Potential for Carfree Development in the UK

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Abstract

Rising car ownership and use has been associated with: pollution, resource depletion, waste of land, social exclusion and health problems. Carfree development is a relatively recent response to these problems in urban areas. There are several examples in continental Europe, but examples in the UK have been few and small in scale. This study aims to explore the feasibility of carfree development in the UK, focussing on the following research questions:

1. What types of existing developments can be defined as 'carfree'?
2. Amongst which groups (if any) is potential demand for housing in carfree developments likely to be found?
3. What are the distinguishing characteristics of these groups?
4. What circumstances would promote or discourage potential demand?

The first question was addressed through a review of the literature and five study visits to European carfree developments. Three types of carfree development were identified and three defining characteristics: traffic-free environments, design for non-car travel and limited separated parking.

To address the remaining questions, from the literature, two target groups were hypothesised to be most likely to move to a carfree development: Carfree Choosers, who live without a car by choice, and Carfree Possibles, car owners willing to give up car ownership under certain circumstances. This hypothesis was tested through: an online survey of members of environmental and cycling organisations, a random postal survey in Camden, London, and a household survey of Poole Quarter, a 'low car' development in Dorset. A subsample of 35 respondents were interviewed by telephone later.

The questionnaire analysis broadly supported the hypothesis for both target groups. The interviews cast doubt on some of the declarations of the Carfree Possibles but supported those of the Carfree Choosers who were judged most likely to provide the early adopters of carfree housing. The Carfree Choosers were the 'most urban' group in locations, behaviour and preferences. The findings confirm that potential demand exists for carfree developments, mainly concentrated in the inner areas of larger cities, where the most suitable sites can also be found.   The thesis concludes with recommendations for Government policy to encourage carfree developments.

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1 Introduction

1.1 Why Carfree Development?

The concept of carfree development is a relatively recent response to long-standing concerns about the effects of motor vehicles on the urban environment. It began in Germany and Austria during the early 1990s (Morris 2005), and was often promoted by activist groups, most of whose members lived without cars. Amongst their various reasons for promoting carfree development, many were seeking an urban environment where they could realise the potential benefits of this lifestyle choice. At the same time, many of them formed part of the wider environmental movement, including the international carfree cities movement, which aims to replace motor vehicles with more sustainable alternatives (World Carfree Network 2009).

These motivations imply two beliefs: that the growth of car use and motor traffic has created environmental and social problems and that removing cars from urban areas can bring benefits for residents and the wider environment, outweighing any new problems created. As reviewed in the next section, there is a broad area of consensus on the first of these beliefs. No such consensus exists on the appropriate policy responses, and there has been relatively little research into the potential contribution of carfree development, particularly in a UK context.

The definition of the term 'carfree' is problematic. As motor vehicles are ubiquitous across the developed world, all the British and European developments described as 'carfree' in this thesis involve some degree of compromise with vehicular access. In the UK the term is generally used to describe any form of housing which has no allocated parking, usually on conventional streets open to traffic. Developments described as carfree elsewhere in Europe generally have **limited parking on the periphery of a residential area free from motor traffic**. This thesis will mainly focus on this 'European style' of carfree development. It will propose an inclusive definition and a categorisation of the types of development which would fall within it.

UK Government policy contains some encouragement for carfree development. Although these policies mainly reflect the limited UK concept of housing with no parking, they do not appear to contain any significant obstacles to the broader European concept of carfree development. Despite this, examples built in the UK have been few in number and small in scale so far. Could the concept be expanded in this country? This question would depend upon a number of factors relating to: potential demand for carfree housing, potential supply and public policy. There are research gaps in all of these areas – too many for one study to address. This study will focus on filling part of those gaps relating to the existence and nature of potential demand: who are the

people – if any – who might be attracted to live in carfree developments, and under what circumstances?

The next section will begin with a brief overview of the problems ascribed to rising levels of car ownership and use, followed by the claims that carfree development can help to address these problems. These will provide the rationale for studying carfree development and the nature of potential demand for it, which will form the main focus for the rest of the study. The final chapter, considering the policy implications will return to these problems and claims in the light of findings which suggest some circumstances where carfree developments could make such a contribution.

1.2   Problems Created by Rising Car Ownership and Use

This section will briefly review the evidence on problems ascribed to rising levels of car ownership and use, followed by the claims that carfree development can help to address these problems.

The rise in car ownership in Britain, which began after the end of rationing in the 1950s, has continued almost without interruption until the present day.   As shown in Figure 1-1 neither economic cycles nor the oil price rises of 1973-4 and 1979 appear to have caused any significant deviations from the secular trend.
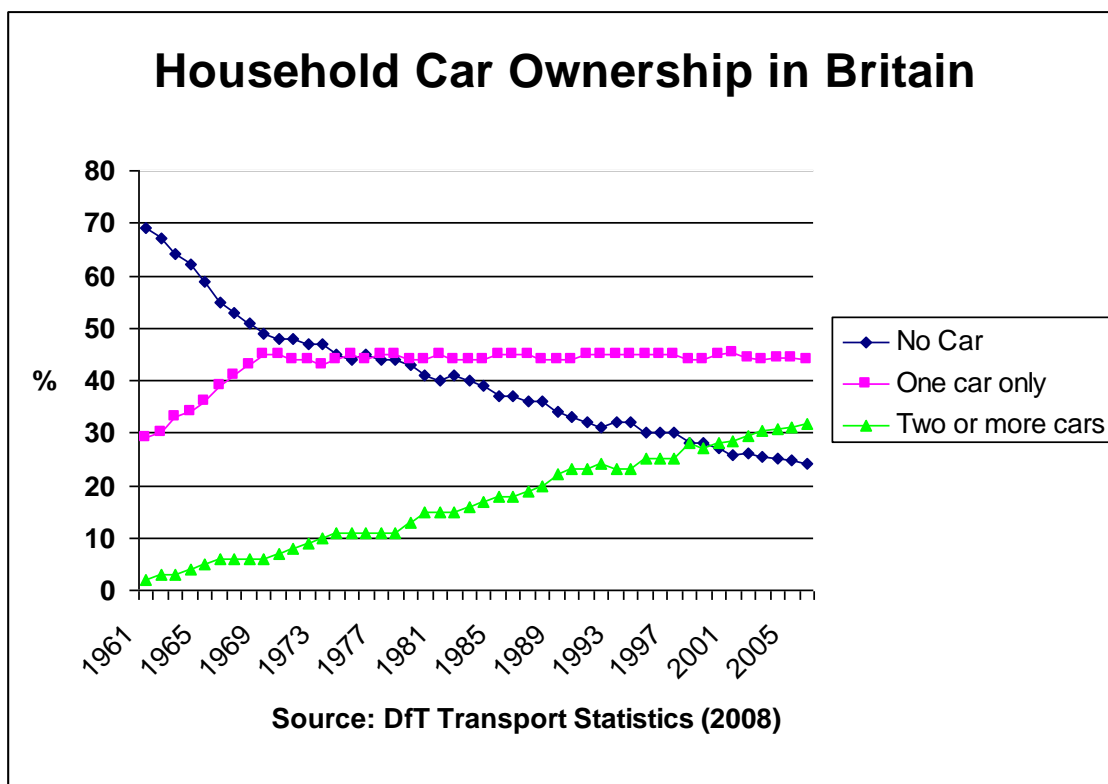
Figure 1-1 Household Car Ownership 1961 – 2006

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Although the relationship is not a linear one, rising car ownership has been accompanied by rising car use as shown in Figure 1-2 (DfT 2008b note the definitions changed slightly in the early 1990s accounting for part of the sharp rise indicated).

Growth in Passenger Travel (billions km)
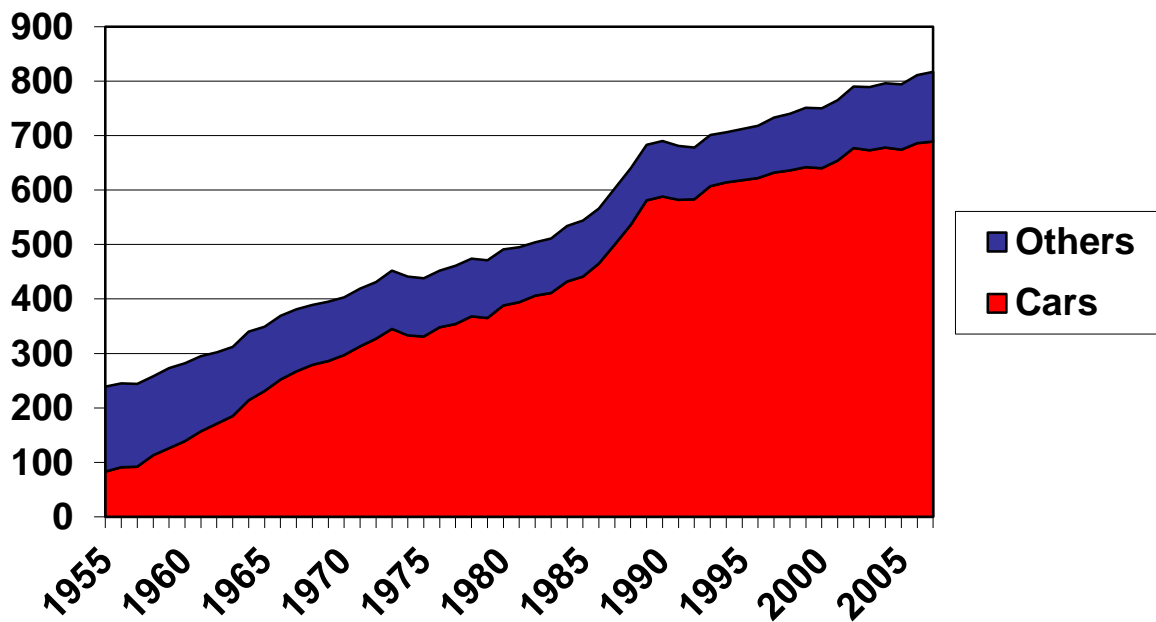
Source: DfT Transport Statistics (2008)

Figure 1-2 Growth in Passenger Travel 1955 - 2007

As the growth has continued, the car and motor traffic have been blamed for: consuming land in a way which damages the fabric of cities (Crawford 2000), weakening community cohesion (Appleyard, Lintell 1972), removing local choice and destroying local services (Sloman 2006), causing the social exclusion of groups unable to drive (ODPM 2003a), restricting the freedom of children (Timperio et al. 2004), worsening congestion (Goodwin 2008), air pollution (RCEP 2007), climate change (CfIT 2005) and obesity (Frank et al. 2004) to list just some of the negative externalities which have been identified through research. The remainder of this section will briefly consider the most significant of these effects under four headings: land use, congestion, climate change, resource depletion and health and quality of life.

Relationship Between Car ownership and Car Use

Although the nature of the relationship is complex, at the aggregate level, there is a strong positive association between car ownership and car use. The pattern becomes particularly pronounced

when measured in terms of distance rather than trip frequency: the average adult in a household with two or more cars travels more than three times as far in a year as the average adult with no car (DfT 2007c). The influence of car ownership is threefold: increasing the number of trips, their length, and, to a more limited extent, substituting car journeys for journeys by other modes (Wootton 1999). Figure 1-3 is taken from the recent report by Lucas and Jones (2009) for the RAC Foundation. It illustrates how the average use of non-car modes is surprisingly similar between households with differing levels of car ownership. The principal difference is that households with more cars travel further:
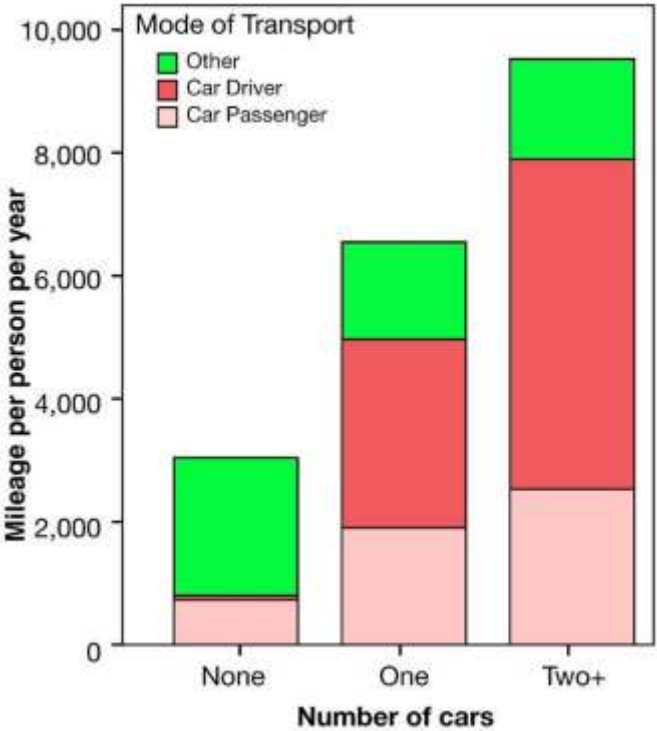
Figure 1-3 Average Annual Mileage by Household Car Ownership (Lucas and Jones 2009)

These are 'raw' comparisons, raising issues of exogenous influences on both car ownership and use, e.g. income, household structure etc. Most of the literature in this area has tended to regard car ownership as either an exogenous factor or as a mediating variable in the relationship between the built environment and car use.

Land Use and Car Dependency

The relationship between car ownership/use and increasing use of land for development is another complex issue. Decentralisation (at the conurbation level) and dispersal (at the local level) of cities have been both causes and effects of rising car ownership and use.

Before the growth of mass car ownership during the late twentieth century, the spatial patterns of urban areas were constrained by the needs of most people to move around by other modes. The growth of suburbs during the early years of the century followed the largely radial pattern of rail or tram systems. From the 1920s until the Restriction of Ribbon Development Act in 1935, both improved bus services and car ownership for an affluent minority contributed to creeping development along radial routes outside the major urban centres (Buchanan 1958).

The 50% threshold of households with cars was reached in 1969 in the UK (DfT 2008b). At around this time, local authorities began to implement minimum parking standards (e.g. Kent County Council 1999), tending to reduce the density of residential development and increase distances for walking or cycling. In the early 1970s the first wave of out-of-town retail development began, led by grocery superstores designed mainly for shopping by car (Jones, Pal 1998). Thus rising car ownership created a positive feedback process where changes in the built environment created dependence upon the car, reinforcing the trend towards higher car ownership and use.

This pattern has been characterised as 'automobile dependence' (Newman, Kenworthy 1989b, Newman, Kenworthy 2000). The term ('car dependency' in British terminology) implies a normative judgement about car use, but it will be used elsewhere in this study, without necessarily invoking this implication, to describe situations where aspects of the built environment contribute to greater reliance on car travel. Car dependency has been considered a policy problem for many reasons. For UK Governments (and many voters and sections of civil society) two important ones have been: the increasing loss of 'greenfield' land to development (DETR 2000, CPRE 2007) and the social exclusion caused to non-car owners in neighbourhoods designed or adapted around mass car ownership (ODPM 2003a).

Car dependency also presents a challenge to policies of urban intensification such as those pursued by UK Governments in recent years. Since the mid 1990s and particularly since the publication of PPG 3 (DETR 2000, CPRE 2007) UK Government policy has sought to reverse the earlier trends towards lower density development, with a target for new housing of 60% on previously developed land, maximum parking standards and minimum density guidelines (CLG 2006). One potential objection to policies which increase the density of dwellings and population is that they are also likely to increase the concentration of cars and traffic in intensified areas. Fear of these consequences has often motivated public opposition to proposals for developments which would increase residential densities in different areas (BBC News Online 2005, Milne 2005).

A substantial body of literature has supported (Handy et al. 2005, Newman, Kenworthy 1989a) and contested (Kitamura et al. 1997, Breheny 1992) the proposition that increasing residential densities tends to reduce car ownership and/or use. Much of the disagreements in that debate relate to value differences, but there is also an unresolved empirical question about the influence of 'self-

selection'. Car use is generally lower in denser inner urban areas, and higher in low density suburbs. Does this mean that neighbourhood design influences travel behaviour, or are these differences caused by people moving to areas which suit their travel preferences? If such self-selection is the main causal factor, then urban intensification may make little difference to travel behaviour.

Although elements in that debate remain unresolved, the weight of evidence would suggest that intensification does generally reduce per capita car use in most circumstances, but that on its own the relationship is a weak one. So for example, one study of English urban regions (Gordon 1997) found that a doubling of residential densities was associated with a 7% reduction in energy-weighted miles of travel to work. This would imply that, in the absence of more radical measures to restrain car ownership and use, intensification which increases the density of population will tend to increase concentrations of cars and traffic, entailing the gamut of problems at the local level described in this section.

The researcher has written elsewhere (Melia 2008a) of a 'paradox of intensification' where policies such as those pursued by UK Governments may help to promote global sustainability, by reducing overall car use, but at the cost of worsening local environmental conditions in intensified areas.

Congestion

One of these adverse effects, which particularly afflicts larger settlements and inner urban areas, is congestion. Department for Transport statistics show the problem continuing, albeit slowly, to worsen in urban areas (DfT 2007e). Following the work of Goodwin et al (1998) during the 1990s the UK Government accepted the central premise of the 'new realism' in transport: that "unrestricted traffic growth would grow faster than any feasible road programme" hence without measures to constrain demand, debates about road programmes concern the choice between "conditions getting worse quickly, or getting worse slowly" (Goodwin 2008). Government statements on transport (e.g. DfT 2004a) have sought to give the impression that policies proposed would tackle the problem of congestion, but as measures such as road pricing have proved politically unpopular, local transport plans (e.g. Plymouth City Council 2006) continue to set targets which aspire to slow down rather than reverse the growth in urban congestion.

Climate Change

The fourth report of the Intergovernmental Panel on Climate Change (IPCC 2007) states that CO_2 is the most important anthropogenic greenhouse gas. Its concentrations in the atmosphere have been increasing since the industrial revolution mainly due to the use of fossil fuels and land use changes.

Although there are differences of potential definition, it is possible to make some observations on the contributions of transport to climate change. On the IPCC 'by source' basis, road transport accounted for 21.6% of UK greenhouse gas emissions (all gases expressed as a CO_2 equivalent) in 2005. Passenger cars and light duty vehicles accounted for 12.6% (DEFRA 2007). The most recent statistics show emissions from road transport continuing to rise in absolute and proportional terms (DEFRA 2009):
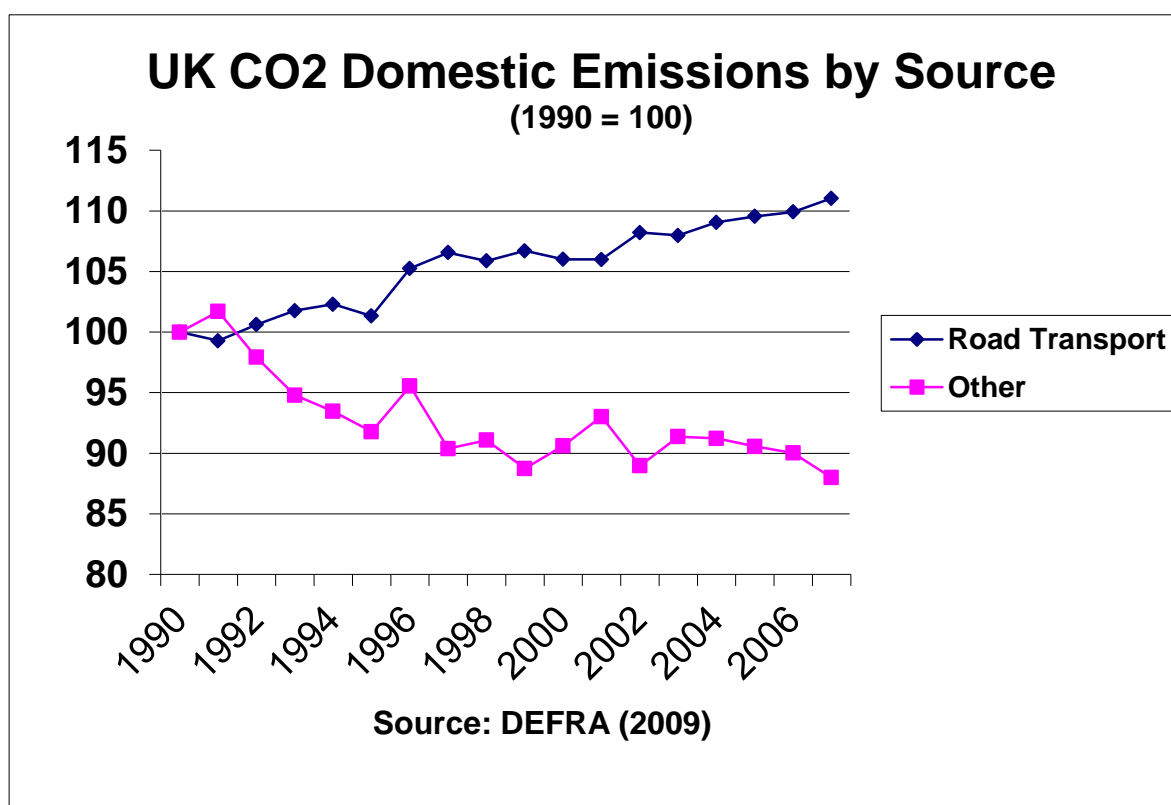
Figure 1-4 UK CO_2 Emissions by Source

The Climate Change Act (HMSO 2008), passed partly in response to the IPCC reports commits the UK to reduce its net carbon emissions (CO_2 and other greenhouse gases) by 80% by 2050. A study by Brook Lyndhurst (2006) for RICS examined a number of scenarios which might enable four UK cities to reach the less challenging reduction of 60%. These focussed on three different sectors, including transport. Using some "unashamedly simplistic" calculations they conclude that

in the absence of a "step change" in technology, "the behaviour of the driving public must also undergo a sea change."

Before the start of the current recession, the Department for Transport (2008a) was forecasting continuing growth in traffic volumes – of 32% between 2003 and 2025, accompanied by a fall of 3% in CO_2 emissions. Earlier forecasts for the decade 2000 to 2010 had shown increasing traffic volumes accompanied by stable or falling CO_2 emissions (2007b). As illustrated in Figure 1-4, seven years into the decade, this optimistic scenario had not occurred.

A key objective of the Climate Change Act was to force Governments (and voters) to set such wishful thinking aside and confront the difficult changes which may be necessary. Although the relative contributions of different sectors will vary, increasing emissions from a sector as large as private vehicles would clearly make overall reductions of 80% difficult, if not impossible.

Some analysts with influence on the UK Government have sought to minimise the importance of behavioural change, advocating largely technological solutions to the problem. The King Report on Low Carbon Cars, (2007) for example, talks of "marginal reductions in CO_2 emissions" from modal shift, in a report emphasising "clean powered vehicles" as the main solution. There is a problem with this proposal, however. In its text, the King Report acknowledges that the carbon footprint of an electric vehicle should be measured against the marginal, or additional, generating capacity required, rather than the average generation mix as usually applied in such calculations. The same point would also apply to hydrogen powered vehicles, where electricity is used to produce the hydrogen. This understanding does not seem to flow through however to the conclusions and recommendations of that report.

The UK currently derives just 2% of its energy use from renewable sources, and is struggling to reach its target of 15% by 2020 (Renewables Advisory Board 2008). Some benefit could be obtained from using surplus generating capacity overnight, but a recent study for the European Federation for Transport and the Environment (2009) has suggested that under current conditions and policies a rapid transition to electric cars could actually increase CO_2 emissions.

Car Manufacture and Resource Depletion

The Society of Motor Manufacturers (2007, cited in: King 2007) estimates that on average 10% of the total CO_2 emissions from the life cycle of a car can be attributed to the manufacturing process with a further 5% associated with disposal. As the King Report points out, these proportions may become more significant if the emissions of the vehicles themselves reduce (presumably also depending on the ability of the manufacturers to reduce their energy consumption, or switch to less carbon intensive sources).

A survey for *The Economist* (Carson 2004) estimated that vehicle manufacture uses up nearly half the world's annual output of rubber, 25% of its glass and 15% of its steel. Although the timeframe has been disputed, the mass conversion of cars to hydrogen fuel cells would have implications for the production and ultimate exhaustion of global stocks of platinum (Spiegel 2004, Borgwardt 2001, Burrall 2009).

Whatever their longevity, any manufacturing processes consuming finite resources which are not 100% re-useable is, by definition, unsustainable in the longer-term. This observation would apply to a wide range of human activities and raises broader issues which will be briefly reconsidered in the conclusion to this thesis. For the purposes of the rest of this analysis, it may simply be observed that motor vehicles create environmental and resource depletion problems through their manufacture and disposal, as well as their use of energy.

Health and Quality of Life

The relationship between transport, movement and health is well documented. Rising car use and declining use of other modes contribute to morbidity and mortality principally through obesity and air pollution (RCEP 2007). One American study concluded that each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity. Conversely, each additional kilometre walked per day was associated with a 4.8% reduction in the likelihood of obesity (Frank et al. 2004). England has the highest rate of obesity in the (original 15 member) European Union (Dept of Health 2007) – a problem (caused by a range of factors, including sedentary lifestyles) of increasing concern for Government and public health officials.

Cardiovascular fitness reducing the propensity towards strokes and heart disease is generally considered the most significant benefit of regular exercise; there are others such as muscle strength (which help to reduce injuries), bone strength (reduced osteoporosis) and flexibility of joints (Fentem 1994). Walking and cycling are particularly important in this respect since they are amongst the few forms of exercise which "can be undertaken by the majority of the population as part of a daily routine" (DfT 1998 cited in: BUPA 2007).

In a review of studies published between 1993 and 1998, Stansfeld et al (2000) found evidence from the UK and elsewhere that environmental noise exposure, including traffic noise was "related to mental health symptoms and consumption of sedative medication". The quality of the studies reviewed varied, but most had attempted to control for extraneous factors; the accumulated weight of evidence appeared to suggest some causal link. Research also suggests a causal link between exercise and mental health (Glenister 1996).

Studies which have sought to quantify the health effects of variations in the built environment at a population or neighbourhood level have produced mixed results. Several studies in the USA have sought to assess the alleged health benefits of New Urbanist developments, compared to more conventional suburban neighbourhoods. Some appear to show a relationship – generally not a very strong one – with factors such as Body Mass Indices, others have found no statistical relationship, when other factors are controlled for (Brown et al. 2008). This ambiguous picture may be partly explained by the limited magnitude of the travel differences between the neighbourhoods under study, particularly in the USA, where variations around the general pattern of car dependency are often marginal.

Although there are clearly many other factors involved, research amongst Old Order Amish communities in North America, whose members do not own cars, has found higher levels of exercise leading to lower levels of obesity (Bassett et al. 2004).

Several studies have related air pollution caused by road traffic to various health problems, although as the RCEP (2007) comments, the issue remains "poorly understood".   Respiratory diseases, particularly amongst children, and cardiovascular diseases have been associated with air pollution. Recommended levels of air pollutants are routinely exceeded in many urban areas across Britain, due primarily to road traffic. The effects are most severe in areas where the highest levels of pollutants are concentrated, thus the greatest benefits may be obtained from policies which reduce motor traffic in those areas.

Several studies have also sought to demonstrate a link between traffic volumes and sociability or social capital within neighbourhoods.   These studies have sought to measure factors which may be considered as proxies for (some elements of) the subjective concept of 'quality of life'. The first and best known study was conducted by Appleyard (1980), who found that people living on streets with heavy traffic tend to interact less with their neighbours and to have fewer local friends. Appleyard's study has been replicated in a number of other settings, including most recently, on three streets in Bristol, chosen for their similarity apart from differences in traffic flows (Hart 2008). This study, based on 60 door-to-door interviews found that on average, residents of the street with

light traffic had about five times the number of local friends and twice the number of local acquaintances as those on the street with the heaviest traffic.

Hart's study also found significant concerns amongst parents on all three streets about speeding traffic, although only on the street with light traffic were any children observed playing outside. The effects of traffic on both physical activity and the social independence of children has been a research and policy concern for some time. A significant study conducted by Hillman et al (1990) revealed the proportion of seven and eight year olds allowed to go to school on their own had fallen from 80% in 1971 to 9% in 1990. Reviewing the literature a few years later Davis and Jones (1996) found evidence from the UK and elsewhere that parents were keeping their children under supervision for longer than previous generations, and although not the only factor, traffic "could be the single most important impediment to children's range, play patterns and independence." The basic problem appears to have changed little since then. A recent survey conducted by Play England amongst children and young people in the North-East and West Midlands (Aynsley-Green 2008) found traffic as a principal barrier to independent play, and "making their streets safer" as the change most would favour.

Contestation and Consensus

The analysis so far implies a policy imperative to reduce dependency on the car, car use and possibly car ownership. This implication has been, and remains, fiercely contested, particularly in the area of land use planning, where the logic outlined above has led many analysts (e.g. Newman, Kenworthy 2000, LSE 2006) to advocate urban intensification (i.e. constraints on, or reversal of, decentralisation and dispersal) alongside policy measures to encourage public transport, walking and cycling and restraints on car use.

Opponents question both the desirability and efficacy of such measures. The desirability arguments reflect differences in values, typically associating car use with individual freedom and economic welfare. The efficacy arguments reveal a degree of consensus about the existence, if not necessarily the nature, of problems caused by rising car use. Amongst those influenced by neo-classical economics, Gordon and Richardson (1997) acknowledge that car use creates externalities, best addressed by economic instruments such as congestion charging. Decentralisation of cities in the USA has alleviated congestion in city centres, they argue, and has also reduced commuting distances through the co-location of firms and households in suburban locations (Gordon, Richardson 1989). These arguments imply that greater concentrations of traffic in urban areas, and increased commuting distances, would create problems.

Glaeser and Kahn (2003) also question both the desirability and efficacy of planning policies designed to reduce 'sprawl' (a disputed term which implies both decentralisation and dispersal) but

accept that sprawl associated with high levels of car ownership and use can lead to problems of social exclusion. Subsidies to help low income households own and run cars are the most appropriate policy response, they argue.

A significant current of opinion within the transport and planning professions questions the scientific consensus on the anthropogenic causes of climate change, but even many of these people accept that rising energy consumption from transport is a problem which should be addressed (Forster 2008). Thus, although the nature of the problems is contested in many ways, the propositions that rising car use creates some general problems and some particular problems in urban areas, are largely accepted.

Can Carfree Development Help to Address These Problems?

No consensus exists on the appropriate policy responses to the problems discussed in this section. Some recent analyses have suggested that to be effective in restraining car use, urban planning policies must also reduce levels of car ownership (Van Acker, Witlox 2010, Headicar 2008). Some studies have found that residential parking restraint is a powerful instrument in reducing car use, partly through reducing car ownership, but also through rationalising car use (Stead, Marshall 2001).

A few writers from professional (Crawford 2000) and academic backgrounds (Reutter 1996) have advocated carfree development, although it has occupied a relatively marginal place in this debate so far. The carfree developments built in Europe (and one in the UK – Slateford Green) have been the subject of several studies reviewed in the next chapter.

These studies provide some support for the claims that carfree development can help to resolve the problems described in this section. There is strong evidence that they reduce car ownership and use, and increase rates of active travel, both by attracting people predisposed towards carfree living, and also by changing behaviour. As discussed in Section 2.6, some other benefits (e.g. relating to health) may be inferred from these findings, although there is, as yet, no specific research evidence on the benefits themselves. One study (Ornetzeder et al. 2008) also provides some evidence that at least one carfree development has helped to address two of the specific problems described in this section, relating to climate change and social contact between neighbours.

The researcher's paper mentioned above (Melia 2008a) suggested that carfree developments may help to resolve the paradox of intensification by enabling urban intensification without increasing the concentration of vehicles and traffic in the intensified areas. This proposition would depend upon the feasibility of carfree development in areas subject to intensification, a question which this

study will consider from the perspective of potential demand i.e.: is there evidence of potential demand for carfree housing in urban areas suitable for intensification?

1.3   Aims and Initial Research Questions

The **aims** of this study are: to explore the feasibility of European style carfree development (as described in Section 1.1) and the circumstances under which the concept could be more widely implemented, in the UK.

To operationalise these aims will require a working definition drawn from observations of existing developments which may be considered carfree.   This suggests a **first research question** for this study:

1.   What types of existing developments can be defined as 'carfree'?

This question will be addressed over the next two chapters through a review of the literature and some direct observation of European carfree developments.

As described in the next section and Chapter 2, there are many research gaps in this area – too many for one study to address. These issues relate to potential demand, potential supply and public policy. It was decided to focus on potential demand, partly because another study (Morris 2005) which began before this one was expected to address some of the other issues, and partly because initial discussions with developers suggested that their scepticism about the existence of potential demand was an important reason for the lack of supply.

The interest in potential demand implies a focus on housing and transport choice. Most social house building in Britain is dependent upon Section 106 planning gain (Burgess et al. 2007) from the sale of open market housing, which forms the largest part of such mixed developments.   To be viable, any mixed development must attract sufficient private buyers so the nature of choice in private housing markets will be central to the research. As the next chapter will explain, there were no suitable carfree developments available for study in the UK at the time this study began, so the central question became an essentially hypothetical one about the existence, nature and circumstances of potential demand.

These can be formulated in three further **initial research questions**[1]**:**

> **2. Amongst which groups (if any) is potential demand for housing in carfree developments likely to be found?**
>
> **3. What are the distinguishing characteristics of these groups?**
>
> **4. What circumstances would promote or discourage potential demand?**

Chapter 5 will refine these initial questions into more specific research questions, in the light of the empirical and theoretical literature.

1.4   What is Preventing Carfree Development in the UK?

Although this study will mainly focus on questions of demand, the feasibility of carfree development in the UK would also depend upon potential supply and (related to this) the public policy context. These are questions on which there is very little direct research evidence.

In a paper dealing mainly with policy questions, Morris et al (2009) review the limited extent of carfree development (mainly 'car free housing', as discussed in Section 2.3) in Britain, and comment that "there is some resistance among UK developers to implementing car-reduced areas on a larger 'community' scale". The sources for that paper included interviews with some local authorities, but not developers. It did not attempt to analyse the reasons for that resistance: a wider literature search revealed no specific studies on this question. Research for the Department for Transport (2005) included some case studies where developers had embraced the concept of reduced parking coupled with travel plans aiming to change residents' travel behaviour. These were selected as atypical 'best practice' case studies, however.

The resistance described by Morris et al may be a symptom of the more widely observed (Barker, Treasury. 2004 for example) risk aversion and resistance to innovation in the UK housebuilding industry. Ball (1999) identifies several ways in which British housebuilders appear more resistant

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[1] There is no agreement in the methodological literature about the meaning of the term 'research objectives' and how this relates to 'research questions'. In some texts research objectives operationalise the research questions; in others the relationship is reversed. As the process of deriving research questions in this study involves three stages, to avoid confusion, the term 'objectives' will not be used in this context.

to innovation than other industries and housebuilders in other countries. Of particular relevance to this study are difficulties in 'responding to consumer needs' and 'particular market segments'.

Some of Ball's explanations relate to the structure of the housing market. The more frequent turnover of properties in this country, encouraged by lower taxes, focuses buyers of new homes on 'saleability' in what is perceived as a conservative market, rather than the bespoke incorporation of individual preferences which often applies elsewhere in Europe. The more cyclical nature of the UK housing and land markets (due to macroeconomic differences as well as factors more directly related to the housing market) makes developers risk averse in their investment decisions.   The planning system also contributes to the problem, according to Ball. Its complexity favours larger firms and disadvantages new entrants and its objectives have not generally encouraged innovation.

National planning policy in the UK has been relatively favourable to carfree development, however, although the term 'car free' has generally been used in Government documents in the narrow sense of 'no allocated parking[2]'. PPG 3 on housing (DETR 2000) stated that:

> "Developers should not be required to provide more car parking than they or potential occupiers might want, nor to provide off-street parking when there is no need, particularly in urban areas where public transport is available or where there is a demand for car-free housing."

This policy was used by several local authorities in their local planning documents (e.g. Camden LB 2000, Brighton & Hove CC 2005) to promote 'car free housing' but not carfree development as defined in this study.

