints

4.11 If it is not possible to markedly improve "the quality of the carrot" the next option must be to consider "increase the length of the stick", that is, using restrictive car parking standards.

4.12 It is of interest that a number of firms within the survey had recently re-located to out of town locations from town centre or suburban locations. Many stated that increased accessibility or increased parking provision was one of the main reasons for this.

4.13 The results of a more reliable survey were published by Christine Howick (Property Market Analysis) in January 1993 which referred to in depth interviews with companies on the move. Of offices located within central London the main disadvantage of their current location was stated to be the lack of access and communication (75%). Companies that had recently moved to business parks stated that the main advantages were seen to be:

- good location 25%
- access to motorway 25%
- good parking 24%
- extra space 20%
- attractive environment 20%
- general improved transport 15%.

When asked to list the most essential ingredient of their new office location 90% stated parking. 75% of all firms referred to needing one space per employee and the other 25% wanted more!

4.14 The problem with trying to use "the stick approach" to reduce travel demand is that it cannot be applied retrospectively to existing offices and most companies have the option of avoiding locations where such restrictive policies might be applied. Many Local Authorities are now actively seeking inward investment and are wishing to attract blue chip companies as a means of reducing local unemployment. Faced with the option of accepting "an IBM" in an out-of-town business park or "no IBM at all" leaves the local planning authority with no realistic choice but to bow to the desire of the developers.

4.15 The ability to seek low parking provision within developments is severely restricted by the chain of separate interests involved. Normally each new office has three separate parties, the developer, the financial institutions, and the tenant. It is in each of their interests to ensure that the building is as marketable as possible at all stages in its life cycle. Just because the first tenant may be prepared to accept low parking provision this is no guarantee that any subsequent tenant may be prepared to accept the same restrictions.

4.16 Two parallel examples illustrate the same problem but in different fields. When the Royal Mail designs new mail sorting depot facilities there is a corporate policy that prevents them from designing specialist buildings - every building has to be designed to accommodate an industry standard specification such that the building has a high potential resale value. A similar pattern emerges in the retail market where superstores will use industry standard floor loadings for design purposes. These are 50% thicker than their needs, but the specification would meet the needs of potential occupiers should the building be required to be marketed.

4.17 For similar reasons developers will not volunteer to adopt parking standards with less than ideal levels.

4.18 The options for reducing car travel by seeking to control the planning process would, therefore, seem to be limited. Individual authorities can adopt restrictive parking policies in conjunction with on-street control measures but the general effect will be to encourage firms to relocate elsewhere. Hence, restraining car use in one area leads to growth in another. The growth of development along the M4 corridor and around the M25 ring is an obvious example of this.

The Effect of CO_2 Emission

4.19 The recent DOE/DOT study on the potential for reducing travel demand as a means of reducing CO_2 emissions concludes that:

> "Reductions in transport emissions from journey to work will be encouraged by:
>
> - the concentration of employment uses in existing centres served by public transport
> - high-density residential developments concentrated at transport routes and in corridors served by public transport

- the release of adequate housing land in suitable locations within existing areas to maximise the possibility for households to locate close to their places of work"

4.20 While the current study has not had the opportunity to consider some of the wider evidence, the data produced does not readily support such thesis as they might effect the SERPLAN County Councils. For instance, Figure 8 illustrates CO_2 emission at differing traffic speeds, clearly trips to offices in congested urban centre generate more CO_2 that trips to offices located in non-congested out-of-town areas. The argument for concentrating development in existing centres must therefore be based on the thesis that the transference from car to public transport has a greater effect on emission levels than the increased emission arising from slower speeds. The existing data from the Shire Counties does not easily support such an argument.

Postscript

4.22 It should be noted, however, that reducing travel is not necessarily the same thing as reducing congestion. Schemes to spread the peak would make highway and public transport investment more efficient, carry more people and reduce congestion. There may, therefore, be much greater scope in considering policies such as car sharing schemes, home working, flexitime, changing school hours, etc.

Notes:

SERPLAN - ***(The London and South East Regional Planning Conference)***
A regional planning organisation constituted by the London Borough Councils and the County and District Councils for Bedfordshire, Berkshire, Buckinghamshire, East Sussex, Essex, Hampshire, Hertfordshire, the Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex.

TRICS - ***(Trip Rate Information and Computer System)***
A computerised database system under the ownership of seven county councils (Dorset, East Sussex, Hampshire, Kent, Surrey, Berkshire and West Sussex) and managed and marketed by JMP Consultants Limited.

** Note:* *This study arose through a joint collaboration arrangement between SERPLAN and TRICS. The SERPLAN Counties and Dorset undertook surveys at a number of office sites. TRICS provided a research budget of £10,000 to enable the analysis and reporting of the data to be undertaken by JMP Consultants Ltd.*

Note: This paper is a synopsis of a report that was prepared by JMP Consultants Ltd for TRICS in consultation with SERPLAN officers. Any views expressed should not be regarded as the views of the SERPLAN conference itself. A full version of the report is available from JMP Consultants Ltd, 172 Tottenham Court Road, LONDON, W1P 9LG for £40 plus VAT.

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CRE/MSF/5424/025/10.9.93.

Location Map of Office Sites

Figure 1

SERPLAN SURVEY SITES (Sites 1 to 51)

Bedfordshire
1. Howard House, Bedford (Edge of Town)
2. Nolts Chartered Accountants/BIS, Luton (Town Centre)
3. Shanks & McEwans, Aspley Heath (Out of Town)
4. Ernst & Young, Luton (Out of Town/Suburban)

Berkshire
5. ICL, Bracknell (Town Centre)
6. Shire Hall, Reading (Out of Town)
7. Avis, Bracknell (Out of Town)
8. HFC, Winkfield (Out of Town)

Buckinghamshire
9. NHBC HQ, Amersham (Edge of Town)
10. Equitable Life, Aylesbury (Town Centre)
11. Abbey National, Milton Keynes (Edge of Town)
12. Dunn & Bradstreet, High Wycombe (Edge of Town)

Dorset
13. Barclays International, Poole (Town Centre Core)
14. Dorset House, Bournemouth (Town Centre)
15. GPT Telecommunications Systems Group, Poole (Out of Town)
16. British Gas, Poole (Suburban/Out of Town)

East Sussex
17. Southern Water, Brighton (Edge of Town)
18. British Telecom, Brighton (Town Centre Core)
19. Private Patient Plan, Eastbourne (Town Centre)
20. Dental Practise Board, Eastbourne (Town Centre)

Essex
21. M+G Assurance Company, Chelmsford (Town Centre Core)
22. Royal London Insurance, Colchester (Town Centre Core)
23. First Data Resources, Basildon (Suburban/Out of Town)
24. Charter Court Business Park, Colchester (Suburban/Out of Town)
25. NatWest Business Centre, Brentwood (Suburban/Out of Town)

Hampshire
26. Barclays International, Southampton (Town Centre)
27. B&Q Head Office, Chandlers Ford (Edge of Town)
28. Moore & Batch, Southampton (Town Centre)
29. Mott Macdonald, Winchester (Town Centre Core) - Pilot Survey
30. Southern Water HQ, Otterbourne (Out of Town)
31. Zurich Insurance, Portsmouth (Town Centre Core)

Hertfordshire
32. Mercury Communications, Elstree (Edge of Town)
33. Iveco, Watford (Town Centre)
34. Nissan, Maple Cross (Out of Town)
35. Data Unavailable

Isle of Wight
36. HM Tax Office, Newport (Town Centre Core)
37. Southern Water, Newport (Town Centre)
38. NFI, Newport (Out of Town)

Kent
39. Kent CC Offices, County Hall, Maidstone (Town Centre Core)
40. LLoyds of London, Chatham (Town Centre Core)
41. HM Land Registry, Hawkenbury, Tunbridge Wells (Edge of Town)
42. Gillingham Business Park, Gillingham (Out ofTown)

Surrey
43. Biwater, Dorking (Edge of Town)
44. British & American Tobacco, Staines (Town Centre)
45. Surrey CC, West Ewell (Edge of Town)
46. Peat Marwick, Guildford (Town Centre)

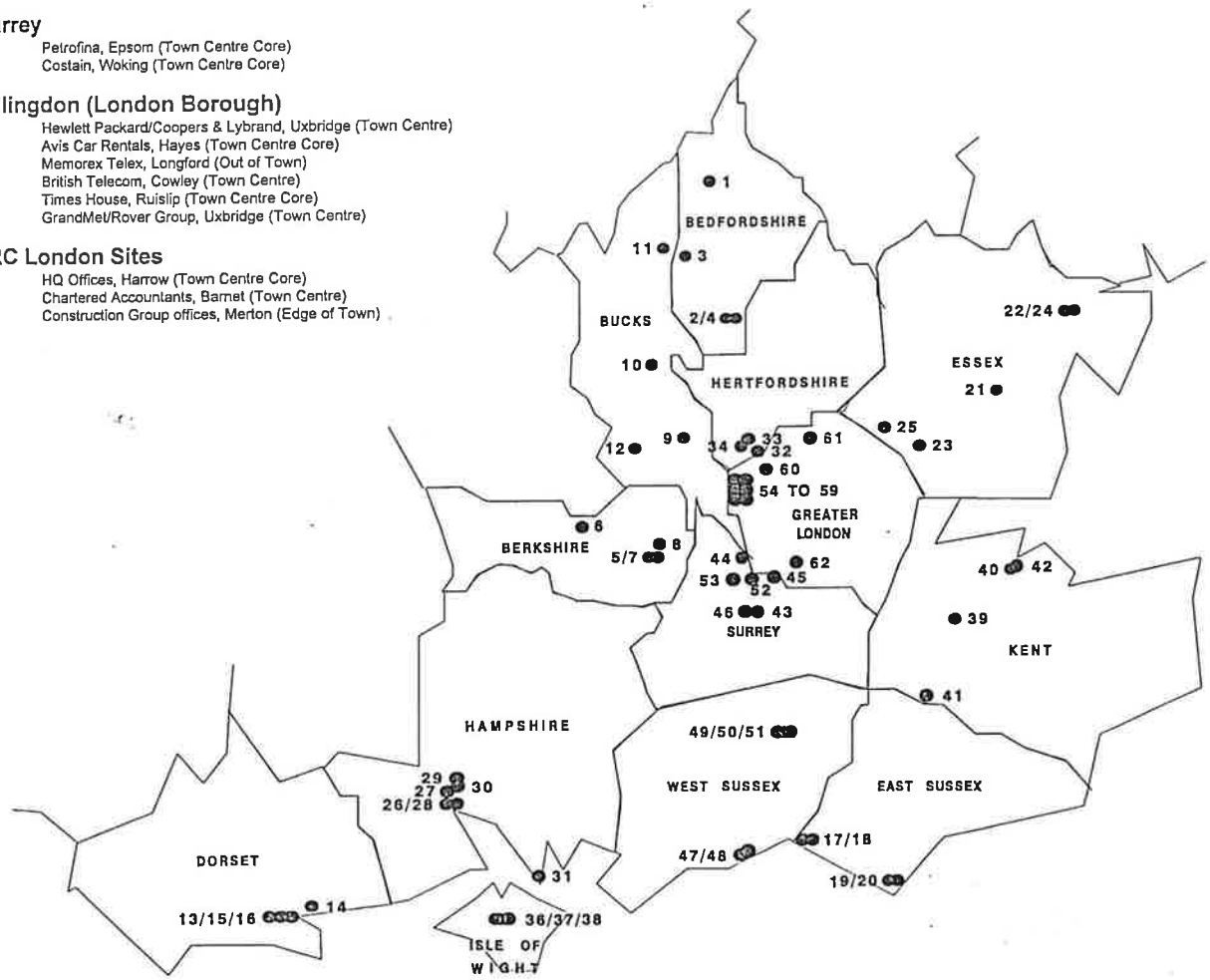
West Sussex
47. Southern Water, Worthing (Suburban/Out of Town)
48. London and Edinburh Insurance Group, Worthing (Suburban/Out of Town)
49. District Council Offices, Horsham (Town Centre)
50. Sun Alliance, Horsham (Town Centre Core)
51. CIBA/GEIGA, Horsham (Suburban/Out of Town)

ADDITIONAL SITES (Sites 52 to 62)

Surrey
52. Petrofina, Epsom (Town Centre Core)
53. Costain, Woking (Town Centre Core)

Hillingdon (London Borough)
54. Hewlett Packard/Coopers & Lybrand, Uxbridge (Town Centre)
55. Avis Car Rentals, Hayes (Town Centre Core)
56. Memorex Telex, Longford (Out of Town)
57. British Telecom, Cowley (Town Centre)
58. Times House, Ruislip (Town Centre Core)
59. GrandMet/Rover Group, Uxbridge (Town Centre)

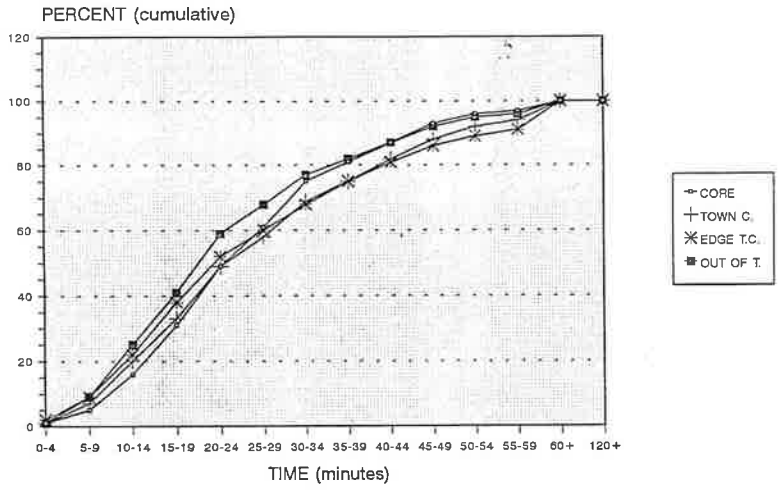
LRC London Sites
60. HQ Offices, Harrow (Town Centre Core)
61. Chartered Accountants, Barnet (Town Centre)
62. Construction Group offices, Merton (Edge of Town)



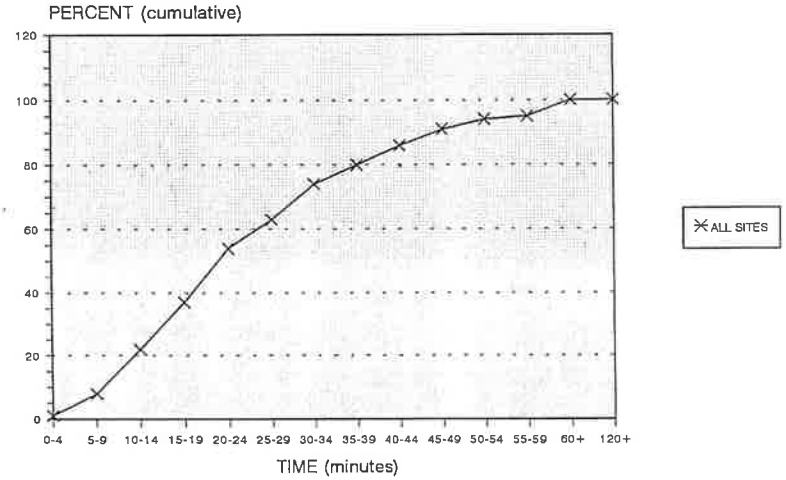
Average Journey Times

Figure 2

AVERAGE JOURNEY TIME BY LOCATION



AVERAGE JOURNEY TIME - ALL SITES



Average Modal Split by Location (Percent)