PPG 13 on transport contains the following reference, in a section on traffic management:

> "New residential areas should be designed to encourage low traffic speeds and may be car free, where there is sufficient access by non car modes" (DETR 2001)

PPG 3 was superseded by PPS 3 (CLG 2006) which replaced the specific guidance on parking policy of its predecessor with some general principles, essentially leaving the issue for local authorities to decide. It contains no reference to car free housing.

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[2] Although the spelling of the terms is often inconsistent, UK documents tend to separate (car free) or hyphenate (car-free) the adjective. Apart from quotations, 'car free' will be used to distinguish the UK definition from the European-derived definition proposed in this study.

Guidance issued by the ODPM (2004) on the planning response to climate change and by the DfT (2005) on residential travel plans both recommend car free development as a means of promoting transport sustainability. In the Department for Transport guidance the concept appears under the heading of 'parking restraint', although it recognises that carfree developments may have some peripheral parking.

More recent guidance produced by the TCPA (2008) for the Eco-town programme (following some input from the author of this study) contained the most explicit Government endorsement of carfree development to date, recommending that "car-free residential and mixed use ped-shed areas should cover a substantial proportion of the Eco-town" The definition of 'car-free' reflects the definition used in this study, following European practice. The TCPA guidance was published with a foreword from the then Housing Minister explaining that it "sets out important principles which should be included within each Eco-town." This document is "Government advice" but not statutory planning guidance. The PPS (CLG 2008) took a much less radical approach to transport; it makes no mention of carfree areas.

Though Government policy does not appear to have actively promoted carfree development in the UK, nor does it appear to contain any particular obstacles to it. The reasons why carfree development has not yet been widely implemented in the UK – and whether supply or policy obstacles are preventing its wider implementation – are another gap in the literature, which would justify further research.

1.5   Structure of this Thesis

The next chapter will review the relatively limited literature on existing carfree developments, illustrating some of the many gaps in the knowledge base. Although it was not judged feasible to conduct primary research in European carfree developments, it was decided to visit a selection of them, making observations and interviewing stakeholders to provide context for the rest of the study.   Chapter 3 will describe these study visits, using these observations and the evidence from the literature to address the first research question, about definitions.

Chapter 4 will review the literature relating to the questions of potential demand in the UK, beginning with empirical data and research studies on people who currently live without cars in this country. Section 4.3 will review the literature on housing, location choice and the role travel plays within it. Section 4.4 will review Diffusion of Innovations Theory and the concept of the early adopter, used in the one existing study which has considered the question of potential demand.

Chapter 5 will outline the research strategy for the rest of the study, beginning with the refinement of the remaining research questions. The primary data collection used three questionnaire surveys: a national online survey targeting members of utility cycling and environmental organisations, a postal survey of two wards with low car ownership in the London Borough of Camden, and a household survey of a low car development with a residential travel plan in Poole, Dorset. Qualitative telephone interviews were then conducted with a subset of respondents from these three surveys.

Chapter 6 will describe the areas selected for data collection in Camden and Poole. Chapter 7 will present the findings of the online survey, Chapter 8 the two household surveys. Chapter 9 will introduce the findings from the interviews in a discussion and reflection on the findings. Chapter 10 will draw conclusions, addressing the research questions in the light of the findings, and making recommendations for Government policy on carfree development.

2   Literature on Carfree Development

2.1   Scope of Evidence

The body of literature specifically relating to carfree development is, as yet, limited, so there are many research gaps. This chapter will review the few studies which have been conducted on European carfree developments in some detail. As this study will make frequent use of evidence from European carfree developments, it may be asked how relevant such evidence would be to UK circumstances. The next section will consider the theories of lesson learning and policy transfer across national boundaries.   Section 2.3 will discuss some of the previous attempts to define carfree development. Section 2.4 will describe the main carfree developments in Europe and the more limited situation in the UK. Section 2.6 will expand the discussion summarised in Section 1.2 about the benefits of carfree development and the evidence that it helps to address the problems created by rising car ownership and use.

Section 2.7 will review the research on the residents of European carfree developments. Section 2.8 will consider what light the European evidence sheds on the circumstances and locations likely to support carfree living in the UK.

2.2   How Relevant is the European Evidence?

As much of the policy analysis (and some other elements of this study) will draw on the experience of European carfree developments, it may be asked to what extent, and under what circumstances, lessons drawn from across national boundaries may be considered valid. There is no straightforward answer to this question but a body of literature provides some guidance.

The literature on transnational policy transfer originated in political science and has also been used in built environment contexts. According to Dolowitz and Marsh (2000), "why a lesson is drawn, where a lesson is drawn from, and who is involved in the transferring process all affect both whether transfer occurs" and whether it is likely to be successful. Policy transfers (the term 'policy' is used in a broad sense, encompassing practices and specific programmes) made "coercively" – imposed by an external body or in response to an external imperative such as an economic crisis – are less likely to succeed than the more "rational" process of "lesson-drawing". Transfers that involve the people affected are more likely to succeed than those which only involve politicians or bureaucrats. Countries tend to have lender-borrower relationships (e.g. from the United States to Britain) which generally remain stable over time, although there may be occasional exceptions. As

May and Marsden (2008) outline in a transport context, city-to-city transfers have also become prominent in recent years; cities may act as innovators or 'early adopters' following the Diffusion of Innovations Theory described in Section 4.5.

Approaching the question from a national Government perspective, Rose (2001) sets out ten steps in learning lessons from abroad which mainly concern the process to be followed, although he has surprisingly little to say about whether the nature of a particular policy makes it inherently suitable or unsuitable for transfer.

Lesson-drawing is "future oriented", so its findings will always be subject to uncertainty. Both Rose and Dolowitz and Marsh (2000) emphasise the importance of contextual affinities and differences (e.g. economic, social and ideological) between lender and borrower countries as factors influencing the probability of transfers occurring and succeeding. This literature offers little guidance, however, to the critical question of how to identify which contextual differences would preclude successful policy transfer, which ones would require the policy to be amended and in what ways. The "conceptual frameworks" (Dolowitz and Marsh prefer this term to 'theory') do not suggest any formula for constructing a testable hypothesis on this complex question. It is, in Flyvbjerg's (2001) term, a "phronetic" question, requiring judgement and "practical wisdom".

The policy innovation literature (not specifically transnational) includes another study with a conclusion relevant to this research. Van den Berg et al (2007) studied eight sustainable transport innovations planned, and in some cases implemented, in the Netherlands, analysing the factors associated with success or failure through qualitative stakeholder interviews. They concluded that it is "predominantly the political, process-related, socio-cultural and psychological factors that determine whether a project succeeds or fails…Technical/content-related and economic factors appear to be much less important." This finding appears consistent with the general approach of the policy transfer literature. Section 3.8 will return to this area of literature in considering the relevance of the European evidence discussed in this and the next chapter.

2.3   Definitions of Carfree Development

The relatively limited literature on carfree development appears to have struggled with the question of definition, which has also hampered attempts to catalogue examples of carfree developments in Europe and elsewhere. There are many areas of the world where people have always lived without cars, because no road access is possible, or none has been provided. In developed countries these include islands and some historic neighbourhoods or settlements. The term

carfree *development* implies a physical change, however, either new building or changes to an existing built area.

There have been two recent attempts to define carfree development. Morris et al (2009) propose a typology with three categories :

- Visually carfree – where the core residential area does not include any motorised access but where there is no attempt to limit car ownership: parking may be provided underground or at the edge of the site
- Low-car – developments which have a reduced overall parking standard
- Car-free – where "little or no provision has been made for vehicle infrastructure or residential parking"

Heller (2008), whose website appeared to have influenced an earlier version of the above paper (Morris 2005), includes these three categories and two others:

- Residents only areas, in some city centres and islands where only residents' vehicles are allowed
- *Stellplatzfrei* (literally 'free from parking spaces'), the term used to described Vauban, the new eco-quarter of Freiburg, where vehicles are allowed to travel along the residential streets at walking pace to pick up and deliver, but not to park (parking is provided in peripheral multi-storey car parks).

Some local authorities in the UK (e.g. Brighton & Hove CC 2005) and some central Government policies (reviewed below) define 'car free housing' solely by the absence of parking provision. This concept is the one generally understood in the UK development industry. In Camden, carfree housing is defined by a Section 106 condition precluding present or future residents from applying for a residents' parking permit (Camden is covered almost entirely by a Controlled Parking Zone).

All of the above definitions are problematic. Although Morris et al include 'low car' as a form of carfree development this would seem a contradiction in terms.   How to differentiate low car from carfree developments is far from clear, however. The legalistic Camden definition is the only one with a precise criterion for inclusion. Even the general British concept of car free housing without allocated parking would require the exercise of judgement. If parking was available on-street or adjacent to the housing, would it make sense to describe it as car free?

Underlying these differences of definition are different concepts of carfree development (or housing) i.e.:

Defining Aspects of Carfree Development

- residential (or mixed use) areas from which vehicles are excluded, and/or
- housing where people live without owning a car

The UK definition ignores the first aspect and assumes that parking restrictions will achieve the latter. Most of the European examples exhibit some element of both, although as explained in the next section neither is absolute: exceptions are made for some vehicles and a minority of residents are able to continue owning cars. If the two concepts above were interpreted as absolute criteria then none of the developments studied in this thesis would qualify (an alternative to the term 'carfree' could be proposed, but this study will follow the literature and European practice in continuing to use the term).

Chapter 3 will propose a typology and a more nuanced definition based on current European practice, whilst recognising that there is an element of circularity in this process: the developments under study, from which the definition will be formulated, are those which have been described as carfree in the literature or by practitioners.

In the meantime, a **working definition** of carfree development will be used, encompassing both the **exclusion of vehicles** and **limitations on car ownership** through parking provision which ensures that **no more than half of households are able to keep cars** on or adjacent to the site (a parking ratio of 0.5 applies to two of the larger developments, Vauban and Woltmanweg). As this definition allows for car ownership amongst some residents, a further distinction must be drawn between 'carfree development' and 'carfree *living'* i.e. living without owning a car.

2.4   Significant Carfree Developments in Europe and Worldwide

Partly because of these difficulties of definition, there is as yet no comprehensive list of carfree developments or carfree areas (a broader concept) worldwide.   An online list was begun a few years ago by Joel Crawford, the author of *Carfree Cities* (Crawford 2000). This list was subsequently transferred to Wikipedia (2006) where the open nature of the editing process would make its reliability questionable. The website of the World Carfree Network (2009) also refers to this list. Wright (2005) discusses a number of historically carfree places and recent developments, summarised under a table headed 'Partial List of Existing Car-free Housing Projects'. The logic for

inclusion in this list seems debatable: BedZed in London, for example, was designed as an eco-friendly small development but with relatively high levels of parking (Morris 2005). Similarly, Tübingen's Sudstadt has conventional parking and (calmed) traffic arrangements.

Drawing on these sources, other literature cited in this study, and the researcher's direct experience the types of carfree area (i.e. built environment with residents) can be categorised as follows:

- Historic settlements whose structure precludes vehicular access
- Settlements not served by road
- Islands
- Alpine or holiday resorts
- University towns and campuses
- Pedestrianised city or town centres
- Newly built carfree neighbourhoods

The largest carfree area is the canal city of Venice with a population of approximately 70,000. Joel Crawford, draws on its example in *Carfree Cities* (Crawford 2000) a vision, blueprint and manifesto for the international carfree movement. He recognises the atypical characteristics of Venice, however (geographical and as a tourist centre) which would make it of limited direct relevance to this study.

Although it is possible to conceive of 'grey areas' (e.g. a new housing development on a carfree island) the concept of carfree *development* would generally encompass only the last four categories, of which the last two are most relevant to this research. The first fully carfree new city, Masdar in the United Arab Emirates, has now begun initial development with the first buildings planned to be ready for occupation during 2009 (Hikisch 2008). The planned population of Masdar is around 50,000. It will be served by express rail and a personal rapid transit system, with all other vehicles prohibited from the city itself (there will be peripheral parking). Deliveries and waste disposal will be made underground. It should be noted that published information on Masdar has come from the UAE authorities or others financially involved in the project, so should perhaps be treated with some caution, although some international NGOs such as WWF have given the project their approval. Although Masdar was masterplanned by a British architectural practice (Foster and Partners), nothing on this scale has yet been proposed in Europe.

Recent European Carfree Developments

The European models of carfree development have all been smaller than Masdar, within existing cities. The broadest study of European carfree developments was conducted by Scheurer (2001).

His thesis refers to seven carfree developments (and some others which would not be considered carfree as defined here) of which the first five were sufficiently advanced to include in his survey:

City	Development	Number of units completed at time of Survey	Anticipated number of units	Actual or Anticipated Completion
Freiburg	Vauban	240	5500+*	2008*
Amsterdam	GWL-Terrein	600	600	1998
Vienna	Autofreie Musterseidlung Floridsdorf	250	250	2000
Edinburgh	Slateford Green	120	120	2000
Hamburg	Stadthaus Schlump	45	45	Late 1990s
Hamburg	Saarlandstrasse	0	164*	2009*
Cologne	Stellwerk 60*	0	400+*	2010*

* Information up-dated since the survey

Table 2-1 Carfree Developments Surveyed or Referred to by Scheurer (2001)

From Wright (2005) and Morris et al (2009) the following developments of significant size which would meet the working definition can be added:

City	Development	Number of units/ residents
Berlin	Woltmanweg	5000 residents
Nuremberg	Langwasser	900 residents

These lists combined, include the most significant European carfree areas identified in the literature and known to the World Carfree Network, and thus were used as a starting point for the selection of study visits described in Chapter 3. The lists are not exhaustive – there are many smaller carfree developments and there may be many older developments which the literature has not yet identified as carfree, such as The Brunswick in Camden, discussed in Chapter 6. These lists only include new developments. The literature includes one study of a 'retrofitting' of an existing residential area, in Halle in the former East Germany, which has been described as a carfree area (Reutter 2003), although the area from which cars were removed was relatively small.

Many cities in Europe, including the UK, have pedestrianised city, town and district centres. These are mainly commercial in nature, although some include some residential properties. Whereas there is a substantial body of research on: the effects of pedestrianisation on retail (e.g. Colin Buchanan and Partners 2004), on travel patterns within cities (e.g. Parkhurst 2003) and the broader benefits of pedestrianisation for cities (e.g. Monheim 1997), a review failed to find any specific research on the extent of, or potential for, carfree living within pedestrianised centres, nor did it reveal any comprehensive information about the size of residential populations within them. The literature (Tsubohara 2007, Ligtermoet 2006) did suggest, however, that Groningen in the Netherlands contains one of the largest examples, with 16,551 residents (Gemeente Groningen 2008) of a city centre from which through traffic has been removed, as discussed in Chapter 3.

2.5   Carfree Development in the UK

As discussed in Section 1.4 national planning policy in the UK has been relatively favourable to carfree development – more so than in some of the other European countries – although the term 'car free' has been used in Government documents (e.g. DETR 2000) in the narrow sense of 'no allocated parking'. The planning policies of several local authorities (e.g. Camden LB 2000, Brighton & Hove CC 2005) have promoted 'car free housing' but not carfree development as defined in this study. More recently, there have been some small developments with limited parking usually in city centres, which provide some separation from traffic, so could be considered carfree.

| Figure 2-1 Exeter Princesshay | Figure 2-2 Bristol Harbourside |

Exeter's Princesshay development, shown in Figure 2-1, is an example of residential development within a pedestrianised city centre. The two blocks on Bristol's Harbourside development shown in Figure 2-2 have no parking. They are surrounded by pedestrianised public space but the road in the foreground runs along one side of them. Both of these developments were built during the course of this study (hence were not available for residents' surveys). The New England Quarter in Brighton includes 172 flats in two blocks with a small amount of semi-private space and very limited parking – still under construction during 2009 (Brighton & Hove CC 2008). Whether, and under what circumstances, small scale developments may be defined as carfree is a problematic question, which will be considered in the next chapter. There are many more 'low car developments' in the UK, some of them larger in scale. One of these was selected for study for this project, as described in Chapter 6.

During the early stages of this study, the only British development specifically identified as carfree in the literature was Slateford Green in Edinburgh, the largest recent carfree development in the UK, with 120 dwellings. It is mainly a social housing development, developed by a housing association which had noticed that 83% of the people on its waiting lists did not own a car. It has been the subject of considerable interest and several studies, including one conducted by Raymond Young Consultancy for the housing association (Young 2002). This concluded that the carfree "innovation" had been successful, although the criteria for this judgement are not entirely clear from the report.

Although the results needed to be treated with caution (based on just 19 valid responses), a more recent survey by Eastwood (2008) found a low level of car use similar to European carfree developments, but with much higher bus use and lower rates of cycling, as shown in Figure 2-3.
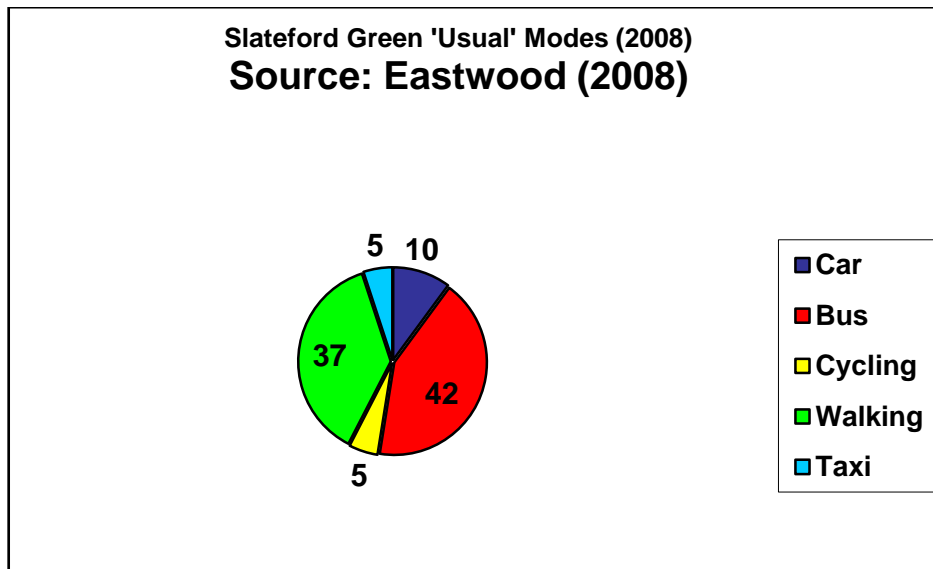
Figure 2-3 Slateford Green 'Usual' Modes of Travel.

The types of people who live in Slateford Green are also noticeably different from those of the continental European carfree developments studied by Scheurer (discussed in Section 2.7). These are largely due to the differing national policies on the allocation of social housing. Whereas the European residents (of all tenures) in Scheurer's survey were all able to answer questions about why they chose to move there, the tenants of Slateford Green are allocated from a general housing list on the same basis as any other property managed by the housing association (personal correspondence, Fergus Allen, Dunedin Canmore, December 9th 2005). For this reason, it was decided that evidence from Slateford Green would be of limited use in seeking to assess the types of people likely, or the factors likely to persuade them, to move to a carfree development.

2.6   Benefits and Problems of Carfree Developments

Although the literature on European carfree developments is limited, it does provide some fairly strong evidence that they reduce car use and increase walking and cycling, which should help to address some of the problems caused by car dependency, as discussed below. The literature also suggests some other potential benefits, which this section will review.

The levels of parking, car ownership and modal shares found by Scheurer's (2001) surveys of European carfree areas are shown in Table 2-3.

City	Development	Parking Ratio	Carfree Households	Modal Share		
				Car	Public Transport	Walking/ Cycling
Freiburg	Vauban	0.5	46%	16%	19%	64%
Amsterdam	GWL-Terrein	0.2	62%	10%	17%	73%
Vienna	Autofreie Musterseidlung Floridsdorf	0.1	92%	5%	58%	38%
Edinburgh	Slateford Green	0.0	74%	16%	33%	51%
Hamburg	Stadthaus Schlump	0.5	25%	24%	17%	58%

Table 2-3 Transport Behaviour in Carfree Developments Surveyed by Scheurer (2001)

Scheurer's method of measuring modal share was rather unusual, asking respondents to fill in the frequency of trips per month under seven specific categories with no 'other' category, so comparisons with all-purpose modal share statistics may not be precise.   Nevertheless, the above table clearly shows a pattern of very low car use and high levels of walking and cycling.

The levels of car ownership in Vauban and particularly Stadthaus Schlump appear surprisingly high. The latter is a relatively small development. Although it does provide a traffic-free courtyard and limited parking, residents are still able to park on surrounding streets, which many of them were doing at the time of Scheurer's survey. Vauban was at an early stage of its development at the time. Another survey was conducted two years later when nearly half of the planned housing was occupied. Nobis (2003) found a similar proportion of carfree households ("over 40%") and using different questions from Scheurer confirmed the low level of car use: cycling was the most frequent mode for commuting, shopping and leisure. Both of these studies were conducted before the extension of the tram system to Vauban in 2006, which may have influenced both car ownership levels and travel patterns.

Social, Health and Other Benefits

The studies of European carfree development have mainly concentrated on the mobility aspects, but they contain some evidence of other benefits.

A more recent survey of Vienna's Florisdorf carfree development (Ornetzeder et al. 2008) explored questions of social cohesion and social contacts in Florisdorf. 85% - 87% of respondents agreed that there were "good neighbourly relationships", "solidarity within the settlement" and that people helped each other. Echoing the findings of Appleyard (1980) and Hart (2008) they found that residents of the carfree project had more friends within the settlement than those of the slightly larger reference settlement (average 16 versus 7). They also knew more people by sight (101 versus 62). The authors ascribe these differences to the carfree nature of Florisdorf, but there is another possible explanation which they do not mention. Scheurer describes the initial resident participation process in Florisdorf as more direct than some of the other carfree developments: prospective tenants were able to determine locations and floor plans. In GWL Terrein the process was more like a "stakeholder conference", although even this would represent more involvement than most new developments. In a more recent article Bouvier (2005) found a high level of ongoing resident involvement in GWL Terrein.

Scheurer also comments on the favourable environment for children in Vauban, where household sizes were particularly high. Nützel (1993) found that children were allowed to play out on the carfree streets of Nuremberg-Langwasser at a younger age (average 3.8) than on conventional streets nearby (average 5.6).

Following the discussion in Section 1.2, no specific research has been found on the health impacts of carfree development, although some benefits could be deduced from the observations about travel patterns and traffic generation.

There has also been relatively little focus on the economic impacts of carfree development although a couple of observations can be made. Scheurer found that between 69% and 84% of shopping trips in European carfree areas (including Slateford Green) were less than 2km with only between 3% and 9% of these made by car (11% in Slateford Green). Although no comparisons were made with surrounding areas, these patterns would presumably contribute to the viability of local shops.

Most of the larger carfree developments allocate spaces for car club vehicles. Nobis found 39% of households surveyed in Vauban belonged to Freiburg's car club, an "exceptional" proportion which would contribute to the viability of that club. Whether the same could be said of public transport is less clear as the modal shares varied considerably (from 17% to 58%) across the developments surveyed by Scheurer.

Does Carfree Development Address the Problems of Car Dependency?

Section 1.2 identified a number of problems caused by rising car ownership and use, particularly in urban areas. It may be considered self-evident that a policy which reduces car ownership and use (always in urban areas, so far) would help to alleviate these problems. There are, however, a number of complicating factors.

The analysis so far suggests that the two defining aspects of carfree development outlined in Section 2.3 have a number of direct and indirect effects, which may be illustrated as follows:

Benefits for:	Environment	Quality of Life	Health
Residents	Better air quality Less noise More green space	More shared/open space More social interaction Reduced risk and fear of road accidents Children more independent More viable local services.	Increased fitness and reductions in associated disease Reduced respiratory illness Improved mental health
Wider local area	Better air quality Reduced need for development land	Reduced congestion More viable local services.	Reduced respiratory illness
Country/World	Reduced CO_2 and other emissions Retention of more green land		

Figure 2-4 Relationship Between Defining Aspects and Benefits of Carfree Development

Clearly some other minor effects (omitted for reasons of legibility) could be added to this diagram, for example, the possibility that exclusion of vehicles from the residential area would reduce car use independently of ownership levels (because a longer walk to a car park would make car use less convenient).

The European studies provide fairly strong evidence for the three intermediate consequences. Ornetzder et al (2008) found evidence to support two of the ultimate benefits: sociability, as discussed above, and reductions in CO_2 emissions: residents of the carfree area had a carbon footprint lower than a more conventional reference development nearby, and considerably lower than the national average.

The benefits for residents, from carfree developments in general, may be inferred with a reasonable degree of confidence, although their extent would depend upon the individual circumstances of each development – not entirely clear from the literature. The other benefits are more problematic. Whether they will be achieved in practice would depend upon a number of other factors, including other policy or design issues. Some of the benefits would depend upon behavioural change and could also be inferred from other evidence, as described below.

The land-related benefits would depend on how the land saved from parking and roads was re-allocated, between gardens, open space and increased density of dwellings (which might reduce building on undeveloped land elsewhere). Reduced congestion would depend upon wider policy and practice in the city and immediate area surrounding the carfree development. There is evidence that road space 'freed up' by traffic reduction measures may liberate suppressed travel demand (e.g. in the context of park and ride schemes: Parkhurst 2000). In the context of carfree developments, these considerations could apply to the surrounding roads. Other measures such as road space reallocation may attempt to 'lock in' the traffic reduction benefits, but in doing so may change the issue from one of reducing congestion to modal shift or travel reduction. In terms of the diagram above, this could augment some of the other benefits without necessarily reducing congestion. This was the experience in London during the three years following the introduction of the congestion charge, where initial reductions in congestion were not maintained. Part of the reason for this was road space reallocation in favour of buses, pedestrians and cyclists. This may have contributed to the reduction in car traffic and increase in bus use and cycling observed over the same period (TfL 2007).

Some of the benefits shown would depend upon behavioural change amongst residents, on which there is some evidence from the European studies. Carfree developments could reduce driving and increase active travel for two reasons:

- They attract residents predisposed towards non-car travel
- They change the behaviour of residents (compared to conventional developments)

If the lower car use in carfree developments were solely due to the former, then the national and global benefits would not be achieved, and the benefits to the wider local area might be achieved at the expense of other areas.

Do Carfree Developments Change Behaviour?

This question (related to observed differences in travel behaviour between urban forms, not specifically carfree) has been the subject of a long-running debate in built environment research (see for example: Handy et al. 2005). Although it has not been entirely resolved, the weight of evidence across many countries suggests that both factors are probably relevant in most contexts, although the relative importance of each may vary according to circumstances.

The evidence from the European studies is consistent in suggesting that carfree developments do indeed change the behaviour of residents as well as attracting people with low-car preferences. Nobis found that 81% of the carfree households in Vauban had previously owned a car; 57% gave up their cars after moving there. Scheurer found proportions varying from 10% (in GWL Terrein) to 62% (in Florisdorf) of households had reduced their car ownership since moving to the carfree developments. Ornetzeder et al (2008) found only one car owner (who was violating the rules of occupation) in Florisdorf. 50% of male and 30% of female residents had previously owned a car. 41% of respondents said they were "using the bicycle much more than before". It is of course, possible that other factors influenced these changes: most of the carfree developments are in accessible urban locations. None of the three studies appear to have explored how they compared in this respect to the respondents' previous homes.

Ornetzeder et al also considered the possibility that residents' lower car use might be compensated by other CO_2 emitting activities such as flying: their findings suggested this was not the case.

Filtered Permeability

As described in the next chapter, transport networks in Freiburg and Groningen (along with several other European cities) are characterised by the principle of filtered permeability. The term was first proposed by the researcher (in: Melia 2008b) and subsequently adopted in the Eco-towns Transport Worksheet (TCPA, CLG 2008) which defines it as: "separating the sustainable modes from private motor traffic in order to give them an advantage in terms of speed, distance and convenience".

There are several ways in which filtered permeability may be achieved such as blocking residential streets to through traffic, with bollards or bus gates, for example. This has been done widely

across several European cities visited by the researcher, and in some British cities such as Oxford (Melia 2009).

| Figure 2-5 Filtered Permeability in Münster | Figure 2-6 Filtered Permeability in Oxford |

The principle of filtered permeability differs from the approach generally favoured in Britain, which may be termed 'unfiltered permeability', where permeability is encouraged for all modes including cars (e.g. DfT 2007a).

The observations in the next chapter suggest that filtered permeability is associated with lower car use and higher use of sustainable modes, although this is an area where very little research has been conducted. Many studies have sought to compare unfiltered permeable street networks with cul-de-sac networks, which limit permeability for all modes. These studies have generally found little difference when other factors are controlled for (Susilo et al. 2010, Hickman, Banister 2008).

One recent North American study (Frank, Hawkins 2008) did compare four areas illustrating the four possibilities with respect to permeability (the authors use the term 'connectivity') i.e.:

1. Low permeability for vehicles, high permeability for pedestrians
2. Low permeability for pedestrians, high permeability for vehicles
3. Low permeability for both
4. High permeability for both

In an American context where car use is generally high, the differences were small, (the share of walking varied between 10% and 18%) but statistically significant. As expected, the first neighbourhood had the highest level of walking and lowest level of car use.

Although the principle of filtered permeability may be applied anywhere, carfree developments usually introduce filtered permeability into the neighbourhoods where they are built by blocking through routes for cars and providing permeability for cyclists and pedestrians (exceptions may

occur where they are surrounded by natural barriers such as the Hamburg examples in Section 3.4). Though this has not yet been studied, it is reasonable to infer that where carfree developments introduce filtered permeability they are likely to exert a modest downward influence on car use in surrounding areas.

Problems: Parking and Vehicular Access

The main problems of carfree developments identified by several of the studies related to parking and the control of vehicular access. Scheurer found dissatisfaction amongst 39% of residents with the arrangements in Vauban. Carfree households were unhappy that some car owners were flouting the rules by parking on the s*tellplatzfrei* streets. Some car owners were unhappy about the inconvenience of parking separated from the housing. Nobis found, overall carfree households were more satisfied with the arrangements than car owners. This finding is consistent with Borgers (2008) who found that car owners in the Netherlands preferred parking to be adjacent rather than separated from their housing (there was no mention of any carfree housing in the sample).

Overspill parking was referred to as a problem in several of the studies and articles about carfree developments. The system in Vauban (and in some other developments, as discussed in the next chapter) requires residents to sign an annual declaration stating either that they do not own a car, or that they do, in which case they must buy a space in one of the peripheral multi-storey car parks. As the cost of these is high, some residents are believed to lie and park their cars elsewhere. Scheurer believed this to be a minor problem: only one of the people he interviewed admitted to doing it, on a temporary basis.

In Slateford Green, where no parking is allocated for normal use, there are no rules preventing car ownership. A minority of residents continue to own cars, parking in a nearby supermarket and drive-through fast food restaurant (Eastwood 2008). Physical barriers with the possibility of exceptions may also create dissatisfaction. Again, in Slateford Green, the control of a discretionary barrier allowing access to a pedestrianised perimeter road had led to complaints directed against the caretaker, and some other residents who had found ways of circumventing the barrier.

2.7   Who Lives in Carfree Developments, and Why Did They Move There?

To assess whether carfree development are feasible in this country would require analysis of: potential demand, potential supply and the policy context. As discussed in Section 1.4, there are research gaps in all of these areas – too many for one study to address. This study will mainly

focus on the existence and nature of potential demand: this section will examine the evidence from European carfree developments in this respect.

The literature includes a considerable amount of demographic information about the residents of European carfree developments, but is more limited on the key questions of income, occupation and previous housing status. Across the developments surveyed by Scheurer, average household sizes (2.3 to 3.3) appear high due to high proportions of households with children (42% to 76%) by European urban standards. Vauban, with 76% and an average household size of 3.3 was particularly high. The others were close to or slightly above their respective national averages, which would generally make them high for the urban areas in which they were located (across Freiburg, for example, just 18% of households had children: Nobis 2003). With the exception of Slateford Green, the proportions of economically active residents were very high (90 – 98%). Scheurer makes various observations about residents' occupations – mainly professional and service sector in Vauban – but these appear based on impressions: no such questions were posed in his surveys, nor was any information sought on income levels.

Whereas Florisdorf and GWL Terrein are described as social housing developments (the latter containing 50% owner occupiers) the implications of this are clearly very different from Slateford Green, where tenants from the local authority housing lists are drawn from low income groups. Ornetzeder et al's survey was the only one to ask about income, education and occupation. Although those on the highest incomes were ineligible, incomes in Florisdorf were higher than the city average. 52% of residents worked in white-collar jobs (particularly in I.T., education and health); 93% were educated beyond secondary school. Confirming Scheurer's results they found that more than half the households had children, and average household size (2.67) was higher than the City average.   Although he provided no figures, Bouvier observed that the high prices of the private apartment in GWL Terrein meant that a large proportion of its residents came from "higher social classes".

These findings differ from the overall pattern of non-car owners, whose composition in Germany appears similar to Britain (discussed in the next section). Reutter and Reutter (1996) found a preponderance of older people, single people and households without children, particularly in the inner areas of Dortmund.   Although their survey did not ask about income, national statistics suggested a strong correlation between car ownership and income (positive), urban and particularly inner urban locations (negative).   They did however find a minority of 'counter-trend' carfree working households, mainly without children (23% of all carfree households), most of whom stated that they could afford to keep a vehicle. Carfree working families with children were a much smaller group (6%). The paper did not comment on the financial constraints of this group, but it might be reasonable to deduce that they were greater. Thus, it seems that the demographic profile of the people attracted to European carfree areas is different from that of non-car owners as a

whole. To some extent, the residents appear to come from a small subset of non owners, and to the extent that some gave up their cars on moving, there is also evidence of carfree developments creating a 'new market'.

To what extent the carfree nature of the developments motivated residents (carfree or otherwise) to move to them is not entirely clear from the European studies, although this was evidently a factor for many. Scheurer asked a multiple response question about reasons for moving to the developments under study (excluding Slateford Green, where tenants are allocated from a local authority housing list). One of the options was: "the ecological quality/carfree character of the neighbourhood". This was ticked by the following proportions:

City	Development	Ecological/carfree	Better Local Environment
Freiburg	Vauban	40%	42%
Amsterdam	GWL-Terrein	33%	29%
Vienna	Autofreie Musterseidlung Floridsdorf	55%	35%
Hamburg	Stadthaus Schlump	13%	38%

Table 2-4 Scheurer (2001): Reasons for Moving to Carfree Developments (amongst others)

The lower proportion citing ecological/carfree factors in Stadthaus Schlump may reflect its smaller size, where the benefits of a carfree environment would be less apparent. These direct responses may not reveal the full extent of the carfree influence, as illustrated by the last column (one of the other options). Perceptions of the local environment would presumably be influenced by the presence of parked cars and traffic. Ornetzeder et al asked a more specific question about the "car-free feature" which was cited as a reason for moving by just 23% of respondents in Florisdorf. 73% cited a "green and healthy environment" however. This distinction between direct and indirect motivations will be a recurring theme in this study.

Scheurer and Ornetzeder et al found evidence of high levels of more general environmental awareness and pro-environmental behaviour (recycling and composting, for example) amongst surveyed residents. Ornetzeder et al found significant differences in these respects between Florisdorf and the reference settlement. In their survey and interviews they found this was particularly marked in relation to bicycle use. The importance of cycling as a mode was discussed

above – Scheurer also found very high levels of bicycle ownership – between 0.9 and 1.1 per resident in all the developments except Slateford Green (0.4).

It seems, therefore, that Environmental awareness and preferences towards cycling may be two significant elements in seeking to identify the potential demand for carfree developments, discussed further in Chapter 5. The role of environmental attitudes and their relation to carfree living will be discussed in the context of UK research in Chapter 4.

2.8   Carfree Development and Carfree Living: Circumstances and Locations

If the people (and personal circumstances) likely to favour carfree development can be identified, this raises a further question: what attributes of the developments themselves, such as their locations, access to services including public transport, or the housing within them are likely to encourage or discourage such people to move there? The studies of European carfree developments provide some limited response to these questions. Scheurer's survey asked residents why they moved to the developments; two of the multiple responses offered (carfree and environmental reasons) were shown in Table 2-4. Other options covered housing size, changes of tenure, 'standard of apartment', proximity to work/school and to friends/family. The responses to these options varied considerably between the different developments (apart from Slateford Green, where the question was not posed) with no discernable overall pattern.

A notable area of omission related to public transport: proximity, frequency and connectivity, all of which would presumably be important to carfree households. All of the European carfree developments in the literature were located in cities with extensive public transport networks. Most of the developments in Table 2-1 and Table 2-2 are in inner city areas, although three: Vauban, Woltmanweg and Langwasser are all in suburban locations well connected to the city's rail or tram network (Vauban relied on buses until the tram extension in 2006). Slateford Green is fairly close to a railway station, but with a limited service; it is closer to frequent multiple bus services, which are more used by residents (as shown in Figure 2-3).

Whereas the European studies include various comments on the locations and their significance, there has been no systematic attempt to analyse the relationship between the locations and the choices made by the new residents to move there. Does their location within larger cities and connection to rail or tram networks indicate that these are essential attributes for carfree developments, or would it be possible to build successful carfree developments in other locations without these advantages?

A similar issue relates to the nature of the housing within carfree developments. The literature suggests that European carfree areas have been built at high densities (Scheurer estimated around 100 dwellings per hectare for Vauban and GWL Terrein) and contain mainly (or entirely) apartments. It was not clear whether this was normal for the areas in which they were built, or whether their carfree nature entailed higher densities. If so, this would be a corollary to the discussion in Section 1.2, where lower densities have historically been associated with rising levels of car ownership and use. Crawford (2000) argues that carfree cities would need to be built at relatively high densities, (particularly compared to 'auto-centric' suburbs) to ensure that public transport and services can be provided within walking distance – how dense would depend upon the distances residents were prepared to walk.

When building a small carfree development within an existing city the density (and layout) of the surrounding area would presumably exert a greater influence in this respect than the density of the development itself, although the two may go together, as planning policies or market forces may preclude low density new developments in high density areas (or vice versa). If high density development including more flats is a corollary of carfree development in most circumstances then the preferences of potential residents towards this form of housing would be critical to its success. This does not appear to have posed a problem for European carfree developments so far. Whether it might in the UK, where the proportion of flats (18.5%) is smaller than the Netherlands (26%) and much smaller than Germany (64%: Eurostat 2009) has not yet been examined.

There are many differences between the housing markets of the European countries studied in this thesis (explored in the next chapter). Evidence of the location and housing preferences – as well as attitudes towards public transport – would not necessarily transfer across national boundaries. The literature search produced no evidence on these factors relating to carfree development in the UK, which is not surprising given the paucity of built examples in this country.

2.9   Summary: Evidence and Research Gaps

The literature reviewed in this chapter provides many insights into European carfree developments and the people who live in them, although there remain several gaps. As discussed in Section 2.3, there is as yet no agreed definition, although the range of developments described in this chapter would offer a basis for a definition, as discussed in the next chapter. Carfree developments in the UK have all been small so far, and the literature suggested no sites likely to provide the answers to the initial research questions of this study.

As discussed in Section 2.6, the literature provides strong evidence that residents of carfree developments own fewer cars and largely as a result of this, use cars less than elsewhere. Some

of the benefits shown in Figure 2-4 may be inferred from this, and there are also two studies which provide direct evidence on two of those benefits. For carfree development to bring national and global benefits would depend upon behavioural change. The European evidence suggests that lower rates of car use and higher rates of active travel in carfree developments are partly due to self-selection by residents who were already carfree but also partly to behavioural change (although the relative importance of location, as opposed to the carfree nature of the European developments, is not clear from the literature). The extent to which each development will address each of the benefits shown in Figure 2-4 will vary according to local circumstances and policies affecting the wider area. To what extent these benefits would also apply in a UK context is another research gap on which this study will shed some light, although given the main focus on potential demand, it is not a primary research objective.

Some of the studies reviewed in this chapter are now several years old. Some refer to developments at an early stage, when most of the housing had yet to be occupied. For that reason, and also to provide a more general orientation to the rest of the study, it was decided to visit several European carfree developments, as described in the next chapter.

3   European Carfree Developments – Observations & Typology

3.1   Purpose and Scope of the Study Visits

The main purposes of the study visits described in this chapter were to increase the researcher's understanding of European carfree developments and to provide context for the rest of the study. The observations will also be used in conjunction with the literature reviewed in the previous chapter to answer the first research question about typology and definitions. For linguistic and resource reasons, no formal data collection was planned, but the observations would be supplemented by interviews with selected stakeholders, taking photographs and collecting literature which might not be available in the UK or online.

The choice of developments to visit was informed by the literature, particularly Scheurer's (2001) study, and an objective to observe a variety of different sizes and types of development. Practical considerations concerning the organisation of the journeys over the three summers from 2006 to 2008 also influenced the choices to some extent. The researcher also visited a number of other cities not specifically related to this study (and not described here) although they also helped to increase his personal understanding of the planning and transport contexts across different countries of Northern Europe.

Section 3.2 describes Vauban in Freiburg, visited during the summer of 2006. Given its size and importance in the literature (Scheurer 2001 devotes a separate chapter of his thesis to it, for example) it was decided to visit Vauban as an early objective. The next priority, partly to provide a contrast to the German examples, was GWL Terrein in Amsterdam, visited during 2007 as described in Section 3.3. Sections 3.4 and 3.5 describe cities and developments visited during the summer of 2008. Saarlandstrasse in Hamburg was under construction at the time of Scheurer's (2001) survey. By 2008 a second phase and another carfree development in Hamburg were under construction, as was Stellwerk 60 in Cologne. Stellwerk 60 was of particular interest as it is the only German carfree area to be entirely privately developed, with most of the housing offered for sale to owner occupiers as with most new developments in the UK.

Section 3.6 describes Groningen City Centre, also visited in 2007, which provides an example of a different kind: an existing city centre from which cars have been progressively removed. Some streets are open to traffic, though not through traffic. The fully pedestrianised streets are mainly commercial but do include some residences which are not directly accessible by car.

The length and nature of each of the study visits varied, as did the availability of information. As far as possible, Sections 3.2 to 3.6 will follow a similar format, describing the visit, the context at a

city-wide level, the origins of the carfree development, some general observations, some more specific ones concerning the carfree nature of the development and where available, information about demand and sale prices. These sections include some modal share statistics, which come from different sources so may not always be exactly comparable.

Section 3.7 will address the first research question, on typology and definitions, following the examples described here. It will set out three types of carfree development: the Vauban model, the limited access model, and pedestrianised centres with a significant residential population, as illustrated by Groningen. From these three types a three-point definition of carfree development will be drawn.

Section 3.8 will summarise the evidence from the European developments on the benefits and problems of carfree development. It will discuss the relevance of the European evidence to the UK context and the question of potential demand in the UK.

3.2   Study Visit – Freiburg, Vauban

With around 2,000 homes and a population approaching 6,000, Vauban can be considered Europe's largest carfree area, although the term needs to be qualified (and many local people prefer not to use it). Vehicles are allowed down the residential streets at walking pace only to pick up and deliver but not to park (although there are some infractions). These areas are mainly accessed from a spine road with some parking and a 30km/h speed limit. Thus Vauban could be considered a collection of carfree areas rather than a single area. Unlike the other sites visited it is an edge of city development, though due to the geography and compactness of Freiburg, only 3km from the city centre.

During a two week stay during August 2006, evidence was collected on this wider context as well as the circumstances around Vauban itself. Formal interviews were held with the project leader and another planner responsible for Vauban, a transport planner with responsibility for cycling, a representative of the ADFK – the German Cycling Federation, a tourism officer and one of the founders of Forum Vauban, the community association which initiated the carfree development. Informal interviews were also held with residents amongst whom the researcher stayed.

The researcher toured much of the city by bicycle, making observations and taking photographs. He also used the tram system and made observations on the other elements of Freiburg's public transport network.

Background: Planning and Transport in Freiburg

Freiburg City Council describes the principles of its transport strategy as five 'pillars':

- Extension of the public transport network
- Promotion of cycling
- Traffic restraint
- Channelling of motor traffic
- Parking space management

Unlike the UK outside London, the public transport system benefits from a general subsidy and is directly run or franchised by the City Council. In 1984 a low-cost all mode regional public transport pass was introduced, which Fitzroy and Smith (1998) identify as the most important factor behind the doubling of public transport journeys over the following decade. In 2006, the season ticket cost 41€ per month and was transferable within households. "Nearly every household has one" according to the City transport planner. The tram system provides the backbone to the network (see Figure 3-1). 70% of local public transport trips are made by tram; 30% by bus. Although the price of public transport is competitive, the rate of subsidy – 10% of operating costs – is considerably lower than the national average because patronage is so high (Pucher, Buelher 2009).
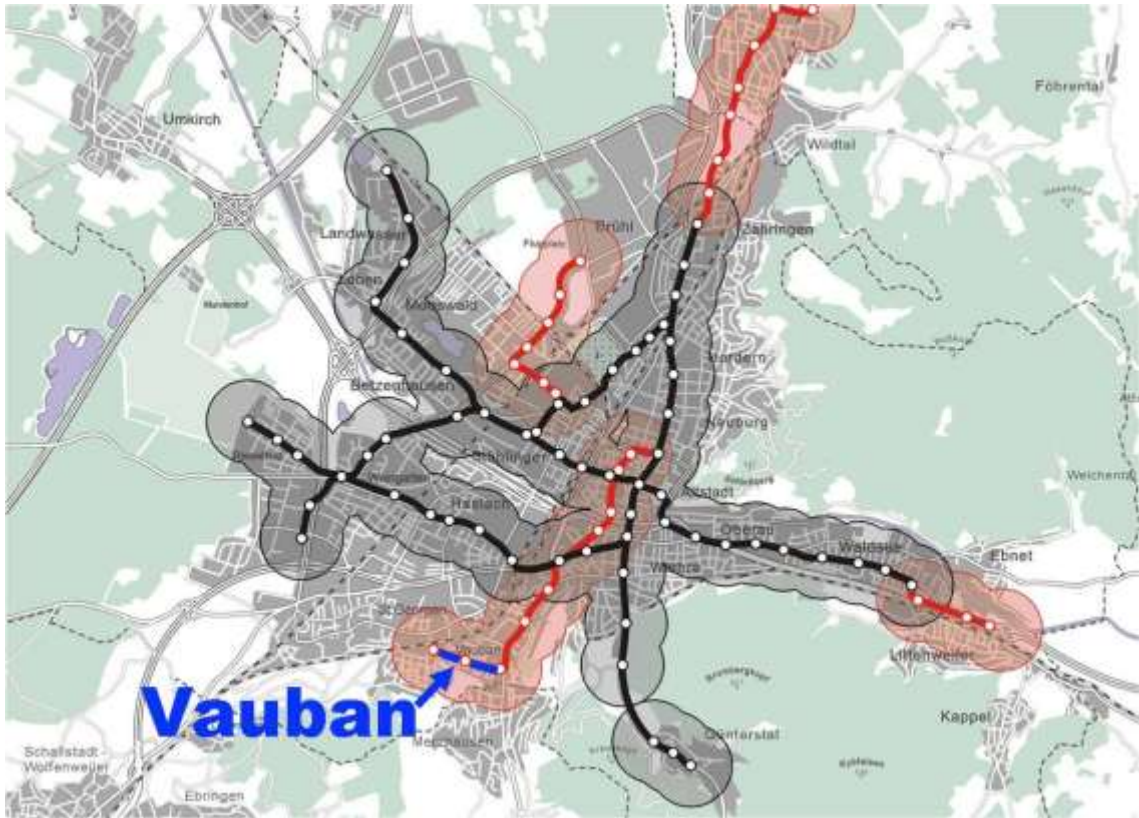
Figure 3-1 Freiburg Tram Network with Walkable Catchment Areas

(Recent and planned extensions in red – Vauban in blue)

The city's land use planning policies have favoured concentration around public transport routes and appear to have encouraged development at relatively high densities compared to UK cities of a similar size. Neighbourhood shopping centres and local markets are favoured by planning policy with larger retail outlets concentrated in the City Centre (although there were also some edge of city retail parks, particularly to the Northwest of the city).

City Centre parking capacity does not appear to exert any significant constraint. 14 car parks in and around the centre have more than compensated for the suppression of on-street parking. Hourly rates varying from 50c in the suburbs to 2€ in the City Centre were believed to be expensive, but were modest by UK standards at the exchange rate of the time.

Since 1971 a cycle network has progressively developed to cover all parts of the city. The continuity and priority offered by the lanes, paths, traffic-calmed and traffic-blocked streets compares with the best of European practice, in the Netherlands, Denmark and other German cities.
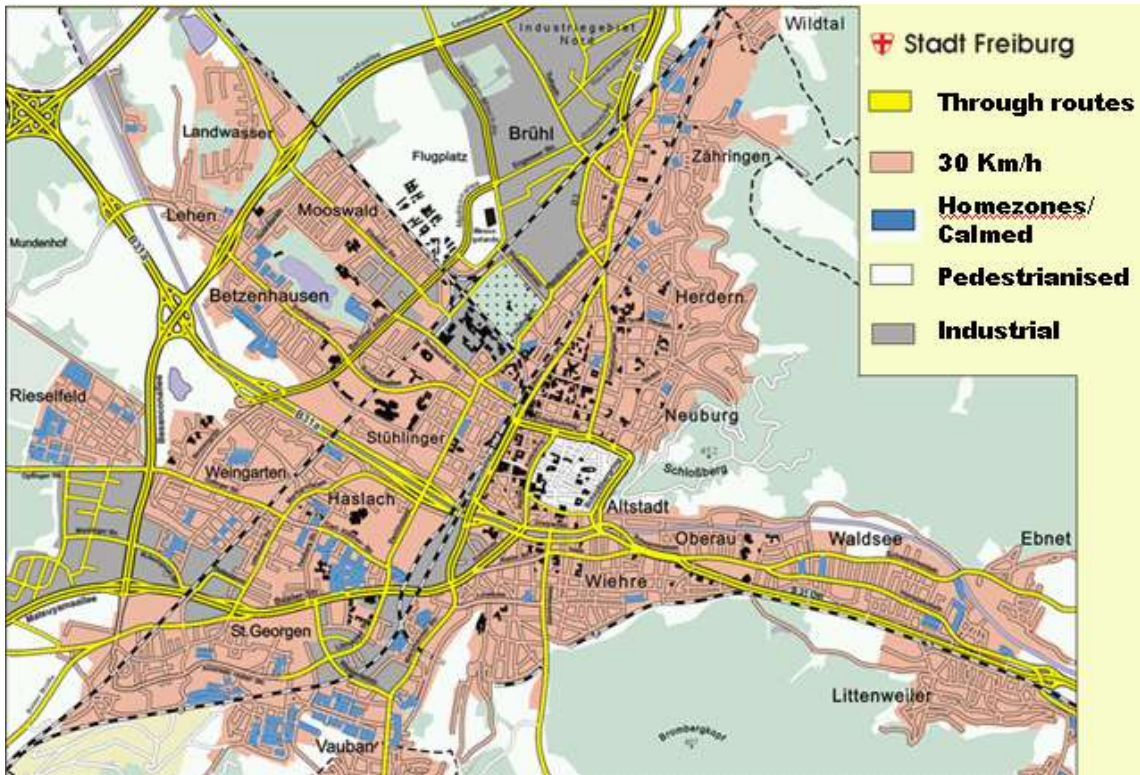
Figure 3-2 Freiburg Road Network
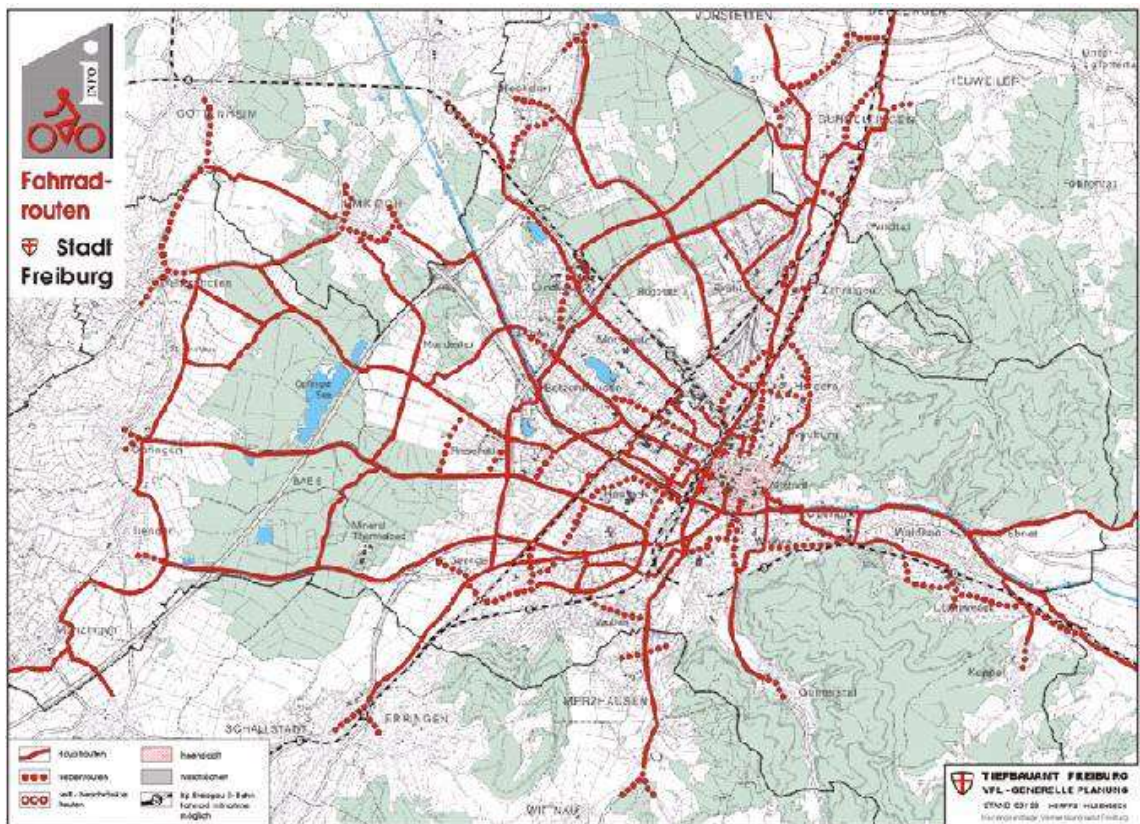
Figure 3-3 Freiburg Cycle Network

A comparison between Figure 3-2 and Figure 3-3 illustrates the limited network of through routes for motor traffic contrasting with the fine grain cycle network, providing filtered permeability (as discussed in Section 2.5) at the city-wide level.

It should also be noted that Freiburg's urban road network is structured to allow traffic to bypass the residential and carfree areas (mostly limited to 50 km/h). Although the city centre was closed to through traffic, the volumes of traffic around it were posing some problems and a longer-term plan existed to build an East-West tunnel to carry through traffic beneath the City Centre, according to the City transport planner.

Through this combination of policies, according to municipal statistics, the modal share of car travel was reduced from 60% in 1979 to 43% in 1999 (Heller Undated) – a time period when car use was rising across Germany and most of the developed world. Cycling rose from 18% to 29%. These statistics did not include walking. Car ownership fell slightly from 422 per thousand inhabitants in 1990 to 419 in 2006, below the national average, but still higher than most British cities of a similar size (Pucher, Buelher 2009).

Freiburg Modal Shares (2007)
Source: Stadt Freiburg in Pucher, Buelher 2009

Legend:
■ Car
■ Public Transport
□ Cycling
■ Walking

Pie chart values: 32, 18, 27, 23
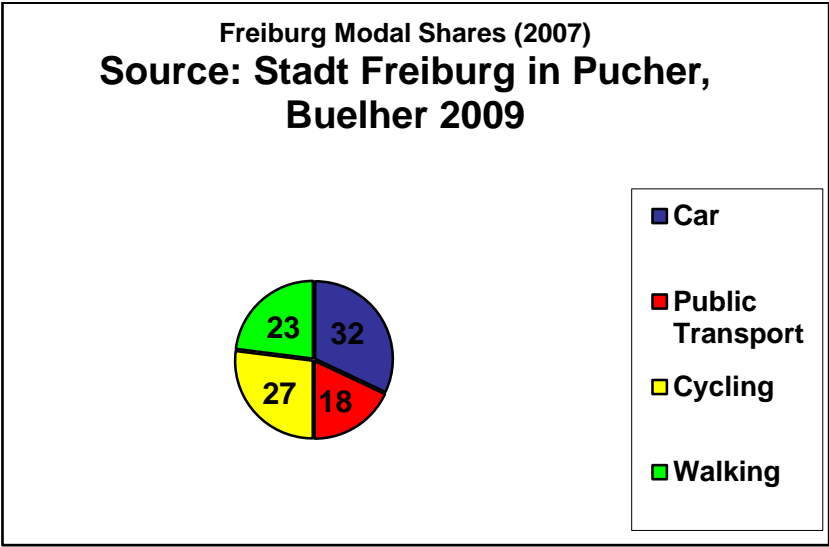
Figure 3-4 Modal Shares for Freiburg, all trips, 1999.

The proportion of walking as a principal mode fell from 32% in 1982 to 23% in 1999 (all the modal shares have remained unchanged since then). This was explained by the increasing take-up of the public transport season tickets: trips by public transport were believed to be substituting for some journeys which would otherwise have been entirely walked. The increase in cycling also appears to have contributed.

Vauban's Origins and Masterplan

In 1992, the French army vacated the 41 hectare Vauban barracks, which came into the possession of the City Council. The idea for a carfree development on the site was conceived by a group of activists who formed the nucleus of Forum Vauban in 1994. There is a legal requirement to consult the public on developments of this kind; Forum Vauban offered to carry out the consultation and obtained some funding for it. To help convince the Council who were initially sceptical about the feasibility of carfree housing, Forum Vauban collected a list of people who signed a declaration saying they would give up their car in order to move to a carfree development on the site. Relationships between the Forum and the City Council fluctuated over the course of the development. The Council regards Vauban as a success for the city, but appeared to betray some frustration with the process. After occupation began, the mainly middle class articulate residents often brought their concerns to the attention of the Council, who sometimes felt Vauban took up a disproportionate amount of their time.

Three hectares of land in two parcels were sold separately at the beginning; the old barracks on these have been converted for student accommodation and the S.U.S.I., an alternative community. The City Council would have preferred the site to be redeveloped as a whole; the consultation and masterplan only applied to the remaining 38 hectares.

The masterplan foresaw the construction of 2000 dwellings over 8 years from 1998 when building began, leading to a final population of around 5000. Completions were slightly slower than originally planned, but due to larger than expected household size, population reached 4,500 during 2006 and was expected to exceed 5,500 by completion, which was achieved during 2008.

Figure 3-5 Vauban Plan

Most of the individual plots were sold to *Baugruppen* (co-housing groups) whose bids were assessed against criteria favouring families with children, older people and Freiburg residents. Some *Baugruppen* were formed by architects, others by prospective residents planning varying elements of self-build (in at least one case, the architect became a resident). With net densities of 90 to 100 per hectare and a floor area ratio of 1.2, there are few individual houses. Most blocks are four stories high.

As with the other European carfree areas reviewed in this chapter, the masterplan for Vauban incorporated a number of other environmental objectives relating to energy efficiency, water use and renewable energy.

The Carfree Concept

Although the term *autofrei* (carfree) is sometimes used in connection with Vauban, this is not how most residents would describe it. The City Council prefer the term *stellplatzfrei*, literally 'free from parking spaces', to describe the majority of the residential areas where this rule applies. Vehicles may enter the roads in the carfree areas at walking pace for pick-up and deliveries only. Signs indicate that children are allowed to play everywhere. The parking rule was not always well respected – controls were rare and penalties light, a source of annoyance to some residents without cars.

Regional planning regulations require carfree developments to prove the lack of parking need and to reserve land in case of future needs. Residents of the 'carfree' areas must sign an annual declaration stating whether they own a car or not. Car owners must purchase a place in one of the multi-storey car parks on the periphery, run by a council-owned company. Each place cost 17,500€ plus a monthly fee to cover ongoing costs.

"We didn't want to be fanatical about the carfree concept. We wanted to reduce individual car use and offer people the option of carfree living" was how the Forum Vauban member described their attitude. "We wanted the car owners to pay the cost of their own infrastructure – we were astonished at the high price."

Predictably, some car owners have tried to circumvent these rules, registering cars in relatives' names, making private arrangements with residents outside the carfree area, or parking on land as yet undeveloped. The Carfree Association works to resolve these conflicts but the Council had resorted to legal action on two occasions.

Figure 3-6 Vaubanallee

The road layout within Vauban follows the principle of filtered permeability: it essentially functions as two separate culs-de-sac for motor vehicles. Most of the district is accessed via a spine road, Vaubanallee, which has a 30kmph (18mph) speed limit and metered parking. Any motor vehicles entering by this route must leave by the same route. In contrast, pedestrians and cyclists can circulate freely in all directions with other entry and exit points to the district available to them. One of these provides a significant short cut for cyclists heading towards the City Centre.

Car Ownership, Parking and Travel Behaviour

The city-wide car club has the greatest concentration of its 2,500 members in Vauban – at least ten of its cars were stationed around the district. A tramline was extended to Vauban early in 2006. A heavy rail line adjoins one end of the site and there were longer-term plans for a regional rail station.

The parking arrangements at Vauban were planned to offer a total capacity equal to half the number of dwellings – higher than the other carfree developments studied here. Scheurer's survey in 2000 found that 54% of households owned a car, although car use (see Figure 3-7) was comparatively low. One more recent source (Heller 2007) estimates that the level of car ownership has fallen since then, to around 20% of households, with a similar proportion owning parking places, presumably for visitors or as insurance for the future, but no car. These figures were estimates by Forum Vauban, so may not be precise.

Surveys of this kind would not capture those people who were seeking to circumvent the parking rules. A resident interviewed by Purvis (2008) suggested that these could amount to 5% of households, though it was not explained how he had arrived at this estimate. The Forum Vauban leader described the non-declarers as "a small but not negligible minority".

Nobis found that 57% of those living without cars had given them up on moving to Vauban. Both Scheurer and Nobis (2003) found that cycling was the predominant mode – Scheurer found three quarters of the working population cycled to work.

Vauban Modal Shares (2000)
Source: Scheurer (2001)
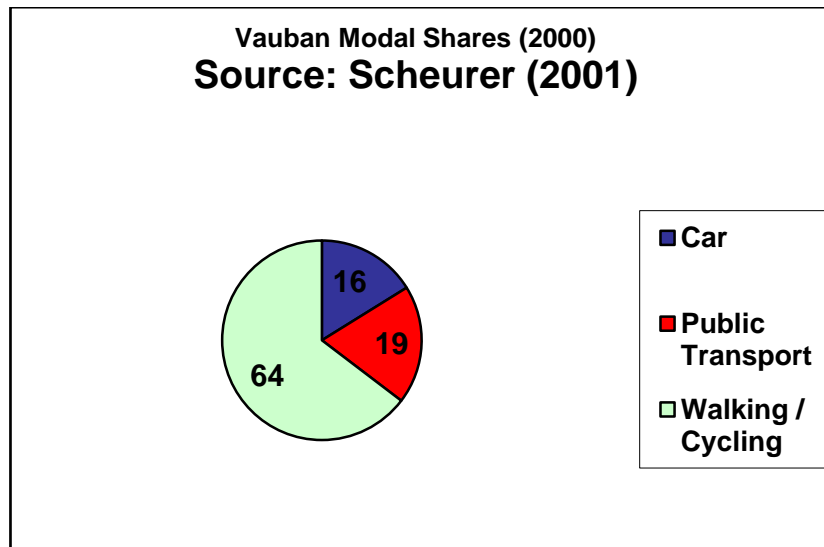
Figure 3-7 Modal Shares for Vauban, all trips.

Nobis (2003) analysed journey types by car ownership. The car use of the car owners in Vauban appeared similar to, possibly slightly lower than, the overall city-wide averages. As the latter included a proportion of non owners, it would be reasonable to assume that the car owners in Vauban drive less than car owners elsewhere in the City.

Both of these surveys were conducted before the extension of the trams to Vauban; a more recent travel survey would have been useful but none had been done by the end of 2008 (Simon Field, personal communication, December 24th). A comprehensive travel survey was not considered feasible during the visit, but an observation was made to provide a general impression of traffic conditions there. This was carried out at two points along the Vaubanallee on an evening and morning of week days for half an hour each. The results, shown in Figure 3-8 indicate the continuing importance of cycling as a mode of travel in Vauban. Tram movements were counted – not the number of passengers – although the trams did appear to be well used. It should be noted that although there is some parking along Vaubanallee, the multi-storey car parks are accessed from elsewhere, so traffic movements into these were not counted.
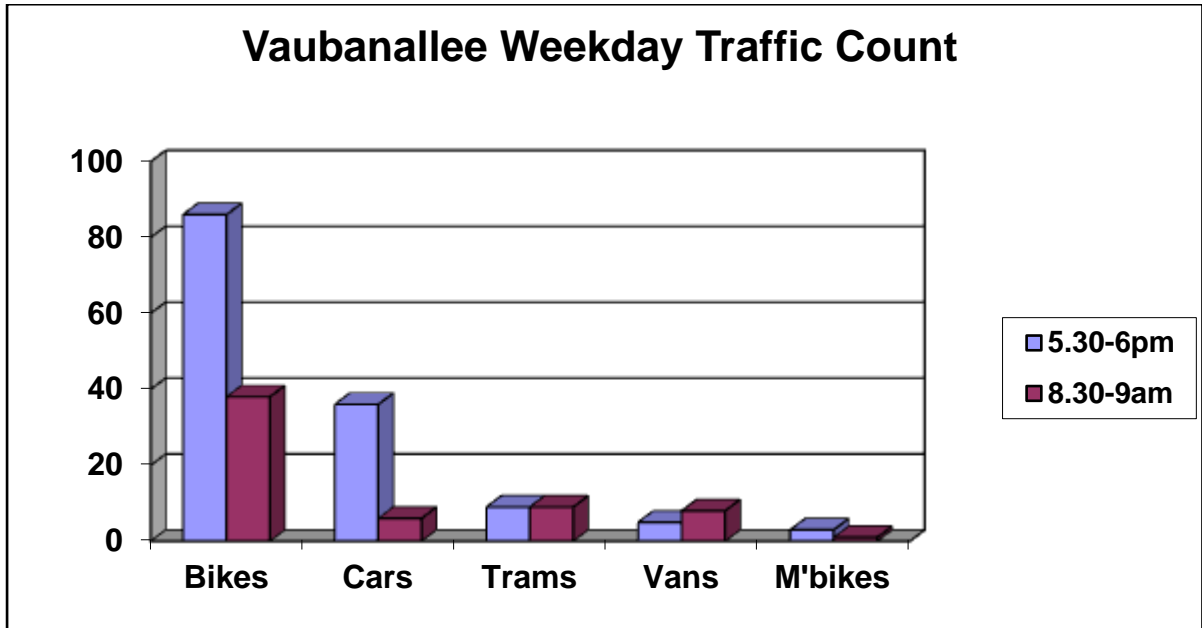
Figure 3-8 Vaubanallee Vehicle Movement Count

Despite occasional problems the traffic management system did appear to have achieved its principal objective, to provide residential areas almost entirely free of moving vehicles (stationary vehicles were more common). The visit coincided with the school holidays. The carfree streets were full of young children, often unsupervised, playing or cycling – noticeably more so than in the *Spielstrasse* (homezones) with parking which are common elsewhere in Freiburg.

The resident with the two young children, five and seven years old, explained that both of them were allowed to cycle freely around the district unsupervised although he added that the five year old stayed mainly in the street where they lived.

Figure 3-9 'Carfree' Residential Streets in Vauban

Demographics

Scheurer's 2000 survey found 76% of households with children and an average household size of 3.34. These unusually high proportions have evidently fallen as Vauban has grown, but young children still seem to form a large proportion of the population. Neither Scheurer's nor Nobis's survey asked about income or occupation; observations during the visit tended to confirm Scheurer's impression of an ecologically aware population (mainly Green voters) largely working in service sector professions. One of the two supermarkets on the main road which borders the main site sold only organic products.

200 housing units, around 10% of the ultimate target, were social housing. The rest were overwhelmingly owner occupied. This was considered a drawback by the city planners who would have preferred more social housing.

Few of the original occupiers had moved; residents commented that the few dwellings that had resold were relatively expensive by national and city standards, although this was not quantified. As discussed in Section 3.5 in the context of Stellwerk 60, impressions of this nature can vary, so need to be treated with caution. Forum Vauban's online message board contains more seekers (mainly to rent) than offers, which appeared to residents to indicate a popular district.

One of the residents informally interviewed had moved from another region specifically to live in Vauban because of its carfree and ecological nature. He said he would not necessarily have come to Freiburg otherwise. His move to Freiburg was an example of the 'lifestyle migration' referred to by Scheurer (2001): he had previously worked as an architect and was now trying to make a living from playing music.

Problems and Social Control

Vauban appears to have suffered from some negative local media coverage in its early years (contrasting with much positive international coverage, particularly in media aimed at built environment professionals). Some newspaper articles gave prominence to stories of conflict allegedly involving eco-extremists living there. Partly in response to this Andreas Kuntz, a sociologist from Freiburg University who lived in Vauban conducted a series of resident interviews there. His self-published book of extracts from these interviews (Kuntz 2006), aims to allow the residents to tell their own stories.

The section on carfree living does reveal some conflict between the carfree and car owning residents, although stories about this in the press are portrayed as exaggerated. Vandalism, noticeably including graffiti, is a problem across Freiburg and most other German cities. Incidents

of vandalism against cars in Vauban were blamed in some newspaper articles on "car haters" or "eco-terrorists", whereas local residents believed the damage was probably caused by young people with no such motivations.

Two of the interviewees did describe incidents as deliberate acts against infringers of the parking rules, however. In one case a man letting down tyres explained when challenged that these cars were not meant to be parked there. In another incident water-based paint was thrown over a van which had been parked for several days in the same place, where parking was not allowed. The carfree association which works to manage these conflicts was described as 'fascistic' by some car owning residents.

An article in The Observer (Purvis 2008), which seemed based on a very brief visit, echoed some of the negative themes mentioned in the German press. One of these is a perception of Vauban as place of social control, which one interviewee blamed on "a high number of teachers who thrive on rules and social control". Kuntz devotes a short section of his book to this issue. Two interviewees describe neighbours noticing their movements in a disapproving way, although another describes the District becoming more private as it and its vegetation have grown.

Both Forum Vauban and the Council were keen to avoid accusations of social control. The Mayor of Freiburg, addressing residents in the community centre in 2005 was quoted by Kuntz (2006) as saying: "I will not create a secret service to deal with the carfree problems of Vauban". The founder of Forum Vauban similarly mentioned that they wanted to create a structure to resolve any conflicts over parking without "a STASI like organisation" (STASI was the secret service of the former East Germany).

Towards the end of 2008 a British transport planner known to the researcher spent ten weeks living in Vauban. He was interviewed by telephone on his return about these issues. He said that the parking rules were flouted more in some streets than others – 'activists' living in certain streets may have exerted some influence over their neighbours to respect the rules. He did not witness any conflict between neighbours, however, and agreed with the assessment above that vehicles are rarely seen moving in the carfree residential streets.

Vauban illustrates one possible model for carfree development which appears to achieve its main objectives but with some problems. With no physical restraints and no effective external deterrents, social pressure remains the only means of ensuring that carfree streets remain carfree. Some members of the German carfree movement have concluded that the design of Vauban's streets, which are wide enough to allow unauthorised parking, may have created an unnecessary problem in this respect (Markus Heller 2008, personal communication May).

3.3 Study Visit – Amsterdam, GWL Terrein

GWL Terrein is a 591 apartment development, 3km from the centre of Amsterdam, completed in 1998. The visit to GWL Terrein was briefer than the others – a couple of hours during July 2007, accompanied by a transport planner from Amsterdam City Region, who was interviewed about GWL and other issues particularly related to cycling policy (as described in: Melia 2007b). Apart from the interview notes, this section draws on Scheurer (2001) who surveyed the development in 2000 and Bouvier (2005) who updated some of Scheurer's findings.