Figure 3

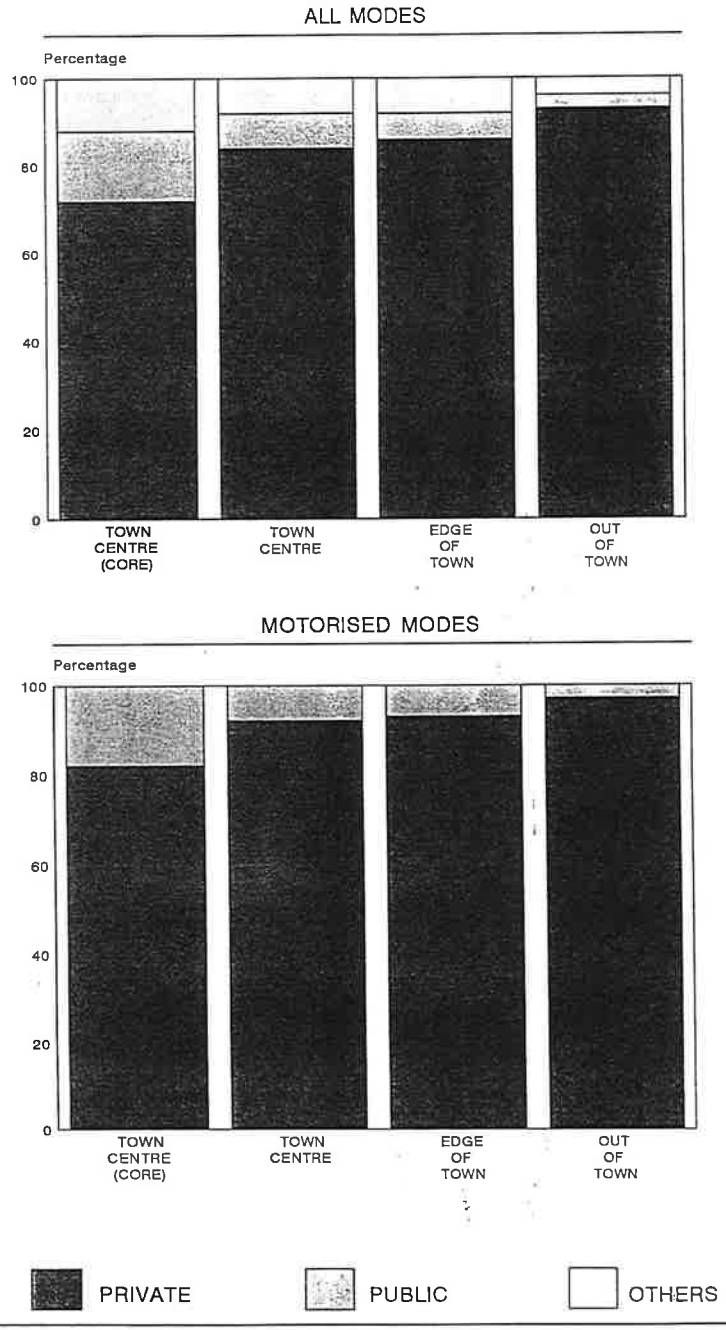


Figure 4

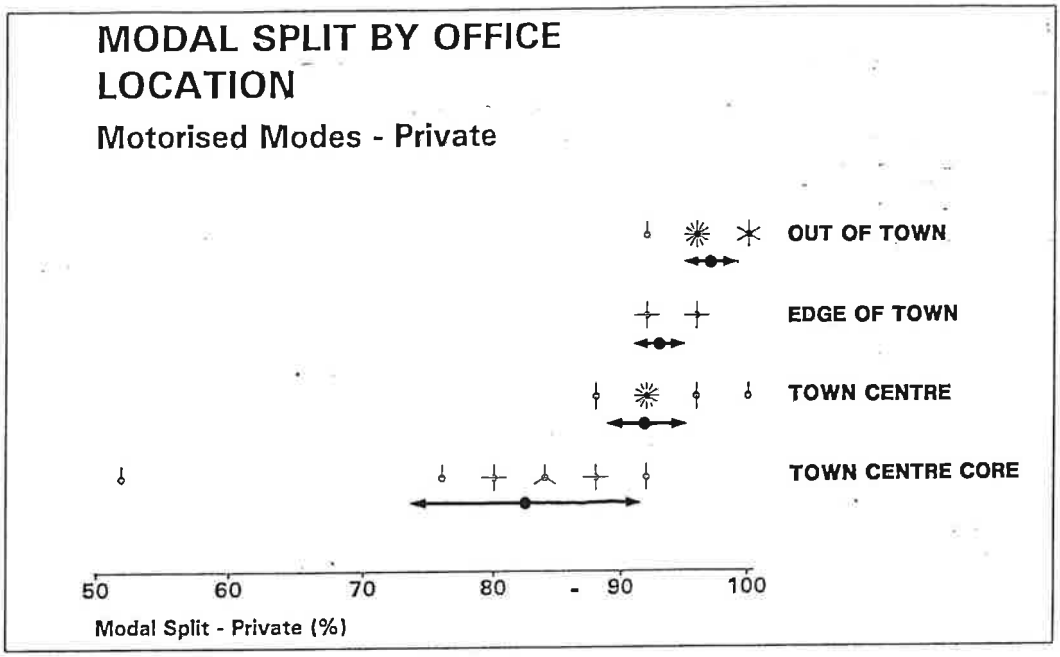
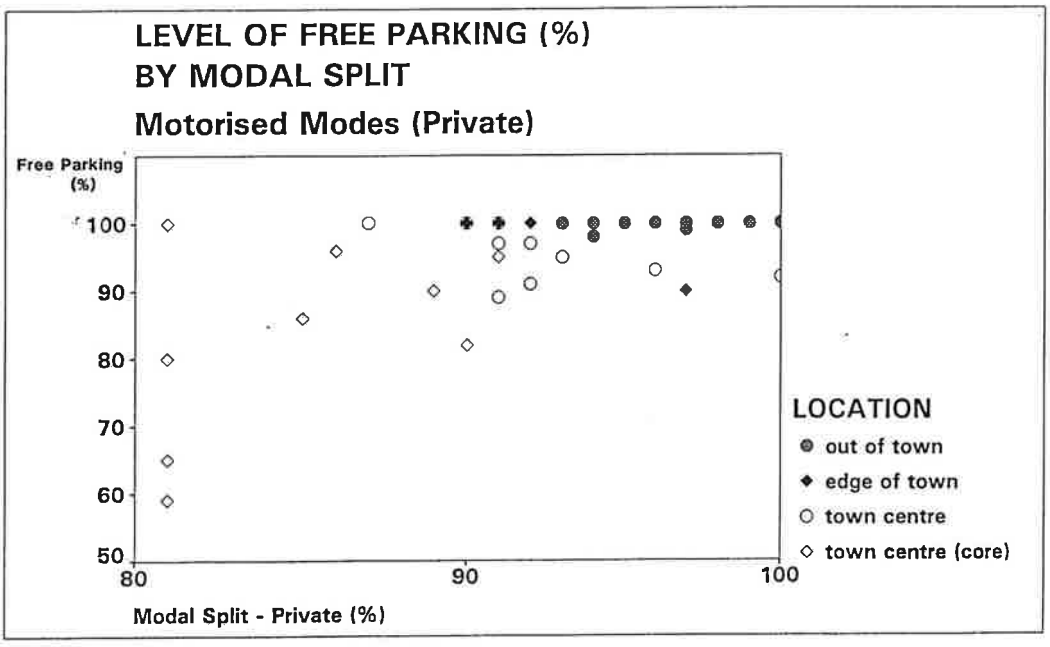
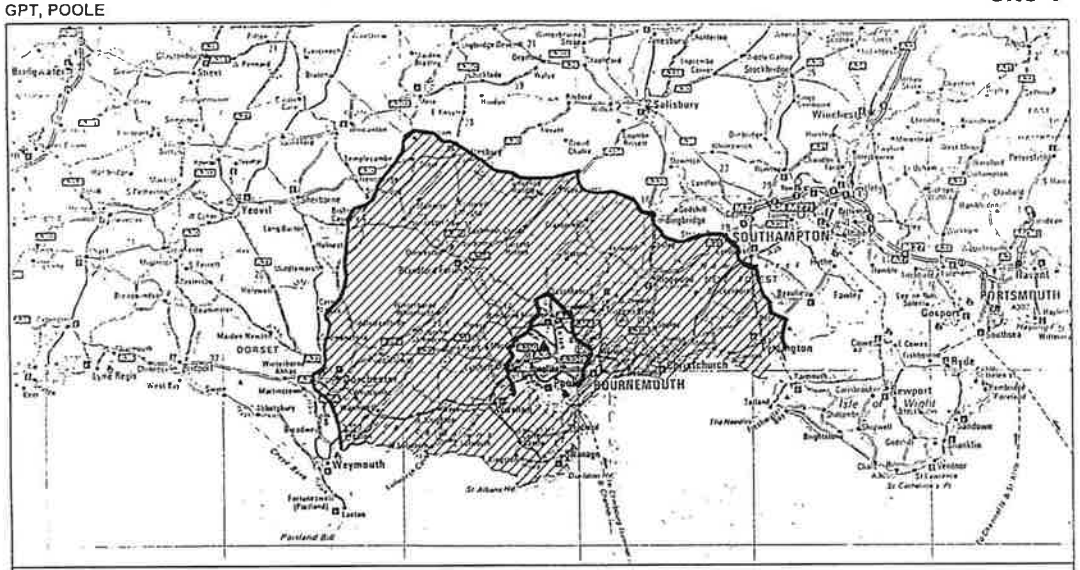


Figure 5



TRAVEL TIME ISOCHRONES (45minutes)
GPT, POOLE

Site 1



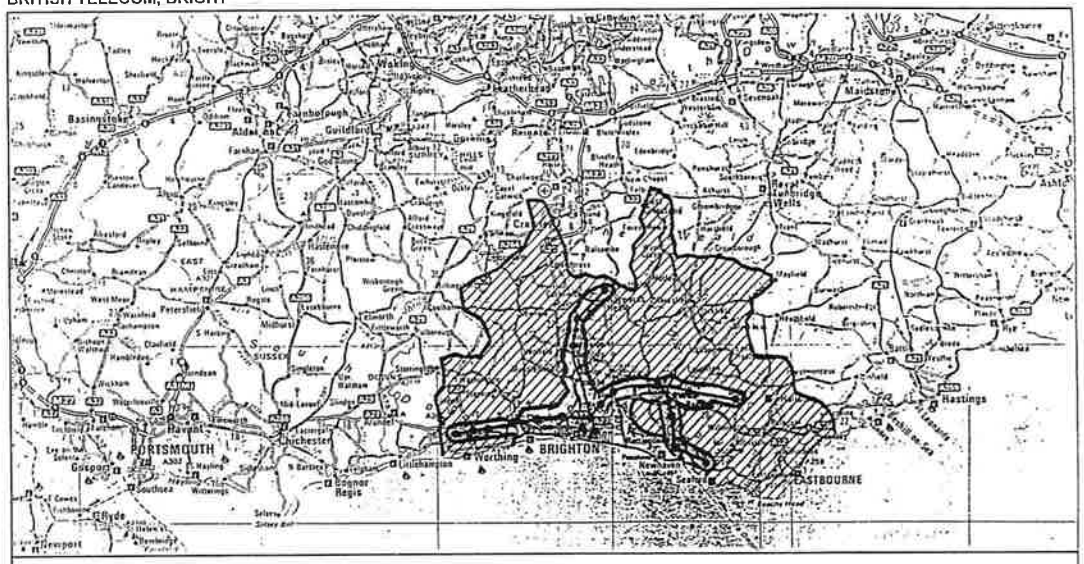
MODAL SPLIT - PRIVATE = 98%
(MOTORISED MODES)

POPULATION CATCHMENTS
PRIVATE = 593 863
PUBLIC = 150 493

RATIO
(% PRIVATE : % PUBLIC)
80 : 20

TRAVEL TIME ISOCHRONES (45minutes)
BRITISH TELECOM, BRIGHT

Site 3



MODAL SPLIT - PRIVATE = 81%
(MOTORISED MODES)

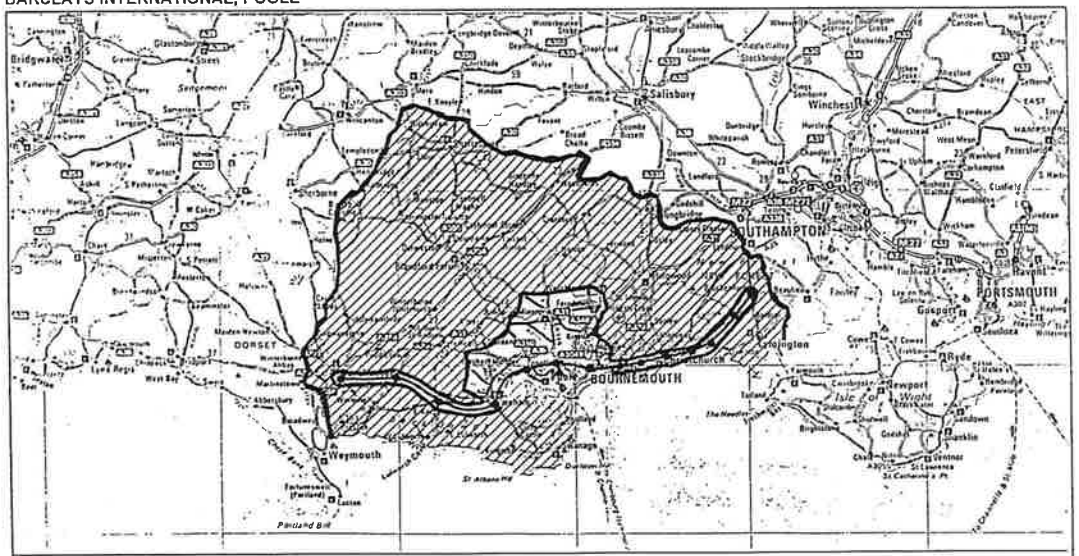
POPULATION CATCHMENTS
PRIVATE = 633 700
PUBLIC = 308 293

RATIO
(% PRIVATE : % PUBLIC)
67 : 33

Figure 6

TRAVEL TIME ISOCHRONES (45minutes)
BARCLAYS INTERNATIONAL, POOLE

Site 2



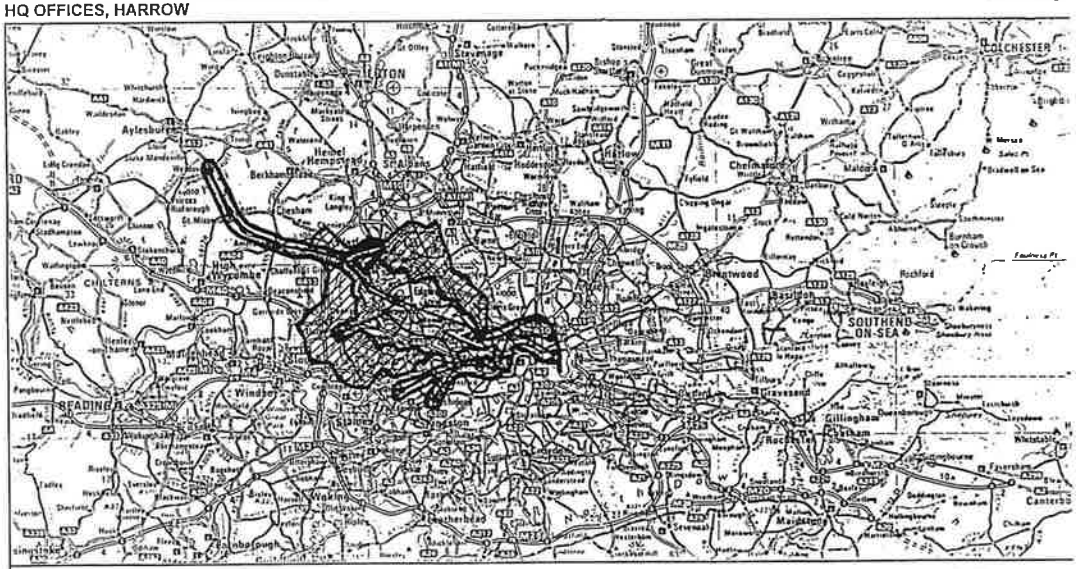
MODAL SPLIT - PRIVATE = 91%
(MOTORISED MODES)

POPULATION CATCHMENTS
PRIVATE = 596 868
PUBLIC = 277 658

RATIO
(% PRIVATE : % PUBLIC)
68 : 32

TRAVEL TIME ISOCHRONES (45minutes)
HQ OFFICES, HARROW

Site 4

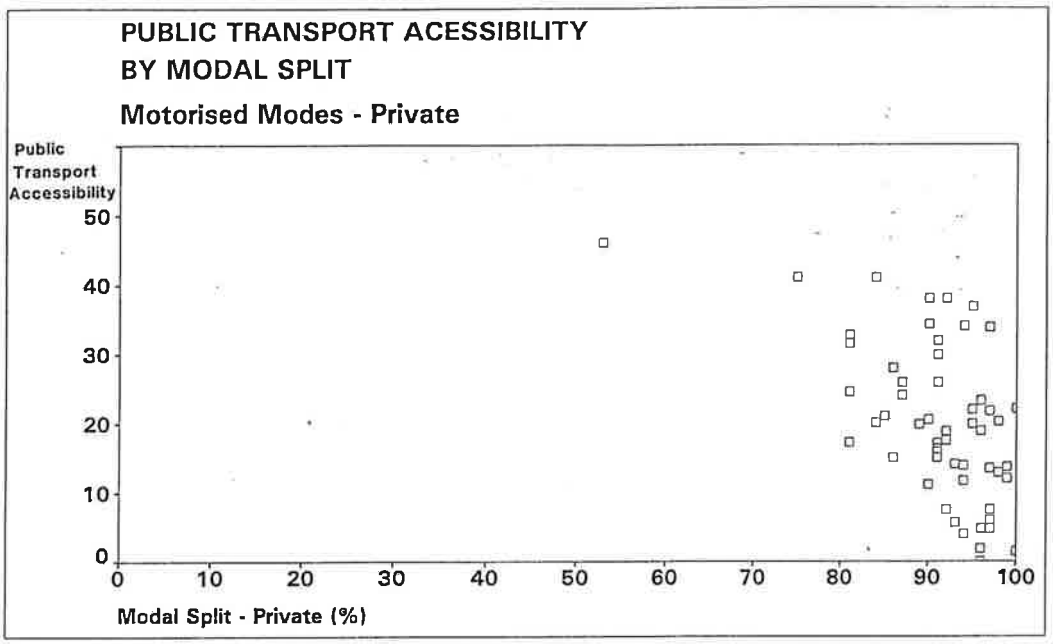


MODAL SPLIT - PRIVATE = 53%
(MOTORISED MODES)

POPULATION CATCHMENTS
PRIVATE = 1 124 300
PUBLIC = 961 430

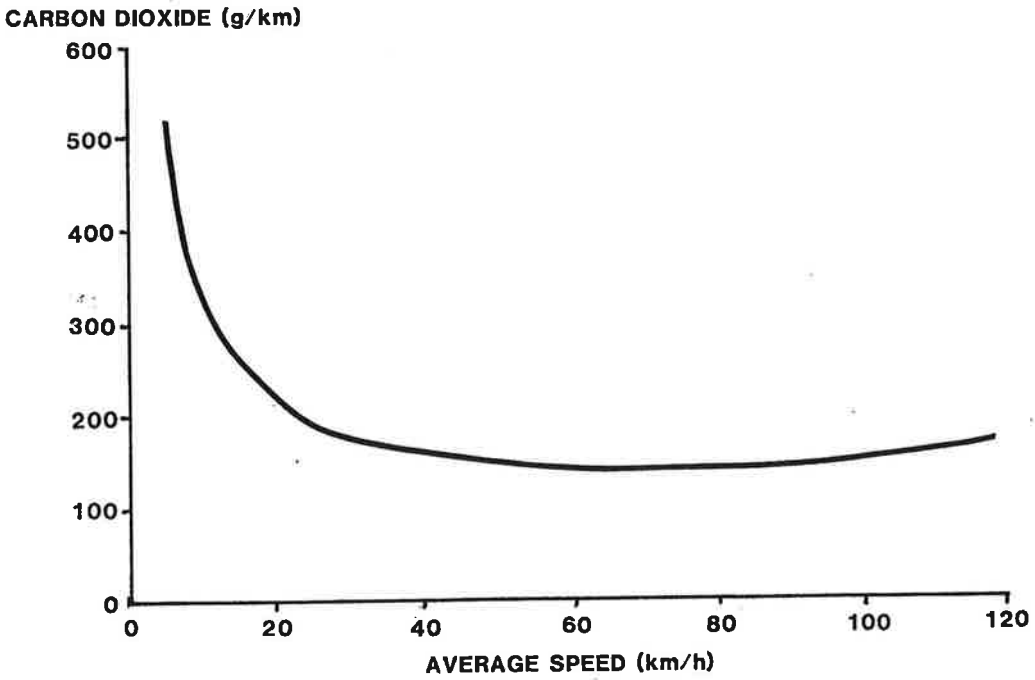
RATIO
(% PRIVATE : % PUBLIC)
54 : 46

Figure 7



CO_2 Emission by Vehicle Speed

Figure 8



PARKING AND PUBLIC TRANSPORT - THE EFFECT ON MODE CHOICE A STUDY OF B1 DEVELOPMENTS

MR MALCOLM S FOSTER AND MR COLIN R EASTMAN

1. BACKGROUND

The Regional Strategy policy document issued by SERPLAN emphasised the need to relate transport and land use and to seek ways to reduce the overall need to travel. A similar theme was set out in the Government's 1990 Green Paper - *This Common Inheritance* - where the concept of reducing the upward trend in CO_2 emissions was announced together with a Study designed to assess the extent to which land-use planning could contribute to the reduction in travel demand and hence vehicle emissions [1]. In parallel to these discussion both LPAC and SERPLAN were looking for ways to advise their respective members on the parking standards that should be adopted in order to develop an integrated approach to transport demand management.

In 1992 the Transport Strategy Group of SERPLAN set up a Parking Study which was to look at how parking policy, in association with a comprehensive package of other planning measures, could be used to implement the overall policy of reducing travel demand. As part of this Study a joint collaborative arrangement was made between SERPLAN and TRICS to undertake and analyse surveys of parking demand and modal choice at a range of office developments located throughout the SERPLAN area. The objective of the study was to seek a relationship between the modal choice for the journey to work and public transport and parking availability. As part of the Study each County Council was asked to undertake surveys at four sites within their area.

In total 59 separate sites were included within the survey base. Questionnaires were handed out to some 23,000 employees and responses were obtained from some 14,000; a response rate of some 62 per cent.

Each of the sites were allocated to a 'locational category' based on a perceived understanding of their characteristics and some preliminary analysis. These categories are relatively crude and are very subjective in nature with the particular allocation to specific groups being open to interpretation. The categories were:-

(i) Town Centre Core
(ii) Town Centre
(iii) Edge of Town
(iv) Out of Town

Table 1 identifies the number of sites for which data is available within each of these groupings

2. ANALYSIS

2.1 Employment Density

Table 2 sets out the differing pattern of employment densities that occurs across the spectrum of locational categories. The range is very marked with a low value of around 15.6 sq m per employee in the core of the town centres to 25.9 sq m per employee in developments away from the centres. The data indicates a high degree of consistency in the estimation of the town centre sites but there is wide variability in the values for the outer sites. There is a range of over 50 per cent between the employment densities of different areas and, as will be seen from later analysis, this is one of the most important parameters in the consideration of trip generating characteristics. The difference in employment density is likely to be a direct function of land values, ie. the higher the land value the more efficiently one needs to use the space.

2.2 Arrival/Departure Patterns

The analysis indicates that 69 per cent of employees arrived during the peak hour (peak as defined by the individual site, which can vary slightly from the standard 8.00 - 9.00) while a slightly lower figure, 65 per cent, left within the evening peak. The peak half hour period is heavily concentrated in both the morning and evening period with about 44 per cent of employees arriving and leaving. Hence it can be seen that in the morning peak nearly two thirds of the peak hour's journeys are concentrated in just 30 minutes.

A separate analysis was undertaken to compare the arrival and departure patterns for those companies which stated that they operated a flexitime policy and those that did not. About half of the companies interviewed operated some form of flexitime. For these companies it was found that some 65 per cent of employees arrived in the peak hour whereas 75 per cent arrived in the same hour for those companies not operating flexitime a policy. In terms of trip generation rates these differences are significant.

2.3 Journey Time

The average travel time for all employees for their journey to work was found to be 27 minutes. There was, however, a large difference between the average travel time by private transport, at 26 minutes, and the travel time by public transport at an average of 47 minutes.

Table 3 compares the travel times for each of the different locations. It will be noted that there is no significant difference between any of the area types.

While the average journey times are around 26 minutes many employees travel significantly longer. Figure 1 plots the trip length patterns for the different areas and it will be seen that the upper quartile value is 30 to 35 minutes and at least 10% of employees travel in excess of 50 minutes.

2.4 Parking Provision

The average car parking provision that existed at the surveyed offices was approximately 45 sq m GFA per space or 0.54 spaces per employee. This varied by type of location as shown in Table 4. It should, however, be noted that several companies had significant unused car parking space, which at times meant that there was up to two spaces per employee!

Out of the 57 sites that have sufficient data, 10 were found to have parking spaces per employee ratios of above 0.9; ie. effectively at least one parking space per employee. For most of the remaining sites, employees were able to find free on-street parking space within easy walking distance of the office and in only 15 of the sites was there any real restraint on the use of the car imposed by means of parking control. Hence, whilst recognising that the survey is in no way a random selection of establishments, it was found that 85 per cent of all employees within the surveyed businesses were in firms that experienced no restraint on the use of the car by means of lack of parking provision.

In some of the sites where insufficient

parking existed within the curtilage of the site the amount of parking that took place on-street around the development was quite large. In one case it was noted that out of 159 car users to the office, 29 per cent used the car park while 65 per cent used free on-street parking.

2.5 Modal Split

The modal split for the journey to work is illustrated for each area type in Figure 2. 'Private' is taken to include car driver, car passenger, taxi and motor cycle, whereas 'public' is taken to include bus, train and company coach. 'Others' consist largely of the non-motorised modes of walk and cycle. One of the most significant factors from this figure is the increase in "Other" trips - largely walk trips - that occur within town centre sites.

Table 5 presents the same data but for motorised modes only. It will be noted that typically out of town locations attract 97% of the trips by private car and this reduces to a level of 82% within the town centre cores. This is clearly not a large difference and reflects the fact that the analysis included few sites within heavily restrained areas. However the data base is believed to be an accurate reflection of the typical towns that make up the SERPLAN area and it should be remembered that representative sites where chosen from a number of the major towns within the area including Southampton, Brighton, Guildford, Watford and Chelmsford.

Figure 3 illustrates the range of modal split values that exist for each locational type. The mean values and standard deviations for each location type are indicated. It will be clear that there is a great deal of overlap between sites and areas. The analysis does, however, indicate a high degree of statistical significance between each category.

2.6 Modal Split and Parking Provision

Analysis was undertaken to attempt to relate modal split to the availability of parking. As has been illustrated above it is not realistic to consider parking provision to be solely a function of parking that occurs within the curtilage of the site as there is frequently free on-street parking that can be considered to be just as accessible as that within the site. From the previous analysis it was noted that only about 15 of the sites experienced any form of parking restraint and even where full provision did not exist the level of restriction was very slight. The analysis indicated no significant relationship.

2.7 Modal Split and Public Transport Provision

There are a number of different ways that public transport accessibility could be defined. As the journey to work trips are relatively long (an average of 30 minutes for car trips and 45 minutes for public transport trips) it was felt that some recognition of the scale of the network coverage was likely to be more important than an assessment of the number of bus or train services passing the site. It was, therefore, decided to define public transport accessibility as the relative catchment area population that could be reached within a set travel time by public transport compared with the size of the area that could be reached in the same time by private transport.

The definition of the catchment areas was undertaken either by the County Council or by the Study Team. A few simple rules were used to produce as much consistency as possible. These were:

Private transport travel times to be based on typical peak period travel conditions.

Public transport travel times were based on:

- including bus services within 10 minutes walk or train services within 15 minutes walk
- excluding bus services with a service of 2 or less buses per hour
- assume 5 minutes wait time
- assume 5 minutes for every interchange
- assume timetabled travel times
- assume a maximum of 10 minutes walk from bus or 15 minutes walk from train at the home end.

Catchment areas population were calculated from 1991 census data based on parish or approximate sub-division of district level based on a door to door travel time of 45 minutes by either mode.

Public transport accessibility was, therefore, defined as:

$$\text{Public transport accessibility} = \frac{PPUB45}{PUB45 + PPRIV45}$$

where PUB45 is the population within 45 minutes travel time by public transport

PRIV45 is the population within 45 minutes travel time by private transport.

Figure 4 shows typical catchment areas for four different sites. It is clear from the illustrations and from tabulation that generally the catchment area by car is many times greater than that by public transport, that is, within a given 45 minutes travel time many more people have the opportunity of travelling to a site by car than by public transport.

Figure 5 illustrates the relationship between pubic transport accessibility and modal split. Unfortunately the relationship is not clear as so much of the data occurs in the top corner and there is insufficient spread of data. More data from Inner London areas would help establish any relationship. However, it should be noted that the database contains sites from part of the Outer London Boroughs where 6 sites from the London Borough of Hillingdon merge indistinguishably with sites from other town centres.

In order to extend the range of variables within the database TRICS are commissioning additional data collection and analysis based on some very specifically targeted sites.

3. SUMMARY OF SURVEY RESULTS

The analysis of the data recorded the following:

- the employment densities within buildings is much higher in town centre areas than out-of-town areas with a GFA of 16 sq m per employee in core town centre areas rising to 26 sq m GFA per employee in areas outside the town centre
- about 70% of employees arrive at work in the peak hour while 65% leave in the evening peak
- the average trip length for the journey to work is 26 minutes by private transport and 47 minutes by public transport
- trip lengths do not seem to differ significantly by area
- approximately 25 per cent of work trips are over 35 minutes in length and 10 per cent are over 50 minutes
- the percentage of trips as passengers does not differ much by area, the average figure being 12 per cent
- about 9% of travellers claim to be in some organised form of car sharing
- there is a significant increase in "walk" trips in town centre locations
- the average modal split (motorised modes) for out of town developments is 97 per cent to car and this drops to 82 per cent in town centre cores
- the average car parking provision in out of town locations was 1 space per 27 sq m, in town centre locations this fell to 1 space per 69 sq m
- public transport accessibility was defined on the basis of catchment areas within 45 minutes travel time
- the public transport accessibility index is of the same order of magnitude as the public transport usage.

Further analysis suggested that:

- the use of flexitime hours contributed to the "spreading" of peak hour arrival and departure patterns
- only a maximum of 15 sites experienced any form of car parking restraint and many employees made use of free on-street parking spaces if insufficient space existed on-site.

4. DISCUSSION

This study was designed to assess how the application of the "carrot and the stick", that is, public transport provision and parking restraint, might effect modal split for the journey to work. The range of the results obtained, with only one site exhibiting a modal split to public transport of greater than 25%, limits the full range of analysis that would have been more helpful. However, the study has provided a wealth of data and provides this opportunity to discuss a few theories and issues that are relevant to the current debate finding ways to reduce the need to travel.

4.1 The Effect of Employment Density

As identified in the previous sections the utilisation of office space has a marked effect on trip generation. If one takes as an example a 10,000 sq m office development and compares its theoretical trip generation characteristics for different locations it is found that the block attracts more trips in a town centre location than in an out of town location. Based on the data derived from the surveys the 10,000 sq m block in the central area attracts 425 car trips while the same block in an out of town area would only generate 350 car trips. The workings are given in Table 6.

4.2 The Effect of Journey Times

Not surprisingly the analysis has identified that journey to work by public transport takes, on average 50% longer than journeys by car. Typically the public transport journey involves an additional 40 minutes of travel a day.

This extra travel time is a considerable erosion of the employees' spare time. If one assumes that the average person sleeps for 8 hours, is at work for 9 hours and travels for 1 hour, this extra 40 minutes of travel by public transport consumes some 10% of the remaining time. In the widest context of the environmental assessment of transport this must be seen to be of considerable disadvantage. This loss of "disposable" or "free time" has a direct effect on the quality of life of the person involved and their family.

It should also be noted that it is frequently the most disadvantaged section of the community that do not have the luxury of having a car that need to spend this extra time travelling.

4.3 The Role of Public Transport

The general perception of the solution to rising car use is that developments should be located at existing centres served by public transport and that public transport should be enhanced so as to encourage a significant shift of modal split.

It is worth looking at a few typical sites included within the study to see what sort of level of change in public transport provision might be necessary to bring about a change in public transport usage. Figure 4 illustrated, to the same scale, the extent of the public transport network that currently exists for typical sites with 98%, 91%, 81% and 53% modal split by car. Although every site has particular characteristics that effect the modal choice, these sites were chosen as being typical.

It can be seen from the illustrations the extent of the increase in public transport network that would be required to make any significant reduction in the use of the car (all other issues being constant). To reduce car use from 98% to 81% the public transport network at Site 1 would need to look like Site 3 and to reduce car use to 53% the network would need to look like Site 4. Such wholesale increase in the provision of public transport is an unrealistic proposition. Other than the costs of the capital works being well beyond anything that is reasonable, the environmental impact of building new rail links and highways to carry bus routes would be an unacceptable intrusion on the environment of the locality.

The provision of public transport on its own has little effect on changing modal choice. This can be seen from the following examples of sites that are located immediately adjacent to railway stations where still only a small percentage of employees travel to work by train (Table 7).

4.4 The Role of Parking Restraints

If it is not possible to markedly improve "the quality of the carrot" the next option must be to consider "increasing the length of the stick", that is, using restrictive car parking standards.

The results of a survey which referred to in depth interviews with companies on the move were published by Christine Howick (Property Market Analysis [2]) in January 1993. Of offices located within central London the main disadvantage of their current location was stated to be the lack of access and communication (75%). Companies that had recently moved to business parks stated that the main advantages were seen to be:

- good location 25%
- access to motorway 25%
- good parking 24%
- extra space 20%
- attractive environment 20%
- general improved transport 15%.

When asked to list the most essential ingredient of their new office location 90% stated parking. 75% of all firms referred to needing one space per employee and the other 25% wanted more!

The problem with trying to use "the stick approach" to reduce travel demand is that it cannot be applied retrospectively to existing offices and most companies have the option of avoiding locations where such restrictive policies might be applied. Many Local Authorities are now actively seeking inward investment and are wishing to attract blue chip companies as a means of reducing local unemployment. Faced with the option of accepting "an IBM" in an out-of-town business park or "no IBM at all" leaves the local planning authority with no realistic choice but to bow to the desire of the developers.

The ability to seek low parking provision within developments is severely restricted by the chain of separate interests involved. Normally each new office has three separate parties, the developer, the financial institutions, and the tenant. It is in each of their interests to ensure that the building is as marketable as possible at all stages in its life cycle. Just because the first tenant may be prepared to accept low parking provision this is no guarantee that any subsequent tenant may be prepared to accept the same restrictions.

The options for reducing car travel by seeking to control the planning process would, therefore, seem to be limited unless it could be applied nation-wide. Individual authorities can adopt restrictive parking policies in conjunction with on-street control measures but the general effect will be to encourage firms to relocate elsewhere. Hence, restraining car use in one area leads to growth in another. The growth of development along the M4 corridor and around the M25 ring is an obvious example of this.

4.5 The Effect of CO_2 Emission

The DOE/DOT study on the potential for reducing travel demand as a means of reducing CO_2 makes the following conclusions:

> "Reductions in transport emissions from journey to work will be encouraged by:
> - the concentration of employment uses in existing centres served by public transport
> - high-density residential developments concentrated at transport routes and in corridors served by public transport
> - the release of adequate housing land in suitable locations within existing areas to maximise the possibility for households to locate close to their places of work"

While the current study has not had the opportunity to consider some of the wider evidence, the data produced by the study does not readily support such thesis as they might effect the SERPLAN County Councils. Concentrating developments in Town Centres is likely to lead to higher congestion and higher CO_2 emissions. The argument for concentrating development in existing centres must therefore be based on the thesis that the transference from car to public transport has a greater effect on emission levels than the increased emission arising from slower speeds. The existing data from the Shire Counties does not easily support such an argument.

4.6 Postscript

It should be noted, however, that reducing travel is not necessarily the same thing as reducing congestion. Schemes to spread the peak would make highway and public transport investment more efficient, carry more people and reduce congestion. There may, therefore, be much greater scope in considering policies such as car sharing schemes, home working, flexitime, changing school hours, etc.

References

[1] Reducing Transport Emissions through Planning - ECOTEC, HMSO, 1993

[2] Offices and Business Parks - Christine Howick, Henry Stewart Conferences, January 1993.

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Table 1 Number of Sites/Surveys by Location

Location Category	Number of Sites	Number of Employees	Number of Survey Responses
1 Edge of Town	15	9406	5482
2 Town Centre	17	5320	3647
3 Edge of Town	8	1938	1350
4 Out of Town	19	8570	5107
All Sites	59	25234	15586

Table 2 Employment Density by Location

Location	GFA per Employee (sq m)
Town Centre Core	15.6
Town Centre	19.8
Edge of Town	25.9
Out of Town	23.2
All Sites	20.7

Table 3 Mean Journey Time by Modal Choice and by Site Location

Location	Private	Public	Others	All Modes
Town Centre Core	26	43	20	27
Town Centre	27	45	20	28
Edge of Town	28	60	17	29
Out of Town	24	46	14	25
All Sites	26	47	18	27

Table 4 Average Parking Provision Standard

Location	GFA per Space (sq m)	Spaces per Employee
Town Centre Core	69.4	0.32
Town Centre	48.8	0.53
Edge of Town	35.5	0.83
Out of Town	27.2	0.72
All Sites	44.8	0.54

Table 5 Modal Split by Motorised Modes

Location	Private	Public
Town Centre Core	82	18
Town Centre	92	8
Edge of Town	93	7
Out of Town	97	3
All Sites	91	9

Table 6 **Trip Generation by Location**

Area	Assume 10,000 sq m Office				
	Employment Density sq m/ Employees	Number of Employees	Modal Split by Private	Number Trips by Car	Number of Car Trips [1]
Town Centre Core	15.6	640	82%	525	425
Town Centre	19.8	505	92%	465	400
Edge of Town	25.9	385	93%	360	320
Out of Town	23.2	430	97%	415	350

Table 7

Site	Station	Percentage of Employees Travelling by Train
Adjacent to Station		
Times House, Ruislip	Ruislip (Met/Picc Line)	8
Iveco, Watford	Watford Junction BR	5
NHBC Amersham	Amersham BR	3
BiWater, Dorking	Dorking BR	2
Station Nearby		
Southern Water, Brighton	Falmer BR	5
M&G Assurance, Chelmsford	Chelmsford Br	8
Zurich Insurance, Portsmouth	Portsmouth and Southsea BR	5
Mott McDonald, Winchester	Winchester	9
County Hall, Maidstone	Maidstone East BR	5
Horsham DC, Horsham	Horsham BR	3

Figure 1

AVERAGE JOURNEY TIME - ALL SITES

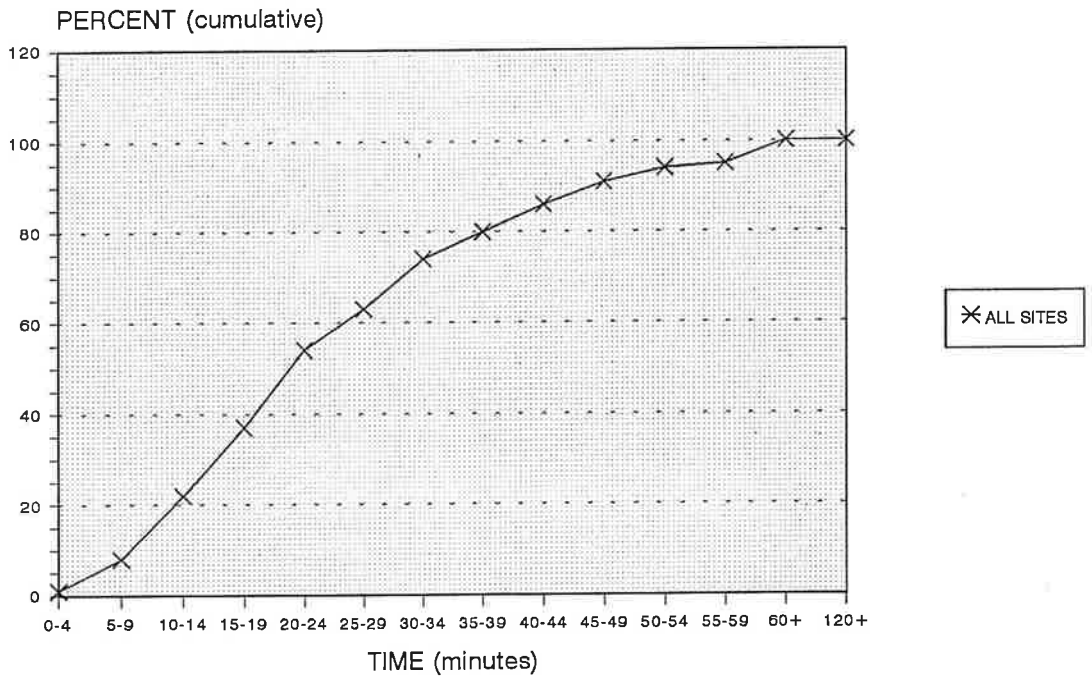
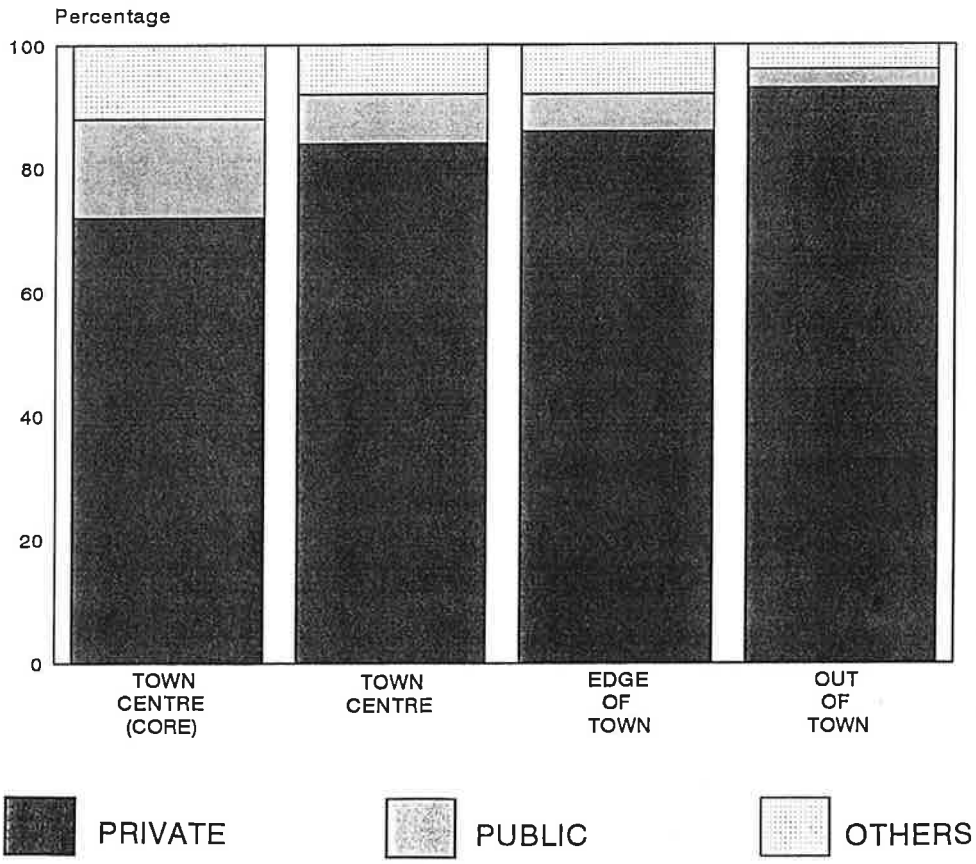
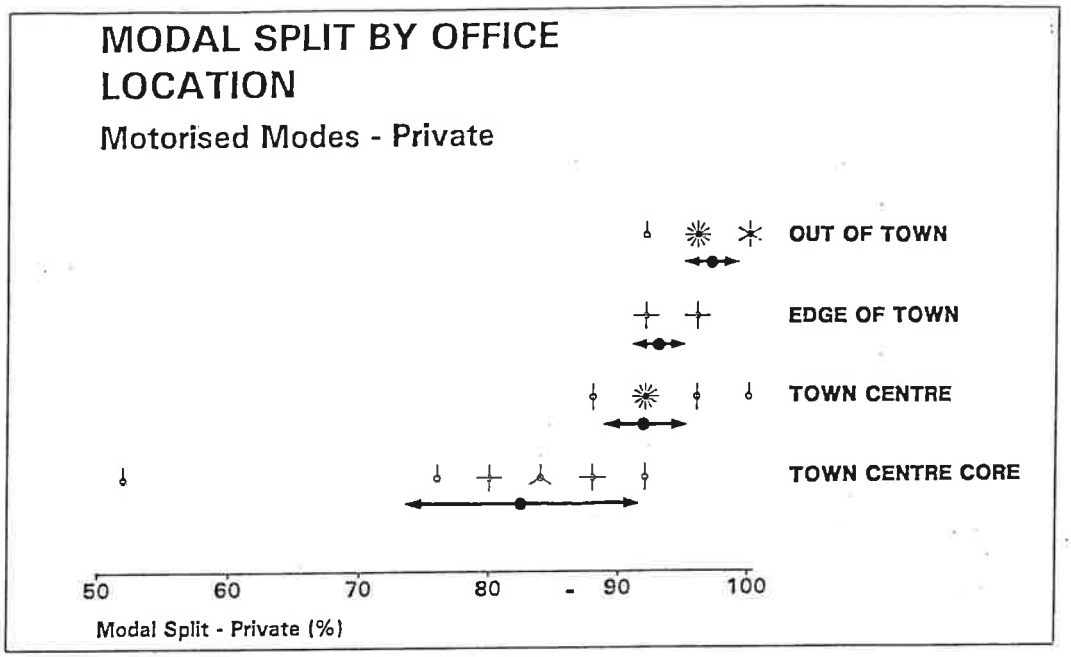
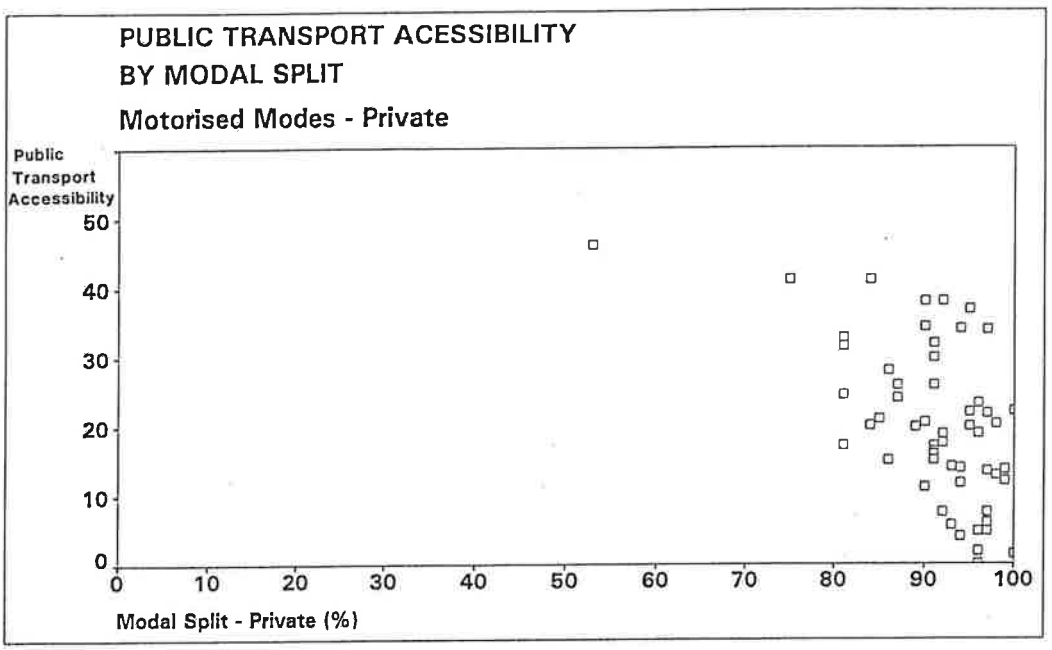