Background: Planning and Transport in Amsterdam

As with Freiburg, the political environment, planning and transport policies were all favourable towards developments with ecological objectives. The Netherlands has the highest population density in Europe (excluding small islands and city states – Wikipedia 2008b), with nearly half the population concentrated in the Randstad Holland region around Amsterdam (population 755,000: Wikipedia 2008a). Although the national policy framework has fluctuated over the years, there is an enduring consensus on the need for compact development to preserve the "green heart" of the region.

Transport policy since the oil price shock of the early 1970s has favoured modal shift away from private car use, particularly towards cycling, which has been rising as a proportion of journeys since then (Parker 2001). The progression of modal shares since 1986 shows a significant rise in cycling (from 21% to 28%), a fall in walking (from 30% to 24%), public transport stable and car use falling very slightly (Gemeente Amsterdam 2008).
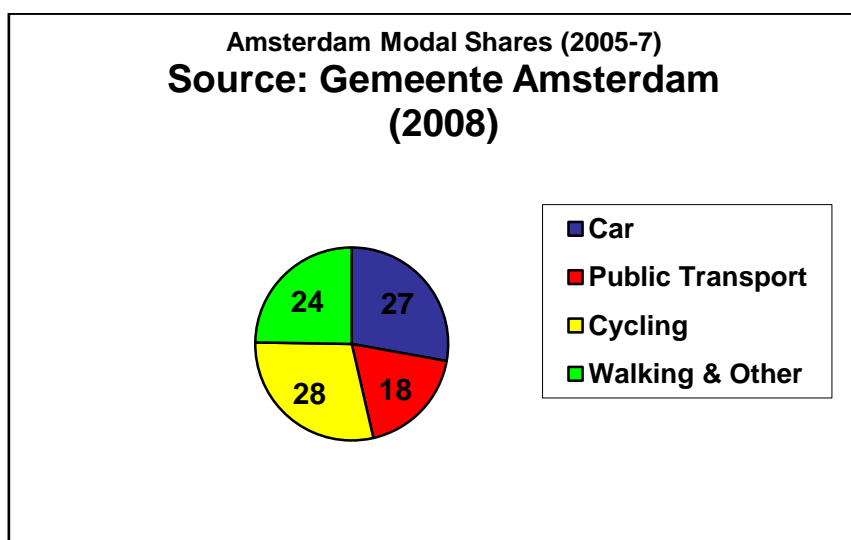
Figure 3-10 Modal Shares for Amsterdam, all trips 2005 -7.

The policy of reducing car use in the city appears to have benefited from a high degree of public support manifested in a referendum decision in 1992 to reduce the number of, and space allocated to cars in the City Centre. As in most cities, these policies remain controversial, however, with some suggestion of a pro-car backlash discernable in the statements of some local politicians elected more recently (Ligtermoet 2006).

There is a more enduring consensus on the promotion of cycling, however. Filtered permeability is provided by cycle bridges and contraflow lanes within the historic City Centre, where many narrow streets have been made one-way for motor vehicles.

GWL Terrein – Origins and Development

The GWL site was a former waterworks of 6 hectares in Westerpark, a low income district (with some recent evidence of gentrification) lying just to the West of the City Centre, close to the end of a tram line. Westerpark has the lowest level of car ownership in Amsterdam, with less than 0.3 vehicles per adult resident (Gemeente Amsterdam 2008). The initiative to develop the site for carfree housing came from Westerpark Borough Council which ran a newspaper advertisement seeking expressions of interest – 4,000 people responded positively.

Figure 3-11 GWL Terrein

The site was developed by five housing associations, although 54% of the apartments were offered for sale on the open market – consistent with a deliberate, and controversial, policy of the Council to attract new middle class residents to Westerpark (Bouvier 2005). The site was developed at a gross density of just under 100 dph – roughly double that of Vauban – in blocks varying between three and nine stories high. Commercial uses included some small offices, a bike hire company, a restaurant (see Figure 3-11) and a TV studio. The latter helped to increase the cachet of a

development which, in the opinion of the researcher, does not benefit from particularly inspiring architecture.

Carfree Concept

Unlike Vauban, vehicles are physically prevented from accessing the interior of the site, which is made up of semi-private open space including play areas (Figure 3-12), and gardens available for rent by the residents. Unlike some of the smaller carfree developments such as those described below, there is no provision for deliveries or removal vans to enter the site – access is only available from the perimeter, where some ground level metered (2.10€ per hour) parking is provided (Figure 3-13).

| **Figure 3-12 GWL Terrein Play Area** | **Figure 3-13 GWL Terrein Peripheral Parking** |

When Scheurer conducted his survey in 2000, there were 110 parking spaces allocated by lottery to residents – a ratio of 0.19, but 38% of households surveyed stated that they owned a car. The surrounding neighbourhoods were already covered by a residents' parking scheme, for which GWL residents were, and are, ineligible. Car owners without an allocated place adjacent to the development were maintaining their car ownership in a number of different ways. Some obtained residents' parking permits via neighbours outside GWL – which was contrary to the rules but difficult to prevent. Some privately rented garages elsewhere, kept cars at their place of work, or took part in informal car sharing arrangements with friends. In these cases, access to the car was often made by bicycle.

Scheurer reported on plans to build a multi-storey car park near to the site, partly to cater for the commercial uses, but with some possibility of more places for residents. According to Bouvier (2005), the number of places available to residents had increased to 135 (0.23 per household) by 2005 but the number of car owning households had fallen to 172 (29%). If some residents were breaking established rules, surveys might not necessarily reveal the true level of ownership, but

the pattern of car ownership falling over time is consistent with the experience of other European carfree areas. Over the five years between the two publications it is plausible that some residents might have decided to end the complicated arrangements Scheurer described for keeping cars in remote locations.

Demographics and Travel Behaviour

The demographic profile described by Scheurer showed some similarities to the other carfree areas. The proportion of households with children, 42%, was lower than Vauban but nearly double the city average. He characterises the residents of the open-market housing (concentrated in blocks at the Southern end of the site) as highly qualified 'knowledge economy' professionals. These people were often attracted to the development by its carfree nature, which they viewed as an advantage, whereas the social tenants were more likely to be attracted by the moderate rents and central location – some of these people complained about the lack of parking which they viewed as a disadvantage.

Scheurer found car use considerably lower than car ownership – amounting to 10% of trips for all the purposes surveyed. Walking and cycling accounted for 73%. Public transport was more significant for commuting – accounting for 30% of trips to work or education. The site was close to a tram stop and only 2.5 km from the central station, from where a significant minority commuted to settlements elsewhere in the region.
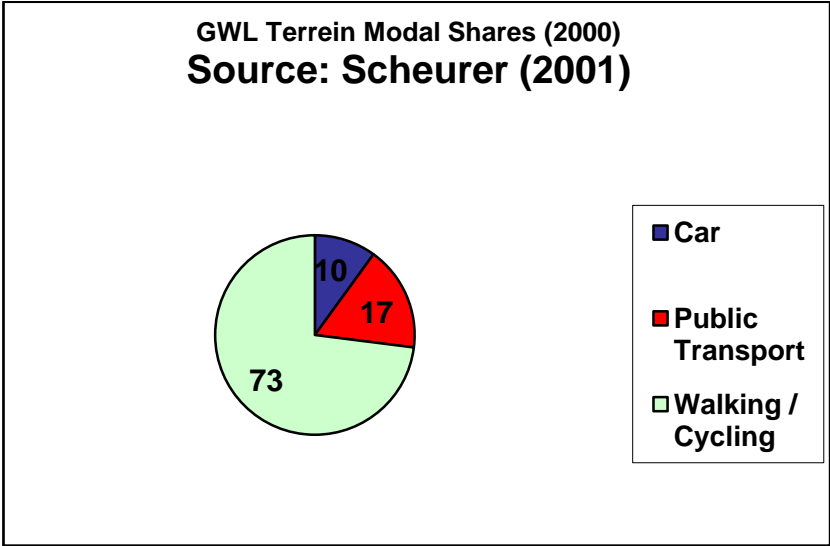
Figure 3-14 Modal Shares for GWL Terrein, all trips.

Bouvier reported that rents for private tenants in GWL nearly doubled between 1998 and 2003, as higher income groups were attracted to the development and the area. The transport planner who accompanied the researcher had considered moving to GWL with his family but found the

purchase prices too high. He had looked at one flat of 100m^2 which was for sale for 400,000€, which he described as relatively high for that part of Amsterdam. An Internet search later that year revealed another slightly larger flat for sale at 439,000€. To what extent the carfree nature of the development influenced the relative value of the properties was not possible to assess, but the development did not appear to be suffering from any lack of demand.

3.4   Study Visit – Hamburg, Saarlandstrasse and Kornweg

In 1992, at about the same time as the carfree movement began in other German cities, a group of activists formed to promote a carfree development in Hamburg. The first phase of their development, in Saarlandstrasse, was completed in 2000. The organisation they formed, Autofreies Wohnen, has continued to promote carfree development in the City. A visit was made to Saarlandstrasse and another site during an afternoon in July 2008, accompanied by the part-time director (*Geschäftsführerin*) of Autofreies Wohnen, who was interviewed about the origins of the development, the current situation and the city-wide context. A member of Autofreies Wohnen who has bought one of the apartments under construction acted as a guide to the Kornweg site.

Background: Planning and Transport in Hamburg

Hamburg is Germany's second city with a population of 1.75m, similar to Greater Manchester (the population of the 'agglomeration' has been estimated at 2.7m Brinkhoff 2009). The planning and transport policies of the city administration have varied with political changes over the years. The Green Party has recently entered the coalition governing the City, which is expected to make the Council more supportive. The previous CDU administration had a pro-car agenda, which led them to increase speed limits on some main roads, for example. The City has a policy when it sells land for development that 15% of the units in new development should be for *Baugemeinden*, (co-housing groups), which has helped such groups with carfree objectives to obtain approval for development of sites.

The city has a well-developed network of U-bahn (underground metro) and S-bahn (express conurbation-wide rail), which would compare favourably to British cities, although the coverage was not as comprehensive as that of Cologne, as described in the next section. In common with most larger German cities public transport ticketing is integrated and heavily subsidised: an all-mode all-day ticket for Greater Hamburg costs just 6€ (the equivalent ticket for Manchester costing £7 is only valid off-peak).

The cycling network was not as comprehensive or as well implemented as in cities such as Freiburg or Amsterdam although it would compare favourably with most British cities. Like Freiburg, there has been a more or less continual increase in public transport usage in recent decades, with passenger numbers increasing by over 50% between 1985 and 2007 (HVV 2007).

Hamburg Modal Shares
Source: HVV (2007)

Car

Public Transport

Cycling

Walking

43

27

11

19
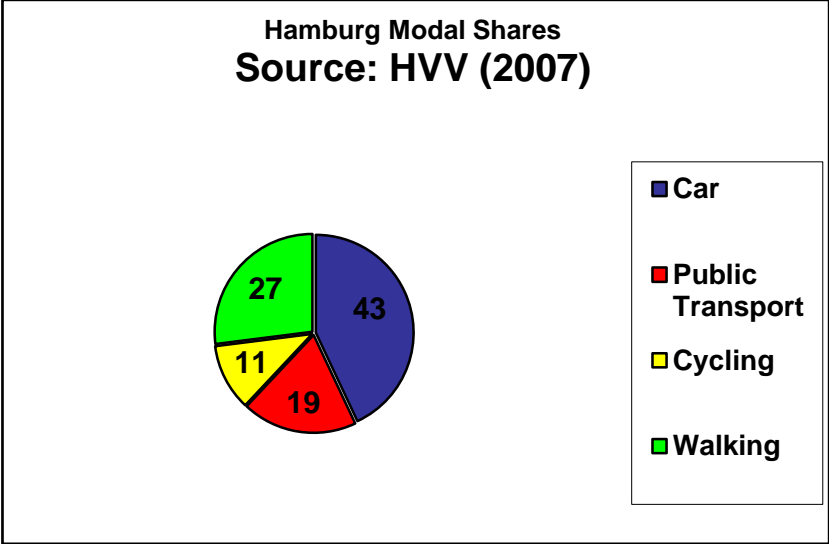
Figure 3-15 Hamburg Modal Shares, all trips, Source: HVV (2007)

Origins of the Carfree Developments in Hamburg

The philosophy of Autofreies Wohnen is 'purist' in the sense that their aim is to provide environments where people can live without owning cars. They began collecting names of potential residents during the 1990s; they had 1,400 on file by 1997 (Scheurer 2001). The originators formed a *Wohnwarft*, a housing association, which still owns a proportion of the housing, and is legally responsible for maintaining the carfree nature of the sites.

The two sites visited were acquired from the City Council, whose cooperation was essential to the process. Saarlandstrasse was a former industrial area. It lies about 5km (as the crow flies) from the City Centre set back from a main road. It is surrounded by water on two sides, which makes it into a natural cul-de-sac, with a small jetty at the rear, used by residents with canoes. It is entirely composed of apartments – (111 in phase 1) in blocks mainly five stories high. This is normal for a new development in locations of a similar distance from the City Centre, according to the Director.

Figure 3-16 Saarlandstrasse phase 1 and phase 2 under construction

Kornweg is a more suburban location, about 10km from the City Centre. Its 64 dwellings, mainly apartments, were being built at lower densities – mainly three stories high. An S-bahn station with a small row of shops is a few hundred yards away. There is only one road access to the site, which will also include some more conventional residential development.

There are several different forms of tenure across the two developments. The originators of the Saarlandstrasse development formed a *Wohnwarft* (housing association), which still owns a proportion of the housing, which is held on a shared ownership basis. The original members were required to provide 20 – 25% of the building costs before building began. New owners must buy into membership of the association, with a payment of around 4,000€ for an average sized flat, on top of which, they pay a monthly rent.

The Saarlandstrasse site was sold to the *Wohnwarft* at full market rate, but with the help of loans from the City. Eighteen apartments in phase 1 were owner occupied and one of the blocks was owned by a private management company, who rent the apartments at normal market rates (although these may be subsidised by the state for those on low incomes). One block includes supported accommodation for people with physical disabilities (see Figure 3-16). Phase 2 will include some more of these units, the rest being entirely shared ownership – a total of 53 dwellings.

Kornweg includes some shared ownership and a form of collective self-build for new owner occupiers.

Several of the blocks include communal facilities, including in Saarlandstrasse a communal roof terrace, a shared garden and a community room of about 35m^2. The latter has been used for: parties, language lessons, music practice and screening of films.

The Carfree Model

In both Saarlandstrasse and Kornweg, vehicular access was limited to one side of the development. The public areas between the blocks were made up of shared gardens, play areas and semi-private open space. The relatively small size of the sites made the trade-off between vehicular access and carfree space less of an issue than with the other developments reviewed in this chapter.

Figure 3-17 Kornweg Site

The parking ratios for the two developments were:

Saarlandstrasse: 0.15
Kornweg: 0.2

The 'standard' minimum parking ratio Hamburg was 0.8; a planning condition was imposed at Saarlandstrasse that if car ownership rose above 0.4, the Council reserved the right to require a payment in lieu from the *Wohnwarft* – an eventuality which had not occurred.

The parking places on site were intended to be used mainly for visitors and deliveries. The facility existed to apply to the *Wohnwarft* for a parking place due to changed circumstances. This had happened twice since the housing was first occupied.

Apart from these exceptions, all residents were required to sign an annual declaration that they did not own a car. There had been some problems confined to the private rented block. The Director believed that the management company might not have made these conditions clear to all their

prospective tenants. This had led to some problems of unauthorised parking, annoying the majority who did not own cars.

Cycle parking was provided at around 2 spaces per dwelling on both sites, with a combination of underground and above ground parking in lockers (see Figure 3-17).

A large majority of the prospective owners of the Kornweg properties were already living without cars. The others had indicated a willingness to give up their cars on moving there.

Both sites are well located with respect to the rail networks. Both sites were a few hundred metres from an S-bahn station; Saarlandstrasse was also about 1km from another station with both S-bahn and U-bahn. The Director believed that walkable proximity to rail networks was essential for a carfree development.

Information about the travel behaviour of the residents was not available – phase 1 of Saarlandstrasse was not yet occupied at the time of Scheurer's survey.

At the time of the visit, one owner at Saarlandstrasse was trying to sell one of these apartments. This was the first time a resident had tried to sell an apartment since the blocks were first occupied, so it was not possible to assess the effect on market values of the carfree model in Hamburg.

3.5   Study Visit – Cologne, Stellwerk 60

Stellwerk 60, around 2.5km from the centre of Cologne, will ultimately have just over 400 dwellings. It was of particular interest because it has been developed privately with around 70% of the housing sold to owner occupiers, a context similar to new developments in the UK. At the time of the visit roughly half of the dwellings were occupied. It was visited for a morning guided by one of the owner occupiers who worked for the German Green Party and had been part of the original initiative.

Background: Planning and Transport in Cologne

Cologne is Germany's fourth city, with a population in 2007 of 995,397 (Wikipedia 2008c). It has a substantial motor industry and became the first German city to be encircled by a radial motorway in 1965 (Wikipedia 2008d). It also has a particularly dense public transport network with 15 light rail lines as well as S-bahn and regional express rail; the total coverage of these appeared noticeably

denser than in Hamburg. A city-wide all-mode day ticket cost 5.20€. Conditions for cycling were generally good, although the many surface tram and rail lines reduced permeability for cyclists and pedestrians in many places.

Average car ownership across the city was 477 per thousand inhabitants – a little below the national average – not unusual for a large city (Stadt Koeln 2008). Modal shares (Stadt Koeln 2008) were as follows:
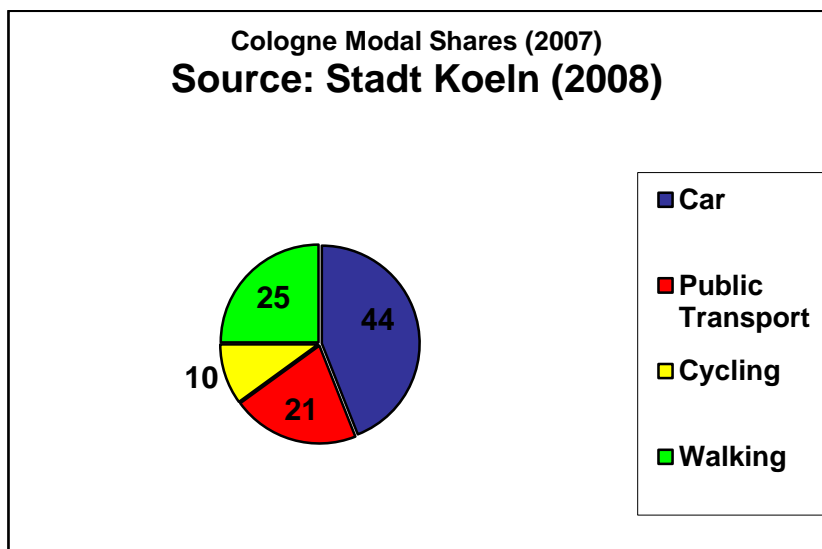
Figure 3-18 Cologne Modal Shares, all trips.

Origins and Development of Stellwerk 60

The initiative for the Cologne developments, as in Hamburg, came from a group of activists, although their approach was slightly different – starting with a *Bürgerinitiative*, a citizens' petition, in the early 1990s. This aimed to put pressure on the City Council to allocate a site for a carfree development. Four potential sites were selected, following which, a city-wide survey seeking potential interest produced nearly 5,000 responses. Half of those expressing interest owned cars but stated that they would be willing to give them up on moving to a carfree development if one were built.

The site finally selected was 4.2 ha, a former railway repair shop, adjacent to a major railway, with some problems of land contamination. Deutsche Bahn had been trying to sell it for some time before it was acquired by the City Council.

Having acquired the site, the Council ran a nationwide architectural competition. 77 architects entered. The winning masterplan, selected by the politicians, originally included plans for an employment area, for which a buyer was never found – it has been developed for housing. Unlike the other developments cited in this chapter, the land was then sold to a single private developer who made some minor changes from the original masterplan. The involvement of a private developer was viewed with some concern by the original activists, and relationships between the two have fluctuated as the development has progressed.

As in Hamburg, the development was also dependent on the attitude of the City Council. The political complexion of the Council has changed over the years; some leaders have been more sympathetic than others, although none have opposed the initiative.

During the early stages there was a demonstration by some of the surrounding residents, who were not convinced that the carfree model would work. One of the access roads to the perimeter of the site runs through a homezone, so the main issue appeared to be that vehicles destined for the carfree area would be driving along this street, allegedly endangering the children of that street. Although the volume of traffic would presumably have been higher if the site had been conventionally developed, the prospect raised an emotional issue that residents of the carfree area, whose children were protected from traffic, would be responsible for traffic allegedly endangering the children in the home zone.

As the development has progressed, according to the Guide, relationships with the surrounding areas improved. The carfree residents' have made common cause with some residents of surrounding areas on a number of issues relating to both.

When finished, Stellwerk 60 will comprise just over 400 units on a site of 4.2 ha (excluding a small park) making a density of approaching 100 dph. Around 70 of the units will be terraced houses, the rest apartments. Around 70% of the properties were being developed for sale and 30% for rent, including one block of about 80 apartments for social housing.

The site is bounded on the eastern side by a terrace of older two to three storey houses. The density of the site has been graded, starting with the 2.5 storey terraced houses on the eastern side, rising to 4.5 storey apartment blocks at the opposite side overlooking the railway. There is a small park adjacent to one corner of the site.

A carfree street, with bollards closing it off to vehicles under normal circumstances, runs along the southern boundary of the site (Figure 3-20). This road was heavily used by pedestrians, cyclists and children playing. The houses all have small private gardens, but most of the space between

the buildings is made up of pedestrian streets or public open space (Figure 3-21). As in Vauban, this was well used by children and residents generally.

Figure 3-19 Plan of Stellwerk 60

| **Figure 3-20 Stellwerk 60 carfree street** | **Figure 3-21 Stellwerk 60 open space** |

The Carfree Model

As with all the German carfree areas, the residents are required to sign an annual declaration concerning their car ownership. The developers are required to hold some land in reserve in case car ownership becomes higher than anticipated.

Those who own cars are required to purchase a space costing 16,000€ in the adjacent multi-storey car park (Figure 3-22). This decision is usually made at the time of purchase. The block will be collectively owned by the purchasers when the development is complete. The parking ratio is 0.2 (see below). At the start of the development, there was no parking control on the surrounding streets, and a minority (the guide estimated about 20 households) had presumably lied on their declarations, and were parking on the surrounding streets. This was about to be addressed with the introduction of a residents' parking scheme in the surrounding area.

As with other carfree developments, a number of people who bought properties with a parking space had since given up their cars and were looking to sell the parking spaces. The level of car ownership was difficult to assess at the time as properties were still being built and sold.

The city-wide car club had 10 vehicles parked on allocated spaces on the edge of the site. Around half of the residents were members. An S-bahn station is 600m south, and a U-bahn station about 600m east of the site. The guide observed that the residents made relatively little use of public transport, as most found it quicker to cycle around Cologne, although access to rail was important for longer-distance travel.

The site itself is entirely free from vehicles, although the possibility of access to within 50m of each property for emergency vehicles was a design constraint. Each property was allocated between two and five cycle parking spaces, in a mixture of underground and surface lockers.

A residents' organisation has some management responsibilities which were expected to increase once the developer finishes. Membership cost 60€ p.a. and was entirely voluntary; it had 61 members at the time of the visit.

Figure 3-22 Stellwerk 60 Car Park	Figure 3-23 Stellwerk 60 postal service

Deliveries were largely done by hand (Figure 3-23). Packages addressed to residents were being delivered to a building used by the site security. For the duration of the construction period, the security staff would deliver these packages by hand or hand carts to the residents. It was planned that the residents' organisation would eventually inherit this building, and would need to find a longer-term arrangement, possibly involving volunteers, when the security guards left the site.

Demographics and Marketing of the Housing

The residents association had recently run a survey of residents, asking why they moved to Stellwerk 60. The top two reasons were:

1. Its location within the City
2. Its carfree nature

As with other German carfree areas, the proportion of households with children, particularly young children, was high, particularly in the individual houses. They were often people who were "looking for a place with a sense of community".

As in Vauban, there were many residents from middle class and professional backgrounds, particularly education and creative professions. According to the guide:

"The title *autofrei* keeps certain people away. Those who you don't want to see, you don't see here."

This had belatedly been recognised by the developer as a positive sales point.
He went on to explain that he was not implying any racial aspect to this; there were people of many different nationalities amongst the new residents (although a large majority appeared to be white).

74

The marketing of Stellwerk 60 emphasised the carfree nature of the development as a key selling point. The heading in Figure 3-24 reads "Stellwerk 60, Cologne's first carfree development".

Figure 3-24 Marketing Website of Stellwerk 60 developers

In the original plans no parking was to be allocated for residents' cars. The developer tried to persuade the City Council to increase the parking ratio to 0.5. A compromise was eventually agreed: 80 spaces, a ratio of 0.2. The developer therefore needed to ration these spaces, so was forced to find buyers who did not require a parking space.

According to the guide, at the early stages, the developer did not understand the market for carfree housing:

"The salesmen came along in their Mercedes. People from the initiating group felt the salesmen didn't understand them. It was a bit of a fiasco."

Later they began to gain an understanding of the carfree market, becoming more discriminating, suggesting properties elsewhere, for those buyers for whom car ownership was important.

In a subsequent telephone interview, the public relations officer for the developers disagreed with this interpretation, claiming that the guide had an oversimplified and idealised view of the situation (these comments appeared to indicate some past friction between them). There was already a substantial proportion of the population (around 30%, she estimated) who lived without cars in

Cologne. The sales strategy was aimed primarily at these people from the beginning. The main attraction for most buyers was the location in a desirable neighbourhood, close to the City Centre.

The developers and the residents disagreed over the comparative sale prices of the properties. According to the guide, who consulted with neighbours on this question, the sale prices within Stellwerk 60, excluding the cost of a parking space, were similar to those in surrounding developments. His own house (3 bedroom 120m^2 terraced), cost 250,000€, which was apparently average for the area. Other factors such as the different sizes of gardens in the houses and provision for storage in flats made exact comparisons impossible, however.

The developers, according to their P.R. officer, estimated that the sale prices in Stellwerk 60 were slightly lower than comparable properties in surrounding developments, although she was unable to quantify this or explain how the estimate had been made.

The developers believed that Stellwerk 60 had been less profitable than other developments on which they had worked, for two reasons. The requirement to include social housing was the main reason; unlike the UK, this is not a normal requirement for private developments in Germany. Secondly the time involved in consultation and agreement with the various authorities had taken longer than normal, because the development was a departure from normal practice.

3.6   Study Visit – Groningen City Centre

Groningen provides an example of a third model of carfree development: a city centre from which cars have been progressively (though not entirely) removed.   Unlike pedestrianised city centres in Britain, it has a relatively large residential population, which has grown by 18% in the decade to 2008 (Gemeente Groningen 2008). It was visited for five days during July 2007, including an interview with the Senior Transport Planner for the City Council.

Background: Planning and Transport in Groningen

Groningen is a city in the North of the Netherlands with a population of 181,000, including about 46,000 students (City of Groningen 2007, cited in: Pucher, Buelher 2007). The transport and planning policies of Groningen bear several similarities to those of Freiburg. Planning policy aims to create a "compact and complete city" (Gemeente Groningen 2006), attracting more people, including families with children, to live in the central areas of the city. Although the residential densities have fallen in recent decades, the city remains concentrated around its historic core: 78%

of its residents and 90% of its jobs are located within 3km of the centre (Ligtermoet 2006). Major
retail outlets are concentrated in or directly adjacent to the City Centre.

Filtered permeability is an explicit element of transport policy, described as creating a "coarse
grain" for private motor vehicles (Figure 3-25) and a "fine grain" for bicycles (Figure 3-26). The
policy has three related strands: creating shortcuts for bicycles (and buses in some places),
channelling of through traffic onto a limited network of roads with minimal obstructions and the
creation of artificial dead ends and other traffic-free areas "to make car travel more circuitous, less
convenient and more time consuming than bike travel" (Pucher, Buelher 2007).

The cycle network shown in Figure 3-26 has been progressively developed since the publication of
a new traffic plan in 1969. As in Amsterdam there is a strong preference for higher levels of
segregation between cyclists and general traffic, with separate paths preferred to on-road lanes,
wherever possible.
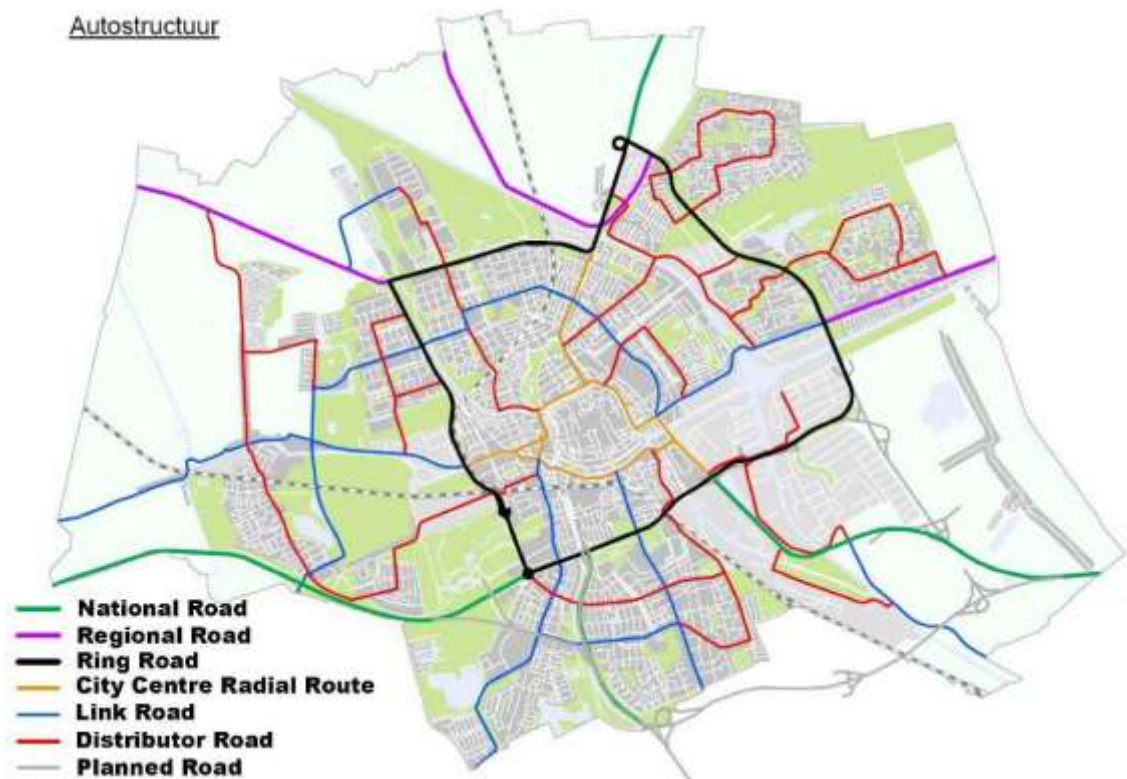
Figure 3-25 Groningen 'Coarse Grain' Network for Motors

primary bicycle roads
secondary bicycle roads
primary roads future / desired / to be studied
secondary roads future / desired / to be studied

Cycling infrastructure in Groningen

Figure 3-26 Groningen 'Fine Grain' Network for Cycling

In recent years, Groningen has alternated with Zwolle as the city with the highest proportion of trips by bicycle in the Netherlands (Ligtermoet 2006). On the most recent measure, using traffic counters, cycling accounted for 59% of traffic movements within the city (Vissers 2008). Figure 3-27 from the City's Statistics Yearbook (from Gemeente Groningen 2008) gives a more complete picture, including walking, although the cycling proportion is believed to have risen since this survey was conducted in 2003.

Groningen Modal Shares (2003)
Source Gemeente Groningen (2008)

- Car
- Public Transport
- Cycling
- Walking

22 33
39
5
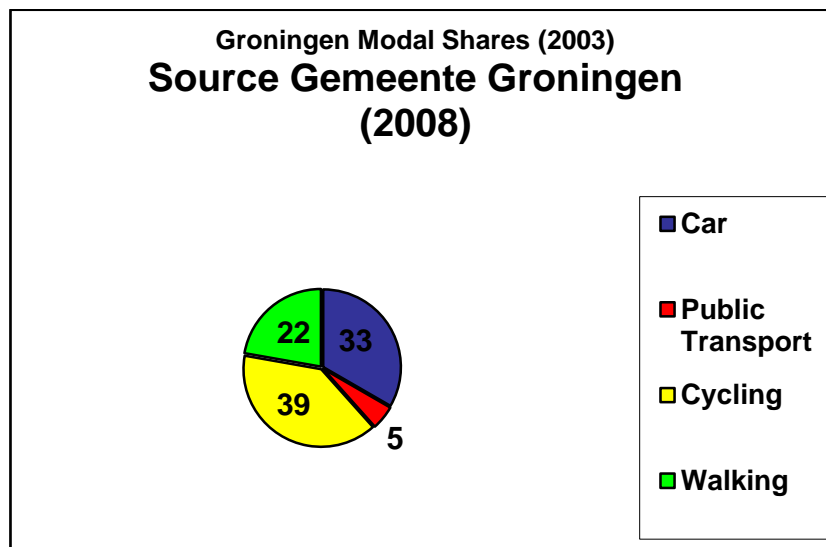
Figure 3-27 Groningen Modal Share, All Trips.

The Council believes the relatively low modal share for public transport is due to the high proportion of cycling. Unlike the other cities described above, Groningen has no tram system. There are plans to build one by 2014, as the city is planned to expand to the East and West (Gemeente Groningen 2006).

The Removal of Cars from the City Centre

In 1977 a new traffic plan was implemented with the aim of removing through traffic from the City Centre, whilst improving access for buses and bicycles. The Council resisted pressure from the retail businesses to reverse the plan, and as the progressive removal of traffic continued, the attitudes of the businesses gradually became more positive (Tsubohara 2007).

The transport planner said that by 2007 the City Council and Chamber of Commerce had been working closely together for some time. During the time of the visit, the Chamber was funding a trial of free supervised cycle parking in the multi-storey car parks within the City Centre. Some research (reported, not seen) indicated that shoppers by bicycle spent a similar amount to shoppers by car, but spread over a larger number of trips. Amongst Groningen residents, 46% of trips to the City Centre are made by bicycle compared to 9% by car (Ligtermoet 2006). As most of these people are not city centre residents, this suggests that carfree city centres can influence the travel patterns of residents of other districts.