Figure 2

ALL MODES




MODAL SPLIT BY OFFICE LOCATION
Motorised Modes - Private
OUT OF TOWN
EDGE OF TOWN
TOWN CENTRE
TOWN CENTRE CORE
50
60
70
80
90
100
Modal Split - Private (%)


PUBLIC TRANSPORT ACESSIBILITY
BY MODAL SPLIT
Motorised Modes - Private
Public Transport Accessibility
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Modal Split - Private (%)

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21st April 1993

Mr Keith Lumley
Traffic Engineering & Control
29 Newman Street
LONDON
W1P 3PE

Dear Keith

PARKING AND PUBLIC TRANSPORT ARTICLE - OCTOBER ISSUE

I refer to our article titled; 'Parking and Public Transport - The Effect on Mode Choice'. Further to your conversation with Colin Eastman, regarding the above, I enclose top copies of the diagrams included in the article, together with a copy of the article indicating the relevant figure numbers.

Please do not hesitate to contact me if these are not sufficient.

Yours sincerely

MSFoster

MALCOLM S FOSTER

Encl.

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"	ECOTEC	47
"	MVA	47
9/6/93	Halliers Partner	47
18/6/93	Dublin Corporation	47
29/6/93	Staffs C.	40
"	Wootton Jeffreys.	47

TRICS

&

SERPLAN

PARKING & PUBLIC TRANSPORT
THE EFFECT ON MODE CHOICE

A Study of B1 Developments

JMP Consultants Ltd

Consulting Civil, Structural and Transportation Engineers

172 Tottenham Court Road London W1P 9LG

Tel: 071-487 5331 Fax: 071-387 0078

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SERPLAN **(The London and South East Regional Planning Conference)**
A regional planning organisation constituted by the London Borough Councils and the County and District Councils for Bedfordshire, Berkshire, Buckinghamshire, East Sussex, Essex, Hampshire, Hertfordshire, the Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex.

TRICS **(Trip Rate Information and Computer System)**
A computerised database system under the ownership of seven county councils (Dorset, East Sussex, Hampshire, Kent, Surrey, Berkshire and West Sussex) and managed and marketed by JMP Consultants Limited.

Note: *This study arose through a joint collaboration arrangement between SERPLAN and TRICS. The SERPLAN Counties and Dorset undertook surveys at a number of office sites. TRICS provided a research budget of £10,000 to enable the analysis and reporting of the data to be undertaken by JMP Consultants Ltd.*

Contents

1 Background

1.1 The Regional Strategy policy document issued by SERPLAN emphasised the need to relate transport and land use and to seek ways to reduce the overall need to travel. A similar theme was set out in the Government's 1990 Green Paper - *This Common Inheritance* - where the concept of reducing the upward trend in CO_2 emissions was announced together with a Study designed to assess the extent to which land-use planning could contribute to the reduction in travel demand and hence vehicle emissions. In parallel to these discussion both LPAC and SERPLAN were looking for ways to advise their respective members on the parking standards that should be adopted in order to develop an integrated approach to transport demand management.

1.2 In 1992 the Transport Strategy Group of SERPLAN set up a Parking Study which was to look at how parking policy, in association with a comprehensive package of other planning measures, could be used to implement the overall policy of reducing travel demand. As part of this Study a joint collaborative arrangement was made between SERPLAN and TRICS to undertake and analyse surveys of parking demand and modal choice at a range of office developments located throughout the SERPLAN area. The objective of the study was to seek a relationship between the modal choice for the journey to work and public transport and parking availability. As part of the Study each County Council was asked to undertake surveys at four sites within their area. From an initial short list of sites, locations were chosen such that at least one site in each County was located in an area of as high a public transport accessibility as possible, while one site was to be located in an area poorly served by public transport. The other two sites were chosen to be in locations divided someway between the two extremes. The surveys completed at each office consisted of self completion questionnaires. In general these were administered by the personnel department of the business concerned. The Employee Questionnaire (see Appendices) involved the completion of a limited number of questions including:

- normal mode of travel to work
- time of arrival/time of departure
- journey time
- home address
- location of parking
- reasons for not using public transport (if appropriate)

1.3 Additional data was compiled for each site which included information on the size of the office and the number of employees, the availability of parking, the use of company bus schemes (where appropriate) and other general information.

1.4 In total 48 separate sites were included within the survey base. Questionnaires were handed out to some 23,000 employees and responses were obtained from some 14,000; a response rate of some 62 per cent.

1.5 In addition to the surveys that were undertaken by the SERPLAN counties some additional data was available from other sources. These included surveys undertaken by Dorset, who are members of TRICS, two surveys undertaken in Surrey in 1987, six surveys undertaken within the London Borough of Hillingdon in 1988 and four surveys undertaken recently at other London sites and made available to this Study by the London Research Centre. While not every aspect of these additional surveys is exactly compatible with the main survey they do have the benefit of extending the range of types of locations considered. The final data base contained 59 sites.

1.6 In choosing the sites, the County Councils sought locations that were representative of the type of developments that could be expected to occur over forthcoming years. The surveyed sites therefore tended to be relatively modern buildings, frequently occupied by 'service and financial' type businesses. The surveyed sites tended to be medium to large establishments as this ensured a reasonable response to the questionnaire.

1.7 The full list of surveyed sites is given in Appendix 1 of this Report and are presented on a map base in Figure 1.1.

1.8 Each of the sites were allocated to a 'locational category' based on a perceived understanding of their characteristics and some preliminary analysis. These categories are relatively crude and are very subjective in nature with the particular allocation to specific groups being open to interpretation. The categories were:-

(i) Town Centre Core
(ii) Town Centre
(iii) Edge of Town
(iv) Out of Town

1.9 Table 1.1 identifies the number of sites for which data is available within each of these groupings.

Table 1.1 Number of Sites/Surveys by Location

Location Category	Number of Sites	Number of Employees	Number of Survey Responses
1. Town Centre Core	15	9406	5482
2. Town Centre	17	5320	3647
3. Edge of Town	8	1938	1350
4. Out of Town	19	8570	5107
All Sites	59	25234	15586

Note (1) Includes the response rates from the 11 additional surveys which were not part of the main SERPLAN survey programme.

(2) Survey data not received for sites 11, 12 and 35 (See Figure 1.1).

Location Map of Office Sites

Figure 1.1

SERPLAN SURVEY SITES (Sites 1 to 51)

Bedfordshire
1. Howard House, Bedford (Edge of Town)
2. Nolts Chartered Accountants/BIS, Luton (Town Centre)
3. Shanks & McEwans, Aspley Heath (Out of Town)
4. Ernst & Young, Luton (Out of Town/Suburban)

Berkshire
5. ICL, Bracknell (Town Centre)
6. Shire Hall, Reading (Out of Town)
7. Avis, Bracknell (Out of Town)
8. HFC, Winkfield (Out of Town)

Buckinghamshire
9. NHBC HQ, Amersham (Edge of Town)
10. Equitable Life, Aylesbury (Town Centre)
11. Abbey National, Milton Keynes (Edge of Town)
12. Dunn & Bradstreet, High Wycombe (Edge of Town)

Dorset
13. Barclays International, Poole (Town Centre Core)
14. Dorset House, Bournemouth (Town Centre)
15. GPT Telecommunications Systems Group, Poole (Out of Town)
16. British Gas, Poole (Suburban/Out of Town)

East Sussex
17. Southern Water, Brighton (Edge of Town)
18. British Telecom, Brighton (Town Centre Core)
19. Private Patient Plan, Eastbourne (Town Centre)
20. Dental Practise Board, Eastbourne (Town Centre)

Essex
21. M+G Assurance Company, Chelmsford (Town Centre Core)
22. Royal London Insurance, Colchester (Town Centre Core)
23. First Data Resources, Basildon (Suburban/Out of Town)
24. Charter Court Business Park, Colchester (Suburban/Out of Town)
25. NatWest Business Centre, Brentwood (Suburban/Out of Town)

Hampshire
26. Barclays International, Southampton (Town Centre)
27. B&Q Head Office, Chandlers Ford (Edge of Town)
28. Moore & Batch, Southampton (Town Centre)
29. Mott Macdonald, Winchester (Town Centre Core) - Pilot Survey
30. Southern Water HQ, Otterbourne (Out of Town)
31. Zurich Insurance, Portsmouth (Town Centre Core)

Hertfordshire
32. Mercury Communications, Elstree (Edge of Town)
33. Iveco, Watford (Town Centre)
34. Nissan, Maple Cross (Out of Town)
35. Data Unavailable

Isle of Wight
36. HM Tax Office, Newport (Town Centre Core)
37. Southern Water, Newport (Town Centre)
38. NFI, Newport (Out of Town)

Kent
39. Kent CC Offices, County Hall, Maidstone (Town Centre Core)
40. LLoyds of London, Chatham (Town Centre Core)
41. HM Land Registry, Hawkenbury, Tunbridge Wells (Edge of Town)
42. Gillingham Business Park, Gillingham (Out ofTown)

Surrey
43. Biwater, Dorking (Edge of Town)
44. British & American Tobacco, Staines (Town Centre)
45. Surrey CC, West Ewell (Edge of Town)
46. Peat Marwick, Guildford (Town Centre)

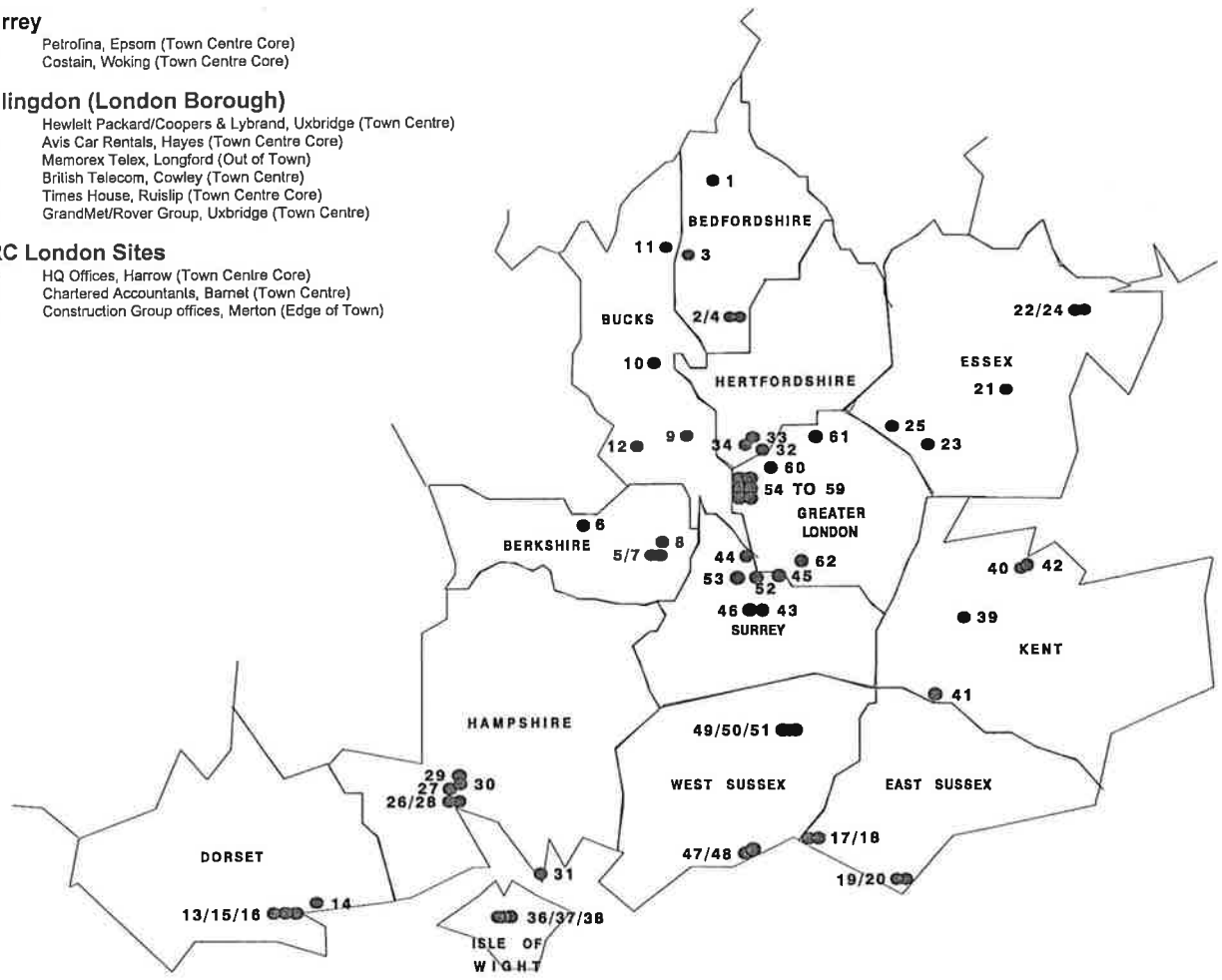
West Sussex
47. Southern Water, Worthing (Suburban/Out of Town)
48. London and Edinburh Insurance Group, Worthing (Suburban/Out of Town)
49. District Council Offices, Horsham (Town Centre)
50. Sun Alliance, Horsham (Town Centre Core)
51. CIBA/GEIGA, Horsham (Suburban/Out of Town)

ADDITIONAL SITES (Sites 52 to 62)

Surrey
52. Petrofina, Epsom (Town Centre Core)
53. Costain, Woking (Town Centre Core)

Hillingdon (London Borough)
54. Hewlett Packard/Coopers & Lybrand, Uxbridge (Town Centre)
55. Avis Car Rentals, Hayes (Town Centre Core)
56. Memorex Telex, Longford (Out of Town)
57. British Telecom, Cowley (Town Centre)
58. Times House, Ruislip (Town Centre Core)
59. GrandMet/Rover Group, Uxbridge (Town Centre)

LRC London Sites
60. HQ Offices, Harrow (Town Centre Core)
61. Chartered Accountants, Barnet (Town Centre)
62. Construction Group offices, Merton (Edge of Town)



2 Analysis

Employment Density

2.1 Table 2.1 below sets out the differing pattern of employment densities that occurs across the spectrum of locational categories. The range is very marked with a low value of around 15.6 sq m per employee in the core of the town centres to 25.9 sq m per employee in developments away from the centres. The data indicates a high degree of consistency in the estimation of the town centre sites but there is wide variability in the values for the outer sites. There is a range of over 50 per cent between the employment densities of different areas and, as will be seen from later analysis, this is one of the most important parameters in the consideration of trip generating characteristics. The difference in employment density is likely to be a direct function of land values, ie. the higher the land value the more efficiently one needs to use the space.

Table 2.1 Employment Density by Location

Location	GFA per Employee (sq m)
Town Centre Core	15.6
Town Centre	19.8
Edge of Town	25.9
Out of Town	23.2
All Sites	20.7

Arrival/Departure Patterns

2.2 The analysis indicates that 69 per cent of employees arrived during the peak hour (peak as defined by the individual site, which can vary slightly from the standard 8.00 - 9.00) while a slightly lower figure, 65 per cent, left within the evening peak. The peak half hour period is heavily concentrated in both the morning and evening period with about 44 per cent of employees arriving and leaving. Hence it can be seen that in the morning peak nearly two thirds of the peak hour's journeys are concentrated in just 30 minutes.

2.3 A separate analysis was undertaken to see whether there was any correlation between the peakiness of the arrival and departure patterns and the locational characteristics of the site (Table 2.2), eg is the peak hour in congested urban centres more spread than in outer areas? No strong correlation could be identified. Figure 2.1 illustrates typical arrival and departure patterns for all of the sites in the database.

Table 2.2 Percentage of Staff that Arrive/Depart within the Sites Peak Hour By Location (Average Percentage Per Site)

Location	Arrivals		Departures	
	Peak Hour	Peak ½ Hour	Peak Hour	Peak ½ Hour
Town Centre Core	65	37	60	39
Town Centre	72	47	68	48
Edge of Town	66	41	64	41
Out of Town	70	45	67	44
All Sites	69	43	65	44

Units: Per Cent

2.4 A separate analysis was undertaken to compare the arrival and departure patterns for those companies which stated that they operated a flexitime policy and those that did not (Table 2.3). About half of the companies interviewed operated some form of flexitime. For these companies it was found that some 65 per cent of employees arrived in the peak hour whereas 75 per cent arrived in the same hour for those companies not operating flexitime a policy. In terms of trip generation rates these differences are significant.