Figure 3-28 Groningen Shopping Precinct	**Figure 3-29 Groningen Inner Ringroad**

The layout of the City Centre today is shown in Figure 3-30. Some streets allow traffic in and out – usually towards one of the multi-storey car parks. Some streets are open only to bikes and pedestrians and some are entirely pedestrianised. These streets, highlighted in yellow, are mainly commercial in nature, although they do have some residents. In some streets, cars are allowed from 6 – 11am and from 4 – 6pm. There are no through routes for private motor vehicles through the centre. The Inner Ringroad provides a fairly slow bypass for motor vehicles around the city

centre in both directions. Priority in its design has been given to cycling and public transport (see Figure 3-29).
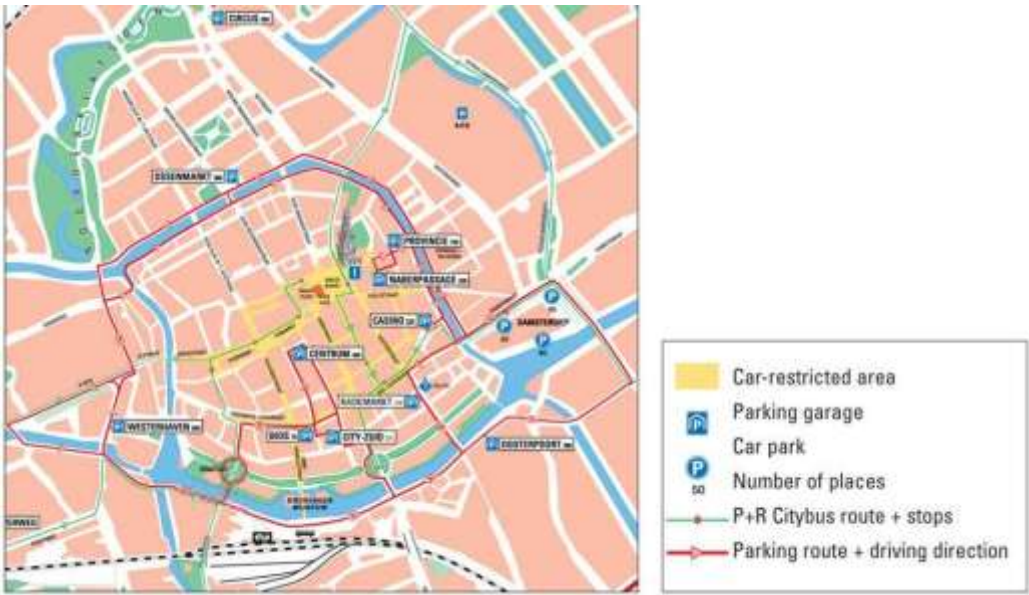
Figure 3-30 Groningen City Centre (the area within the moat – roughly 1km^2)

The centre of Groningen differs from pedestrianised centres of British cities both in terms of its size and the number of people living there: 16,551 at the last survey conducted by the City Council (Gemeente Groningen 2008). In 1965 car ownership in Groningen was slightly above the national average (Ligtermoet 2006). In 2008, the situation was as follows:

Source: Gemeente Groningen 2008	Cars/100 households
Netherlands	89.1
Groningen	50.7
Groningen City Centre	28.7

Table 3-1 Car Ownership in Groningen and the Netherlands.

There does not appear to have been any specific research into the reasons for this pattern of relatively low car ownership. Apart from the general transport and planning policies of the city, three factors would appear to be significant: the proportion of students, household income and parking policy.

The proportion of students has grown since the 1960s, and as students represent around a quarter of the population, this has an impact on other comparisons between Groningen and elsewhere. The proportion of single person households (58%) is unusually high, for example. The University Hospital borders the City Centre, so the concentration of students in the City Centre is probably greater than the city average. Household income in the Centre was 7% lower than the city average which was in turn 18% below the national average (Gemeente Groningen 2008).

There are 900 metered on-street parking spaces within the City Centre intended for short-stay parking. City Centre residents and businesses can apply for permits for these, but by 2006 the number of permits granted had exceeded the number of spaces so no more were being issued (Gemeente Groningen 2006). There were also 1640 spaces in multi-storey car parks within the centre. There were plans to change the most central car park ('Centrum' on Figure 3-30) from a general public facility to one reserved for residents only. Most of the multi-storey car parks were charging 1.50€ per hour, which was lower than Amsterdam, Freiburg and most British cities of a similar size.

Observations

Observing the traffic conditions across the city, in the Centre, the bicycle was clearly the predominant mode of transport. There was relatively little motor traffic and the volume of cycle traffic appeared to be the highest of any of the cities visited. This was particularly apparent in the Grote Markt, the central square (Figure 3-31), where the frequency of cycle movements made crossing the road on foot difficult at times.

| **Figure 3-31 Groningen Grote Markt** | **Figure 3-32 Groningen suburban bus gate** |

The examples of filtered permeability across the City were many and various, including separate cycle paths, bridges, underpasses and bus/cycle gates as illustrated in Figure 3-32. The flows of cycle traffic on radial routes between the centre and suburbs were also substantial. In other

aspects such as density and relatively unrestricted parking, the suburbs built during the 1970s and 1980s appeared similar to those built around the same time in British cities.

The observations in Groningen were mainly focussed on transport movements and shopping. The City Centre was a focal point for many activities, with movements of people at all times of the day and evening. It was difficult to distinguish the residential population from visitors, so it would not be possible to comment on the social and other aspects observed in the other developments studied.

Whereas there have been several studies into the impact of the traffic plan on the retail sector, there does not appear to be any specific research into the carfree residential population of the City Centre. The parking arrangements and general traffic plan would seem to have reduced both car ownership and use there but in the absence of a more detailed study this observation must remain tentative. Given the long time period over which the plan has evolved, and the particular character of the City Centre, with many old and historic buildings, it would likewise be difficult to assess the impact of the plan on property values.

3.7   Typology and Definition of Carfree Development

Section 2.3 outlined some of the previous attempts and difficulties involved in formulating a definition of carfree development. It also set out two defining aspects of European carfree development, relating to exclusion of vehicles and non-ownership of cars. None of the developments discussed in this chapter apply either of these aspects absolutely; each exhibited a context-specific compromise. In some of the cases the vehicular management was sufficiently similar to enable the formulation of three types, from which a definition may be drawn:

Three types of European Carfree Development

- Vauban model
- Limited access model
- Pedestrianised centre with residential population

In the **Vauban model** there are no physical restrictions on vehicles entering the carfree residential streets. The only physical restrictions are on through traffic. Despite frequent infractions, the model does offer a largely traffic-free immediate environment. The separation of parking and absence of through traffic are both significant factors when comparing Vauban to more conventional models, such as home zones.

The **limited access model**, illustrated by GWL Terrein, Stellwerk 60, Saarlandstrasse and Kornweg, places more physical restrictions on the access of motor vehicles to the core residential areas. Exceptions can be made in some circumstances for emergency vehicles and some larger deliveries – although smaller deliveries are often made by hand. This model offers a less compromised traffic-free environment and does not require the social control or other enforcement mechanisms of the Vauban model.

Groningen (and Freiburg to some extent) has extended the principle of **pedestrianised centres**, already prevalent in many British cities, over a wider area including many residents, who live with limited parking and correspondingly low car ownership, and varying levels of restriction on vehicular access. Princesshay in Exeter, mentioned and illustrated in Section 2.4, is a smaller scale British example of residential development introduced into a pedestrianised city centre which was previously entirely commercial.

These three may be considered ideal types in the non-normative sense: judgement would be needed to classify other developments, which may combine elements of more than one; The Brunswick in Camden, discussed in the next chapter, may be considered a small pedestrianised centre and a limited access development. Vauban currently appears unique, but it is likewise possible to conceive of a future development combining *stellplatzfrei* streets with vehicular access more limited than Vauban, but greater than the examples used to define the limited access model.

A definition encompassing these three types would need to identify the key elements shared by all three but not by other forms of development. As discussed in Section 2.3, there is no clear dividing line between carfree and low car developments, but the analysis in this chapter would suggest three factors which, though not unusual in themselves, are combined in all three models:

Definition of Carfree Development

Carfree developments are residential or mixed use developments which:

- Normally provide a traffic free immediate environment, and:
- Are designed to facilitate movement by non-car means, and:
- Offer no parking or limited parking separated from the residences.

The term "limited parking" will require a judgement, which may vary according to the context. In European carfree areas the parking ratios vary from 0.15 to 0.5 places per dwelling. Although not

proposed as a defining criterion, the cost of these spaces is also usually separated from the cost of the housing.

The term 'traffic free' is qualified to reflect the above observations about Vauban. Even in the smaller carfree developments with physical restrictions on vehicular access, exceptions are made, for some deliveries, emergency vehicles etc. The parking separation and particularly the 'traffic free' criteria imply a certain scale to be meaningful. This scale would vary according to specific local circumstances; so again, judgement would need to be exercised. A plot with two or three houses would clearly not qualify. The Hamburg developments described in Section 3.4 are relatively small examples. They are able to offer the benefits of a traffic-free environment because of their local circumstances. Saarlandstrasse is bounded by water; Kornweg is effectively a cul-de-sac, surrounded by the gardens of other properties. (these factors are common to many other developments – the combination of the three criteria distinguishes the Hamburg examples as carfree). In other situations – surrounded by roads open to traffic – larger sites would be needed to offer the benefits of a traffic-free environment, which may be greater for those dwellings further from the periphery.

3.8 Transferability to the UK

The evidence reviewed in this chapter and the literature reviewed in Section 2.6 suggest that carfree developments in Germany, Austria and the Netherlands do indeed ameliorate identifiable problems caused by the concentration of cars in urban areas. To determine whether similar benefits would apply in a UK context would raise a more general question of whether, and under what circumstances, policy initiatives in the built environment may be transferred across national boundaries.

Although every locational context is different, there do not appear to be any physical or practical reasons why the European models of carfree development might not, in at least some other circumstances, be applied to the UK: indeed, small-scale examples of the limited access and pedestrianised centre models already exist.

The literature on policy transfer and innovation reviewed in Section 2.2 suggests a wide range of policies and programmes may be transferred across national and cultural boundaries, usually amended in some way. Whether a transfer will occur, and whether it will be successful, mainly depend on contextual factors and the process of transfer or implementation. As European models of carfree development have not yet been tried on any scale yet in Britain, the process of their implementation may still be determined.

This leaves the following questions relating to context:

- What are the *relevant* contextual similarities and differences between the European cities and potential UK equivalents?
- Do any of the contextual differences invalidate the European evidence?
- Do they suggest that some of the benefits might not be achievable in a UK context?
- What gaps exist in the information available to answer these questions (and can this study fill some of them)?

As discussed in Section 2.2, these are questions of judgement, which cannot be answered with any certainty. The factors discussed here are cited because they appear to have some bearing on propensities to live without cars, or abilities to innovate in housing or transport.

The **relevant similarities** are perhaps the easiest to identify. Motor vehicles are ubiquitous across the developed world. Most households in all the cities visited own at least one. In the inner cities, following the paradox of intensification, lower levels of car ownership are counterbalanced by higher population and dwelling densities. The city centres also contain destination attractors for many journeys originating elsewhere, so municipal authorities have been obliged to address the growth in traffic and congestion.

Various forms of parking management (no parking zones, metered on-street parking, multi-storey and underground car parks, residents parking schemes) familiar to UK residents have evolved in all of the cities and are particularly applied in the city centres. Whatever their history, the road networks have evolved to enable vehicles to access all parts of the cities; carfree developments and pedestrianised areas are exceptions to the general practice. Car ownership is higher in Germany than in the UK (the Netherlands is lower than both CfIT 2007). Thus the emergence of a carfree movement represented a departure from mainstream culture in much the same way as it does in Britain.

One important institutional **difference** between the German and Dutch cities and their British equivalents was the greater autonomy of the former in setting their own transport and planning policies; there was no evidence of national policies having encouraged or specifically constrained any of the carfree developments. As found by Falk and Hall (2009) the greater autonomy and resources available to the municipal authorities enables them to lead the development process, with private developers involved "on the City's terms". The extent of the planning differences should not be exaggerated, however. It is worth noting that the Urban Task Force, which was influential in shaping English planning policy from 1998 onwards, chose Germany and the

Netherlands as two comparator countries because of the "close similarity to English conditions", particularly related to land use patterns (Ward 2007).

Four other **significant differences** relate to: public transport, the environment for cycling, housing markets and parking policy. By UK standards the transport networks of the European cities benefited from greater integration, particularly relating to ticketing, and higher subsidies reflected in lower fares. All except Groningen had trams or light rail as well as S-bahn, underground and/or heavy rail designed for travel within the city (as well as between cities). There were longer-term plans to build a tram system in Groningen.

The other four developments are all within walking distance of a tram stop or S-bahn station, and some of the interviewees believed this to be essential to a successful carfree development. It should be noted, however, that the tram was only extended to Vauban eight years after occupation began. At the time of Scheurer's (2001) survey, buses provided the only public transport, although the city centre and main rail station can be reached in around ten minutes by bicycle. In Slateford Green, following usual practice in the UK, public transport was provided almost exclusively by buses.

The cycling culture of the Dutch and German cities appears to have assisted the spread of carfree development there. Compared to most new developments in Britain, all five European carfree areas were well connected for cycling and well provided with facilities for cycle parking and storage. At the city-wide level, filtered permeability and greater segregation of cycle traffic than would be usual in the UK can be observed to varying extents in all of the four cities. Some of the interviewees maintained that cycling has always been, at least since the 19th Century, an integral part of Dutch culture; this was not generally the view in Germany. In both countries, the rate of cycling fell sharply from the end of the World War II until the 1970s (Parker 2001). Its recovery since then has coincided with the gradual development of cycling networks. The causality in this relationship has probably operated in both directions, as political support for cycling has grown in response to the growing number of cyclists.

There are also some significant differences between the housing markets in the different countries. Across Germany as whole less only 6% of the housing stock is made up of social housing compared to 19% in Britain. The proportion in the Netherlands is much higher: 34% (Ball 2007). The institutional structure of social housing provision differs between the countries, although some similar features such as mixed tenure developments and different forms of shared ownership could be observed in the European cities and also in the UK.

The proportion of the housing stock occupied by the owners is lower in Germany (45%) and the Netherlands (55%) than in Britain (69% SNHBC 2005). In some German cities it is often

considerably lower: just 20% in Hamburg (Ball 2007). One comparative study estimated that the typical transaction costs on moving home are over twice as high in Germany as in Britain (with the Netherlands in between the two), hence the more mobile sections of the population, particularly younger people, prefer to rent (Zander, Faller 2006). This would at least partly explain the relative stability of the owner occupiers in the German carfree areas.

The legal instruments available, and used, vary between the different countries. The German system of annual declarations does not appear to offer any particular solution to the problem, although it does provide a legal basis for action against offenders, as taken in at least two cases by Freiburg City Council. The legal situation is complicated, but it seems that the German style of annual declarations may not be enforceable under English law (A. Chandler, Bristol Law School, personal communication, 11/03/09). The researcher has not been able to find any examples of its use in Britain. Section 106 (or Section 75 in Scotland) conditions have been used to enforce parking conditions in Britain, including the Camden examples and some student developments, where conditions are written into the tenancy agreements (e.g. Edwards 2007).

To what extent do any of these differences affect the **transferability** of the carfree models to the UK? The better (and cheaper) public transport in Germany in particular could be argued to make carfree living more attractive there. But the proportions of people living without cars are higher in Britain (per capita income was slightly higher than in Germany but lower than the Netherlands on a purchasing power parity basis Svennebye 2008). A similar argument could be made about the better conditions for cycling.

Accessibility to public transport (and even its cost, to some extent) will vary more for individuals within countries than it will between country averages. If Carfree Choosers exist in all three countries then, although the size of the potential demand may vary, these factors would not invalidate the comparison. They may, however, affect the locations where carfree development might be viable. If, as some of the German interviewees suggested, proximity to rail or trams is essential for successful carfree developments, this would pose a far greater constraint in Britain, where policy has increasingly focussed on buses as the main mode of urban public transport in recent years. Slateford Green, as a social housing development, may provide little guidance in this respect. People on low incomes without cars make little use of rail, as they tend to do less long-distance travel (ODPM 2003b). Whether the same is true of the main target market of Carfree Choosers is a question this study will need to consider.

The greater stability in the European housing markets could suggest that purchase of a home would represent a greater long-term commitment in the European cities. As British home buyers are able to move on more easily, the risk involved in making a commitment to carfree living may therefore be less onerous in a British context. On the other hand, concerns about the ease of re-

sale are likely to be more important for British home buyers. Again, the differences in the housing markets would not necessarily invalidate the comparisons; the key question this study will consider is whether carfree housing would be attractive to segments of the British home buying public.

In conclusion it may be inferred that if and where the European models of carfree development can be transferred to the UK (adapted to the particular circumstances of each location), *in general*, the principal benefits, as shown on Figure 2-4, would be similar. There are **four** identifiable **caveats** to this statement:

1. The locational opportunities and constraints may differ in a UK context – these will be considered, mainly from a demand perspective, in Chapter 9.
2. The issue of behavioural change – of critical importance to the benefits for surrounding areas and the global environment – will be also considered in Chapter 9, in the context of the findings from Poole Quarter.
3. The freedom available to children observed in the European carfree areas might not be so great in a UK context.
4. Different approaches might be needed to parking control

On the third point, the researcher, who took advice from his host in Vauban, was able to photograph children playing, with and without their parents (e.g. Figure 3-9) without raising any of the child protection concerns which might occur in a similar situation in the UK. Closer parental supervision in a UK context might reduce but not entirely negate the benefits, if children were allowed to move around more freely than they would in a more conventional development.

Without the annual car ownership declarations and a mechanism for enforcing them, more conventional parking controls would need to be applied and enforced within British carfree developments and the areas surrounding them if overspill parking was to be avoided. Within British cities, this would arguably be easier than in Freiburg, where several interviewees commented on the lack of enforcement (at least in suburban areas) and the low levels of penalties.

3.9   Demand for Carfree Living – the European Evidence

This chapter has described three differing types of carfree development found across Europe, suggesting the typology and definition proposed in Section 3.7. The observations and literature reviewed in the previous chapter support several of the benefits claimed for carfree development, as illustrated in Figure 2-4, although there remain some gaps in the research. Turning to the issue of housing demand, it may be asked what light the European evidence sheds on the groups of

people which might be receptive to the concept in the UK. In terms of car ownership, three groups of residents may be observed:

1.   People who already lived without cars
2.   People who gave up their cars on or after moving to a carfree development
3.   People who continue to own cars in a carfree development

The relative size of these groups (on which there is some, incomplete evidence) is likely to change over time. The maximum size of the third group will be constrained by the availability of parking. Some residents have been observed to move from the third to the second group, and new residents may come from any of the groups.

Evidence on the demographics of the residents of the European carfree developments is limited, but the observations of the researcher and interviewees during the visits were consistent with the picture described by Scheurer and Ornetzeder of an educated, environmentally aware population, with higher than average incomes, many children, and often working in service-sector professions. If these observations are correct, then Groningen City Centre would be different from the other developments visited in this respect: the lower than average levels of income may be wholly or partly explained by the concentration of students there.

Quantitative evidence on demand and sale values of properties was limited, although it can be observed that none of the developments has been obliged to change its carfree nature (as explicitly allowed for in the German cases) as a result of any lack of demand from people wanting to move there. In Vauban and Saarlandstrasse comments were made about the relative stability of the residential populations. For whatever reasons, there did not appear to be any significant desire for people to move away.

The European evidence provides some useful suggestions of where to begin a search for potential demand in the UK, but it cannot be assumed that such demand would necessarily be found amongst the same groups in this country; this will need to be assessed directly through primary research in the UK. The next chapter will consider the literature on car ownership and housing choices in the UK together with some theoretical concepts relevant to these objectives. Chapter 5 will return to the analysis in this section in constructing a methodology for this study.

4 Potential Demand in the UK: Empirical & Theoretical Literature

4.1 Potential Demand in the UK

The previous chapter addressed the first research question, relating to definitions, and also discussed the evidence on the benefits and problems of carfree development. The remaining three initial research questions all concern potential demand in the UK. Who are the people who might move to a carfree development, and under what circumstances? These questions could be addressed by surveying existing carfree developments in the UK, if suitable examples could be found; as discussed in Section 2.5, no such examples were identified at the early stages of the study. In the absence of these it was decided to approach the question from first principles, beginning with a review of the evidence on carfree households in this country. The continental evidence suggests the potential market may come from a subset of carfree households; some studies, also reviewed in this section, have sought to segment the carfree population according to attitudes in ways which may help to identify relevant subsets. There is also evidence of strong associations with settlement size and type, and location within settlements, reviewed in Section 4.3.

Non-ownership of cars is only one of the factors likely to influence household decisions to move to a carfree development. In other respects, potential residents are likely to face many of the same choices and constraints affecting other households considering a home move. Section 4.4 will review the literature on households' housing and location decisions, and the role transport plays in these.

As European style carfree development would represent an innovation in this country, Section 4.5 will describe Diffusion of Innovations Theory and the use of its concepts in research relevant to this area. The final section will summarise the research gap which the rest of this study will aim to address.

4.2 Carfree Households in the UK

Although there is no specific evidence relating to carfree *development* in the UK, there is a significant body of evidence on carfree *living*. This section will review the empirical evidence on people who currently live without cars in the UK, their characteristics and circumstances. It will do this through a review of the literature and analysis of 2001 Census data. It will also consider the evidence on environmental attitudes, introducing two theories which help to explain the paradoxical observation that those who are most committed to living without cars tend to hold pro-environmental attitudes yet few people cite environmental reasons for not owning a car.

Of the many factors which may influence car ownership, three stand out from the (cross-sectional) UK Government statistics: income, life stage and residential location, which exhibit the same correlations and associations observed by Reuter and Reuter in Germany. This section will consider the first two; the next section will consider the question of location.

Despite increases in car ownership amongst lower income groups since 1989, car ownership today remains strongly correlated with income as shown in Figure 4-1 (from: DfT 2007c):

Household Car Ownership by Income Quintile

Source: DfT Transport Trends 2007
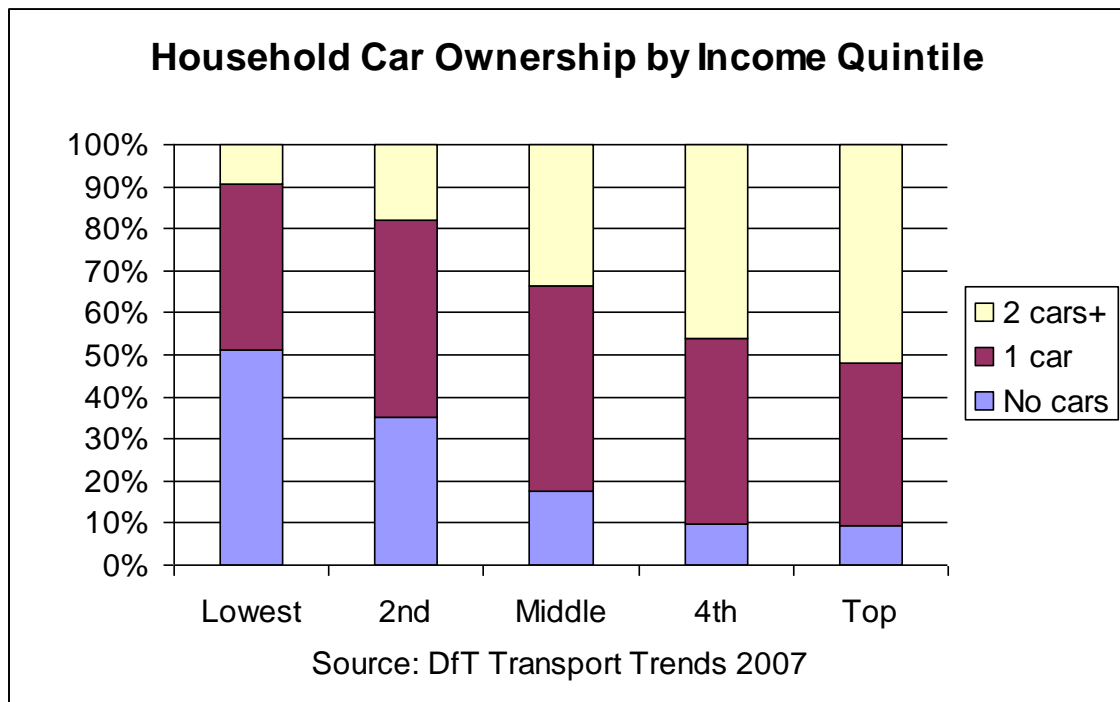
Figure 4-1 Household Car Ownership by Income Quintile

Using data from the Family Expenditure Surveys from 1970 to 1995 Dargay (2001) found that income elasticity declines with increasing car ownership and is also asymmetrical: rising incomes lead to rising car ownership, which will not decline to the same extent if incomes subsequently fall. The relatively small differences between the fourth and fifth quintiles reflect income elasticities declining towards zero – saturation level for certain categories of household.

The following tables taken from 2001 Census (ONS 2009) show some of the main social categories with the lowest car ownership (which overlap in some cases):

2001 Census Table CAS061	% without cars	% of all hholds without cars
Single person households:	52.6%	58.9%
Pensioner households:	50.1%	44.3%
Average for England	**26.9%**	

Table 4-1 Household Groups with Low Car Ownership

The proportion of households without a car has fallen slightly since then, to 24% of households for Britain as a whole, in 2006 (DfT 2008b). The preponderance of one person households shown above means the proportion of *individuals* with no car in their household is lower:

2001 Census Table CAS061	% without car in household	% of people aged 16-74* without cars
Social tenants:	47.2%	43.6%
Private tenants:	33.7%	22.5%
Unemployed:	36.6%	7.3%
Lone parents:	46.0%	14.7%
Permanently Sick or Disabled:	36.6%	11.1%
Carers:	24.1%	9.4%
Students (economically inactive):	23.6%	4.2%
Average for England*:	**16.9%**	

Table 4-2 Social Groups with Low Car Ownership (Individuals)

*   More recent figures including the over 75s show an overall average of 19% for Great Britain (Leibling 2008).

The presence of children in a household tends to be associated with car ownership, although the effect is not a strong one compared to the far more important presence of a second adult: 9% of couples without children have no access to a car, compared to 7% of those with children.

The following groups tend to have higher than average car ownership, but still form a significant proportion of those without cars. These groups will have a particular significance for this study.

2001 Census Table CAS061	% without car in household	% of people aged 16 - 74 without cars
Employees	11.0%	34.5%
Home owners	7.8%	33.9%
Home owning employees	5.7%	14.0%

Table 4-3 Car Ownership Amongst Employees and Home Owners (Individuals)

Interpretations of data on car ownership, as with other measures of travel behaviour, need to take into account the widely observed phenomenon of churn, where apparently stable aggregate levels over time conceal significant proportions changing their behaviour in opposite directions (or asymmetric churn, where small net changes conceal larger movements in both directions). Chatterjee (2001) advances several explanations for churn related to life events and differing responses to changed circumstances.

Dargay and Hanly (2007), using British Household Panel Survey data from 1991 to 2001, found 8.2% of households increased their car ownership and 7.6% reduced it in an average year. The difference between the two figures reflected the growth in car ownership over the period. Reductions in car ownership were usually from two or more cars to one or more. The small proportions (average 1.9% p.a.) who gave up cars altogether were mainly in the 18 to 24 or over 65 age groups. The use of long-running panel data imposed certain limitations. The sample did not include newly-formed households, who might have given up a car following a divorce, for example.

This study also found a significant gender difference: households where a woman is identified as the head of household tend to have significantly lower car ownership, even when income is controlled for. The BHPS assumes the head of household is male, where couples jointly own or rent a property, which may be questionable, although the observation of lower car ownership and access to cars amongst women is corroborated by other studies (e.g. ODPM 2003a), despite rises over recent decades.

Reasons for Carfree Living

The reasons why people live without cars were analysed in a report for the Scottish Executive (1999). A nationally representative sample was drawn from the 12% of adults who could drive but

who generally chose not to. The main reasons they selected from predetermined lists are shown below, juxtaposed against a UK-wide survey (DfT 2006a – note the differing bases).

Scottish Executive (1999)*		UK Dept. for Transport (2006)*	
No access to a car	21%	No one in household able to drive*	38%
Financial	44%	Cost of car/driving	32%
Prefer public transport	12%	Not necessary – other transport available	31%
Ill health/age	16%	Health/physical difficulties	19%
		Nervousness about driving	13%
Personal preference	43%	Other	8%
		Lack of parking spaces	7%
Environmental considerations	9%	Environmental Reasons	4%

Table 4-4 Reasons for Non-Car Ownership

* The responses in the DfT study are shown as a percentage of all those without a car; in the Scottish study only those with a driving licence were asked. The DfT table summarises the main factors from a longer list

The differences between the tables evidently reflect the categories imposed by the researchers in each case. Both suggest that financial considerations are important for many households without a car, but also confirm the results of previous surveys (e.g. Eurostat 1994 in CfIT 2000) that most could probably afford one if they had to. The Scottish survey drew a distinction between those who had "made a conscious and altruistic decision not to own a car" who were particularly positive about the benefits, whereas those affected by ill-health or financial considerations dwelled on the disadvantages.

This is probably a useful distinction, although there will be some people who fall between the two – for whom financial considerations are part of the reason for not owning a car. Much research has focussed on the difficulties faced by socially excluded groups without access to cars (ODPM 2003a, Welsh Consumer Council. 2004). The Social Exclusion Unit (ODPM 2003a, Welsh Consumer Council. 2004) found a pattern of car ownership strongly associated with both income and the broader-based Index of Multiple Deprivation. In the 10% most deprived wards across the country 50% of households have no access to a car. Amongst these groups, older people, younger people, people with disabilities and ethnic minorities are all disproportionately represented. They tend to travel less overall, use local buses more than other groups, walk more often, and use cars and rail less often.

A more recent study for the Scottish Executive (Dudleston et al. 2005, a third phase of the 1999 study mentioned above) incorporated another Scotland-wide survey with 1,045 face-to-face structured interviews of a sample stratified by age, gender, car ownership and employment status. The interviews covered travel behaviour, attitudes to travel and the environment and travel awareness. From the responses, the researchers segmented the car drivers into four, and non drivers into three, attitudinal clusters. Two groups are particularly relevant here. "Car Sceptics" (10% of the sample) are positive non owners of cars who cycle more, but interestingly use buses less, than average. They tend to be younger, with high environmental awareness. Compared to the other, more reluctant non owners, they contain fewer unemployed people, and people from lower social groupings. They cycle considerably more and use buses less than the other non owners. 'Aspiring Environmentalists' (16%) are drivers who tend to find driving stressful and are most open to modal shift; they typically cycle and use buses more than the average. They tend to be from higher social classes, younger than the average, with more women.

Anable (2005) used a similar process to segment a sample of 666 visitors to National Trust properties in the Northwest of the UK (thus the sample itself could not be considered representative of the general population). She identified a smaller group, 'Carless Crusaders' (4%) similar to the Car Sceptics in many ways except that their reasons for sacrificing car ownership were more explicitly environmental. She found few significant associations with demographic variables, but the income distribution of the Carless Crusaders was noticeably higher than the other, more reluctant non-car owners.

Environmental Attitudes and Car Ownership

The relationship between environmental attitudes and car ownership is problematic. The proportions of non-drivers citing environmental reasons in both the Scottish and UK surveys were both small and yet the residents of European carfree areas (Ornetzeder et al. 2008, Scheurer 2001) and the groups most committed to living without cars, or susceptible to reducing car use, from Dudleston's and Anable's study all display pro-environmental attitudes.

This observation is consistent with findings on environmental attitudes in other fields. Surveying the literature, Bamberg (2003) concludes that the direct empirical relationship between environmental concern and behaviour is "low to moderate". Using Ajzen's Theory of Planned Behaviour (TPB), he suggests one possible explanation for this.

The TPB (Ajzen 1991) postulates that behaviour is influenced by three situation-specific beliefs, with intentions performing an intermediate function as illustrated in Figure 4-2:
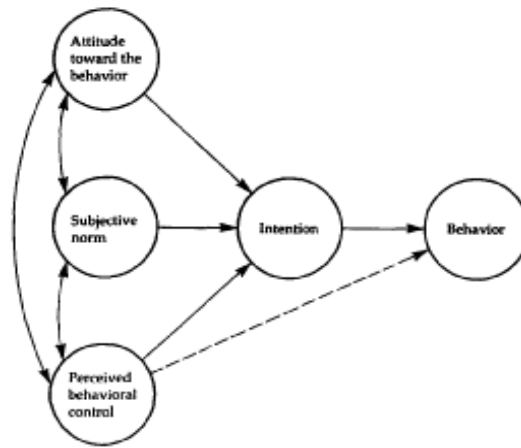
FIG. 1. Theory of planned behavior.

Figure 4-2 Theory of Planned Behaviour from Ajzen (1991)

Perceived behavioural control is the individual's perception of the ease or difficulty in performing the behaviour.

Attitude refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour. Attitudes may be either affective or evaluative.

Subjective norms are the perceived social pressure to perform or not perform the behaviour.

The first two tend to exhibit the strongest correlations – the subjective norms are generally found to exhibit only a weak influence on behaviour, although this may be due to difficulties in measurement (Armitage, Conner 2001). Underlying each of these three constructs are salient beliefs influencing each one. A general attitude or value may exert an indirect influence on the behaviour via these three indirect beliefs. So, in the experiment Bamberg conducted with students given a leaflet on green electricity, he found those with strong environmental beliefs were more likely to:

- hold positive views about green energy
- believe that others around them would share those views,
- believe that switching their electricity supplier would be easier.

A relationship still exists between general attitude and behaviour, although the mediating effect of the situation-specific beliefs may weaken it since other factors also influence the process. In Bamberg's experiment 16% of the 'greener' students returned the tear-off slip asking for a brochure on green energy, compared to 8% of those with low environmental attitudes.

If this analysis is correct and generalisable, we might expect people with pro-environmental attitudes to be more likely to:

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- hold positive views about public transport, cycling and/or walking
- believe that others around them would share those views
- believe that it is possible for them to live without a car

But when presented with a questionnaire asking 'why do you live without a car?' such people may not necessarily cite environmental reasons, as these may not be the conscious reasons for the decision.

The study by Anable (2005) attempted to measure the TPB coefficients and although not all the differences were statistically significant, did find, for example, that Carless Crusaders had the significantly highest score on perceived behavioural control (measured by their disagreement with the statement: 'there are many problems and difficulties associated with using public transport').

The TPB has been extensively used, tested and analysed in a range of contexts, particularly in the health domain. Its predictive ability has generally been found stronger where the measure of behaviour was self-reported rather than objectively measured (Armitage, Conner 2001) – people may believe (or claim) that they are behaving in a certain way which objective observation may not support.

The Theory of Cognitive Dissonance (Festinger 1962) also sheds some light on the relationship between environmental attitudes and carfree living. This theory concerns a psychological process which can change a person's attitudes when these conflict with their behaviour. Cognitive dissonance reduction can occur following a choice (which may also be a decision not to make a change), subconsciously accentuating its advantages and downplaying its disadvantages. Cognitive dissonance reduction tends to occur most strongly where a decision is evenly balanced. Where the individual already feels convinced about the justification for the decision, there is usually less evidence of attitudes changing after the event. Since its original formulation the theory has been tested, challenged and refined (Aronson 1992). Whatever the underlying psychological processes, it seems attitudes have been frequently observed to change in this way.

In a survey of carfree households, Jain (1998) notes that environmental concern sometimes "strengthened *after* they had become 'car-free'". A car club member interviewed by Sloman (2006) made the same observation of his own attitudes. Festinger's theory would predict that people who made a choice to give up a car, or not to acquire one, would find their attitudes changing after the event, tending to justify their decision. This process would be strongest in those for whom the decision was finely balanced. It could also help to explain why people without cars hold environmental beliefs but do not cite those beliefs as a reason for living without a car: their original decisions might have pre-dated their growing environmental awareness.

Choices: Carfree Living and Carfree Development

To summarise, the UK literature suggests that the attitudes and characteristics of people who make a positive choice to live without a car differs markedly from the majority of non-car owners, for whom low income, old age and ill health are often factors. As discussed in Section 2.7 the overall profile of non-car owners in Germany is similar to that in the UK, but the residents of carfree developments in Germany (and Austria and the Netherlands) differ from this profile. They appear more similar to Dudleston's Car Sceptics and Anable's Carless Crusaders: their income levels are higher than would normally be expected of non owners of cars; they tend to come from professional occupational groups, and to hold pro-environmental attitudes, which may directly or (more likely) indirectly influence their decision to move to a carfree development.

Although other explanations for these similarities may be postulated (coincidental factors may have caused similar outcomes) it would be reasonable to hypothesise that those groups who have made, or would make, a positive choice to live without a car are more likely than other groups to make a positive choice to live in a carfree development. This analysis will be developed further in Section 5.2.