Table 2.3 **Percentage of Staff that Arrive/Depart within the Sites Peak Hour by Flexitime Policy (Average Percentage per site)**

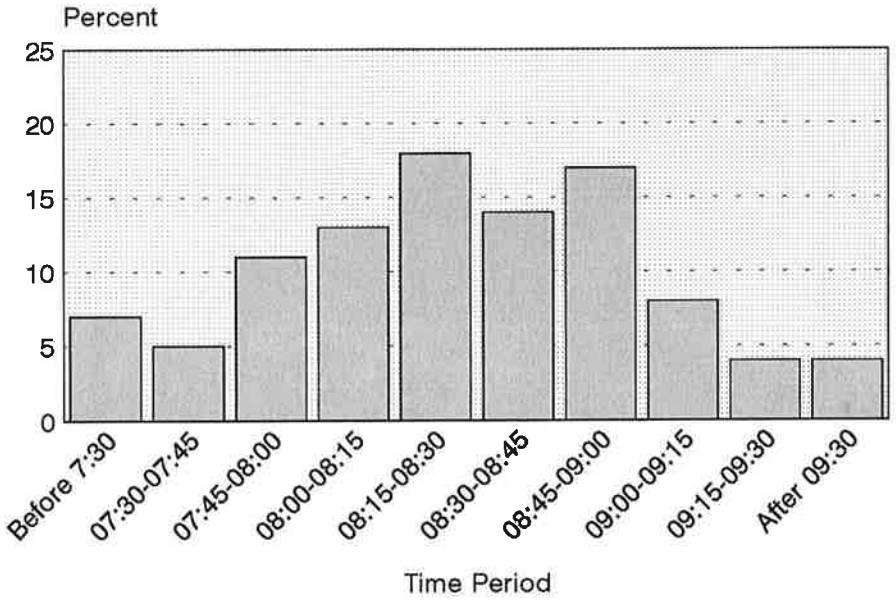
	Arrivals		Departures	
	Peak Hour	Peak ½ Hour	Peak Hour	Peak ½ Hour
Flexitime policy operated by Company?				
YES (23 sites)	64	38	61	38
NO (20 sites)	75	51	71	51
ALL SITES	69	43	65	44

Units : Per Cent

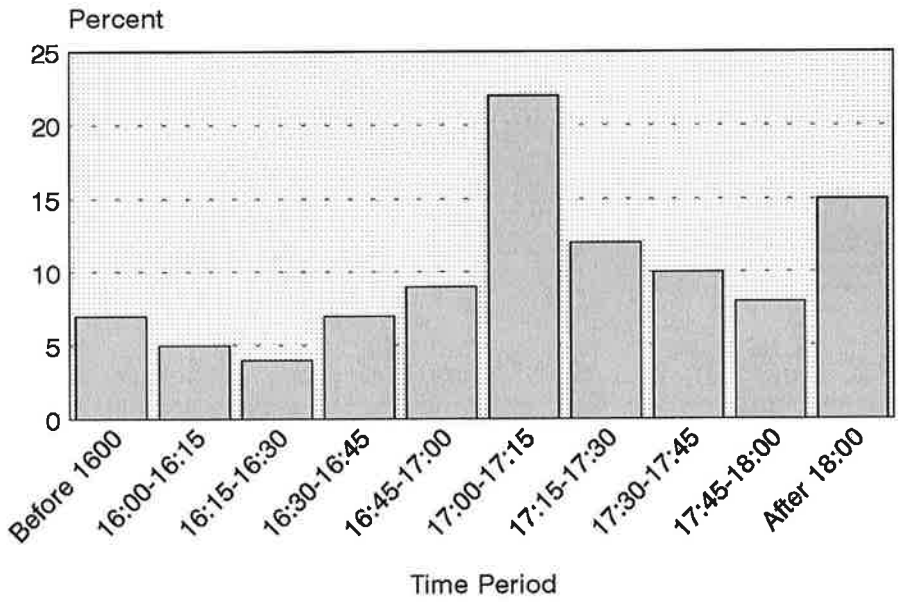
Arrival and Departure Patterns

Figure 2.1

AVERAGE ARRIVAL TIMES (PERCENT)



AVERAGE DEPARTURE TIMES (PERCENT)



Journey Time

2.5 The average travel time for all employees for their journey to work was found to be 27 minutes. There was, however, a large difference between the average travel time by private transport, at 26 minutes, and the travel time by public transport at an average of 47 minutes.

2.6 Table 2.4 compares the travel times for each of the different locations. It will be noted that there is no significant difference between any of the area types. The sites with the longest travel times were found to be in Hertfordshire although no explanation for this difference could be identified.

Table 2.4 Mean Journey Time by Modal Choice and by Site Location

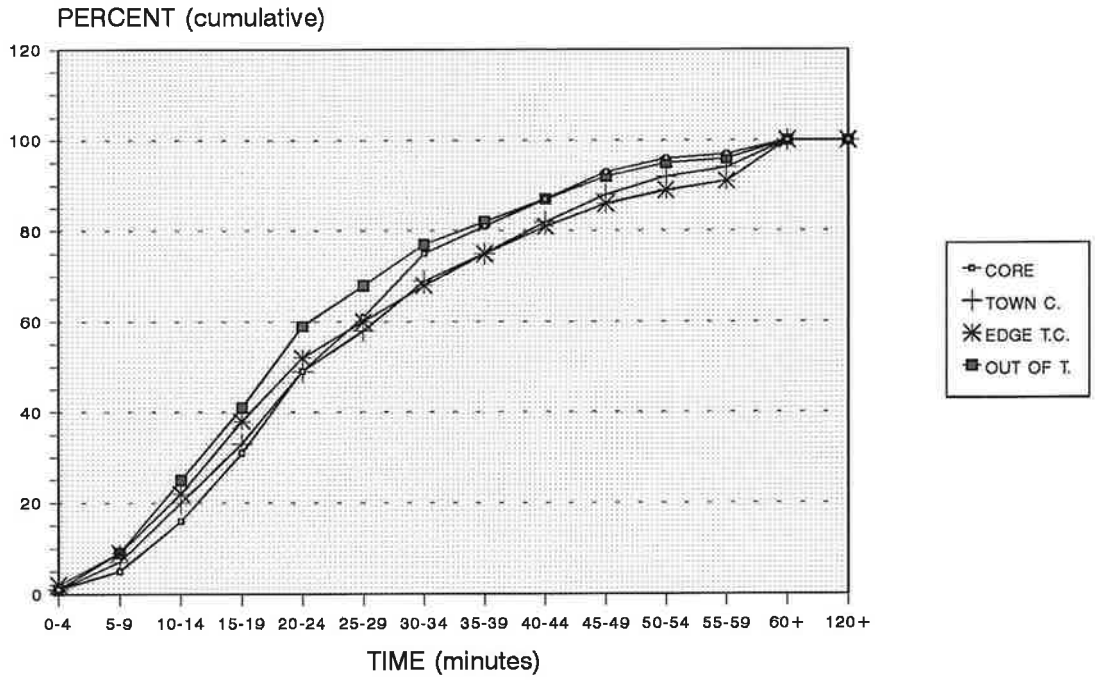
Location	Private	Public	Others	All Modes
Town Centre Core	26	43	20	27
Town Centre	27	45	20	28
Edge of Town	28	60	17	29
Out of Town	24	46	14	25
All Sites	26	47	18	27

2.7 While the average journey times are around 26 minutes many employees travel significantly longer. Figure 2.2 plots the trip length patterns for the different areas and it will be seen that the upper quartile value is 30 to 35 minutes and at least 10% of employees travel in excess of 50 minutes.

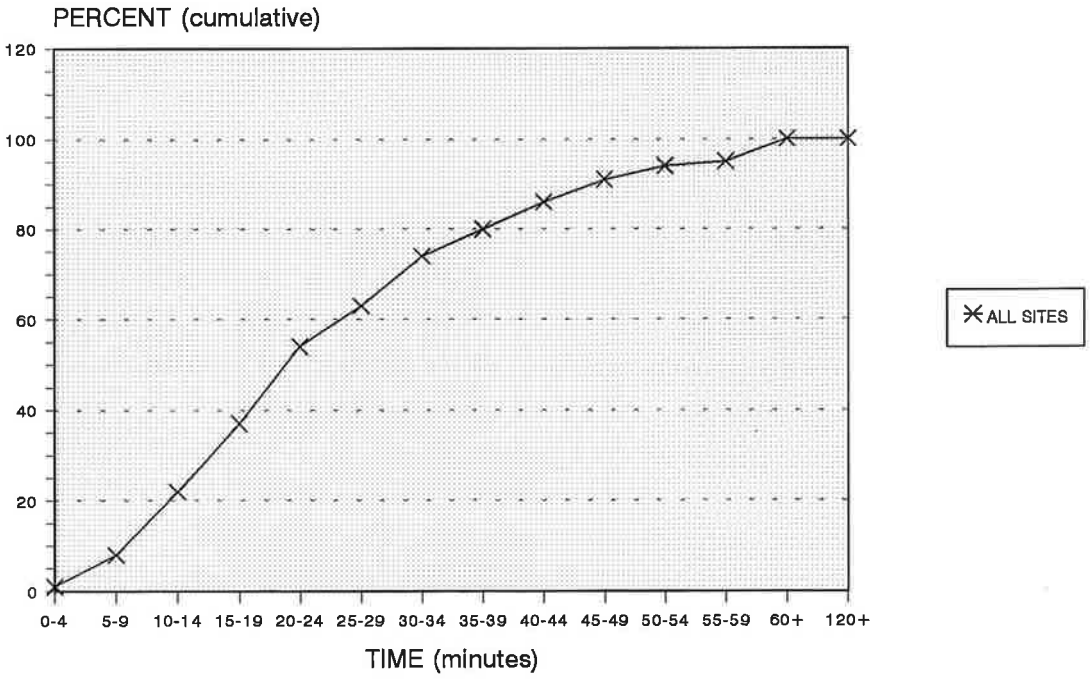
Average Journey Times

Figure 2.2

AVERAGE JOURNEY TIME BY LOCATION



AVERAGE JOURNEY TIME - ALL SITES



Parking Provision

2.8 The average car parking provision that existed at the surveyed offices was approximately 45 sq m GFA per space or 0.54 spaces per employee. This varied by type of location as shown in Table 2.5. It should, however, be noted that several companies had significant unused car parking space, which at times meant that there was up to two spaces per employee!

Table 2.5 Average Parking Provision Standard

Location	GFA per Space (sq m)	Spaces per Employee
Town Centre Core	69.4	0.32
Town Centre	48.8	0.53
Edge of Town	35.5	0.83
Out of Town	27.2	0.72
All Sites	44.8	0.54

2.9 Out of the 57 sites that have sufficient data, 10 were found to have parking spaces per employee ratios of above 0.9; ie. effectively at least one parking space per employee. For most of the remaining sites, employees were able to find free on-street parking space within easy walking distance of the office and in only 15 of the sites was there any real restraint on the use of the car imposed by means of parking control. Hence, whilst recognising that the survey is in no way a random selection of establishments, it was found that 85 per cent of all employees within the surveyed businesses were in firms that experienced no restraint on the use of the car by means of lack of parking provision.

2.10 In some of the sites where insufficient parking existed within the curtilage of the site the amount of parking that took place on-street around the development was quiet large. In one case it was noted that out of 159 car users to the office, 29 per cent used the car park while 65 per cent used free on-street parking.

2.11 The amount of parking that occurred in different types of space by locational type is set out below (Table 2.6) where it can be seen that 95% of drivers surveyed are currently able to make use of free spaces.

Table 2.6 Car Parking Type by Location

	Percentage of Car Drivers Using FREE		CHARGED
	ON-SITE	OFF-SITE	OFF-STREET
Town Centre Core	56	28	16
Town Centre	76	20	4
Edge of Town	96	3	1
Out of Town	96	4	0
All Sites	83	12	5

Units : Per Cent

Modal Split

2.12 The modal split for the journey to work is tabulated for each area type in the following Table. In this, and subsequent Tables 'private' is taken to include car driver, car passenger, taxi and motor cycle, whereas 'public' is taken to include bus, train and company coach. 'Others' consist largely of the non-motorised modes of walk and cycle.

2.13 Table 2.7 illustrates the pattern of modal split by area type and it will be seen that the use of the private mode dominates all travel patterns. Even within the core town centre areas some three out of every four employees use private transport (See Figure 2.3).

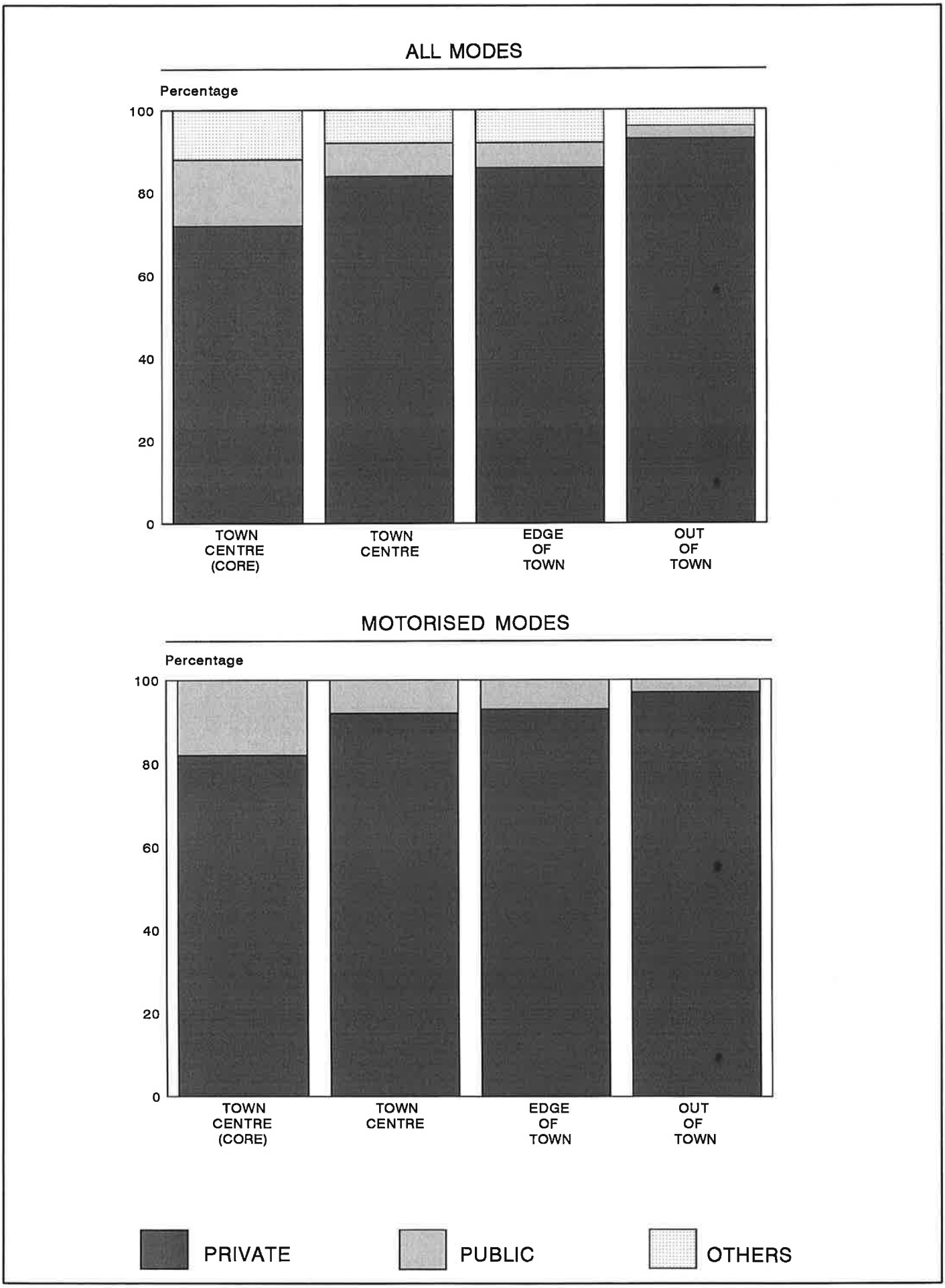
Table 2.7 Average Modal Split by Location (Per Cent)

All Modes

Location	Private	(Car Drivers)	Public	Others
Town Centre Core	72	(59)	16	12
Town Centre	84	(73)	8	8
Edge of Town	86	(76)	6	8
Out of Town	93	(79)	3	4
All Sites	84	(72)	8	8

Average Modal Split by Location (Percent)

Figure 2.3



2.14 One of the most significant factors from the above table is the increase in "Other" trips - largely walk trips - that occur within town centre sites.

2.15 The percentage of employees that arrive at work having travelled as car passengers varies significantly by site. It is not possible from the survey to define how many of these shared a car with another employee or the number that were a part of a separate 'kiss and ride' arrangement. Table 2.8 sets out, by location, the percentage of employees that travelled as car passengers, the average car occupancy (assuming that all passengers travelled with fellow employees) and the percentage of employees who claimed that they were part of a formal car sharing scheme. What is very noticable from the analysis is the similarity of the results for each area despite the site by site variability. In general it can be seen that some 12 per cent of employees travel as passengers which creates an average occupancy of about 1.2. About 9 per cent of employees are part of an organised car share arrangement.

Table 2.8 Car Passenger Usage

	percentage car passengers	car occupancy	percentage car sharing
Town Centre Core	13%	1.23	13%
Town Centre	11%	1.16	9%
Edge of Town	9%	1.13	5%
Out of Town	13%	1.18	7%
All Sites	12%	1.18	9%

2.16 Table 2.7 had illustrated the modal choice pattern across all areas. It has already been noted that there is a very much higher degree of 'other' trips, notably walk and cycle, to the town centre sites. However, if for east of presentation these trips are taken out of the analysis, such that the comparison is just between motorised modes, the results are presented in Table 2.9 and the lower half of Figure 2.3

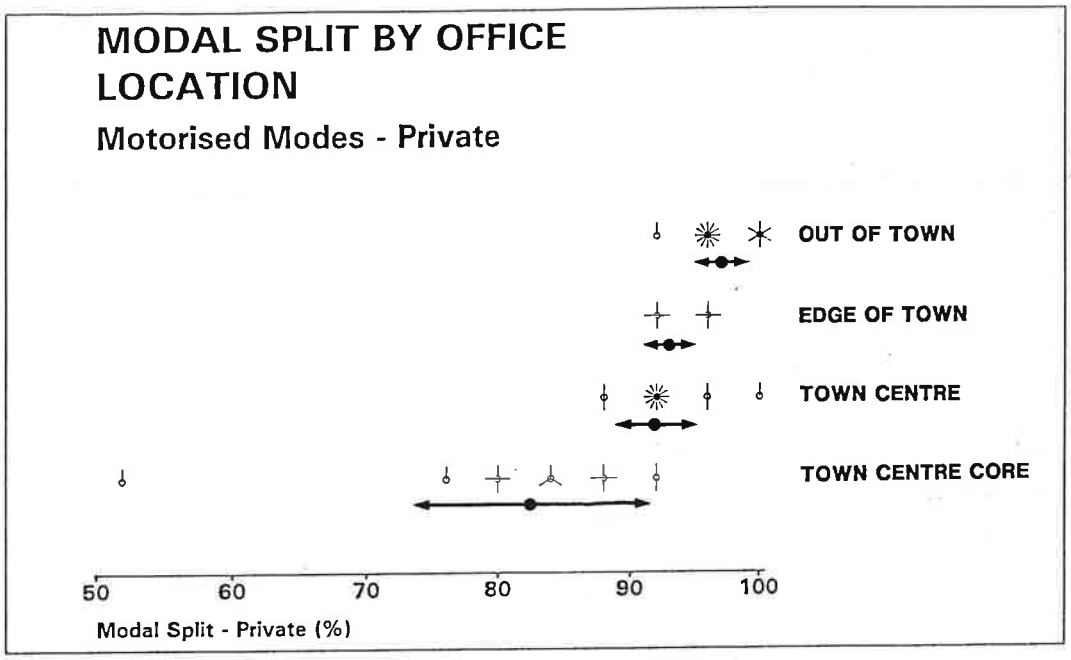
Table 2.9 Modal Split by Motorised Modes

Location	Private	Public
Town Centre Core	82	18
Town Centre	92	8
Edge of Town	93	7
Out of Town	97	3
All Sites	91	9

2.17 It will be noted that typically out of town locations attract 97% of the trips by private car and this reduces to a level of 82% within the town centre cores. This is clearly not a large difference and reflects the fact that the analysis included few sites within heavily restrained areas. However the data base is believed to be an accurate reflection of the typical towns that make up the SERPLAN area and it should be remembered that representative sites where chosen from a number of the major towns within the area including Southampton, Brighton, Guildford, Watford and Chelmsford.

2.18 Figure 2.4 illustrates the range of modal split values that exist for each locational type. The mean values and standard deviations for each location type are indicated. It will be clear that there is a great deal of overlap between sites and areas. The analysis does, however, indicate a high degree of statistical significance between each category.

Figure 2.4



2.19 It is worth considering a few specific sites that lie outside the range of results that one would have expected in order to see what, if anything, could be learnt that might have wider implications. A brief analysis of a few sites are given below.

Site 20 Dental Practice Board (Eastbourne)

Located close to Eastbourne town centre the site has a modal split of 13 per cent towards public transport. Although the site has limited on-site parking there is adequate free on-street parking in close proximity to the development. The reason for the higher than average public transport usage could well be explained by the high level of part time workers at the site i.e. the Clerical/Secretarial level, part-time workers account for some 40 per cent of all employees. In general, car availability levels are lower for those in part-time employment than full-time workers.

Site 46 Peat Marwick (Guildford)

Located in the centre of Guildford the site attracts no users by public transport. There is adequate parking for most of the employees although a few do use public charged spaces. The reason why nobody uses public transport is probably a reflection of the nature of the business (i.e. Chartered Accountants) and the occupational groups employed. Of the 101 staff, 90 are classified as Managers, Professionals, Technicians and Support Staff. Access to a private car is likely to be relatively high for these staff.