4.3   Locations Associated with Carfree Living in the UK

The previous section described the personal circumstances associated with carfree living; there are also strong associations with location and settlement size. Carfree households are mainly concentrated in larger settlements but, as illustrated by the following graph (data from: DfT 2007d), the relationship is not linear, with a levelling off in the mid-ranges:

Car Ownership By Settlement Type

(* other settlements by population)
Source: DfT Transport Statistics for GB, 2007
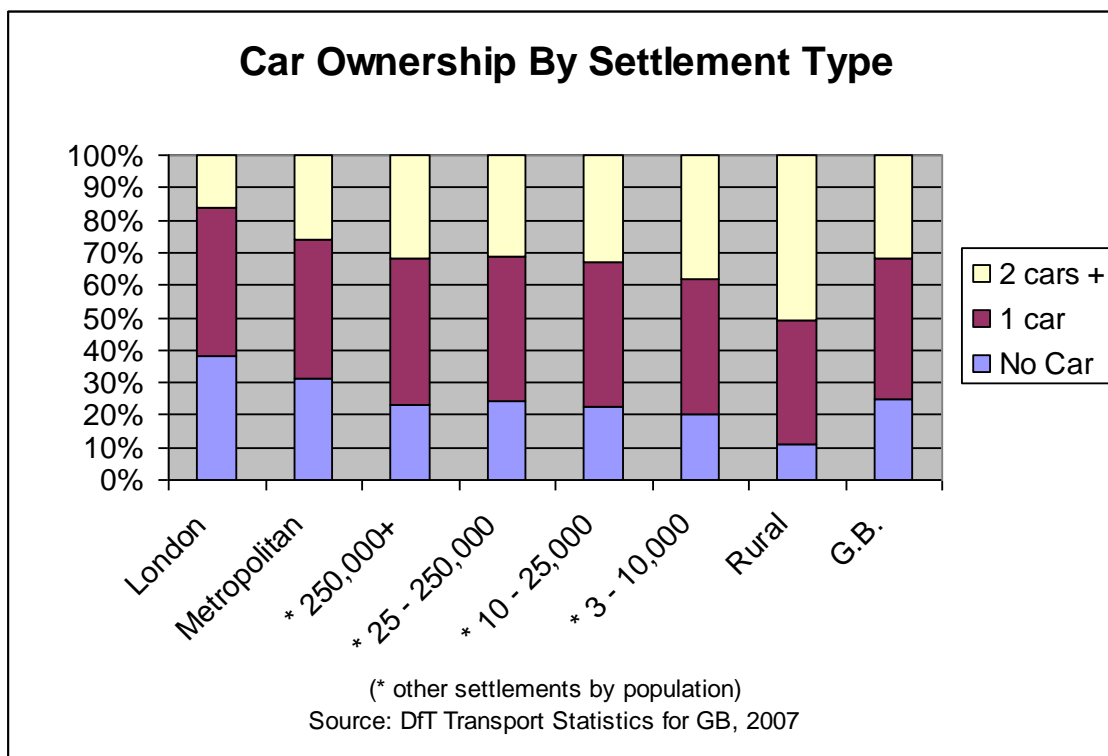
Figure 4-3 Car Ownership by Settlement Type

Better public transport and easier accessibility to employment and services are generally advanced as the two main reasons why larger settlements have lower levels of car ownership. The income effect explained above also plays a role: overall, poorer areas (as well as poorer individuals) tend to have lower car ownership.

Every ward in the country contains some households without a car, from which it may be deduced that it is *possible* for at least some people to live without a car anywhere.   In just over a quarter of wards – predominantly rural and concentrated in Southern England – the proportion is less than 5%, these are presumably not attractive places for people seeking to live without a car by choice. At the other end, the 50 wards with the highest proportions of carfree households (54% - 69% excluding the City of London and Isles of Scilly) are concentrated in the inner areas of London and Northern cities, particularly Newcastle, Liverpool and Manchester.

The 50 local authorities in England and Wales with more than a third of households without a car are shown on Appendix i. Northern cities and inner London boroughs make up over half – the latter including the top 11. Apart from the Inner London boroughs, all the other areas exhibited lower than average median incomes, with the exception of Brighton and Hove and North Tyneside. 47 of the 50 authorities rank above average on the Income measure of deprivation, which reflects the proportion of the population on means-tested benefits (the exceptions were: the City of London, Isles of Scilly and Wansbeck).

The literature and the Census data indicate that urban extensions and new settlements built in recent years, including those such as Poundbury (Becker 2006) and Camborne (Platt 2008) which were designed with ostensibly sustainable transport objectives, have been characterised by particularly high levels of car ownership and use. Poor public transport links appear to explain at least part of the reason, although the authors of some of these studies have expressed scepticism that improved public transport links would significantly change the situation (Kochan 2008, Kennell 2004). A recent study of purportedly sustainable developments across England (some urban, some ex-urban Susilo et al. 2010) found levels of driving to work slightly lower than the Census average, though much higher than any of the developments reviewed in Chapter 3. In a regression analysis of households across the different developments the most important factor influencing public transport use was access to a car. Thus there may be an element of circularity in this relationship.

Most of the studies which have sought to explain variations in car ownership (as opposed to studies of car *use*, which are often more sophisticated) have used broad aggregate location and settlement type variables, sometimes combined with disaggregated household data (on income, household size etc e.g.: Whelan 2007, Dargay 2002). Apart from suggesting that each of these categories exerts an independent influence, these studies add little to our understanding of the causal relationships beyond that which could be inferred from the raw data.

One recent report has provided some more detailed evidence, however. In a study for the RAC Foundation, Lucas and Jones (2009) used the National Travel Survey database to examine the relationship between settlement size, public transport accessibility and car ownership at the household level. The accessibility measure was a (somewhat arbitrarily) weighted measure of walking distances to bus stops and rail stations combined with bus and rail frequencies. They found that accessibility to public transport was only associated with lower car ownership in larger settlements, as shown:
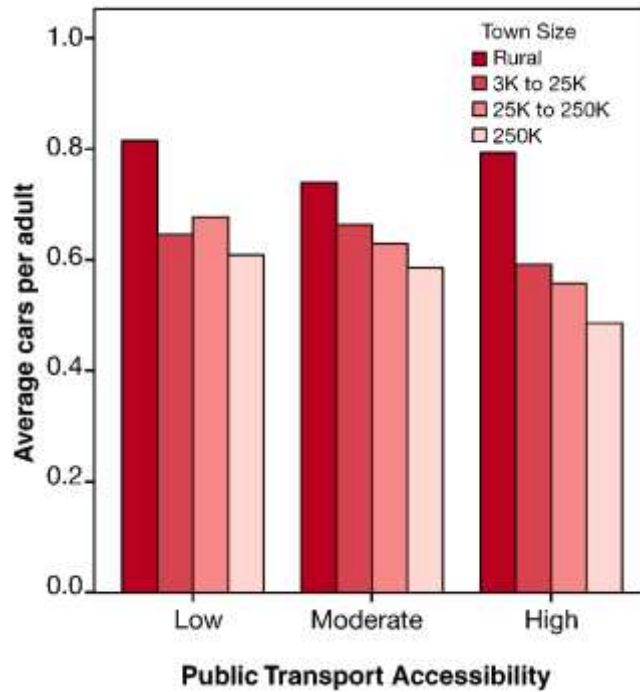
Figure 4-4 Car Ownership and Accessibility from Lucas and Jones (2009)

The is consistent with the analysis of Dargay (2001) who (using data from the Family Expenditure Survey) found greater sensitivity of car ownership to variations in income and motoring costs in urban than rural areas where the car may be considered more of a 'necessity'.

Neither of these studies differentiated areas *within* the settlement categories. The Census data discussed in Section 4.2 shows lower car ownership in inner city than suburban areas. A similar pattern has been observed with respect to car use (Independent Transport Commission 2004).

Location Criteria for Carfree Living – A Gap in the Literature

This analysis, together with the European evidence, would suggest that carfree developments would be more likely to attract and retain residents if they were located within larger settlements, particularly in inner city areas, and were well-served by public transport. The reasons for these associations (and the criteria for assessing the adequacy of public transport) could be inferred but do not appear to have been studied in any depth so far. Nor do some other criteria – such as proximity to specific services – which might be considered important for carfree living (their relationship to car *use* has been studied in more detail). These issues would also be relevant when considering whether any other (small town, suburban or ex-urban) locations could be made sufficiently attractive for carfree living.

The statement about inner cities attracting more residents pre-supposes that these would correspond with the aspirations of potential residents, or failing this, that such people would be willing to override other aspirations (to live in the countryside, for example) when moving home in order to live in a carfree development or maintain their carfree lifestyle. A similar point may be made about housing preferences: if carfree developments in the UK were to follow European practice, with high densities and a majority of flats, would they attract potential residents? These are questions which the literature has not yet addressed, although there has been research into the broader questions of household housing and location decisions and the role of transport considerations within them.

4.4   Housing, Location Choice and Travel

As the specific questions around moving to carfree developments have not been addressed in the literature, it may be asked: how do households make their location decisions in general, what role does transport play in this process, and does the literature shed any light on the questions of preferences for (or against) high density urban living?

Studies from a range of disciplines have sought to answer the first of these questions in different ways. Sociological studies have drawn on theories of class, status and social capital to explain household location decisions usually at a neighbourhood or city-wide level (e.g. Butler 2003, Brun, Fagnani 1994) but have not tended to focus on the relationship between location and travel.

The economically-derived studies are generally based explicitly or implicitly on some variety of utility theory where price or willingness to pay is used as a measure of the relative value which households attach to attributes (e.g. of the housing itself, the location and its travel implications) which they are hypothesised to trade off against each other. Some of these studies use hedonic pricing methods (e.g. Arsenio, Bristow 2000) to estimate the utility attached to particular attributes of housing (e.g. size of house, accessibility to services etc.) from variations in market prices.

Other studies (e.g. Kim et al. 2005, Walker et al. 2002) use stated preference experiments which enable the researcher to analyse policy options or housing markets that do not currently exist. Stated preference experiments have some important disadvantages, however. As Kim et al point out, they are vulnerable to two forms of bias: commitment bias, where willingness to pay is overstated, and policy bias where respondents seek to influence policy. The concept of commitment bias could be extended, where hypothetical trade-offs are proposed, to a more general problem of 'wishful thinking'. In a context relevant to this study, Jarvis (2003) found considerable difference between stated preferences and revealed behaviour amongst two-wage

households in the US with pro-urban and low-car preferences, who found their ideals difficult to implement in practice.

The more sophisticated economic studies recognise that social factors such as class and status may play an important role in household location decisions, but these factors are generally treated as exogenous to their models. Thus, as in the debate about transport and the built environment, these models may help to analyse the factors influencing households' decisions, but without shedding much light on the decision-making process itself.

After reviewing the literature on travel and location choice, Stanbridge (2007) concluded that it "has raised more questions than have been answered". Amongst these questions is the derivation of the attributes used to model housing and location choices. In some cases attributes are introduced in order to test specific hypotheses. But the rationale for the other independent variables is often absent from the published papers. In some cases it appears constrained by data availability, so Clark and Huang (2003), who use the British Household Panel survey, include marital status but treat cohabiting couples by default with other non-married adults living in the same household, for example.

Measures of 'goodness of fit', R^2 and ρ^2 of between 0.09 and 0.28 (Kim et al. 2005, Walker et al. 2002, Clark, Huang 2003), suggest the models are only capturing a small proportion of the reasons why people move. One exception to this (Bina et al. 2006) achieved an adjusted R^2 of 0.83 from a model which included 44 independent variables, with multicollinearity between many of them.

Stanbridge (2007, 2006) approached this challenge in a different way, beginning with semi-structured interviews, followed by a questionnaire. Responses from a sample of 229 recent movers in Bristol produced 67 prompts for moving and 96 search criteria. These were grouped, with some difficulty into 18 general prompts and 19 general criteria. This diversity of responses would indicate part of the problem for quantitative models of location choice.

Stanbridge found that 86% of respondents considered travel at some point in the process, mainly at the search stages. Housing-related prompts (e.g. seeking a bigger or smaller home) were the most frequently cited reasons for moving, by 72.5% of respondents compared to 26.4% for travel-related prompts (respondents could cite more than one reason). Similarly, housing search criteria (particularly property size and price) were cited twice as often as travel-related search criteria.

This is consistent with Clark and Huang's (2003) national findings that most moves are short in distance, and are most likely to be prompted by life stage changes and/or housing size issues. Older, better off, married people (although note the absence of data on cohabitating relationships) and households with a birth or a marital status change, are all more likely to move.

Following their move 57% of Stanbridge's respondents indicated some change to their mode of travel for least one regular journey. She concluded that moving house (possibly along with other life stage changes) weakens travel habits. Any change will happen after the move, but the individual is likely to consider the change at some earlier point in the process. These findings are consistent with the observations from German carfree areas of people giving up cars after moving there.

As nearly all the European carfree areas, and all carfree areas proposed in Britain have been new (as opposed to retrofitted) developments, another issue for this study is that newly built properties have historically only appealed to a minority of potential buyers: 36% might consider one according to an ODPM survey (2003 cited in Leishman et al. 2004). Leishman et al found a general preference for lower density suburban locations amongst most new-build buyers in Glasgow and Edinburgh. One group, however, preferred flats and inner urban (but not specifically city centre) locations. This group included predominantly younger single households and couples 54% of whom had one car: the published information did not permit an overall comparison of car ownership between the groups, unfortunately.

Respondents with children tended to prefer suburban or out of town locations and houses to flats. The authors did not attempt to draw any conclusions about the relative sizes of the different groups, but it is worth noting that, contrary to the assumptions behind much of recent discourse in the professional literature (e.g. Williams 2008 and even some academic studies such as Lopez 2008), one and two person households make up 64% of all households in England, compared to just 21% for couples with dependent children (ONS 2009).

One problem sometimes acknowledged (e.g. in the context of different development options Platt et al. 2004) but rarely addressed, is to what extent expressed preferences may reflect other perceived associations. One example relevant to this study might be the influence of traffic noise, pollution and congestion on the relative perceptions of urban and suburban, higher and lower density areas.

Changes in British cities over the recent years have brought new populations into some regenerated inner city areas. Much of the research in this area has focussed on London, guided by gentrification theory (e.g. Butler 2003). As Tallon and Bromley (2004) point out, London may be something of a special case as a 'global city'. Their study of central areas in Bristol and Swansea found populations more diverse than the stereotype of young professionals associated with areas such as London's Docklands. 'Mundane' attractions such as proximity to shops and facilities were more important than 'lifestyle' factors (although their definitions overlapped somewhat). Noise, traffic and pollution rated highly amongst the residents' negative perceptions, with reducing traffic

selected by 57% of the Bristol respondents as the most favoured measure to improve their neighbourhood (this question did not appear to have been put to the Swansea sample for some unexplained reason). Most of the respondents in both cities were living in flats, and levels of car ownership (60% in Bristol, 42% in Swansea) were lower than the national and city-wide averages.

Carfree and Urban Living – Contiguity of Aspirations?

The evidence from this and previous sections suggest that for 'European style' carfree development to succeed in the UK, sufficient demand would need to exist (or emerge, or be created) amongst people who sought to live:

- Without a car
- In inner urban areas
- In high density housing
- In newly built housing

A minority of people can be identified in each of these categories and it can be demonstrated that people *currently* living in each of the first three circumstances also tend to exhibit the two others. There is evidence of contiguity of *aspirations* towards the last three circumstances amongst a minority of home buyers, although whether these people would also be attracted to carfree living has not yet been established. Whether different styles of carfree developments could also succeed in other circumstances, such as lower density suburban or ex-urban areas, has not yet been studied in a UK context, although the evidence suggests this would be more challenging from a design and possibly a demand perspective.

4.5   Innovation and Early Adopters

One reason for the differences between residents of carfree developments and other, more typical non-car owners, may relate to different attitudes towards innovation – as carfree developments have represented a departure from normal practice in all of the countries where they have been introduced. There exists a substantial body of literature guided or inspired by the Diffusion of Innovations Theory first proposed by Rogers (1995), some of it relevant to this study.

Rogers defines five ideal adopter categories:

1. innovators
2. early adopters
3. early majority

4. late majority
5. laggards.

Leaving aside the normative implications of this terminology (Rogers acknowledges a 'pro innovation' bias in much of the literature) the first two of these categories may bring some insights into the potential market for carfree housing.

Innovators are a small group for whom "venturesomeness is almost an obsession". Their outlook is cosmopolitan, standing outside local social systems, whose other members may not particularly respect them. This does not prevent them from playing a key role in introducing new ideas from outside the social system. The diffusion of these ideas depends in turn upon the early adopters, a larger group more integrated into local social systems and more respected by local peers, who will frequently look to them for subjective evaluations of innovations.

There has been much research into the characteristics of these groups. Some of the key findings as summarised by Rogers are as follows. Compared to later adopters, earlier adopters tend to have:

- Higher social status (usually associated with higher income)
- Higher levels of education
- Greater degrees of upward social mobility
- Greater intelligence
- Greater rationality
- More favourable attitudes to change and uncertainty
- Greater connections to interpersonal networks (within the local social system for the early adopters, outside it for the innovators)

There is an unresolved controversy within the literature concerning the first of these points. Frank Cancian (several works cited in: Rogers 1995) proposed what became known as the 'Cancian dip' – that lower middle status individuals are likely to be more receptive to innovation than those of higher middle status who have more to lose. The evidence, according to Rogers, is inconclusive but has been sufficient to question assumptions of a linear relationship between status and innovativeness.

The proposition that people from the lowest status groups tend to be later adopters is more widely accepted. This has led Rogers to propose the innovativeness-needs paradox: those who have most need of an innovation may be the last to benefit from it (assuming that the innovation would be beneficial, perceptions of which may differ). If this proposition can be applied to the context of this study, it would imply that those groups who tend to live without cars for mainly financial

reasons, as described in the previous section, may be amongst the least receptive to carfree development. Dudleston's 'Car Sceptics', Anable's 'Carless Crusaders' and the groups identified in European carfree areas would all appear to have more in common with the ideal early adopters.

Although Diffusion of Innovations Theory has often been applied to technological innovations, it has also been used in different contexts, including Old Order Amish communities who (as mentioned in Section 1.2) reject modern technology including cars. Hostler (1980, cited in: Rogers 1995) and others found Old Order Amish highly receptive to innovations consistent with their values, such as sustainable farming techniques.

Rogers defines the adopter categories as fixed percentages of a notional population (e.g. the innovators are the 2.5% most innovative). To operationalise these concepts in the way he intended requires a definable population. Clearly some innovations may never apply to some sections of the general population. In other cases, of which carfree development may be one, the boundaries of the potential population may be changeable, and impossible to define. This will be a challenge for this study.

Diffusion of Innovations Theory does not seem to have been directly tested in the context of carfree development, but the concept of the early adopter has been used somewhat more loosely in two relevant studies.

Shaheen (1999) analysed the early adopters of a Californian 'carsharing system' (a car club in British terminology) and found:

- 70% were married
- 54% were 24 to 40 years old
- 60% had a household income of over $50,000
- 50% agreed that the environment was a concern
- 80% liked to experiment with new ways of doing things

Shaheen notes that the income distribution (relatively high) appeared higher than those of (continental) European car clubs. The question of income and its relationship to status is problematic in this context. People with high levels of environmental awareness may have different perceptions of status as it relates to income and consumption. People with very high incomes, though they may be open to innovations in other respects, may be less receptive to carfree living, for lifestyle reasons.

A recent study has used the concept of the early adopter to analyse attitudes towards the possibility of carfree Eco-towns (Lopez 2008). This study used a 'snowballing' electronic mailing

starting with the researcher's own email address book. As he was an ecological architect, the sample included many professional people with environmental awareness. Respondents were asked:

- Would you be prepared to live in a carfree Eco-town? (82% said yes)
- Is Britain ready for carfree Eco-towns? (57% said yes).

Given the opportunistic sampling (and the absence of any statistical tests), the findings could not be generalised with any confidence, but the associations within the sample suggest some of the factors which may characterise potential early adopters in this context.

Those answering most positively to both of the questions were, compared to the rest of the sample, more likely to be female, to work in service sectors, particularly related to the environment, and to live without a car, or with fewer cars.

Over the sample as a whole, the most cited attractions of a carfree Eco-town were quality of life and 'walkability'. The most cited barriers (which would "stop you from living in a carfree Eco-town") were the unreliability/inconvenience of public transport and a feeling that new towns would be "soulless". The public transport factor was strongly associated with answers to the two principal questions about carfree Eco-towns. As predicted in the earlier discussion about the Theory of Planned Behaviour: this factor represents a key perceived behavioural control.

4.6   Potential Demand in the UK: A Gap in the Literature

This chapter began by asking who are the people who might move to new carfree developments in the UK and what circumstances might influence such decisions. It found no evidence in the literature of existing carfree developments in this country through which these questions could be directly assessed. It found the overall pattern of carfree living in Britain similar to Germany, with low income groups, single people and pensioners all over-represented. The European evidence suggests that the early movers to carfree developments have differed from this pattern, coming from a subset of higher status people – as would be predicted by Diffusion of Innovations Theory – with high levels of environmental awareness, for whom non ownership of a car is a positive choice rather than a financial imperative. There is evidence from UK studies that similar segments of the population exist in this country. It might be hypothesised, therefore, that the early adopters of housing in carfree developments might be predominantly found amongst these segments.   Lopez (2008) was the only study found which has attempted to assess the potential demand for carfree development in the UK, guided by Diffusion of Innovations Theory. Its specific focus on Eco-towns and its sampling methods would prevent any generalisation of its findings, however.

The evidence from the European carfree areas and on carfree households in the UK would both suggest the greatest potential for carfree living would be found within larger cities, particularly their inner districts, in areas of high population density. Would the people most interested in carfree housing prefer to live in such places? Could similarly conducive conditions be created in other (suburban or ex-urban) locations by the provision of better public transport and other services? Both these and the more general question about potential demand in the UK are gaps in the literature which the next chapter will set out a strategy to address.

5 Research Strategy

5.1 Outline of the Chapter

Section 1.3 set out the aims and initial research questions for this study. One of these, to propose a definition and typology of carfree development was addressed in Section 3.7. The remaining questions relate to potential demand for housing in carfree developments in the UK. The next section will reconsider and refine the initial research questions in the light of the literature reviewed in the preceding chapters. This has provided no specific evidence to address these questions in a UK context. Nor did it suggest any existing carfree developments in the UK where the questions could be directly assessed. In the absence of these it was decided to approach the issues from first principles: what defining factors distinguish the residents of European carfree developments from the general population and how can these factors be used to generate a testable hypothesis about potential demand in the UK? This analysis will generate four potential groups, defined by car ownership and their attitudes towards it, which will provide a focus for the primary research outlined in the rest of the chapter.

Section 5.3 will outline the overall research design. Following from this, Section 5.4 will discuss the selection of samples and sample sites. The following section will discuss alternative methods such as online and paper surveys, group or individual interviews, explaining the choices made. Section 5.6 will describe the first of the questionnaire surveys – an online survey of members of environmental and cycling organisations. Section 5.8 will describe the qualitative follow-up telephone interviews which were conducted with a subset of volunteers from the questionnaire surveys. The next chapter will describe the two paper-based surveys which were conducted in specific geographical areas, in London and Poole.

5.2   Potential Groups and Research Questions

The literature on European carfree developments provides a range of information about the characteristics – demographic, economic, behavioural and attitudinal – of their residents. These show certain patterns, discussed in Section 2.7, but none of these factors would distinguish individual residents from the general population. So, for example, residents in aggregate tend to have higher than usual levels of pro-environmental attitudes, but it could not be assumed that other individuals with such attitudes would necessarily favour the prospect of living in a carfree development. Nor did the literature suggest any combination of characteristics which was unique to the residents of carfree developments.

The UK literature reviewed in Section 4.2 draws a distinction between people who live without a car by choice and other more reluctant non owners. The former tend to have higher incomes and more pro-environmental attitudes, cycle much more and use buses less than the latter, although again, these are tendency statements rather than unique identifiers. These studies also identify groups of car owners who tend to have pro-environmental attitudes and high levels of cycling, and who are willing to consider reducing their car use. Whether any of these people would be willing to go further and give up car ownership was not explored in these studies.

If the potential market cannot be directly identified by observable characteristics, the question may be considered from a different perspective: do any observable characteristics act as pre-requisites for moving to a carfree development? As summarised in Section 3.9, a defining feature of carfree developments is that a large majority of residents do not – and would be unable to – own cars. With the exception of Slateford Green, most residents have consciously chosen, for whatever reason, to move to a development regarded as a departure from normal practice; some of them have given up car ownership to do so. Although none of the European studies posed this question, the income and professional profile of the residents suggests that most lived without a car as a matter of choice rather than financial or other necessity. This was certainly the case amongst those residents interviewed during the visits described in Chapter 3, although they were not necessarily representative of all residents.

This analysis suggests two principal groups amongst whom potential demand for carfree housing in the UK is likely to be found: Carfree Choosers and Carfree Possibles, as defined in Table 5-1 (this leaves aside for the moment, the possibility of a minority of residents in carfree areas continuing to own cars. Chapter 8 will return to this issue).

In seeking to distinguish these groups from the rest of the population, three characteristics are relevant: car ownership, attitudes towards it and, in the case of existing car owners, ability to give up car ownership under foreseeable and feasible circumstances:

Possible Groups	Car Owner	Desire and Ability to Change
Carfree Choosers*	No	do not own a car by choice
Carfree Possibles*	Yes	would like to give up car ownership under foreseeable and feasible circumstances
Other Nonowners:	No	are temporarily or permanently unable to own a car
Other Owners:	Yes	have no desire, or are unable, to give up car ownership
*target groups		

Table 5-1 Possible Groups Related to Car Ownership, Desire and Ability to Change

The process of survey design revealed some areas of potential ambiguity and other challenges in operationalising these definitions e.g. how to assess the feasibility of the declarations made by Carfree Possibles. These are discussed in Section 5.6.

Although the specific categories (derived from first principles rather than survey evidence) are newly proposed, the studies reviewed in Section 4.2 suggest that the UK population includes substantial proportions of the Carfree Choosers, Other Nonowners and Other Owners, with the latter likely to form the largest group. Whether significant proportions of Carfree Possibles exist in the UK is not so clear (Dudleston's 'Aspiring Environmentalists' are drivers who would like to drive less rather than necessarily giving up the car altogether).

Following the above analysis, it may be hypothesised that potential demand for carfree development in the UK will be found amongst Carfree Choosers and Carfree Possibles. If this hypothesis is fully or partially confirmed, to understand the nature of the potential demand, it may be asked what further characteristics (beyond those entailed by the definitions) differentiate these groups from the other two groups. On this basis, the initial research questions described in Section 1.3 were refined as follows:

2. **What characteristics of Carfree Choosers and Carfree Possibles distinguish them from Other Nonowners and Other Owners of cars?**

3. **Are Carfree Choosers and Carfree Possibles more likely than the other groups to choose living in a carfree development?**

Question two is predicated on the assumption that the hypothesis in question three would be entirely or partially supported by the findings. If the hypothesis were rejected, then both questions would need to be revisited, to identify whether potential demand might be concentrated amongst

any other groups. Whether the hypothesis was supported or not, the study would also need to reflect on the appropriateness of these questions in the light of the findings.

The European evidence and the UK evidence discussed in Section 4.2 both suggest that the Carfree Choosers are likely to have a different socio-demographic profile from the Other Nonowners, typically coming from higher social groups with higher levels of income. Diffusion of Innovations Theory would also suggest that they and the Carfree Possibles, if they are indeed more receptive to housing in carfree developments, are likely to exhibit the characteristics of innovators or early adopters. Normally, this would imply a higher status and income than the other groups, although as this particular choice would involve the rejection of an expensive commodity often associated with status, the normal relationship might not apply in this case.

Having identified the groups likely to favour moving to carfree developments, it remains to be assessed what attributes of the developments themselves would facilitate or hinder such decisions. This question will be central to the assessment of the policy implications in the final chapter of this thesis:

4.   What attributes of carfree developments would make these choices more or less likely?

There was some evidence from the European studies, of the attributes which prompted or enabled residents to move to carfree developments, although there was a significant gap relating to public transport provision. Whether the same motivations and attributes would apply in a similar way in the UK remained to be assessed.

European carfree developments have all been built in existing cities, at relatively high densities, and have been well linked to public transport networks including rail and/or trams. The evidence from the UK, (Lucas, Jones 2009) discussed in Section 4.3, suggests that proximity and frequency of public transport can influence levels of car ownership, but only in larger settlements.

To assess the feasibility of carfree development in the UK, this analysis would suggest the testing of attitudes amongst the identified groups towards different types of location (e.g. in existing cities or ex-urban locations) and higher or lower density housing. Attitudes to related factors, such as accessibility to services and public transport, might also be relevant to this.

None of the research questions specifically refers to the prevalence of the different groups, or the size of potential demand for carfree development, nationally. As no sizeable carfree developments yet exist in the UK, the main purpose of the study was to assess whether potential demand exists,

and if so, what circumstances and locations would best satisfy demand for the first examples in this country. To estimate the national size of potential demand would have required a nationally representative sample. For the mainly practical reasons described in Section 5.4 this was judged unfeasible. The findings would provide evidence about the prevalence of the target groups within the populations chosen for study, although this might not be typical of the general population. It might be possible to make some tentative statements about the national size of the target groups based on the previous studies. Chapter 9 will return to this question.

5.3   Research Design

This section will consider the nature of the remaining research questions and the choices that were made in constructing a research design to address them. It will begin with a discussion of the fundamental methodological issues: the choice of overarching approaches, then cutting across these, the merits and challenges of qualitative, quantitative and mixed methods.

The starting point for considering the overarching research approach is the nature of the research questions. Following a common thread in the literature Blaikie (2000) states that all research questions can be reduced to three main types: "'what', 'why' and 'how'", which would appear to exclude the hypothetical question 'whether'. Yin (2009) adds to this list: who, where, 'how much' and 'how many'. Although he also avoids the term 'whether', he maintains that 'what' questions can be divided into two categories. The second of these are where "the research goal is to describe the incidence or prevalence of a phenomenon or when it is to be *predictive* about certain outcomes" [emphasis in the original]. In other words, these are the 'whether' questions.

This refinement may be added to the table which Yin uses to illustrate the choice of research approaches, shown in Table 5-2. This differs from the original in the additions of the 'whether' terms and the substitution of 'approach' for Yin's contested use of the term 'method', which could confuse in this context: these overarching approaches transcend the choice of qualitative and quantitative methods, which follows. The additional 'whether' term under 'Survey' and 'Case Study' follows Yin's analysis (i.e. they are a subdivision of the 'what' questions); under 'Experiment' it is a departure. Clearly experiments are frequently used for predictive questions.

Approach	Form of Research Question	Requires Control of Behavioural Events	Focuses on Contemporary Events?
Experiment	How, why, whether?	Yes	Yes
Survey	Who, what, whether, where, how many, how much?	No	Yes/No
Archival Analysis	Who, what, whether, where, how many, how much?	No	Yes/No
History	How, why?	No	No
Case Study	How, why?	No	Yes

Table 5-2 Relevant situations for different research approaches, adapted from Yin (2009)

The table is clearly a simplification: hybrids, exceptions and additions to the approaches and recommendations are conceivable (action research is another possible approach, for example). Nonetheless, it does provide a useful framework for considering the choice of principal approaches facing this study. Following its logic, the three remaining research questions can be classified as follows:

Research question	Form of Question	Control of Behavioural Events Possible?	Focuses on Contemporary Events?
2	Who, what, how many?	No	Yes (& past)
3	Who, whether?	Partially	Yes (& past)
4	What, whether?	Partially	Yes

Table 5-3 Forms of the research questions

This analysis would rule out two of the five possible approaches: history and case study. The term '**history'** refers to an in-depth historical analysis, which was clearly not appropriate here. A **case study** according to Yin is an in-depth investigation of a contemporary phenomenon in its real life context. Applying this definition to a built environment context, Amaratunga et al (2001) argue that case studies are better suited for building theory and generating hypotheses rather than testing them – which is a key objective here.

Elsewhere in the literature, the term 'case study' is often used more loosely (see the discussion in Robson 1993 about what constitutes a case, for example) but Yin's definition illustrates a useful distinction for this study. Had appropriate carfree developments existed in the UK, a case study approach could have been followed, in which case the research questions would have been somewhat different. As described in Section 2.6, no such examples were found.

As this study is mainly focused on individual behaviour and characteristics, **archival analysis** would not address the research questions on its own. Contextual use has already been made of Census and other Governmental data. The possibility of using these to generate a sample including the target groups was considered. The two principal existing national datasets: the Census (ONS 2009) and the National Travel Survey (National Centre for Social Research 2005) could provide some but not all of the information required to identify these groups: the NTS includes some questions about attitudes, for example, but not those (relating to car ownership) necessary to identify the target groups. No other suitable existing datasets were identified, so a new sample or samples would need to be generated.

As with archival analysis, **experimental methods** could likewise address only part of the research questions: the 'whether' questions. Stated preference experiments, where people are asked to

choose between different options, or asked how much they would be prepared to pay for them, are often used to research hypothetical questions and were considered, to address research questions three and four. As Kim, Pagliara et al (2005) explain, problems such as commitment bias and policy bias suggest these methods offer no particular solution to the fundamental problems of hypothetical questioning. 'Stated preference' in the specific sense in which the term is used in, or derived from, the economic literature describes a range of techniques for answering essentially quantitative questions. They are sometimes used to value less tangible attributes such as noise and sunlight in a housing context (Arsenio, Bristow 2000) but the output is still quantitative. As few people in the UK have any direct experience of carfree neighbourhoods, any attempt to attach a value to their attributes (in terms of willingness to pay house prices, for example) would yield dubious results.

A more qualitative form of stated preference could have presented participants with information about, and images of, European carfree areas before posing the hypothetical questions. A similar approach was taken by Platt (2004) followed by an online questionnaire (concerning people's preferences between different forms of development) – qualitative interviews could also have followed. These options were not pursued because the second research question implied an exploration of people's behaviour and attitudes towards their existing neighbourhoods. All the research questions suggested the need for some exploration of attitudes, likely to require more than one stage of research. If respondents were alerted at an early stage to the study's specific interest in carfree developments this could bias their responses to subsequent questions about related subjects (e.g. their reasons for acquiring or disposing of a car).

Another experimental (or quasi-experimental) method considered, was to relate the behaviour under study to different personality or behavioural characteristics. In commercial market research, the propensities of individuals to purchase particular products or services are sometimes assessed by asking questions with no apparent relationship to those products or services; the associations are believed to operate at a subconscious or semi-conscious level. The possibility of such an approach for this study was discussed with two commercial directors one experienced as a commissioner and the other as a provider of such research (C. Melia, Tourism South-East and C. Christie, Arkenford Market Research, 2006, personal communications). Apart from the technical and resource challenges, to validate such a model would require evidence that the attributes were indeed associated with the behaviour under study, in real life. Whereas it might be possible to find psychological attributes associated with carfree *living*, this would not necessarily help to answer question three about carfree *neighbourhoods*.

Two other approaches not listed on Table 5-2, action research and participant observation, were judged unsuitable for research questions focussed on household and individual decision-making. Of the listed options, this left the **survey approach**. As used by Yin, the term potentially

encompasses a wide range of quantitative and/or qualitative methods. These choices are considered next.

Quantitative Qualitative and Mixed Methods

The relative merits of quantitative and qualitative methods have provoked what some have described as "paradigm wars" (Lincoln and Guba 1985 cited in: Flick 2007). Partly in response to this, there has been growing interest in recent years into the potential for mixing the two, although the ways this can and should be done has also generated considerable disagreement. Some of the methodological literature (e.g. Mason 2002) argues that these choices should flow from the personal ontological beliefs of the researcher, i.e. 'objective' versus 'socially constructed' reality. Others argue that the nature of the subject researched (Snape, Spencer 2003) and more specifically the research questions (Amaratunga et al. 2001) should guide the choice. That was considered the more useful approach for this study.

Quantitative research can be defined quite simply as that which "generates numerical data or data that can be converted into numbers" (Welsh Assembly Government 2009). In terms of surveys, it is usually associated with self-completed questionnaires or structured interviews with largely closed questions. There are many definitions of the term 'qualitative research', some of them simple juxtapositions, e.g. research which: "produces findings not arrived at by…quantification" (Strauss and Corbin 1998 cited in: Snape, Spencer 2003). In another example, qualitative research: "is an interpretative approach concerned with understanding the meanings which people attach to phenomena" (Snape, Spencer 2003)(Snape, Spencer 2003 the latter cites: Strauss and Corbin 1998). In the context of surveys, it is associated with focus groups, group or individual interviews with mainly open questions.

All three research questions refer to the target groups. As these could not be identified from existing archival data, some form of large scale survey would be needed in the first instance to generate a new sample from which the groups could be identified. As pointed out by Amaratunga et al (2001) large scale surveys are "strictly quantitative with some room for interpretation".

Research questions three and four involve the assessment of attitudes. A common theme in the literature (Fowler 2002, Oppenheim 1992) is the limitations of quantitative methods in this respect. Although it would be oversimplifying to assume a clear boundary between the two, Fowler's distinction between factual and attitudinal questions is a useful one. For factual questions, questionnaire design should aim as far as possible to eliminate ambiguity. This may not be possible for attitudinal questions, which present a particular challenge for the analysis and interpretation. The assumption that a researcher necessarily understands the meaning attached by a respondent to a particular question may be wrong. Qualitative methods are better equipped

to explore subjective meanings, including clarification of the meanings which respondents have attached to survey questions and responses.

Table 5-4 illustrates the different aspects of the remaining research questions which could be, and were, explored using quantitative and qualitative methods. Question two could arguably be addressed by purely quantitative methods, although a qualitative perspective might yield some additional insights. Given the decision to use survey methodology, it is difficult to see how either three or four could be satisfactorily addressed without an element of both. Question three is comparative, hypothetical and concerns attitudes. To compare responses between the different groups would imply a quantitative test. On the other hand, survey responses to hypothetical questions cannot be taken at face value. To probe, understand and interpret the responses would, as suggested by Fowler, imply qualitative methods. Question four suggests a deductive step from the preferences of potential residents to the design, location or other aspects of carfree developments. To achieve any confidence that these preferences were widespread would imply a large-scale survey. Again, the question is hypothetical and attitudinal, requiring further probing and interpretation.

Research Question	Quantitative Survey Methods	Qualitative Survey Methods
2	Numerical assessment of characteristics (e.g. housing, transport, demographic) Statistical comparisons between the groups	Attitudes of respondents towards the characteristics. Probing their interpretations of survey questions
3	Statistical tests on responses to a hypothetical question about moving to a carfree development	Probing interpretations and robustness of responses: under what circumstances would they really move to a carfree development?
4	Direct questions about attributes (of neighbourhoods, housing etc.). Statistical tests to compare responses of the different groups	Probing interpretations of the different attributes and respondents' views on how these might affect their likelihood of moving to a carfree development

Table 5-4 Use of Quantitative and Qualitative Methods to Address the Research Questions

This analysis suggests a way through the highly contested issues around the use of mixed methods. Flick (2007) suggests several ways in which quantitative and qualitative methods may be combined. One initial choice at the design stage relates to the sequence: should the quantitative precede the qualitative work, vice versa, or should they run concurrently? In this case the decision was clear: to identify the target groups, the quantitative data collection would need to come first.

Another question is whether the subjects for the qualitative analysis should be drawn from the larger group of survey respondents, or whether a new sample should be sought. The objectives shown on Table 5-4 to probe interpretations of the survey questions would imply a sub-sample drawn from the survey respondents.