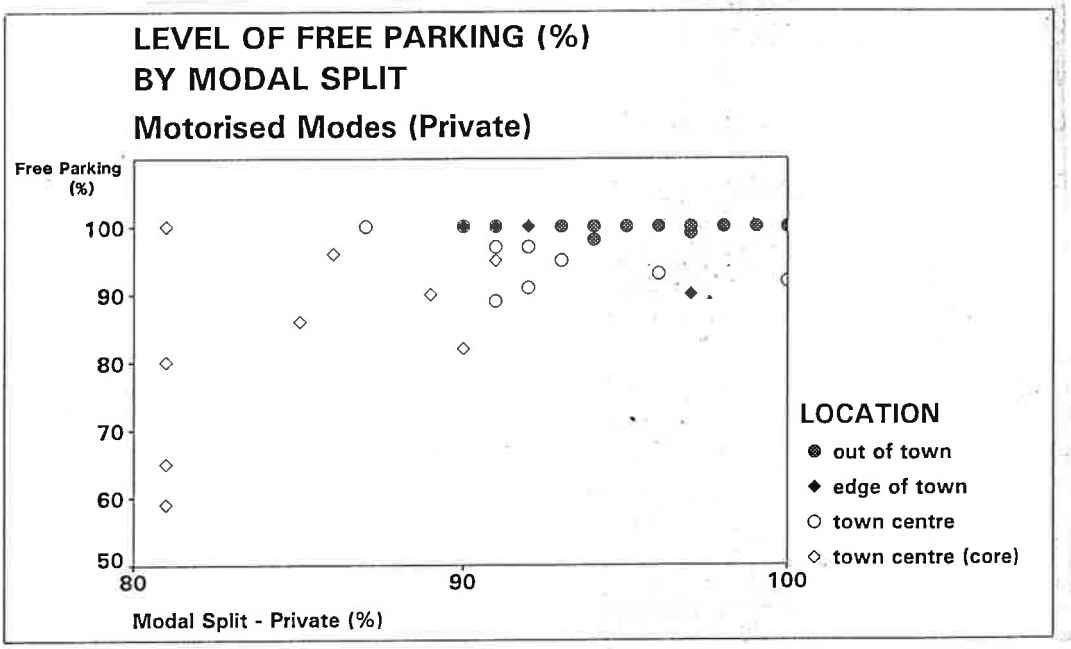
Site 60 HQ Office (Harrow)

Located in Harrow immediately adjacent to the Harrow-on-the-Hill underground and railway station, this site is of a completely different nature than all of the other sites included within the data-base. Nearly half of the motorised trips are by public transport. The site exhibits a very high employment density with only 9 sq m of space per employee and has only some 60 car parking spaces for 450 staff. Long term charged parking does exist in the area. The site is however immediately adjacent to an extensive public transport network with a very frequent service of trains to a wide range of location throughout North West London.

Modal Split and Parking Provision

2.20 Analysis was undertaken to attempt to relate modal split to the availability of parking. As has been illustrated above it is not realistic to consider parking provision to be solely a function of parking that occurs within the curtilage of the site as there is frequently free on-street parking that can be considered to be just as accessible as that within the site. From the previous analysis it was noted that only about 15 of the sites experienced any form of parking restraint. Figure 2.5 illustrates a graph of the percentage of drivers that used free parking space (the best proxy for parking availability) and the level of private transport modal split. While the graph illustrates a concentration of sites in one corner there is a pattern that emerges (albeit with a low statistical relationship) with reducing levels of free parking leading to reducing levels of car usage.

Figure 2.5



Note: Parking Information was not available for all of the additional sites.

Modal Split and Public Transport Provision

2.21 There are a number of different ways that public transport accessibility could be defined. As the journey to work trips are relatively long (an average of 30 minutes for car trips and 45 minutes for public transport trips) it was felt that some recognition of the scale of the network coverage was likely to be more important than an assessment of the number of bus or train services passing the site. It was, therefore, decided to define public transport accessibility as the relative catchment area population that could be reached within a set travel time by public transport compared with the size of the area that could be reached in the same time by private transport.

2.22 The definition of the catchment areas was undertaken either by the County Council or by the Study Team. A few simple rules were used to produce as much consistency as possible. These were:

Private transport travel times to be based on typical peak period travel conditions.

Public transport travel times were based on:

- including bus services within 10 minutes walk or train services within 15 minutes walk
- excluding bus services with a service of 2 or less buses per hour
- assume 5 minutes wait time
- assume 5 minutes for every interchange
- assume timetabled travel times
- assume a maximum of 10 minutes walk from bus or 15 minutes walk from train at the home end.

Catchment areas population were calculated from 1991 census data based on parish or approximate sub-division of district level.

2.23 It was necessary to define catchment areas prior to the initial analysis of the survey results and hence a value of 45 minutes by both car and public transport were chosen. Catchment area populations were defined for each of the 59 sites.

2.24 Public transport accessibility was, therefore, defined as:

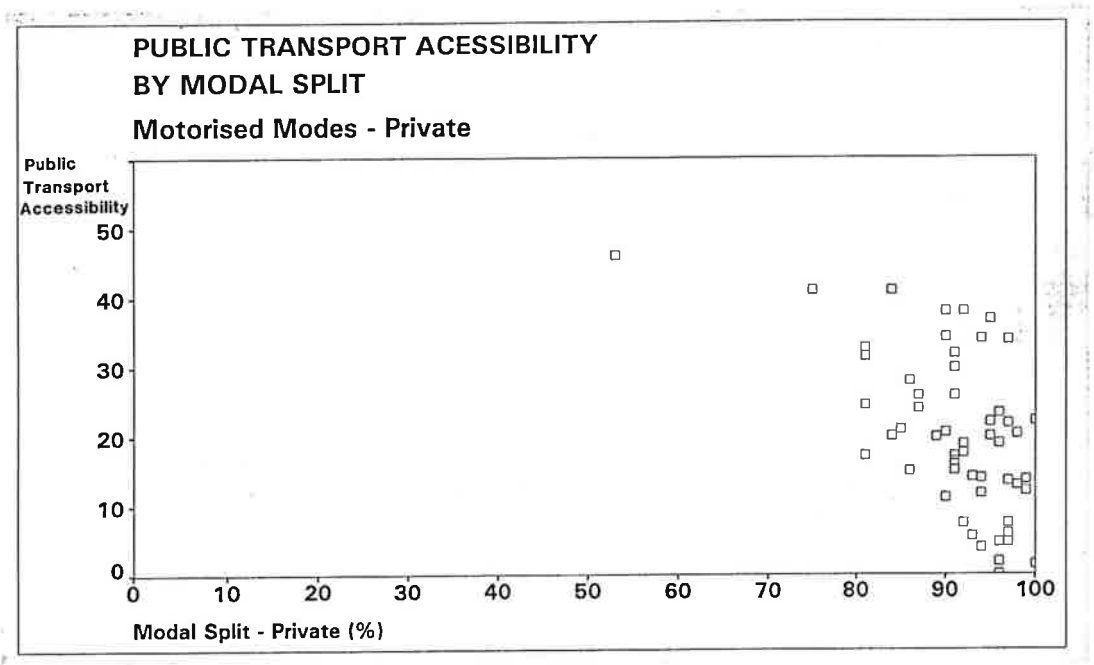
$$\text{Public transport accessibility} = \frac{P_{PUB45}}{P_{PUB45} + P_{PRIV45}}$$

where P_{PUB45} *is the population within 45 minutes travel time by public transport*
P_{PRIV45} *is the population within 45 minutes travel time by private transport.*

2.25 Figures 2.6, 2.7, 2.8 and 2.9 show typical catchment areas for four different sites. (Full tabulations of the values of all sites are provided in Appendix 2). It is clear from the illustrations and from tabulation that generally the catchment area by car is many times greater than that by public transport, that is, within a given 45 minutes travel time many more people have the opportunity of travelling to a site by car than by public transport.

2.26 Figure 2.10 illustrates the relationship between pubic transport accessibility and modal split. Unfortunately the relationship is not clear as so much of the data occurs in the top corner and there is insufficient spread of data. More data from Inner London areas would help establish any relationship. However, it should be noted that the database contains sites from part of the Outer London Boroughs where 6 sites from the London Borough of Hillingdon merge indistinguishably with sites from other town centres.

Figure 2.10



Note: The 3 Isle of Wight sites have been omitted since all destinations on the island are reached within the 45 minute travel time for both private and public transport.

2.27 Two sites with significant different characteristics are available to the study team, one is in central Harrow and the other is on Kingsway in the heart of the City. (The Kingsway site has not been added to the database as it is so different from any other site that it would bias the presentations of any set of illustrations). The data for these two sites are:

Harrow	46% public transport accessibility	47% public modal split
Kingsway	approx 70% public transport accessibility	96% public modal split.

This data perhaps illustrates that better and more meaningful relationships could be formed if sites in Inner London were looked at, but clearly such sites are not typical of SERPLAN Counties.

3 Summary of Survey Results

3.1 The analysis of the data recorded the following:

- the employment densities within buildings is much higher in town centre areas than out-of-town areas with a GFA of 16 sq m per employee in core town centre areas rising to 26 sq m GFA per employee in areas outside the town centre
- about 70% of employees arrive at work in the peak hour while 65% leave in the evening peak
- the average trip length for the journey to work is 26 minutes by private transport and 47 minutes by public transport
- trip lengths do not seem to differ significantly by area
- approximately 25 per cent of work trips are over 35 minutes in length and 10 per cent are over 50 minutes
- the percentage of trips as passengers does not differ much by area, the average figure being 12 per cent
- about 9% of travellers claim to be in some organised form of car sharing
- there is a significant increase in "walk" trips in town centre locations
- the average modal split (motorised modes) for out of town developments is 97 per cent to car and this drops to 82 per cent in town centre cores
- the average car parking provision in out of town locations was 1 space per 27 sq m, in town centre locations this fell to 1 space per 69 sq m
- public transport accessibility was defined on the basis of catchment areas within 45 minutes travel time
- the public transport accessibility index is of the same order of magnitude as the public transport usage.

3.2 Further analysis suggested that:

- the use of flexitime hours contributed to the "spreading" of peak hour arrival and departure patterns

- only a maximum of 15 sites experienced any form of car parking restraint and many employees made use of free on-street parking spaces if insufficient space existed on-site.

3.3 The study has identified a number of areas where further research work could be usefully carried out, these include:

- look at further sites in more restrained areas
- look at areas such as Oxford to assess the effect of parking restraint being applied over a long period
- look at individual companies who have recently relocated in order to assess "before and after" travel patterns.

4 Discussion

4.1 *This study was designed to assess how the application of the "carrot and the stick", that is, public transport provision and parking restraint, might effect modal split for the journey to work. The range of the results obtained, with only one site exhibiting a modal split to public transport of greater than 25%, limits the full range of analysis that would have been more helpful. However, the study has provided a wealth of data and provides this opportunity to discuss a few theories and issues that are relevant to the current debate finding ways to reduce the need to travel.*

The Effect of Employment Density

4.2 *As identified in the previous sections the utilisation of office space has a marked effect on trip generation. If one takes as an example a 10,000 sq m office development and compares its theoretical trip generation characteristics for different locations it is found that the block attracts more trips in a town centre location than in an out of town location. Based on the data derived from the surveys the 10,000 sq m block in the central area attracts 425 car trips while the same block in an out of town area would only generate 350 car trips. The workings are given in the following table.*

Table 4.1 Trip Generation by Location

	Assume 10,000 sq m Office				
Area	*Employment Density sq m/ Employees*	*Number of Employees*	*Modal Split By Private*	*Number Trips by Car*	*Number of Car Trips* [(i)]
Town Centre Core	*15.6*	*640*	*82%*	*525*	*425*
Town Centre	*19.8*	*505*	*92%*	*465*	*400*
Edge of Town/Suburban	*25.9*	*385*	*93%*	*360*	*320*
Out of Town	*23.2*	*430*	*97%*	*415*	*350*

Note [(i)] *Assumes car occupancy figures*

4.3 *This series of assumptions is not just a theoretical presentation of the data, the results of the surveys identified a similar pattern with car driver trip rates being found to be as follows:*

Table 4.2 Car Trips, per Day, by Location

	Journey To Work Car Trips per day per $100m^2$ GFA
Town Centre Core	*4.36*
Town Centre	*3.97*
Edge of Town/Suburban	*3.30*
Out of Town	*3.72*
All Sites	*3.95*

4.4 It can, therefore, be seen that the effect of employment densities carries more weight than the change of modal split. Hence, it can be concluded that offices in town centres generally generate more trips than similar sized offices on the edge of towns.

The Effect of Journey Times

4.5 Not surprisingly the analysis has identified that journey to work by public transport takes, on average 50% longer than journeys by car. Typically the public transport journey involves an additional 40 minutes of travel a day.

4.6 This extra travel time is a considerable erosion of the employees' spare time. If one assumes that the average person sleeps for 8 hours, is at work for 9 hours and travels for 1 hour, this extra 40 minutes of travel by public transport consumes some 10% of the remaining time. In the widest context of the environmental assessment of transport this must be seen to be of considerable disadvantage. This loss of "disposable" or "free time" has a direct effect on the quality of life of the person involved and their family.

4.7 It should also be noted that it is frequently the most disadvantaged section of the community that do not have the luxury of having a car that need to spend this extra time travelling.

The Role of Public Transport

4.8 The general perception of the solution to rising car use is that developments should be located at existing centres served by public transport and that public transport should be enhanced so as to encourage a significant shift of modal split.

4.9 *It is worth looking at a few typical sites included within the study to see what sort of level of change in public transport provision might be necessary to bring about a change in public transport usage. Figures 2.6, 2.7, 2.8 and 2.9 illustrated, to the same scale, the extent of the public transport network that currently exists for typical sites with 98%, 91%, 81% and 53% modal split by car. Although every site has particular characteristics that effect the modal choice, these sites were chosen as being typical.*

4.10 *It can be seen from the illustrations the extent of the increase in public transport network that would be required to make any significant reduction in the use of the car (all other issues being constant). To reduce car use from 98% to 81% the public transport network at site one would need to look like Figure 2.8 and to reduce car use to 53% the network would need to look like Figure 2.9. Such wholesale increase in the provision of public transport is an unrealistic proposition. Other than the costs of the capital works being well beyond anything that is reasonable, the environmental impact of building new rail links and highways to carry bus routes would be an unacceptable intrusion on the environment of the locality.*

4.11 *The provision of public transport on its own has little effect on changing modal choice. This can be seen from the following examples of sites that are located immediately adjacent to railway stations were still only a small percentage of employees travel to work by train (Table 4.3).*

Table 4.3 Rail use at selected sites near railway stations

Site	Station	Percentage of Employees Travelling by Train
Adjacent to Station		
Times House, Ruislip	Ruislip (Met/Picc Line)	8
Iveco, Watford	Watford Junction BR	5
NHBC Amersham	Amersham BR	3
BiWater, Dorking	Dorking BR	2
Station Nearby		
Southern Water, Brighton	Falmer BR	5
M&G Assurance, Chelmsford	Chelmsford BR	8
Zurich Insurance, Portsmouth	Portsmouth and Southsea BR	5
Mott MacDonald, Winchester	Winchester BR	9
County Hall, Maidstone	Maidstone East BR	5
Horsham DC, Horsham	Horsham BR	3

4.12 If it is not possible to markedly improve "the quality of the carrot" the next option must be to consider "increase the length of the stick", that is, using restrictive car parking standards.

4.13 It is of interest that a number of firms within the survey had recently re-located to out of town locations from town centre or suburban locations. Many stated that increased accessibility or increased parking provision was one of the main reasons for this.

4.14 The results of a more reliable survey were published by Christine Howick (Property Market Analysis) in January 1993 which referred to in depth interviews with companies on the move. Of offices located within central London the main disadvantage of their current location was stated to be the lack of access and communication (75%). Companies that had recently moved to business parks stated that the main advantages were seen to be:

- *good location* 25%
- *access to motorway* 25%
- *good parking* 24%
- *extra space* 20%
- *attractive environment* 20%
- *general improved transport* 15%.

When asked to list the <u>most</u> essential ingredient of their new office location 90% stated parking. 75% of all firms referred to needing one space per employee and the other 25% wanted more!

4.15 The problem with trying to use "the stick approach" to reduce travel demand is that it cannot be applied retrospectively to existing offices and most companies have the option of avoiding locations where such restrictive policies might be applied. Many Local Authorities are now actively seeking inward investment and are wishing to attract blue chip companies as a means of reducing local unemployment. Faced with the option of accepting "an IBM" in an out-of-town business park or "no IBM at all" leaves the local planning authority with no realistic choice but to bow to the desire of the developers.

4.16 The ability to seek low parking provision within developments is severely restricted by the chain of separate interests involved. Normally each new office has three separate parties, the developer, the financial institutions, and the tenant. It is in each of their interests to ensure that the building is as marketable as possible at all stages in its life cycle. Just because the first tenant may be prepared to accept low parking provision this is no guarantee that any subsequent tenant may be prepared to accept the same restrictions.

4.17 Two parallel examples illustrate the same problem but in different fields. When the Royal Mail designs new mail sorting depot facilities there is a corporate policy that prevents them from designing specialist buildings - every building has to be designed to accommodate an industry standard specification such that the building has a high potential resale value. A similar pattern emerges in the retail market where superstores will use industry standard floor loadings for design purposes. These are 50% thicker than their needs, but the specification would meet the needs of potential occupiers should the building be required to be marketed.

4.18 For similar reasons developers will not volunteer to adopt parking standards with less than ideal levels.

4.19 The options for reducing car travel by seeking to control the planning process would, therefore, seem to be limited. Individual authorities can adopt restrictive parking policies in conjunction with on-street control measures but the general effect will be to encourage firms to relocate elsewhere. Hence, restraining car use in one area leads to growth in another. The growth of development along the M4 corridor and around the M25 ring is an obvious example of this.

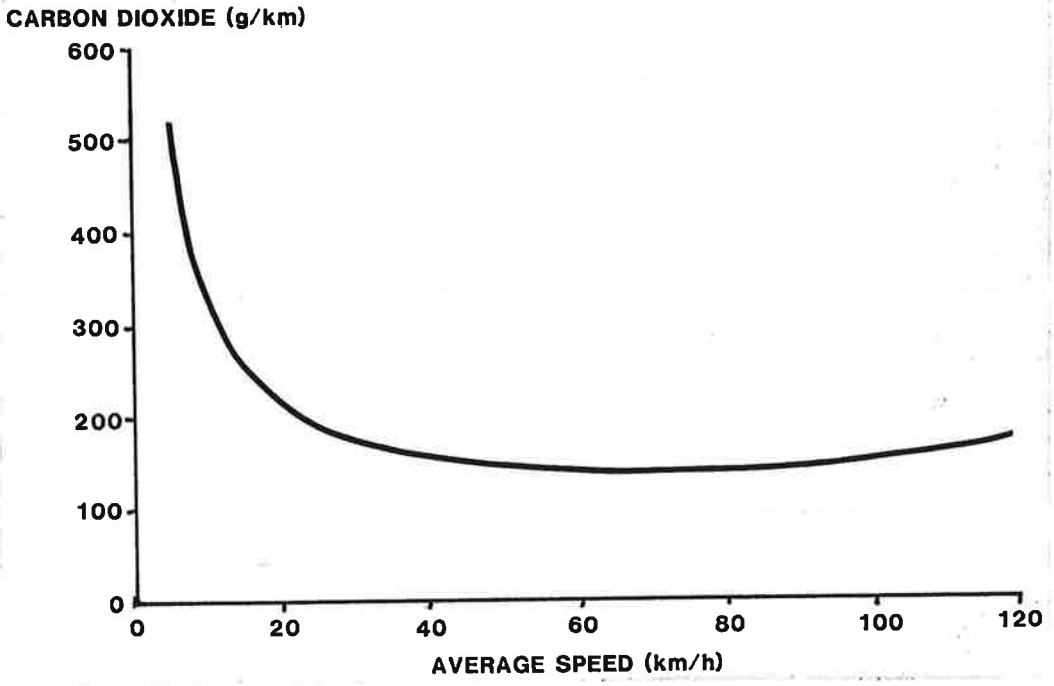
The Effect of CO_2 Emission

4.20 The DOE/DOT study on the potential for reducing travel demand as a means of reducing CO_2 emission is still to be released although preliminary conclusions have been published by Dr Jones of ECOTEC (Local Transport Today and Tomorrow, February 1993), The document states as conclusions:

> *"Reductions in transport emissions from journey to work will be encouraged by:*
>
> - *the concentration of employment uses in existing centres served by public transport*
> - *high-density residential developments concentrated at transport routes and in corridors served by public transport*
> - *the release of adequate housing land in suitable locations within existing areas to maximise the possibility for households to locate close to their places of work"*

4.20 While the current study has not had the opportunity to consider some of the wider evidence, the data produced does not readily support such thesis as they might effect the SERPLAN County Councils. For instance, Figure 4.1 illustrates CO_2 emission at differing traffic speeds, clearly trips to offices in congested urban centre generate more CO_2 that trips to offices located in non-congested out-of-town areas. The argument for concentrating development in existing centres must therefore be based on the thesis that the transference from car to public transport has a greater effect on emission levels than the increased emission arising from slower speeds. The existing data from the Shire Counties does not easily support such an argument.

CO_2 Emission by Vehicle Speed *Figure 4.1*



Postscript

4.22 It should be noted, however, that reducing travel is not necessarily the same thing as reducing congestion. Schemes to spread the peak would make highway and public transport investment more efficient, carry more people and reduce congestion. There may, therefore, be much greater scope in considering policies such as car sharing schemes, home working, flexitime, changing school hours, etc.

Note: This report has been prepared by JMP Consultants Ltd for TRICS in consultation with SERPLAN officers. Any views expressed should not be regarded as the views of the SERPLAN conference itself.

JMP Consultants Limited
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Appendices

APPENDIX A1 SITE DETAILS

Location Category	Office Site	Town	County	Site No.	Gross Floor Area (sq m)	Number of Employees	Employee Car Park Spaces	Gross Floor Area Per Employee (sq m)	Car Park Spaces Per Employee	GFA Per Car Park Space (sq m)
Town Centre Core	Barclays International	Poole	Dorset	13	30,658	2,220	1,110	13.81	0.50	26
	British Telecom	Brighton	East Sussex	18	7,103	300	192	23.68	0.64	36
	M&G Assurance	Chelmsford	Essex	21	7,432	541	75	13.74	0.14	94
	Royal London Insurance	Colchester	Essex	22	14,799	858	399	17.25	0.47	36
	Mott MacDonald	Winchester	Hants	29	1,384	99	17	13.98	0.17	81
	Zurich Insurance	Portsmouth	Hants	31	2,053	207	16	9.92	0.08	121
	HM Tax Office	Newport	Isle of Wight	36	886	75	0	11.81	0.00	-
	Kent CC (County Hall)	Maidstone	Kent	39	13,935	685	117	20.34	0.17	99
	Lloyds of London	Chatham	Kent	40	18,581	932	508	19.94	0.55	35
	Sun Alliance	Horsham	West Sussex	50	n/a	1,500	n/a	n/a	n/a	n/a
	Petrofina	Epsom	Surrey	52	5,400	325	132	16.62	0.41	41
	Costain	Woking	Surrey	53	5,400	380	40	14.21	0.11	135
	Avis Car Rentals	Hayes	LB Hillingdon	55	3,250	230	53	14.13	0.23	61
	Times House	Ruislip	LB Hillingdon	58	2,653	135	101	19.65	0.75	26
	HQ Offices	Harrow	LB Harrow	60	4,230	469	58	9.02	0.12	73
Town Centre	Notts/BIS	Luton	Beds	2	1,189	78	41	15.24	0.53	26
	ICL	Bracknell	Berks	5	3,716	182	188	20.42	1.03	20
	Equitable Life	Aylesbury	Bucks	10	27,742	1,255	646	22.11	0.51	40
	Private Patient Plan	Eastbourne	East Sussex	19	6,765	338	77	20.01	0.23	85
	Dorset House	Bournemouth	Dorset	14	2,508	163	113	15.39	0.69	21
	Peat Marwick	Guildford	Surrey	46	2,025	101	45	20.05	0.45	38
	District Council Offices	Horsham	West Sussex	49	6,527	240	340	27.20	1.42	19
	Hewlett Packard	Uxbridge	LB Hillingdon	54	12,528	580	336	21.60	0.58	37
	British Telecom	Cowley	LB Hillingdon	57	1,545	120	51	12.88	0.43	30

Location Category	Office Site	Town	County	Site No.	Gross Floor Area (sq m)	Number of Employees	Employee Car Park Spaces	Gross Floor Area Per Employee (sq m)	Car Park Spaces Per Employee	GFA Per Car Park Space (sq m)
Town Centre (Cont.)	Dental Practice Board	Eastbourne	East Sussex	20	10,000	1,205	316	8.30	0.26	32
	Barclays International	Southampton	Hants	26	1,812	64	8	28.31	0.13	226
	Moore & Blatch	Southampton	Hants	28	1,143	53	14	21.57	0.26	82
	IVECO	Watford	Herts	33	7,897	351	252	22.50	0.72	31
	Southern Water	Newport	Isle of Wight	37	1,115	50	35	22.30	0.70	29
	British & American Tobacco	Staines	Surrey	44	6,132	301	233	20.37	0.77	33
	GrandMet/Rover Group	Uxbridge	LB Hillingdon	59	3,760	130	99	28.92	0.76	38
	Chartered Accountants	Whetstone	LB Barnet	61	880	109	30	8.07	0.28	29
Edge of Town	Howard House	Bedford	Beds	1	2,109	60	25	35.15	0.50	64
	NHBC HQ	Amersham	Bucks	9	1,878	125	44	15.02	0.35	40
	Abbey National	Milton Keynes	Bucks	11	n/a	n/a	n/a	n/a	n/a	n/a
	Dunn & Bradstreet	High Wycombe	Bucks	12	n/a	n/a	n/a	n/a	n/a	n/a
	Southern Water	Brighton	East Sussex	17	10,972	203	400	54.05	1.97	26
	Mercury Communications	Elstree	Herts	32	9,587	497	410	19.29	0.82	23
	HM Land Registry	Hawkenbury	Kent	41	9,340	526	250	17.76	0.48	36
	Biwater	Dorking	Surrey	43	5,295	183	219	28.93	1.20	24
	Surrey County Council	West Ewell	Surrey	45	2,943	240	174	12.26	0.73	16
	Construction Group	Summerstown	LB Merton	62	2,540	104	92	24.42	0.88	28
Out of Town	Shanks & McEwans	Aspley Heath	Beds	3	1,296	113	80	11.47	0.71	16
	Ernst & Young	Luton	Beds	4	3,066	217	162	14.13	0.75	17
	Shire Hall	Reading	Berks	6	n/a	1,054	n/a	n/a	n/a	n/a
	Avis	Bracknell	Berks	7	3,345	177	176	18.90	0.99	19
	HFC	Winkfield	Berks	8	5,110	360	261	14.19	0.73	19
	GPT Telecommunications	Poole	Dorset	15	27,871	1,175	1,203	23.72	1.02	22
	British Gas	Poole	Dorset	16	4,479	270	327	16.59	1.21	13
	First Data Resources	Basildon	Essex	23	25,469	1,025	690	24.85	0.67	36

Location Category	Office Site	Town	County	Site No.	Gross Floor Area (sq m)	Number of Employees	Employee Car Park Spaces	Gross Floor Area Per Employee (sq m)	Car Park Spaces Per Employee	GFA Per Car Park Space (sq m)
Out of Town (Cont.)	Charter Court Business Park	Colchester	Essex	24	2,311	73	95	31.66	1.30	16
	NatWest Business Centre	Brentwood	Essex	25	1,808	128	50	14.12	0.39	32
	B&Q Head Office	Chandlers Ford	Hants	27	8,361	600	412	13.94	0.69	20
	Southern Water	Otterbourne	Hants	30	1,600	160	150	10.00	0.94	8
	Nissan	Maple Cross	Herts	34	10,964	270	394	40.61	1.46	26
	NFI Electronics	Newport	Isle of Wight	38	3,391	105	80	32.30	0.76	42
	Gillingham Business Park	Gillingham	Kent	42	21,424	501	431	42.76	0.86	32
	Southern Water	Worthing	West Sussex	47	6,325	440	265	14.38	0.60	22
	London & Edinburgh	Worthing	West Sussex	48	9,290	992	550	9.36	0.55	16
	CIBA GEIGY	Horsham	West Sussex	51	33,071	850	490	38.91	0.58	67
	Memorex Telex	Longford	LB Hillingdon	56	1,021	60	46	17.02	0.77	22

(61 sites = 50 Serplan (incl. Bucks 3 & 4) TRICS 8, LRC 3

APPENDIX A2 MODAL SPLIT AND POPULATION CATCHMENT SITE INFORMATION

Location Category	Office Site	Town	County	Site No.	Average Modal Split (%) (Motorised Modes)		Average Modal Split (%) (All Modes)			Population Catchment Size Within 45 Mins		
					Private	Public	Private	Public	Others	Private Transport	Public Transport	Ratio (% Private:% Public)
Town Centre Core	Barclays International	Poole	Dorset	13	91	9	84	8	8	596,868	277,658	68 : 32
	British Telecom	Brighton	East Sussex	18	81	19	73	17	10	633,700	308,293	67 : 33
	M&G Assurance	Chelmsford	Essex	21	81	19	68	15	17	1,084,400	225,594	83 : 17
	Mott MacDonald	Winchester	Hants	29	81	19	72	17	11	1,510,100	490,000	76 : 24
	Royal London Insurance	Colchester	Essex	22	89	11	79	10	11	676,700	167,379	80 : 20
	Zurich Insurance	Portsmouth	Hants	31	81	19	72	17	11	1,239,900	570,000	69 : 31
	HM Tax Office	Newport	Isle of Wight	36	90	10	72	8	20	136,000	136,000	50 : 50
	Kent CC (County Hall)	Maidstone	Kent	39	85	15	69	12	19	784,300	212,100	79 : 21
	Lloyds of London	Chatham	Kent	40	86	14	82	13	5	636,500	248,100	72 : 28
	Sun Alliance	Horsham	West Sussex	50	86	14	63	10	27	843,200	150,000	85 : 15
	Petrofina	Epsom	Surrey	52	84	16	73	14	13	1,100,000	280,000	80 : 20
	Costain	Woking	Surrey	53	87	13	80	12	8	1,300,000	400,000	76 : 24
	Avis Car Rentals	Hayes	LB Hillingdon	55	75	25	66	22	12	1,115,000	760,000	59 : 41
	Times House	Ruislip	LB Hillingdon	58	84	16	79	15	6	1,115,000	760,000	59 : 41
	HQ Offices	Harrow	LB Harrow	60	53	47	50	44	6	1,124,300	961,430	54 : 46
Town Centre	Dorset House	Bournemouth	Dorset	14	90	10	87	9	4	690,113	360,473	66 : 34
	Notts/BIS	Luton	Beds	2	91	9	83	9	8	1,336,697	259,290	84 : 16
	ICL	Bracknell	Berks	5	92	8	88	8	4	3,720,857	301,038	93 : 7
	Equitable Life	Aylesbury	Bucks	10	96	4	84	3	13	651,200	151,369	81 : 19
	Private Patient Plan	Eastbourne	East Sussex	19	91	9	77	8	15	518,000	180,369	74 : 26
	Southern Water	Newport	Isle of Wight	37	91	9	87	8	5	136,000	136,000	50 : 50
	Peat Marwick	Guildford	Surrey	46	100	0	93	0	7	1,251,100	355,000	78 : 22
	District Council Offices	Horsham	West Sussex	49	91	9	79	8	13	843,200	150,000	85 : 15
	Hewlett Packard	Uxbridge	LB Hillingdon	54	92	8	89	8	3	1,260,000	781,000	62 : 38
	British Telecom	Cowley	LB Hillingdon	57	94	6	87	6	7	1,650,000	850,000	66 : 34

Location Category	Office Site	Town	County	Site No.	Average Modal Split (%) (Motorised Modes)		Average Modal Split (%) (All Modes)			Population Catchment Size Within 45 Mins		
					Private	Public	Private	Public	Others	Private Transport	Public Transport	Ratio (% Private:% Public)
Town Centre (Cont.)	Dental Practice Board	Eastbourne	East Sussex	20	87	13	72	10	18	518,000	180,360	74 : 26
	Barclays International	Southampton	Hants	26	92	8	90	8	2	1,404,400	325,000	81 : 19
	Moore & Blatch	Southampton	Hants	28	91	9	77	28	8	1,404,400	290,000	83 : 17
	IVECO	Watford	Herts	33	93	7	83	7	10	1,739,690	285,665	86 : 14
	British & American Tobacco	Staines	Surrey	44	90	10	85	9	6	1,381,200	356,000	80 : 20
	GrandMet/Rover Group	Uxbridge	LB Hillingdon	59	90	10	87	10	3	1,260,000	781,000	62 : 38
	Chartered Accountants	Whetstone	LB Barnet	61	88	12	84	11	5	n/a	n/a	n/a
Edge of Town	Howard House	Bedford	Beds	1	95	5	78	4	18	713,127	200,930	78 : 22
	NHBC HQ	Amersham	Bucks	9	97	3	86	3	11	836,900	233,038	78 : 22
	Abbey National	Milton Keynes	Bucks	11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Dunn & Bradstreet	High Wycombe	Bucks	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Southern Water	Brighton	East Sussex	17	92	8	90	8	2	745,700	158,252	82 : 18
	Mercury Communications	Elstree	Herts	32	94	6	93	6	1	2,413,665	100,532	96 : 4
	HM Land Registry	Hawkenbury	Kent	41	90	10	77	8	15	530,200	66,400	89 : 11
	Biwater	Dorking	Surrey	43	95	5	92	4	4	421,100	245,000	63 : 37
	Surrey County Council	West Ewell	Surrey	45	91	9	83	8	9	783,000	333,000	70 : 30
	Construction Group	Summerstown	LB Merton	62	92	8	89	8	3	n/a	n/a	n/a
Out of Town	Shanks & McEwans	Aspley Heath	Beds	3	100	0	100	0	0	944,440	14,138	99 : 1
	Ernst & Young	Luton	Beds	4	96	4	95	4	1	1,371,689	0	100 : 0
	Shire Hall	Reading	Berks	6	93	7	91	7	2	2,578,093	154,221	94 : 6
	Avis	Bracknell	Berks	7	97	3	94	3	3	3,720,857	301,038	93 : 7
	HFC	Winkfield	Berks	8	96	4	96	4	0	3,719,900	185,350	95 : 5
	GPT Telecommunications	Poole	Dorset	15	98	2	79	2	19	593,868	150,493	80 : 20
	British Gas	Poole	Dorset	16	97	3	92	3	5	621,393	317,871	66 : 34
	First Data Resources	Basildon	Essex	23	94	6	93	6	1	931,800	122,990	88 : 12
	Charter Court Business Park	Colchester	Essex	24	94	6	94	6	0	676,700	108,921	86 : 14

Location Category	Office Site	Town	County	Site No.	Average Modal Split (%) (Motorised Modes)		Average Modal Split (%) (All Modes)			Population Catchment Size Within 45 Mins		
					Private	Public	Private	Public	Others	Private Transport	Public Transport	Ratio (% Private:% Public)
Out of Town	NatWest Business Centre	Brentwood	Essex	25	97	3	96	3	1	969,200	48,140	95 : 5
	B&Q Head Office	Chandlers Ford	Hants	27	95	5	90	5	5	1,207,700	300,000	80 : 20
	Southern Water	Otterbourne	Hants	30	99	1	98	1	1	2,023,100	320,000	86 : 14
	Nissan	Maple Cross	Herts	34	96	4	96	3	1	1,767,479	33,402	98 : 2
	NFI Electronics	Newport	Isle of Wight	38	98	2	88	2	10	136,000	136,000	50 : 50
	Gillingham Business Park	Gillingham	Kent	42	96	4	92	4	4	706,400	214,060	77 : 23
	Southern Water	Worthing	West Sussex	47	97	3	94	3	3	814,300	127,000	87 : 13
	London & Edinburgh	Worthing	West Sussex	48	98	2	90	1	9	814,300	120,000	87 : 13
	CIBA GEIGY	Horsham	West Sussex	51	99	1	82	1	17	843,200	120,000	88 : 12
	Memorex Telex	Longford	LB Hillingdon	56	97	3	97	3	0	1,650,000	110,000	94 : 6

(61 sites = 50 Serplan (incl. Bucks 3 & 4) TRICS 8, LRC 3

APPENDIX A3 AVERAGE JOURNEY TIMES AND PARKING CHARACTERISTICS

Location Category	Office Site	Town	County	Site No.	Average Journey Time (mins)				Parking Locations (Per Cent)		
					Private	Public	Others	All Modes	Free Spaces	On Street	Employee Car Park
Town Centre Core	Barclays International	Poole	Dorset	13	23	34	16	23	95	13	79
	British Telecom	Brighton	East Sussex	18	24	44	23	27	100	1	98
	M&G Assurance	Chelmsford	Essex	21	31	37	20	30	59	15	32
	Royal London Insurance	Colchester	Essex	22	22	33	18	22	90	2	83
	Mott MacDonald	Winchester	Hants	29	29	41	29	31	65	24	31
	Zurich Insurance	Portsmouth	Hants	31	31	39	19	31	80	24	36
	HM Tax Office	Newport	Isle of Wight	36	19	67	12	21	82	50	0
	Kent CC (County Hall)	Maidstone	Kent	39	31	39	19	30	86	8	64
	Lloyds of London	Chatham	Kent	40	26	50	27	29	96	15	80
	Sun Alliance	Horsham	West Sussex	50	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Petrofina	Epsom	Surrey	52	n/a	n/a	n/a	n/a	81	16	n/a
	Costain	Woking	Surrey	53	n/a	n/a	n/a	n/a	99	0	n/a
	Avis Car Rentals	Hayes	LB Hillingdon	55	n/a	n/a	n/a	n/a	76	52	24
	Times House	Ruislip	LB Hillingdon	58	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	HQ Offices	Harrow	LB Harrow	60	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Town Centre	Notts/BIS	Luton	Beds	2	32	34	16	30	97	17	77
	ICL	Bracknell	Berks	5	32	42	19	32	97	0	96
	Equitable Life	Aylesbury	Bucks	10	21	38	17	21	93	5	83
	Dorset House	Bournemouth	Dorset	14	22	52	22	24	100	0	98
	Private Patient Plan	Eastbourne	East Sussex	19	20	26	14	20	100	65	29
	Peat Marwick	Guildford	Surrey	46	34	n/a	8	32	92	12	68
	District Council Offices	Horsham	West Sussex	49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Hewlett Packard	Uxbridge	LB Hillingdon	54	n/a	n/a	n/a	n/a	100	0	100
	British Telecom	Cowley	LB Hillingdon	57	n/a	n/a	n/a	n/a	96	3	77

Location Category	Office Site	Town	County	Site No.	Average Journey Time (mins)				Parking Locations (Per Cent)		
					Private	Public	Others	All Modes	Free Spaces	On Street	Employee Car Park
Town Centre (Cont.)	Dental Practice Board	Eastbourne	East Sussex	20	16	37	17	19	100	25	70
	Barclays International	Southampton	Hants	26	32	33	70	33	91	3	88
	Moore & Blatch	Southampton	Hants	28	29	71	11	30	89	36	36
	IVECO	Watford	Herts	33	41	59	15	40	95	1	89
	Southern Water	Newport	Isle of Wight	37	17	40	11	18	100	0	100
	British & American Tobacco	Staines	Surrey	44	33	67	18	35	100	18	81
	GrandMet/Rover Group	Uxbridge	LB Hillingdon	59	n/a	n/a	n/a	n/a	79	21	70
	Chartered Accountants	Whetstone	LB Barnet	61	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Edge of Town	Ernst & Young	Luton	Beds	4	24	46	5	24	100	0	100
	NHBC HQ	Amersham	Bucks	9	22	55	15	22	90	1	85
	Abbey National	Milton Keynes	Bucks	11	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Dunn & Bradstreet	High Wycombe	Bucks	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Southern Water	Brighton	East Sussex	17	24	44	23	27	100	1	99
	Mercury Communications	Elstree	Herts	32	46	87	11	48	100	2	98
	HM Land Registry	Hawkenbury	Kent	41	19	48	18	22	100	0	98
	Biwater	Dorking	Surrey	43	31	28	9	30	100	0	96
	Surrey County Council	West Ewell	Surrey	45	27	43	22	28	100	1	96
	Construction Group	Summerstown	LB Merton	62	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Out of Town	Howard House	Bedford	Beds	1	25	115	21	29	100	0	100
	Shanks & McEwans	Aspley Heath	Beds	3	31	-	-	31	100	0	100
	Shire Hall	Reading	Berks	6	26	49	26	27	100	0	99
	Avis	Bracknell	Berks	7	22	33	17	32	100	0	99
	HFC	Winkfield	Berks	8	31	41	n/a	31	100	0	100
	GPT Telecommunications	Poole	Dorset	15	17	32	14	17	100	1	99
	British Gas	Poole	Dorset	16	19	50	7	19	99	0	98
	First Data Resources	Basildon	Essex	23	21	47	17	22	100	0	98
	Charter Court Business Park	Colchester	Essex	24	19	38	-	20	98	0	98

Location Category	Office Site	Town	County	Site No.	Average Journey Time (mins)				Parking Locations (Per Cent)		
					Private	Public	Others	All Modes	Free Spaces	On Street	Employee Car Park
Out of Town (Cont.)	NatWest Business Centre	Brentwood	Essex	25	37	68	5	38	100	23	58
	B&Q Head Office	Chandlers Ford	Hants	27	20	36	17	20	100	0	100
	Southern Water	Otterbourne	Hants	30	22	50	4	22	100	0	97
	Nissan	Maple Cross	Herts	34	42	58	15	42	100	0	99
	NFI Electronics	Newport	Isle of Wight	38	13	10	7	12	100	0	100
	Gillingham Business Park	Gillingham	Kent	42	21	56	27	23	100	8	90
	Southern Water	Worthing	West Sussex	47	18	73	15	19	100	0	99
	London & Edinburgh	Worthing	West Sussex	48	18	46	20	18	100	3	95
	CIBA GEIGY	Horsham	West Sussex	51	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Memorex Telex	Longford	LB Hillingdon	56	n/a	n/a	n/a	n/a	n/a	n/a	n/a

(61 sites = 50 Serplan (incl. Bucks 3 & 4) TRICS 8, LRC 3

1. WHERE DO YOU LIVE?

TOWN_____ POSTCODE_____

2. WHAT TIME DID YOU ARRIVE AT WORK TODAY? (please tick)

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
BEFORE 07.30	07.30 07.45	07.45 08.00	08.00 08.15	08.15 08.30	08.30 08.45	08.45 09.00	09.00 09.15	09.15 09.30	AFTER 09.30

3. WHAT TIME DO YOU EXPECT TO LEAVE WORK TODAY? (please tick)

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
BEFORE 16.00	16.00 16.15	16.15 16.30	16.30 16.45	16.45 17.00	17.00 17.15	17.15 17.30	17.30 17.45	17.45 18.00	AFTER 18.00

4. HOW DID YOU TRAVEL TO WORK TODAY?

(a) Please tick main mode of travel only.

☐	☐	☐	☐	☐	☐	☐	☐	☐
CAR DRIVER	CAR PASSENGER	TAXI	WALK	BUS	TRAIN	MOTOR CYCLE	CYCLE	COMPANY COACH

(b) If your journey to work also involved any other modes of travel, please specify.

☐	☐	☐	☐	☐	☐	☐	☐	☐
CAR DRIVER	CAR PASSENGER	TAXI	WALK (if over 5 mins)	BUS	TRAIN	MOTOR CYCLE	CYCLE	COMPANY COACH

5. HOW LONG DID YOUR JOURNEY TAKE?_____ minutes (door to door)

6. DO YOU BELONG TO A CAR SHARING POOL OR GET A LIFT FROM A COLLEAGUE ON A REGULAR BASIS?

	YES	NO
	☐	☐

IF YOU DROVE A CAR TODAY, PLEASE ANSWER THE FOLLOWING QUESTIONS:

7. WHERE DID YOU PARK?

Space provided by employer	☐
Free off-street car park	☐
Charged off-street car park	☐
On the street	☐
Elsewhere (please explain)	☐ _____

_____

8. IF YOU PAID FOR YOUR PARKING SPACE WHAT WAS THE DAILY PARKING CHARGE?_____

9. WHY DID YOU CHOOSE NOT TO USE PUBLIC TRANSPORT?

☐	☐	☐	☐	☐	☐	☐	☐	☐
CAR NEEDED DURING DAY	TOO EXPENSIVE	TOO INFREQUENT	TOO UNRELIABLE	TOO SLOW	NOT CONVENIENT	NO SUITABLE SERVICE	CAR MORE FLEXIBLE	PREFER COMFORT OF CAR

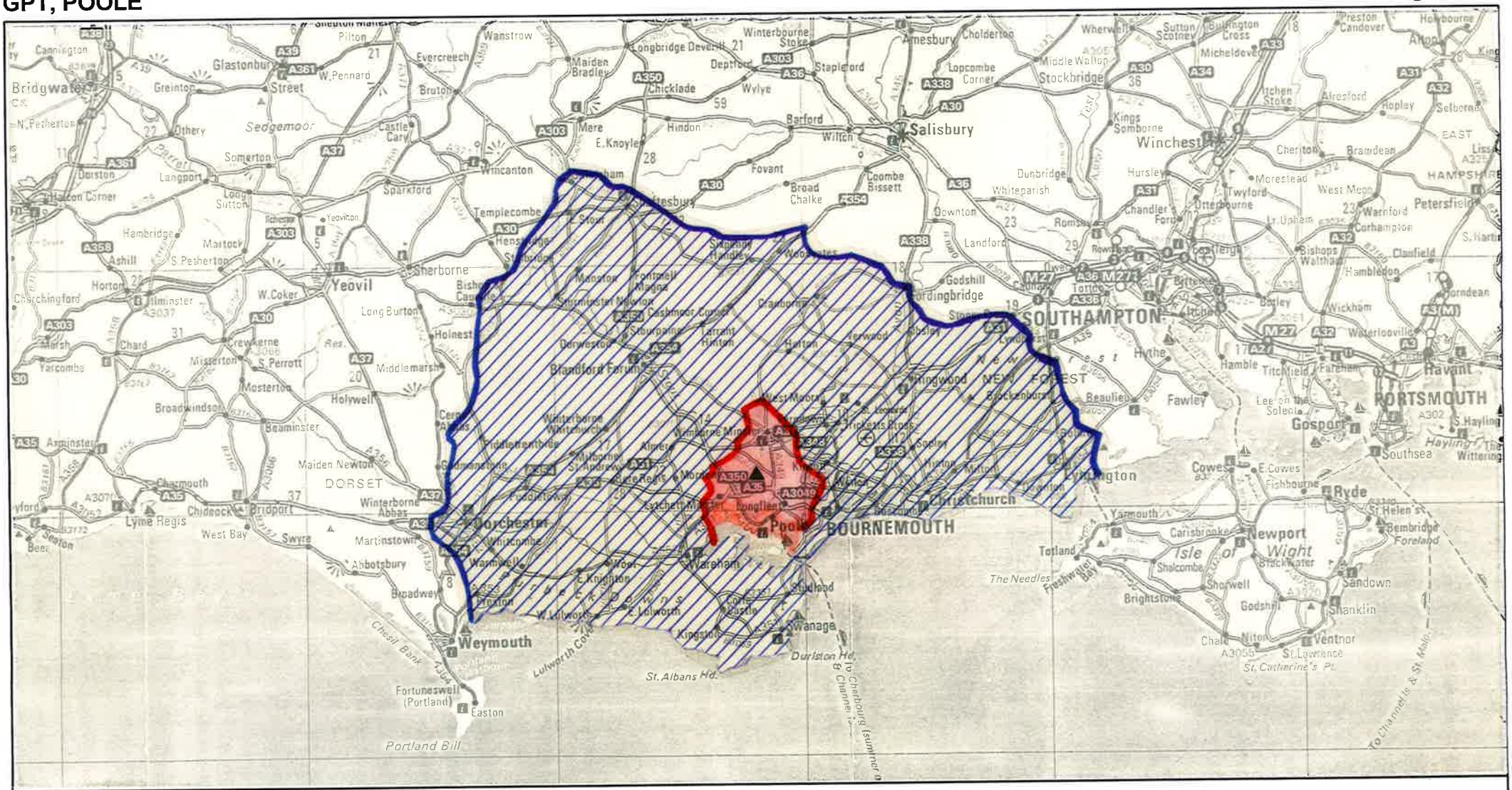
ADD COMMENTS _____

_____

THANK YOU FOR YOUR HELP

TRAVEL TIME ISOCHRONES (45minutes)
GPT, POOLE

Figure 2.6



MODAL SPLIT - PRIVATE = 98%
(MOTORISED MODES)

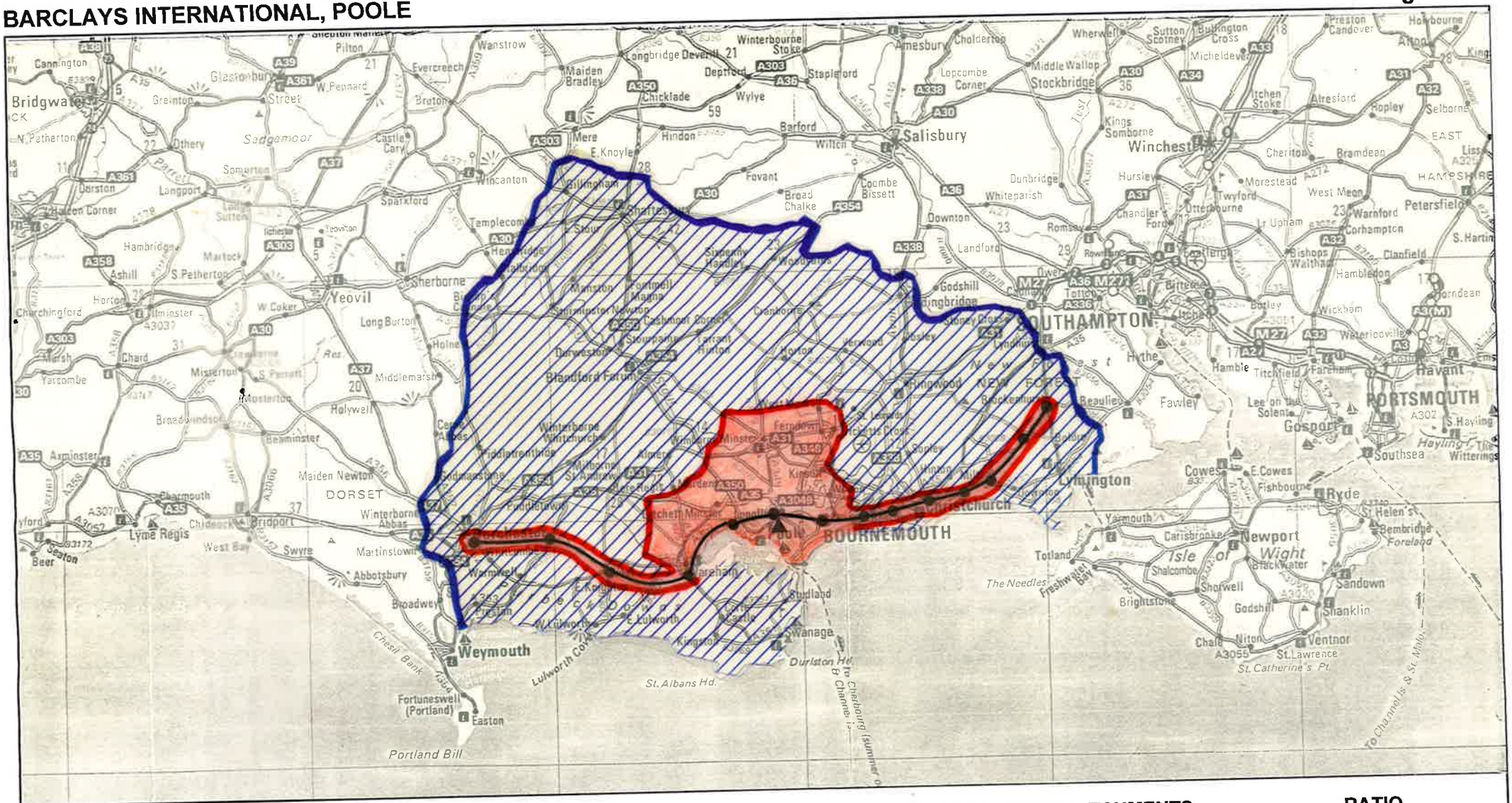
POPULATION CATCHMENTS

- **PRIVATE = 593 863**
- **PUBLIC = 150 493**

RATIO
(% PRIVATE : % PUBLIC)
80 : 20

TRAVEL TIME ISOCHRONES (45minutes)
BARCLAYS INTERNATIONAL, POOLE

Figure 2.7



MODAL SPLIT - PRIVATE = 91%
(MOTORISED MODES)

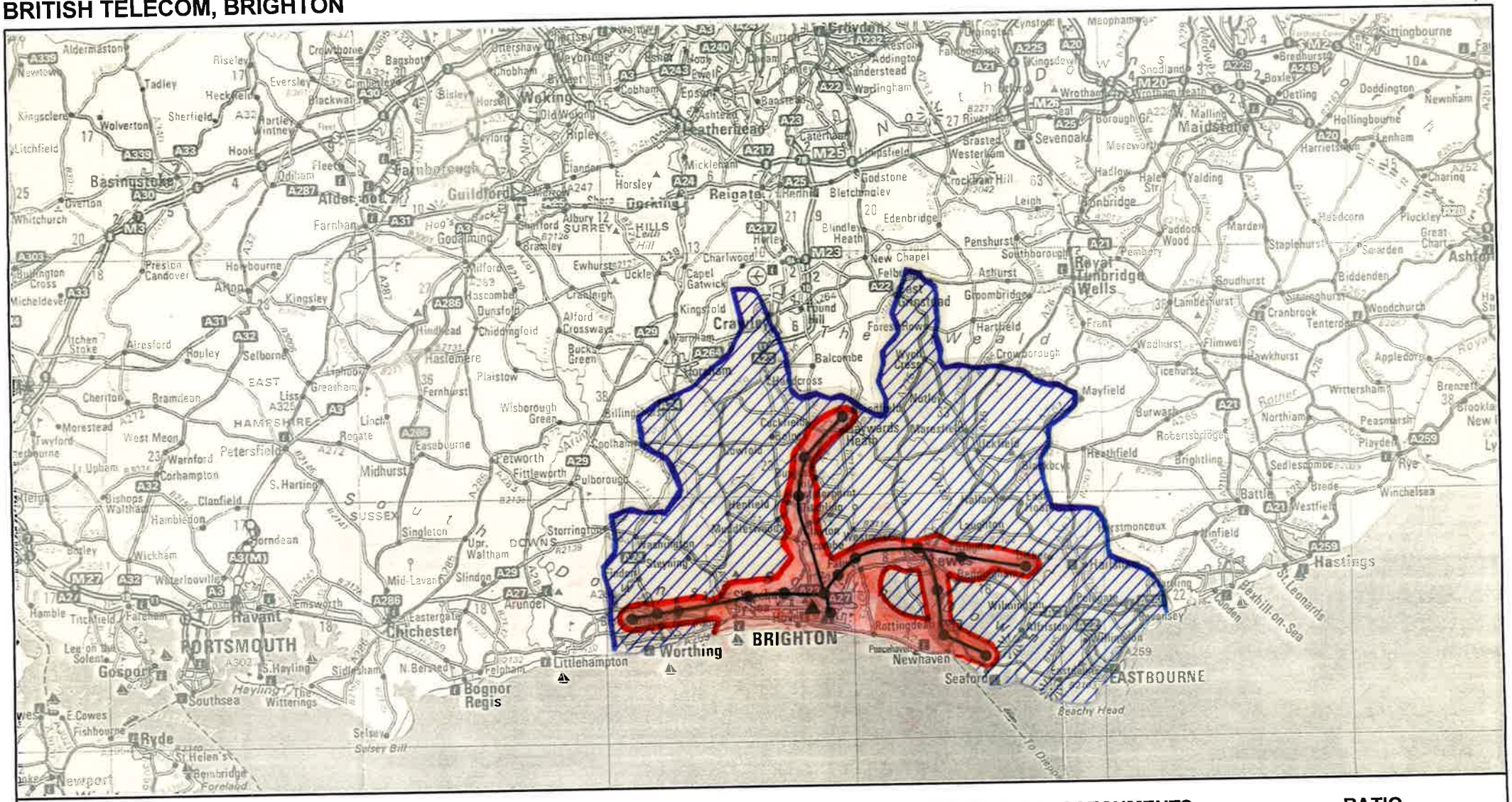
POPULATION CATCHMENTS

- **PRIVATE = 596 868**
- **PUBLIC = 277 658**

RATIO
(% PRIVATE : % PUBLIC)
68 : 32

TRAVEL TIME ISOCHRONES (45minutes)
BRITISH TELECOM, BRIGHTON

Figure 2.8



MODAL SPLIT - PRIVATE = 81%
(MOTORISED MODES)

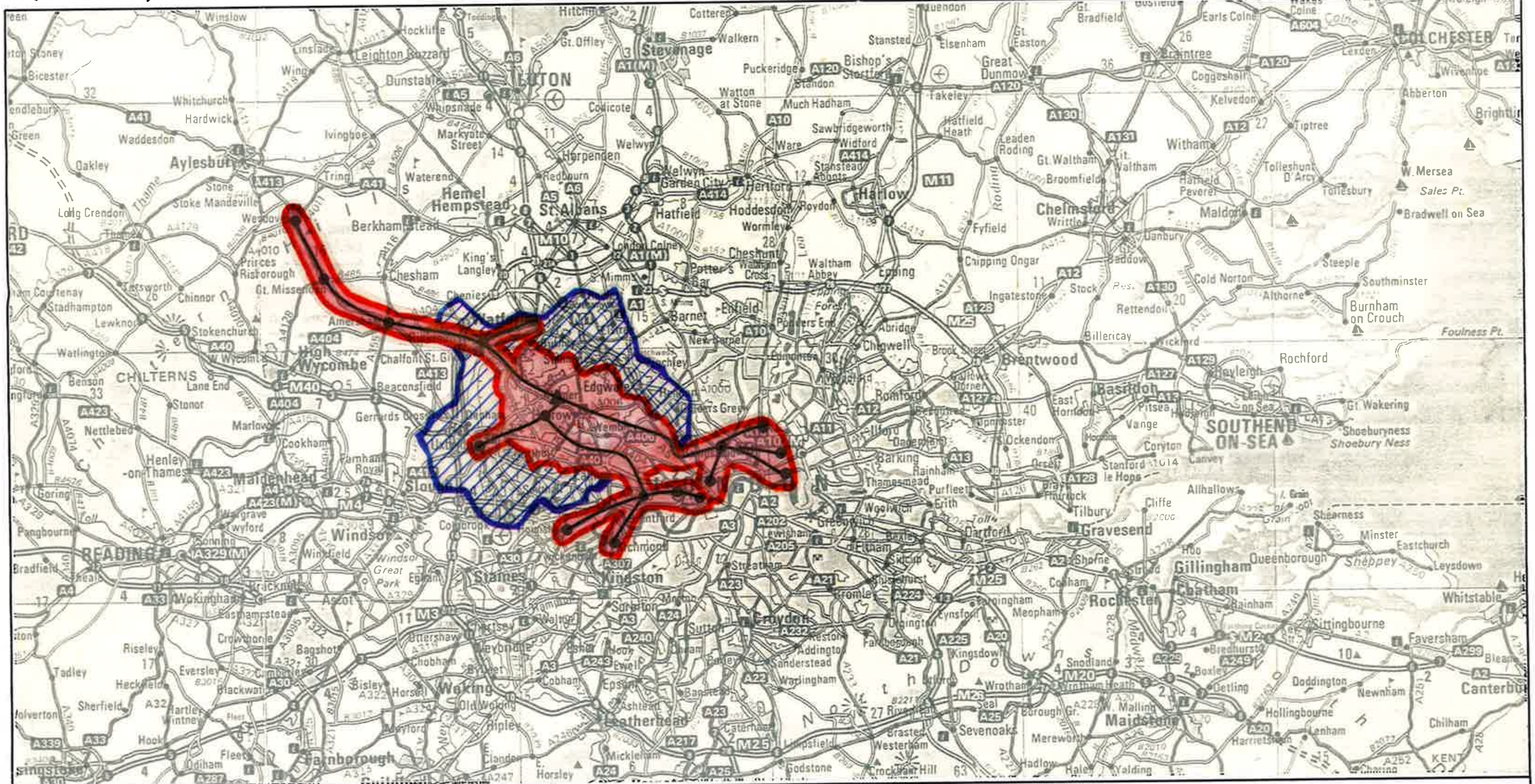
POPULATION CATCHMENTS

- **PRIVATE = 633 700**
- **PUBLIC = 308 293**

RATIO
(% PRIVATE : % PUBLIC)
67 : 33

TRAVEL TIME ISOCHRONES (45minutes)
HQ OFFICES, HARROW

Figure 2.9



MODAL SPLIT - PRIVATE = 53%
(MOTORISED MODES)

POPULATION CATCHMENTS

- **PRIVATE = 1 124 300**
- **PUBLIC = 961 430**

RATIO
(% PRIVATE : % PUBLIC)
54 : 46