The most controversial issue in this area relates to triangulation: the use of qualitative methods to corroborate the quantitative findings and/or methodology or vice versa. Some writers argue that this is both possible and desirable, some even advocating the conversion of qualitative findings into quantitative data or occasionally vice versa (see discussion in: Flick 2007). Others (e.g. Massey 1999 with whom the researcher would concur) argue that the different ontological and epistemological bases of the two approaches would yield combined findings of dubious validity. The approach followed here, illustrated in Figure 5-1, will involve a degree of corroboration, in respect of research questions three and four. The qualitative interviews will be used to explore the meanings behind the survey responses but not to convert data nor to use one to validate the methodology of the other.

```
┌──────────────┐         ┌──────────────┐
│ Questionnaire│ - - - ->│ Qualitative  │
│   surveys    │         │  interviews  │
└──────────────┘         └──────────────┘
       │                        │
       ▼                        ▼
┌──────────┐  ┌──────────────┐  ┌──────────────┐
│Literature│  │  Statistical │  │   Thematic   │
│and theory│  │   Analysis   │  │   Analysis   │
└──────────┘  └──────────────┘  └──────────────┘
     │              │                  │
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┌───────────────────────────────────────────────┐
│ Explanation, prediction, inferences and insights│
└───────────────────────────────────────────────┘
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           ┌──────────────┐
           │ Conclusions  │
           │     and      │
           │recommendations│
           └──────────────┘
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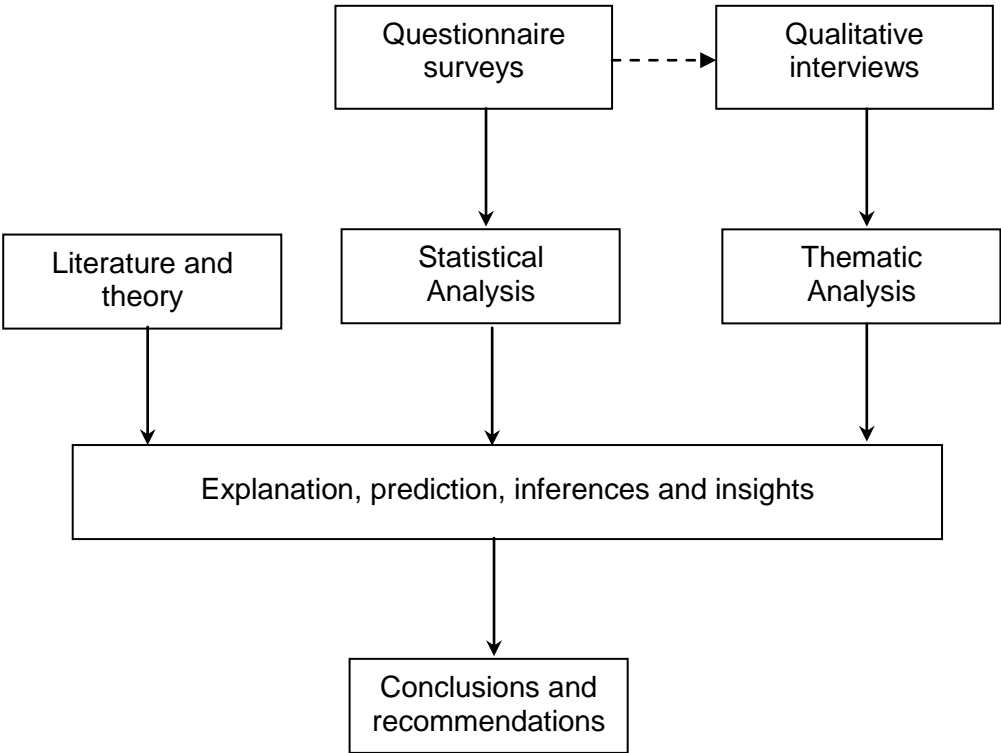
Figure 5-1 Qualitative and Quantitative Methods in this Study, adapted from Amaratunga et al (2002)

Summary of Research Design

This section began by considering a number of different possible research approaches following Yin (2009), deciding that a survey approach would best address the research questions. These questions suggested a combination of quantitative surveys followed by some form of qualitative interviews, to explore interpretations and probe the robustness of responses to the quantitative surveys. The phrases 'quantitative survey' and qualitative interview' encompass a number of more specific options. The rest of this chapter will discuss the choices made between these options, beginning with the principles of sample selection.

5.4   Sample Selection

Figure 5-2 summarises the principal decisions made in selecting samples for survey. This section will describe those down to the asterisked levels. Sections 5.5 and 5.7 will describe the choices made within the Online, and the Camden and Poole surveys respectively.
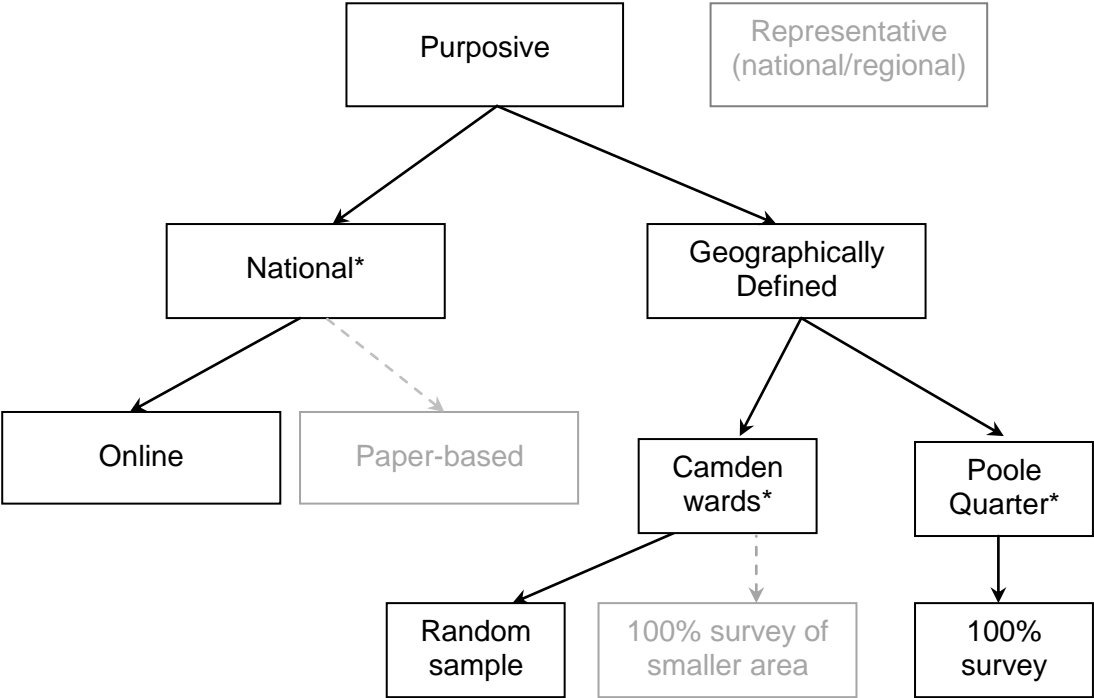
Figure 5-2 Sample Selection – Options Chosen and Rejected

As with research design, the starting point for sample selection was the nature of the research questions. The statistical tests mentioned in Table 5-4 implied a large-scale survey based on a sample or samples with sufficiently large concentrations of the different groups. The unsuitability of existing datasets has been discussed. This left two broad choices:

1. A (new) representative national (or local) sample of sufficient size

2. A purposive sample or samples believed to contain higher than usual proportions of the target groups.

A challenge for the first option was to identify how large a sample would be needed. The proportions of the target groups within the national population were not known, but there were reasons for believing that they would be relatively small. The Carfree Choosers were a subset of the 19% of adults without cars. Although the questions and definitions were not exactly the same, the 'Car Sceptics' – the positive non car owners identified by Dudleston et al (2005) – made up 36% of non car owners in their stratified representative sample from across Scotland. By inference, this would suggest that Carfree Choosers might form around 6% of the adult population of Britain. Similarly, the Carfree Possibles were likely to be a smaller group – possibly much smaller – than the 'Aspiring Environmentalists' who formed 16% of the sample in the same study.

Given these uncertainties and the limitations on resources available to this study, it was decided to opt for purposive sampling. It would begin with larger samples for quantitative analysis followed by qualitative analysis of a smaller subset.

Following this decision, it was then considered how and where such samples might be found. As the groups could not be directly identified from observable characteristics, it would be necessary to look for characteristics expected to be associated with them. If these expectations were not confirmed (i.e. the target groups within the samples were too small to permit valid statistical testing) the approach would need to be reconsidered. A number of different samples surveyed at intervals allowing for some learning from experience would help in this respect.

Whether to survey nationally distributed, geographically defined samples, or both was considered next. As discussed in Sections 4.2 and 4.3, carfree living is strongly associated with certain types of location. Understanding how such locations facilitate carfree living would help to answer research question four. It should be relatively easy to find geographical concentrations of the Carfree Choosers, as described below, but criteria for locating concentrations of Carfree Possibles were less clear. In any case, a small number of geographically limited samples might not satisfactorily answer all the research questions. Minorities of either target groups might be found in unexpected locations. The characteristics and experience of these people could provide a different perspective on research questions two and four. For these reasons it was decided to survey both a nationally distributed purposive sample and one or two geographically defined samples.

For the national survey, as geographical locations were not to be used as filters, this raised the question of how else concentrations of the target groups might be found. As discussed in Section 2.9, pro-environmental attitudes, and positive attitudes towards cycling are two factors commonly

found amongst residents of European carfree developments. There is also some evidence from the UK, as discussed in Section 4.2, that environmental attitudes are associated with carfree living and willingness to reduce car use. It was hypothesised therefore, that high concentrations of the target groups would be found amongst the members of **environmental groups.** The most striking transport difference noted by Dudleston et al between the Car Sceptics (a similar concept to the Carfree Choosers) and other more reluctant non owners was the considerably higher rates of cycling amongst the former. Their Aspiring Environmentalists – car owners willing to reduce their car use – also tended to cycle more than other car owners. This and the observations in the European carfree developments suggested that organisations representing **utility cyclists** would also contain high proportions of the target groups.

To reflect the locational associations with carfree living, it was decided to supplement this survey with geographically-defined samples, in areas where high concentrations of the target groups were expected. Following the analysis of car ownership in Sections 4.2 and 4.3, it was expected that Carfree Choosers would be found in greater concentrations in areas where car ownership was low and incomes relatively high. Home ownership is strongly associated with car ownership – high concentrations of home owners without cars would tend to indicate that carfree living was a choice rather than a constraint. Diffusion of Innovations Theory would also suggest that these higher status carfree households would be more likely to provide the innovators and early adopters of this new concept for the UK.

As shown on Appendix i, the London Borough of Camden is one of four inner London boroughs with amongst the lowest car ownership in the country combined with relatively high income levels. Car ownership varies considerably within the Borough: the wards with the lowest levels are, as might be expected, those which border the West End and City of London. Excluding some sparsely populated wards in the City of London and Isles of Scilly, Camden also contains the three wards with the lowest car ownership in Southern England.

	Authority	Ward	Adults	With no car/van	Home Owners	Home Owners with no car/van
1	Isles of Scilly	Tresco	104	85.6%	2.9%	0.0%
2	City of London	Tower	128	76.6%	30.5%	15.6%
3	Isles of Scilly	St. Agnes	121	71.9%	25.6%	18.2%
4	**Camden**	**Bloomsbury**	**5,650**	**68.8%**	**29.5%**	**16.6%**
5	City of London	Portsoken	754	66.7%	9.2%	3.8%
6	**Camden**	**Kings Cross**	**6,982**	**65.5%**	**19.1%**	**10.0%**
7	City of London	Farringdon Without	605	63.6%	35.0%	21.3%
8	Camden	Holborn & Covent Garden	7,825	63.2%	23.0%	9.9%
9	City of London	Walbrook	90	62.2%	37.8%	18.9%
10	Westminster	Church Street	4,767	60.1%	25.3%	9.4%
11	City of London	Bishopsgate	96	59.4%	21.9%	8.3%
12	Camden	St Pancras & Somers Town	8,752	59.1%	18.7%	6.9%
13	Islington	Bunhill	7,538	59.0%	21.0%	8.1%
14	City of London	Cripplegate	2,344	58.0%	58.4%	27.4%
15	Kensington & Chelsea	Earl's Court	7,947	57.8%	36.6%	13.1%
16	Westminster	Lancaster Gate	9,822	57.7%	35.4%	12.2%
17	Westminster	St James's	6,373	56.8%	23.8%	8.4%
18	Camden	Regent's Park	8,553	56.6%	22.8%	6.8%
19	Lambeth	Bishop's	6,907	56.6%	22.2%	7.0%
20	Westminster	West End	5,812	56.5%	28.5%	9.5%

Table 5-5 Wards with Highest Proportions of Carfree Adults in Southern England

Bloomsbury and **Kings Cross,** as shown on Table 5-5 (more details shown on Appendix ii) both had median incomes above the national average, and in the case of Bloomsbury, above the London average (DMAG 2006). Bloomsbury also has the highest concentration of home owners without cars (apart from those same special cases). An observational visit was made before deciding on the sample selection and survey design, as described in the next chapter.

Inner London is something of a special case in terms of accessibility and particularly public transport. To provide a contrast, and also to explore the influence of more specific design and management factors it was decided to add a sample site using a recent 'low-car' housing development in a provincial town. Two elements were expected to increase the concentrations of the target groups: parking limitations and policies to promote sustainable transport objectives which were made explicit to new residents. The first of these elements, which defines a low car development is fairly common. The second factor, particularly associated with residential travel plans, was much less common in 2005 when this study began. The Department for Transport had recently published a good practice guide to residential travel plans (DfT 2005). Some of the examples were in London or nearby, and some were at a very early stage in their development. **Poole Quarter,** one of the case studies in that report was chosen because it was in a medium-sized provincial town, and because it was sufficiently well-advanced to permit a household survey. An observational visit to Poole Quarter is discussed in Section 6.3.

5.5 National Survey – Choice of Methods

The household focus of the Camden and Poole surveys implied the use of paper-based questionnaires – discussed in Section 5.7. For the national survey, the relative advantages of paper and online surveys were both considered.

Online surveys offer the potential to handle larger samples at no additional cost, and without the need for labour intensive (and potentially error-inducing) data entry. As the response rate exceeded initial expectations this was to prove a more important factor than first assumed. Another advantage of online surveys is that they permit more complicated branching than paper-based surveys – to ask different questions of car owners and non-car owners, for example. The paper-based equivalent ('if you ticked x, please go to section y') introduces possibilities for error. Online surveys can reduce the incidence of missing data by forcing respondents to answer particular questions before they can proceed (which might have the disadvantage of convincing some people to abandon). A similar issue has been noted by Evans and Mathur (2005) relating to the order of answers – the control exercised by online surveys can help to avoid biases introduced where respondents are able to look ahead at later questions. Online surveys are not immune from data entry problems, however; some would-be participants at the pilot stage did not participate because of the temporary unavailability of the server, for example.

The principal disadvantage of online surveys is they draw from an "inherently biased sample population" (Madge, O'Connor 2004). During its early years several studies indicated that Internet users tended to be predominantly white, male, urban and under 35 years of age, with higher educational levels and higher incomes. Since then, Internet access has continued to rise across the UK. By 2006 it had reached 57% of all households (ONS 2006) and several studies in the UK (Mayor of London 2002) and elsewhere (Evans, Mathur 2005) suggest these biases are diminishing.

Several studies have found that online surveys are associated with lower response rates than equivalent mail surveys (Solomon 2001). This is particularly the case for surveys which are long, complicated and/or slow to load, although a study of large-scale online surveys found no patterns in failure to complete rates by gender, age or educational level (Jeavons 1998 cited in Solomon 2001).

If a freely accessible web address is used for an online survey, particularly if multiple media are used to publicise it, 'the population' from which the sample survey is drawn would be unknowable.

This would preclude any measurement of percentage response rates, or assessment of sample bias.

This last point was considered more important for the geographically focused samples. Whereas survey results could be compared to Census data for a geographically defined area, comparable data on the members of environmental or cycling (or indeed any national) organisations would probably not be available. For a purposive national sample, with a focus on higher income and more educated groups, the advantages of an online survey were judged to outweigh the disadvantages.

5.6   Designing and Publicising the Online Survey

Because of its greater flexibility, it was decided to begin with the online survey and develop the paper-based surveys in the light of this initial experience. Following the discussion in Section 5.3, the purpose of the online survey was twofold: to provide quantitative data concerning the target groups, and also a pool of volunteers for the qualitative interviews.

The survey design presented a number of particular challenges related to: the identification of the target groups, hypothetical questioning, the wording and order of the questions, and the expectations created by the introductory text. Each of these is discussed in turn, followed by a brief discussion of the groups who were approached and participated in the survey.

Identifying the Target Groups

The process of designing the online survey revealed some areas of potential ambiguity in the definitions of the possible groups shown on Table 5-1. The starting point for assessing the desire and ability to change car ownership status was the subjective assessment of the individuals themselves. The definition of the **Carfree Possibles** raised questions about their seriousness of intent, and the feasibility of the changes which might permit these people to give up car ownership. As they currently owned cars, presumably, at least in the short-term, either the intent or the ability to change must be lacking. For initial classification, it was decided to identify the Carfree Possibles by a statement: "I would like to live without a car if circumstances changed". What these circumstances might be would require further investigation. The seriousness of intent was addressed by the addition of a **further criterion**: that the individuals had **already given up car ownership in the past** and subsequently reacquired a car. This refinement had a number of implications (e.g. relating to age profile) as discussed in Chapters 7 and 9.

Another issue affecting the definitions of both the Carfree Possibles and Carfree Choosers was how to classify individuals who lived in households with a car, but did not own one themselves. As many of the questions would focus on decision-making at the household level, it was decided to classify these people as car owners in most cases. An exception was made where another household member owned a car, but the respondent did not drive it. In these circumstances, the respondent was classified as a non owner. The definition of the **Carfree Choosers** (and the Other Nonowners) did not preclude them from driving other cars, owned outside the household. The questionnaires and interviews would need to explore the influence of other household members and their car ownership status on the respondents.

These three scenarios are summarised in Table 5-6:

Situation	Classified As
Respondent does not own a car – drives a car owned by another household member	Car owner
Another household member owns a car – respondent does not drive it.	Non owner
No cars in household – respondent drives other cars	Non owner

Table 5-6 Household Car Ownership and Classification of the Possible Groups

The financial constraints on car ownership raised another potential ambiguity. If someone lives without a car for financial reasons, should this be considered a choice or a constraint? Again, the principle of self-definition was followed. Someone who was unable to afford car ownership would be classified according to their choice between the three mutually exclusive options shown in Table 5-7.

Statements	Classified As
I live without a car by choice	Carfree Chooser
I do not own a car but would like to	Other Nonowner
I am unable to own a car for physical or health reasons	Other Nonowner

Table 5-7 Statements Defining the Non Owner Groups

Hypothetical Questions

The literature on survey design often advises caution (Fowler 2002), or complete avoidance of hypothetical questions (Oppenheim 1992). As discussed in Section 5.3, to address the research questions some element of hypothetical questioning was unavoidable, although efforts were made to minimise the hypothetical content of the questions and frame them in a way which would permit cross-comparisons and interrogation during the second, qualitative, stage.

At the beginning it was intended to keep the wording of the online and a future paper-based survey identical, to enable comparisons. However, once the draft survey was entered onto the software package (on www.questionpro.com) and the full potential of the branching tool was explored, it became apparent that attempting to replicate this in a paper-based survey (e.g. 'if you ticked "yes" go to question x') would make the latter too long and complicated. A key advantage of the online software is that respondents only see the questions relevant to them.

The particular software chosen had already been successfully used for another survey within the Faculty and this research was able to benefit from some of the technical lessons learned. The use of a previously tested software helped address some potential problems with survey design. For example, consistency in the format of multiple option questions is one means of reducing the demands on respondents, encouraging them to continue (Oppenheim 1992).

The questionnaire went through eight drafts and a pilot before the **final version, shown in Appendix iii.** The pilot survey ran during December 2006 using members of the Faculty with experience of administering surveys, and members of two of the target organisations: the CTC and Friends of the Earth. 21 completed the survey, making a range of observations, which influenced the final version. The latter ran from February until July 2007.

Some questions were given particular attention, and amended several times, such as Question 22:

22) Which of the following factors would most influence your choice of place to move to? (Please choose 3 or 4):

[11 options + 'Other']

The hypothetical factors most influencing "your choice of house or flat to move into" in Q. 22 were initially informed by the housing literature including Kim et al (2005), Leishman et al (2004) and Walker (2002), as well as the literature on the relationship between transport and the built form. Initially, factors related to both the neighbourhood and individual property were included. These were later removed because it was felt that asking respondents to balance these against the locational factors would overstretch the hypothetical nature of the responses. Other questions would collect some (limited) information about respondents' current housing type and broad preferences. Following the discussion above, questions 7 and 8 about the advantages and problems of the areas where respondents currently lived (Q.7 and 8) would provide a comparison to Q.22, based on a more concrete situation.

The initial **order of the questions** was amended following advice from a marketing specialist experienced in commissioning market research (C. Melia, Commercial Services Director of Tourism Southeast), beginning with more straightforward factual ones, followed by ones requiring more complex evaluation, with personal questions such as household income towards the end, once an element of trust had been established.

Following Oppenheim (1992) several of the draft questions were reworded to make them appear more polite, less brusque (e.g. "How would you describe your household?" rather than "Your household:" followed by a list). The definition of income was one potential problem raised by Oppenheim which was never entirely resolved. People's views and recollections might result in the inclusion or exclusion of investment or property income, for example. More specific guidance was considered but ultimately, to avoid over-complication and the appearance of intrusiveness, it was decided to limit this to: "annually, before tax".

It was not judged feasible to build a full 'mobility biography' (following Lanzendorf 2003) from the survey responses, but questions 14 and 15 about past car ownership were introduced to provide some context for the analysis of responses to the hypothetical questions. The third stage of qualitative interviews would probe the reasons for people's changes in car ownership in more detail.

The **introductory text** on the survey home page (shown on Appendix iii) presented a challenge: to what extent to acknowledge the political/environmental objectives of the study. On the one hand, it could influence some of the responses. On the other hand, the literature emphasises the need in motivating respondents to explain the purpose of the questions they are about to answer (Fowler 1998). Given the self-selecting element amongst the participants it was felt that the advantages of disclosing the broad objectives would outweigh the disadvantages – the chosen wording was not judged to suggest any new ideas with which they would not already be familiar (carfree development was not mentioned). The media of communication chosen, through environmentally-related organisations and publications made some acknowledgement of the rationale for the study inevitable in any case.

The organisations approached for assistance with dissemination were as follows:

Organisation	Response?	Media of Communication
A2B Magazine*	No	-
CTC	Yes	Electronic newsletter
Eco Village Network*	No	-

Environmental Transport Association	Yes	Electronic newsletter
Friends of the Earth	Yes	Website and electronic newsletter
Greenpeace	Yes	Electronic newsletter
Green Party	Yes	Electronic newsletter and website
Grown up Green	Yes	Electronic newsletter and website
Living Streets	Yes	Electronic newsletter
London Cycling Campaign	Yes	Members magazine
Sustrans	Yes	Electronic newsletter and magazine
Transport 2000	Yes	Informal email contact
Women's Environmental Network	No	-
Sustainable Travel Demonstration Towns:		
Darlington		Free magazine delivered to homes
Peterborough		Electronic & paper newsletters
Worcester		Newsletter

Table 5-8 Organisations Contacted for Publicising the Online Survey

Following the discussion in Section 5.4, the first section of Table 5-8 lists environmental organisations (a publication in one case) and/or organisations representing utility cyclists. With hindsight, the logic for the inclusion of the three Sustainable Travel Demonstration Towns was not so clear. They were contacted following a discussion with the project's contact at the Department for Transport. None of these towns had particularly low car ownership. The justification for their inclusion was simply that the population there had already been sensitised to the issues of sustainable transport. In the event, no more than a dozen respondents came from these towns, and some of these were members of the environmental or cycling organisations.

A domain name: www.transportsurvey.org.uk was purchased to simplify the online address for people reading paper-based media. A press release was sent to two local newspapers in Camden, publicising the online survey. At least one of them did run the story, although this did not produce many respondents (only 3 indicated that they had heard through a newspaper article). Following this it was decided to run the separate paper-based survey there.

5.7   Household Surveys

This section describes the development and distribution of the two household surveys; the Camden survey was developed in the light of the experience from the online survey; the Poole survey followed both. In both cases, the previous questions served as the starting point. The

following chapter describes the observational visits to each of the locations, which also helped to inform the process.

Camden

Having decided on a geographically focussed household survey in Bloomsbury and Kings Cross wards, a choice was required between a random sample across the two, or a survey focussed on a smaller area within them. As described in Section 6.1, the observational visit found a diverse mixture of buildings, land uses and local environments; it was not possible to identify a 'representative' smaller area within them. The random sample was chosen, therefore.

The predominance of shared buildings without identifiable letterboxes suggested a postal survey rather than a hand-delivered one. Around half of the adult population was included on the electronic version of the electoral register – the others having opted not to receive any mailings. Unfortunately no information was available on any self-selection differences which might introduce an element of bias into the sample. It would only be possible to assess how representative the final sample was by comparing selected indices with Census data.

The online survey (Appendix iii) was used as the starting point for the questionnaire; the final questions are shown on Appendix iv. Although several of the questions were amended to reflect local circumstances, it was hoped to keep many of them similar to facilitate comparisons. The branching structure of the online survey was considered too complicated for a paper-based questionnaire, however, so this was simplified, with colour coding used to facilitate branching to numbered sections.

The population of the area appeared diverse both in terms of ethnicity and national origin (the presence of a university may have been a factor in this). This raised some potentially significant issues for the survey. Existing research into the attitudes of ethnic minorities towards transport issues, mainly relates to public transport and public communication issues (e.g. Welsh Consumer Council. 2004, Social Research Associates 2003). There did not appear to be any UK research into how ethnicity affects attitudes to car ownership.

Collecting information on both ethnicity and national origin was considered. The ethnic categories used in the Census would introduce a lengthy question which, though familiar to many people, could still prove off-putting. Given the apparent diversity of the area, a very large sample would probably be needed to enable statistically significant comparisons between sub-samples, apart from simple binary divisions such as white/non-white. This posed an ethical question concerning the collection of personal data beyond that which might be strictly necessary to answer the research questions. It was decided to limit the question in this respect to place of birth: in London,

elsewhere in the UK, or overseas. The possibility of moves outside the UK would also be relevant to the questions about future intentions.

200 pilot questionnaires with a box inviting comments on the questions, were sent out to randomly selected individuals from the electoral register in May 2007. As suggested by Oppenheim (1992) question wording is not the only reason for piloting. Appropriateness of layout is another. The use of colour can aid clarity, particularly where respondents are asked to follow branching options. Appendix iv illustrates how colours were used to differentiate the sections under which questions were grouped. 19 (9.5%) of the pilot questionnaires were returned in the freepost envelopes provided, suggesting only minor amendments. Unfortunately some of the problems identified with the full survey, such as respondents overlooking whole pages, were not evident in the pilot returns; these problems did help to inform the Poole survey.

Anticipating a low response rate typical of postal surveys in Inner London, 2,000 copies of the main survey were mailed out in July 2007. As only minor amendments were made from the pilot version, it would be possible to combine the two for the purposes of analysis.

Poole Quarter

Unlike the two wards in Camden, Poole Quarter was a single development in a relatively small area, so a survey of all households was considered feasible. As the electoral register was not up to date, it was initially decided to deliver the questionnaires by hand to all occupied properties. Access arrangements to the blocks of flats varied but access was eventually gained to all bar eight properties – a total of 228 questionnaires delivered.

The Camden questionnaire was adapted to reflect the different circumstances, concentrating on Poole Quarter as a development, and deleting the references to moving intentions (as respondents had only recently moved, this was judged inappropriate). Parking restrictions and the residential travel plan were two reasons why Poole Quarter had been selected. All its residents had moved there recently, so this enabled questions to be posed about how their travel behaviour had changed, and whether the residents believed the travel plan had been effective.

The hypothetical question about carfree areas was phrased in a slightly different way, following the questions about the Poole Quarter travel plan:

24) Some European countries have gone further, with 'carfree neighbourhoods', where parking is further reduced and separated from the housing. They are designed around public transport, walking and cycling. Traffic is only allowed to enter at walking pace

for pick-up or deliveries. If you were looking to move in the future, and such a neighbourhood were built in this country, would you:

[6 options]

Some improvements were made to the layout of the questionnaire following the Camden experience – changing the position of page numbers and coloured boxes, for example, with the aim of reducing the number of questions omitted in error. The final questions are shown on Appendix v.

After some consideration it was decided to ask one person per household to complete the questionnaire. The alternative, with response boxes for each person, was considered too complicated and likely to reduce response rates.

The response rate following the first delivery was 25%. By the end of 2007 an updated electoral register became available. A second mailing of households which had not responded was carried out in December 2007, which increased the response rate to 42.5% – 97 returns.

5.8   Qualitative Interviews

The decision to use qualitative methods for the second stage of the research entailed two further choices: whether to use group or individual interviews, and whether by telephone or face-to-face, as illustrated in Figure 5-3.   The key criteria for making these decisions were the level of decision-making under study – the household – and also resource constraints.
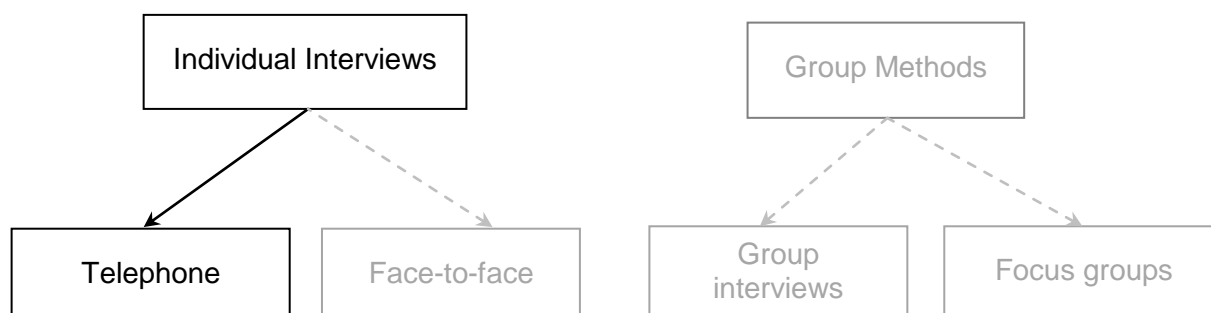
Figure 5-3 Qualitative Methods: Options Considered and Rejected

There are two principal methods for exploring group questions face-to-face: focus groups, and group interviews. The two are similar, but focus groups involve more interaction between the

133

participants, whereas group interviews are more interviewer-led. Focus groups have been found to produce noticeably different 'results' from individual interviews on the same subject. They are of greatest value in exploring "social dynamics" (May 2001). They are "synergistic" but "lack the depth" of individual interviews (Finch, Lewis 2003).

Where a study is seeking to explore a decision-making process, a key issue in choosing between the different methods is the level at which the decision is made. To some extent, all decisions are influenced by individual and social factors, but the balance between the two may vary according to the subject under consideration. Although social ties and the opinions of others may be influential, a decision to move house is generally taken within the household. The probing of responses to hypothetical questions relating to future house moves and carfree neighbourhoods was judged likely to be easier and more effective in an individual interview rather than a group forum.

Individual interviews also allow greater control over the selection of participants. As not everyone originally selected could be contacted, and a few declined to be interviewed, the selection process was a dynamic one, taking account of under-represented attributes when deciding who to approach next. In contrast, attendees at focus groups (as witnessed by the researcher in another project within the Faculty) may be unrepresentative of the people who were invited. Although a second focus group may be a possibility, in practice, it may not be possible to involve the spread of participants originally sought.

In the context of the national survey, it would not have been realistic to expect respondents to travel great distances to attend focus groups. A focus group might have been possible in the context of Poole Quarter, where it could have revealed more about the social dynamics of life within the development. It would not have allowed much probing of individual responses to hypothetical questions, however.

Having chosen individual interviews, the relative advantages of face-to-face versus telephone interviews were considered. The former have the advantage over telephone interviews of less time pressure, and also allow the interviewer to visually assess the reaction of interviewees. The anonymity of telephone interviews may encourage greater honesty, but ultimately, the decision to choose telephone interviews was determined by resource constraints, given the objective to interview a wide range of people from the three different surveys – the largest number from the online survey dispersed across the country.

A semi-structured format was chosen for the interviews to ensure that specific areas of questioning were covered, whilst allowing the interviewees to describe their own situations and give their own views. Following Arthur and Nazroo (2003) a topic guide was developed for each of the target groups, starting with a few objectives related to the research questions, and developing these into

areas for questioning. **Appendix vii** – the **topic guide** for the Carfree Choosers from the online survey – is attached as an example. Some minor amendments were made to the topic guides as the interviews progressed, but their overall structure remained unchanged.

The aim of the telephone interviews was to elucidate and in places to test the reliability of the questionnaire responses and interpretations which might be placed upon them – particularly those responses relating to willingness to give up car ownership and move to a carfree neighbourhood. They aimed, to some extent, to follow the biographical approach recommended by Lanzendorf (2003), although the goodwill and attention span of the interviewees (interviews lasted from about 15 to 40 minutes) meant that questions about the past were selective rather than comprehensive.

Just over half of the online and Poole respondents, and just under half of the Camden respondents indicated willingness to be interviewed by telephone. The aim in selecting interviewees was not to achieve any sort of representative sample, but to concentrate on the target groups and within these groups to achieve a mixture of ages, gender, household composition, employment status, income and housing tenure (factors associated with variations in car ownership and use). It was also intended to focus on people who had expressed an interest in carfree development. All bar four had ticked that they were 'keen to move' or would consider a move to one.

As described in Section 6.1, the Camden study area included a small development, the Brunswick (see Figure 6-9) which could be considered carfree as defined in this study. Two of its residents – Carfree Choosers – responded to the survey and were selected for interview; it was intended to explore both their experience of living in a carfree environment and to how their experience might affect their views on moving to other larger carfree neighbourhoods in the future.

The final list of **35 interviewees and their key attributes** are shown on **Appendix viii**. In some respects such as children, the sample is close to the national average (29% of households in the 2001 Census). In others, the sample reflects the characteristics of the target groups and/or the areas from which they were drawn e.g. the low proportion of social tenants and high proportion of flat dwellers. The desire to achieve a mix was constrained at times by practical considerations such as availability of valid telephone numbers, and the ability to speak to people at times they considered convenient. This proved particularly difficult for the Camden sample.

The interviewees were asked for permission to record the telephone conversations – all agreed to this. The interviews were all conducted and transcribed by the researcher himself, again partly for resource reasons, but this permitted both a degree of quality control, and familiarity with the data. Replaying the tapes of the pilot interviews enabled the researcher to analyse his own role in the interviews. Expressions of agreement and other views likely to 'lead' the interviewee were identified as problems to be consciously avoided in the later interviews.

Thematic Analysis

NVIVO was used to codify the transcripts, with 91 codes covering nearly everything said by the interviewees, developed on a 'bottom up' basis. These codes were then grouped into seven categories as shown on **Appendix ix**, and combined with the attributes shown on Appendix viii which were imported from the SPSS files of the questionnaire responses. This process allowed subsets of the data to be analysed for particular themes, for example the attitudes of Carfree Choosers to residential location decisions. As the analysis progressed, the NVIVO data was used quite freely, with frequent re-reading of the original transcripts to obtain more general impressions.

5.9   Personal and Socio-Political Context

What is the purpose of this study? The aims and research questions provide part of the answer, but as recommended by Mason (2002) the socio-political and personal aspects of this question should also be considered.

This research began with an idea that carfree towns would be both feasible and beneficial, particularly from an environmental perspective. During the course of this study the researcher helped to establish Carfree UK, an organisation which aims to promote carfree developments in this country. He has represented Carfree UK in dealings with Government departments/advisors, local authorities and private developers. This offered both an opportunity and a challenge for this study.

A long-running debate in the philosophy of social research – one which will never be 'resolved' – concerns the possibility and desirability of value neutrality. The concept, as attributed to Max Weber (1949) has sometimes been caricatured in recent years: Weber never suggested that values could or should be removed from social research. His emphasis was on identifying and separating the values of the researcher from the conduct of the research. To what extent this is possible and desirable is at the crux of the debate which continues today.

May (2001), who generally takes the opposing view to Weber, outlines five stages at which he argues values inevitably enter the research process:

1. Interests leading to research
2. Aims, objectives and design
3. Data collection

4. Interpretation
5. Use made of the findings

Hammersley (1995), who tends towards Weber's position, accepts that researchers can and will engage in research for a range of motives including political ones but while they are conducting that research, should focus solely on "the production of valid and relevant knowledge" avoiding bias defined as "systematic and culpable error; systematic error that the researcher should have been able to recognize and minimize" (Hammersley, Gomm 1997). In terms of May's five stages, Hammersley would permit researchers' values to influence stage one (although attempts by funders and governments to redefine the purpose of research should be resisted), not stages two to four, and is not clear on stage five. Other writers such as Flyvbjerg (2001) and Bourdieu (2002 as cited earlier), argue for both a right and a duty, of researchers to engage in political debates, using their findings to further explicitly political objectives.

Between those who still pursue the ideal of value neutrality, and those who maintain its impossibility or undesirability, Lewis (2003) argues for "empathetic neutrality" where researchers make their assumptions transparent and proceed reflexively. Without rehearsing the whole debate here, her advice seems appropriate for a study of this nature. May's five stages offer a useful starting point for such a reflexive analysis.

Stage one of this study was explicitly influenced by the values of the researcher, which favour carfree development for environmental reasons. The same comment would appear to apply to the other researchers into carfree development cited elsewhere in this study: Crawford (2000), Morris (2005), Nobis (2003), Reutter (2003) and Scheurer (2001) have all been involved in some way with the UK, German and/or world carfree movement. Indeed the field would probably benefit from a debate involving researchers from a more sceptical perspective.

As several of the writers on research methodology recommend, the role of funders should also be explicitly acknowledged. In this case, funding from the ESRC and the DfT was obtained once the study had already begun. The original contact at the DfT, who assisted this study at certain stages, has since left the Department. Since the application was approved, the DfT has not sought to influence the direction of the study, nor has the funding prevented the researcher from writing articles critical of some aspects of DfT policy and practice (Melia 2008b, Melia 2007a). The objective to influence *current* policy could arguably constrain more radical 'blue sky thinking' – a dilemma frequently encountered within applied research – but this objective was already established before funding was applied for.

Following May's five stages, this study aims to follow the principles outlined by Hammersley and Weber, as far as possible, during stages two to four – the conduct of the study itself. Evidence

supporting or questioning the feasibility of carfree development would need to be treated with care, to avoid accusations of bias. In fact, the objectives of the study, influenced by resource constraints, were limited in this respect: the surveys and interviews were expected to produce evidence on the population segments and circumstances most likely to favour carfree living but would not be sufficient to establish the viability of carfree developments in the UK.

At the fifth stage, 'political' use has already been made of interim findings from this research, in articles such as the two cited above, and in evidence from Carfree UK to the Department for Transport, Town and Country Planning Association working for DCLG, and the Environmental Audit Committee (2008), all in the context of Eco-towns. Where presented in an academic context (e.g. Melia 2008a) the aim has been, as far as possible, to follow Hammersley's advice and avoid politically motivated bias.

Chapter 10 will be a chapter of two parts in this respect. Sections 10.2 and 10.3, answering the research questions, may be considered part of May's fourth stage. From Section 10.4 onwards, the findings will be used to draw conclusions about what *ought* to be done, and to make recommendations for Government policy. These sections may be considered part of May's fifth stage, and as such, the value judgements which underpin them will be made explicit.

5.10 Summary of Research Design

This study began with aims concerning the feasibility of carfree developments in the UK, and who might want to live in them. This chapter has developed these into three research questions focussing on two target groups. These groups were hypothesised to be favourable to the prospect of living in a carfree development.

Section 5.3 considered a number of different possible research approaches, deciding that a survey approach would best address the research questions. These questions suggested a combination of quantitative surveys followed by some form of qualitative interviews, to explore interpretations and probe the robustness of responses to the quantitative surveys.

Due to the expected small size of the target groups, purposive samples were chosen on the basis that they were likely to contain high concentrations of the target groups. These were expected to be found concentrated amongst members of environmental and cycling groups, and in geographical areas where car ownership is low in relation to income, or where a decision to live in a particular place implies accepting some restriction on car ownership and use.

Three survey samples were chosen to reflect these expectations: an online survey aimed at members of environmental and utility cycling organisations, a postal survey of the Bloomsbury and Kings Cross wards of Camden and a household survey of Poole Quarter, a new 'low car' development in Dorset.

The hypothetical questions at the heart of this study would remain problematic; the review of methodological options found no comprehensive solution to the difficulties these raised. A combination of quantitative and qualitative questioning appeared to offer the best approach, enabling the motivations of respondents to be probed in more detail, and yielding information about past and current behaviour against which to assess the responses to questions about potential future decisions.

6   UK Survey Areas

6.1   Camden – Bloomsbury and Kings Cross Wards

As described in the previous chapter, the Bloomsbury and Kings Cross wards of Camden were chosen as sample sites for their low car ownership, relatively high incomes and low car ownership amongst home owners – all factors which were expected to yield a high proportion of Carfree Choosers. Before making a final decision on the sampling method and design of the planned survey it was decided to explore the local context, through an observational visit and review of specific literature.

Background: Planning and Transport in London

With a population of 7.5 million (TfL 2008) London is considerably larger than any of the cities described in the previous chapter, but there are some similarities in the planning and transport contexts. Following many years of decline, the population of London began to recover, earlier than most British cities (Champion 2004), rising 10% between 1981 and 2006. The changes were strongest in Inner London, where population rose by 16% over the same period (TfL 2008). In Camden these changes were encouraged by planning policies favouring urban intensification (Williams 2000).

As discussed in Section 4.3 Car ownership in London is lower than any other British city and in common with other cities, the lowest levels of ownership are concentrated in the inner areas, as illustrated in Figure 6-1:
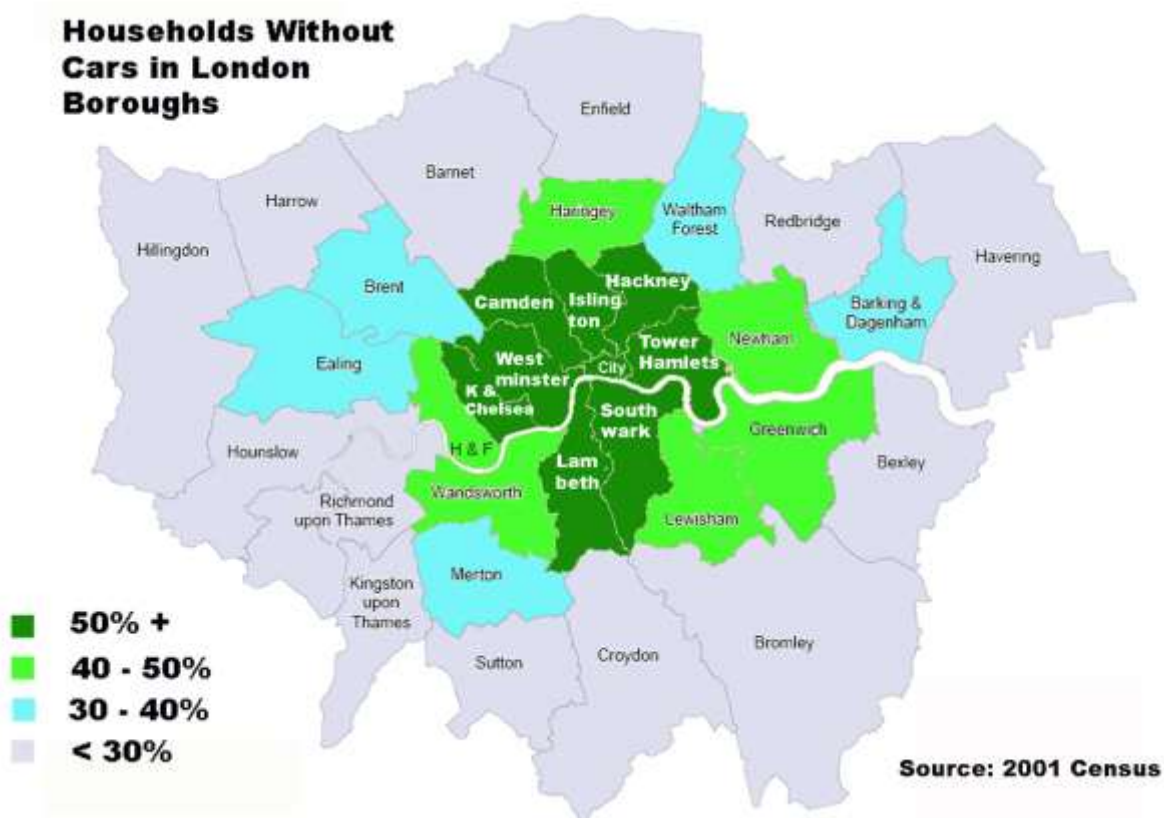
Figure 6-1 Households Without Cars in London by Borough

Unlike other UK cities, public transport is both regulated and benefits from a general subsidy (both the level and conditions of subsidy are more limited elsewhere). This increased by 40% between 2000/1, when the Mayor and Assembly took over devolved powers, and 2004/5 (Knowles, Abrantes 2008). This increase was made partly to support the introduction of the congestion charge in 2003, although the net revenue from the charge made only a small contribution to the cost. Although the conditions are not as straightforward as in the German cities, integrated ticketing is available through the (prepayment) Oyster Card and (off-peak) Travel Card.

Assisted by these policies (and other economic factors) public transport passenger kilometres increased by 50% between 1991/2 and 2006/7 (TfL 2008, excluding national rail) while patronage was falling elsewhere in England and Wales (Knowles, Abrantes 2008).

Figure 6-2 shows a level of car use comparable to the European cities in Chapter 3. The shares for public transport and walking are higher than any of the European cities, although the Commission for Integrated Transport (2001) has suggested the latter may reflect differences between national surveys in the reporting of walking trips. Such differences cannot explain the substantial differences in the share of cycling, however: between five and twenty times higher in the European cities.

London Modal Shares (2007)
Source: TfL (2008)

Legend:
- ■ Car
- ■ Public Transport
- □ Cycling
- ■ Walking

Pie chart values: 39, 26, 2, 31
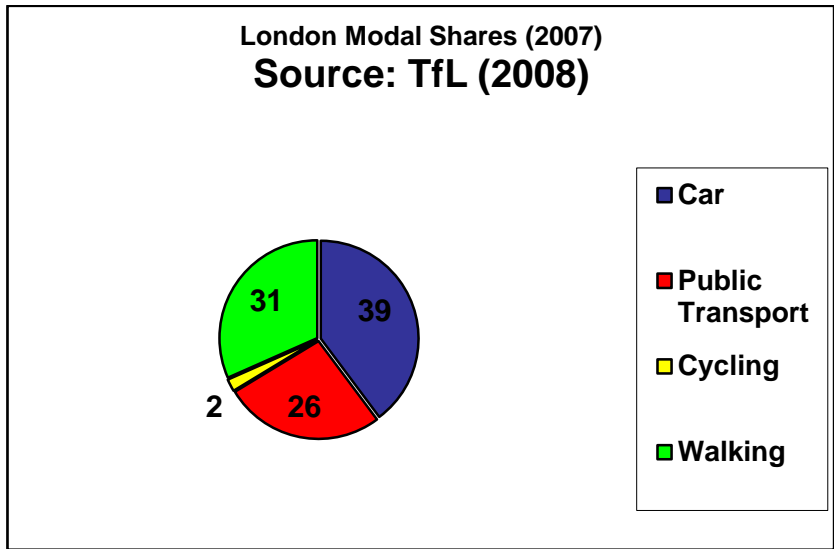
Figure 6-2 London Modal Shares, workday trips.

The Borough of Camden

A different picture emerges when Inner London is considered separately. Trip counters in four locations in Camden showed the share of bicycles more than doubling from 2001 to 11.4% of movements (not including pedestrians) in 2008 (Camden LB 2008). Figure 6-3 shows the modal shares for travel to work from the 2001 Census, before the introduction of the congestion charge; public transport was already the predominant mode and car use was almost as low as in the European carfree areas.

Camden Journeys to Work (2001)
Source: Census Table CS121

Legend:
- ■ Car
- ■ Public Transport
- □ Cycling
- ■ Walking

Pie chart values: 18, 57, 4, 18
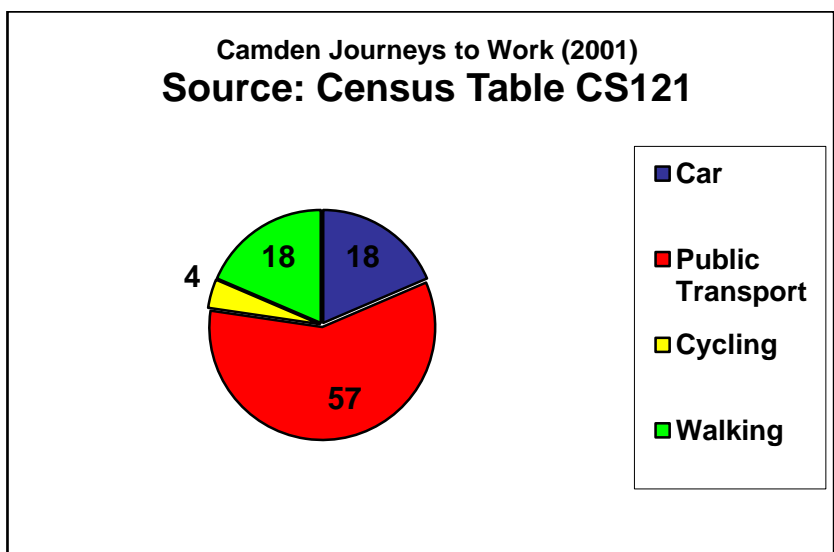
Figure 6-3 Camden Travel to Work by Mode.

The London Borough of Camden has been pursuing a policy of restricting residential parking for some time. By 2004 all of the borough's highways were covered by a Controlled Parking Zone. In tandem with this policy, Camden has implemented over 2,500 mainly small 'car free' housing units, distributed across 287 sites (Camden LB 2005). 'Car free housing' is defined in Camden by a Section 106 planning condition precluding the occupiers in perpetuity from applying for a resident's parking permit.

Observational Visit
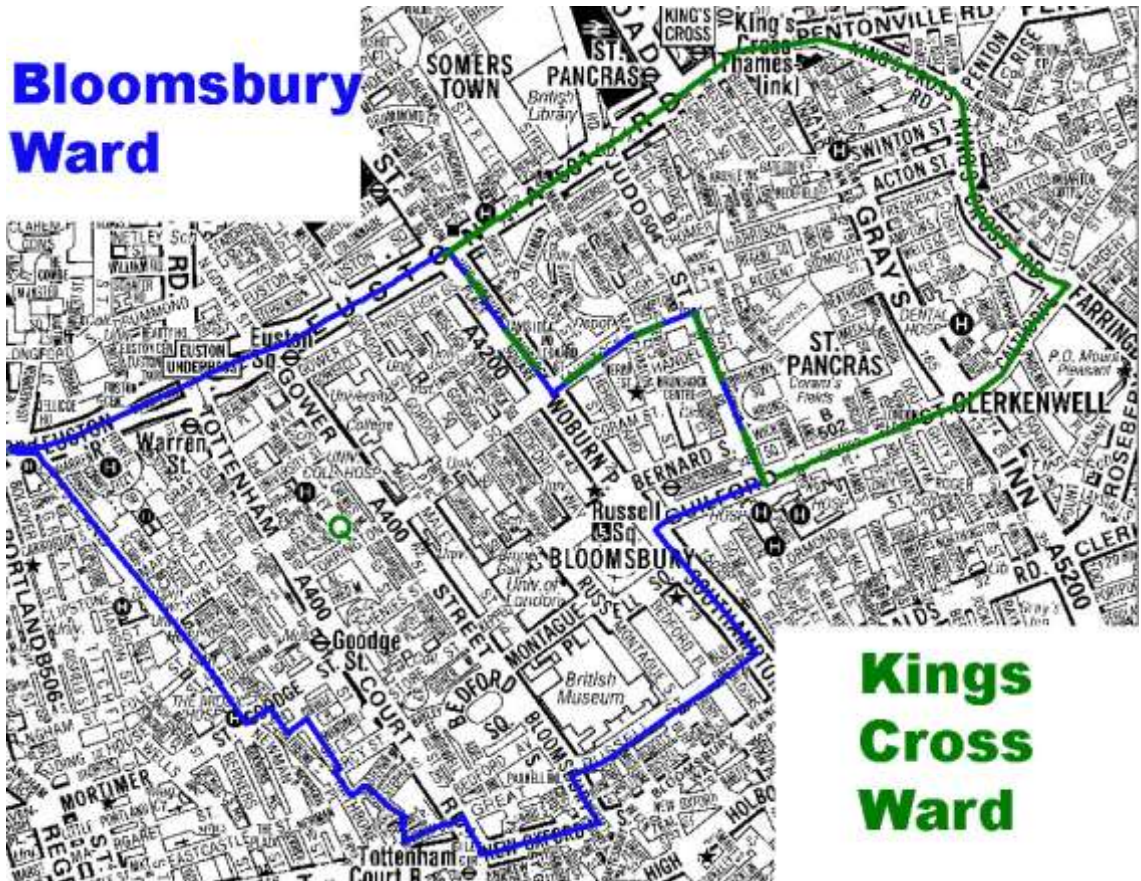
Figure 6-4 Map of Bloomsbury and Kings Cross Wards

An observational visit to the Bloomsbury and Kings Cross wards was carried out by bicycle on an afternoon in March 2007. It was initially planned to look for predominantly residential areas with significant proportions of single households living in individual houses, as these would be common in most other residential areas elsewhere in the UK. This proved unattainable. Various commercial (including university) uses spread across most of the two wards. The only extensive concentrations of purely residential properties were council or housing association estates such as those shown in Figure 6-5 and Figure 6-6.

| **Figure 6-5 Peabody Trust Estate, Bloomsbury** | **Figure 6-6 Council flats, Kings Cross Ward** |

There were very few houses occupied by single households. Terraces of older town houses were distributed across much of the two wards. Some had been converted into flats (Figure 6-7). Others had changed to commercial uses; in some streets and some houses there appeared to be a mixture (Figure 6-8).

| **Figure 6-7 Terraces converted to flats, Bernard St., Bloomsbury Ward** | **Figure 6-8 Mixed commercial/residential, Doughty Street, Kings Cross Ward** |

Camden Borough Council (T. Pancha 2007, personal communication March 14) cited two recent 'car free developments' in Bloomsbury: a student residency on Woburn Place and the recently redeveloped Brunswick (Figure 6-9). This was originally completed in 1972 as a council housing and pedestrianised shopping area. It had 560 flats, mainly one or two bedroom, of which around 50 were now privately leased from the Council (The Brunswick Project 2007). There was a two storey car park beneath the Centre with a total of 172 spaces, some of which were allocated for non-residential purposes.

| **Figure 6-9 The Brunswick, Bloomsbury Ward** | **Figure 6-10 Gordon Square, Bloomsbury, surrounded by University College London** |

Observation of estate agents' windows and properties for sale online illustrated the problems of affordability which were to feature in the survey responses and interview comments. The advertised price for a two bedroom flat in The Brunswick was £425,000, for a four storey town house in Kings Cross: £925,000. This suggested that owners of the few houses remaining in individual household occupation would be atypically wealthy – a key difference between Central London and elsewhere.

The two wards fall almost entirely within the congestion charging zone. A mixture of residents' and metered parking was available on most of the streets, apart from the 'red routes' (arterial roads where parking is banned) some other main thoroughfares and narrow side-streets. The restriction on the residents' parking spaces only applied from 8.30 am until 6.30pm on weekdays and 1.30pm on Saturdays. Many of these spaces were unoccupied during the day. Illegal parking had clearly been a problem on some housing estates where signs threatened clamping and impounding of offending vehicles with release fees totalling several hundred pounds.

There was an extensive but rather disjointed network of cycle routes, mainly signposted along quieter roads. The number of cyclists on the roads appeared relatively high by British standards, though not as high as the European cities described in the previous chapter. Some of the relatively few segregated sections of the London Cycle Network run through Bloomsbury. Both the design quality and standards of maintenance of these sections compared unfavourably with the facilities viewed in the European cities.

The two wards are served by six tube stations on different combinations of six different lines; the mainline and Thameslink stations are located on the Northern border of Kings Cross Ward. Everywhere within the two wards could be considered within reasonable walking distance of more than one of these stations.

6.2 Poole Quarter

As described in Section 5.4 Poole Quarter was selected for study following its inclusion as an example of good practice in the DfT's (2005) guide to residential travel plans. It is a mixed tenure development; when completed it was planned to provide 512 dwellings, mainly flats. It was visited twice: briefly in September 2006 and a year later to distribute the surveys.

Background: Planning and Transport in Poole

Poole in Dorset had a population of 138,385 in 2001, forming a conurbation of around 300,000 with Bournemouth. It is a ferry port and seaside resort with a large older population (25% over 60 compared to a national average of 20% ONS 2009, table CS001). 96% of the population were classified as 'white British' in 2001. Thus, it would provide a contrast in several respects to Camden.

The proportion of carfree households from the Census was 18% – lower than the national average (25%). Interestingly, the proportion of adults aged 16 – 74 without a car was much lower: 8.5%. This reflects the particular concentration of carfree households in Poole amongst two groups: single person households, particularly in the central areas, and retired people over 75.

All purpose modal share information was not available, but the journey to work data from the 2001 Census shows considerably higher car use than in London or any of the European cities. This and the proportion for cycling are both higher than the national averages (67%, 3%); walking was similar to the national average, but public transport was considerably lower (average for England: 16%). This may partly be due the growth of large suburban housing estates and edge of settlement employment developments, such as the one around Bournemouth airport.

Median income was slightly (5%) higher than the national average, whereas the proportion of households without cars was lower than the national average (18% against 25% ONS 2009).

Poole Journeys to Work (2001)
Source: Census Table CS121

Car
Public Transport
Cycling
Walking

5
7
10
76
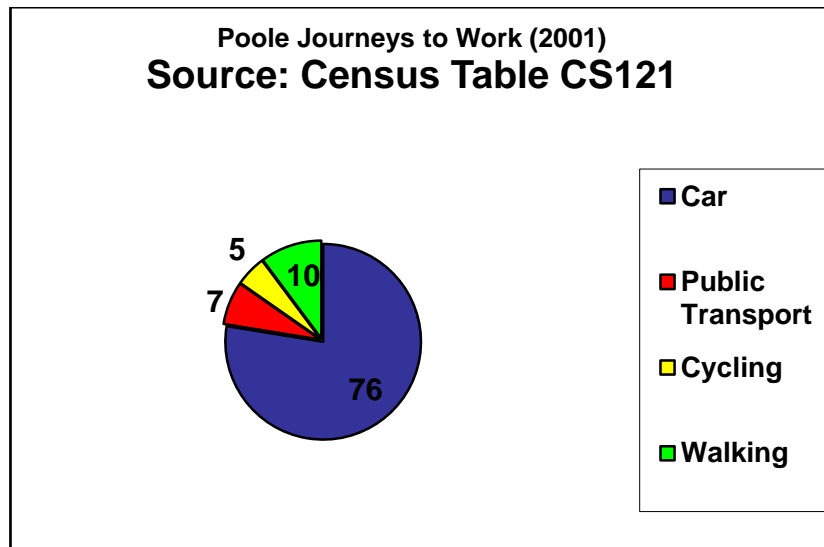
Figure 6-11 Poole Borough Travel to Work by Mode

The Local Plan (Poole BC 2007) includes the following statement:

"The rapid growth of Poole over the last 30 years on greenfield sites has come to an end and the challenge to agencies involved in the development process is to accommodate growth within the existing urban area."

One element of this new policy would involve the limited objective: "to modify the undesirable side effects of car use".

The Local Transport Plan, prepared jointly between Poole and Bournemouth Boroughs and Dorset County Councils similarly declares a limited objective to "restrain traffic growth".

A report monitoring progress against its targets (Dorset CC 2008) showed a 70% increase in bus patronage over the three years to 2007/8. The introduction of free bus travel for people over 60 in 2006 would probably account for much of this increase; the Councils also cite as contributory factors: bus priority measures, the introduction of real-time information at bus stops and new vehicle fleets. The increase in patronage was advanced as an explanation for the recorded reduction in the reliability of bus services.

The report also shows a 50% increase in cycling over the same period, although the monitoring based on trip counters may have reflected localised changes rather than a general increase of that magnitude. The only measurement of modal shares showed the proportion of journeys into the urban centres at peak time by car increasingly slightly to around 56%.

Whereas controlled parking zones had been introduced in several parts of Bournemouth, in Poole, the report noted: "political support for on-street parking restrictions has been difficult to secure".

Poole Quarter

Poole Quarter was planned with a parking ratio of 0.7 places per dwelling. For most of the dwellings occupied at the time of the survey, this meant one allocated parking space per dwelling. Some of the other blocks yet to be built, including some sheltered housing, were planned with much less parking. According to the developer, parking had caused some problems in selling some of the larger properties, so they successfully applied for about 6 additional spaces (Lee Smith, Poole Borough Council 2007, personal communication October 10[th]). On-road visitor parking was provided with pay and display meters.

Poole Quarter was one of the first developments in the country to be planned with a residential travel plan aiming to reduce car use amongst residents (DfT 2005).   Measures included a car club, a voucher worth up to £100 providing discounts on public transport or cycle purchase and a personalised journey planning service. The developer was also providing a subsidy to enhance the local bus service. The Council pointed out that some of the measures (e.g. the number of car club vehicles) had yet to be fully implemented. The location, within walking distance of the town centre, a major supermarket and the railway and bus stations offered a number of advantages for a development with a travel plan.

Figure 6-12 Plan of Poole Quarter

Roughly half of the site was occupied by September 2007 with a total of 512 units planned for the 4.72 hectare site – a density of 108 units per hectare, comparable to that of GWL Terrein.

The affordable housing was substantially complete. Two higher rise towers still under construction would contain entirely open market flats, thus the proportion of affordable housing on the site at the time of the survey would have been higher than the ultimate expectation of around 35%.

| **Figure 6-13 Poole Quarter Seldown Road and Cycle Path** | **Figure 6-14 Poole Quarter Locked Communal Cycle Parking** |

The Department for Transport guide emphasised the design elements intended to encourage cycling and children's play. The cycle route shown in Figure 6-13 bordered the site, providing a cut-through between two of the through roads. As in Camden, the design standards compared poorly in terms of priority, design speed and ease of use to the European examples. Lockable communal cycle parking was provided within the blocks of flats and did appear to be used (Figure 6-14).

The relatively few houses all had small enclosed gardens (Figure 6-15) but there appeared to be no equivalent for the flats. Children's play areas were supposed to be provided across the site, but these were not seen at the time of the survey (a small area was apparently provided in one part of the site). The central courtyards were designated as home zones (Figure 6-16) but the density of car parking did not make them attractive places for children's play. The visits were made on weekdays during term time, so no conclusions could be drawn from the absence of children playing. It would be difficult to imagine younger children, with or without parents, playing in the 'home zone'.

| **Figure 6-15 Poole Quarter Townhouses with Gardens** | **Figure 6-16 Poole Quarter Courtyard Home Zone** |

Signs threatening wheel clamping suggested that parking had evidently been a cause of some conflict. Two large information boards fixed in the grass verge by one of the entrances described the objectives of the Travel Plan.

The location, walking distance of the town centre and Poole harbour, was evidently considered an attractive one; the sea was not directly visible from ground level, but could be viewed from nearby and possibly from some of the upper floor windows. An Internet search in October 2007 revealed town houses such as those shown in Figure 6-15 for sale at prices similar to those for detached bungalows and 'executive homes' elsewhere in Poole.

6.3   Conclusions

The observations of the study areas appeared consistent with the hypotheses which had led to their identification. Higher than average proportions of the target groups could be anticipated in both. One factor common to both was limitations on parking, although the implications of this were expected to differ between Camden and Poole Quarter.

In Camden, both car ownership and use were low. High proportions of the Carfree Choosers could be expected, although the proportions of Carfree Possibles might be low: if people wished to live without a car, the circumstances in Camden would make this easier than almost anywhere else in the country, whilst the parking situation would offer a strong disincentive to local car use, even if a residents' parking permit could be obtained. The implications of the congestion charge would be more difficult to predict, since nearly all residents of the two wards would benefit from the 90% discount available to households within the charging zone.

The parking policy in Poole Quarter was intended to limit ownership to one car per household. This could be expected to affect the travel behaviour of those households with more than one adult, whilst the accessibility to public transport and services, though not as good as in Camden, could be expected to facilitate the use of non-car modes. Thus Poole Quarter was expected to include fewer Carfree Choosers than Camden, though more than in conventional housing in similar locations. The proportion of Carfree Possibles would be difficult to predict in advance.

Neither Poole Quarter nor any of the places observed within the Camden wards appeared to offer immediate environments as supportive of active travel and children's play as those provided by the European carfree areas. Assessing the attitudes of respondents towards this possibility, with its associated restrictions on car ownership and use, would be a key objective of the surveys and interviews.

7   Online Survey Findings

7.1   Overview

This chapter will describes the findings of the online survey discussed in Section 5.6. The next section will begin by describing the sources of the respondents and breakdown of the possible groups, as defined in Table 5-1. Section 7.3 will compare the responses of the Carfree Choosers to the overall sample, to Census data, and in a few cases, to the Other Nonowners. It will seek to identify differences relevant to the research questions, culminating in an analysis of responses to the questions about moving to a carfree neighbourhood. Section 7.4 will do the same for the Carfree Possibles.

The questionnaire responses were analysed using SPSS. As the statistical comparisons are generally categorical, Pearson's chi-square tests are used. The phrase 'significant', relating to comparisons, is sometimes used as shorthand for 'statistically significant' – at the 95% level, unless stated otherwise. Where such tests are made the chi-square statistics are shown on **Appendix vi**. The statistics in Appendix vi are shown in the order in which the comparisons are referred to in the text, divided into the corresponding sections in this chapter and the next one.

7.2   Overall Sample and Distribution of Possible Groups

Appendix iii lists the questions, frequencies and percentage responses from the online survey. 932 respondents started the online survey. 822 of them completed it. The description and analysis that follows includes those partial completions, although on occasions the analysis will exclude those who did not answer a particular question.

Respondents were asked how they heard about the survey. A substantial minority of respondents entered 'other' and described the specific source, which could have been entered under one of the named categories.   In these cases, the data was manually amended, assigning the respondent to the correct category and reducing the 'other' category accordingly. The responses were as follows:

Q29 How did you hear about this survey?

		Frequency	Percent	Valid Percent[3]
Valid	newspaper	3	0.3	0.3
	free magazine	8	0.9	0.9
	environmental organisation	213	22.9	24.1
	cycling organisation	622	66.7	70.4
	word of mouth	29	3.1	3.3
	can't remember	1	0.1	0.1
	other	7	0.8	0.8
	Total	883	94.7	100.0
Missing		49	5.3	
Total		932	100.0	

The unsolicited 'other' information combined with observations on timing suggested that nearly all the 70.4% now categorised under 'cycling organisation' came from one source – an email newsletter sent to around 4,000 registered members of the CTC, the national cycling organisation. It should be noted that the members who had subscribed to the e-mailing, a relatively small proportion of the national membership, were likely to have a particular interest in the campaigning work which the CTC does on behalf of cyclists. A large majority of the remaining respondents came from a range of different environmental organisations.

The profiles of the two groups ('cyclists' and 'others' for simplicity) were quite different. Because the cyclists make up two thirds of the sample their influence dominates the total group. The most striking difference between the two groups was the gender breakdown:

			Cyclists	Others	Total
24 gender		Count	486	112	598
	male	% within group	**78.1%**	**41.9%**	**67.3%**
		Count	136	155	291
	female	% within group	**21.9%**	**58.1%**	**32.7%**
Total		Count	622	267	889
		% within group	100.0%	100.0%	100.0%

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[3] For single option questions, SPSS generates two statistics: 'percent' (of all respondents to the survey) and 'valid percent' (respondents to the question). For multiple option questions, an equivalent to 'valid percent' has been separately calculated (i.e. the ticks for that option, as a percentage of those who responded to the question as a whole).

The cyclists were also older, had a higher income, included more employees and were more likely to live in a detached house.

Potential Groups

The four potential groups defined in Section 5.2, were identified by the question responses shown in Table 7-1 (see Appendix iii for the full questions):

Possible Group	Question	Responses
Carfree Choosers:	16	I live without a car by choice
Carfree Possibles:	12	I would like to live without a car if circumstances changed
	&: 15	options 2 or 3 (have lived without a car in the past)
Other Nonowners:	16	options 2 or 3 (would like to own a car, or I am unable to)
Other Owners:	12	options 1 or 2 (would not give up car, or not possible)
	&/or: 15	options 1 or 4 (never lived without a car since passing test)

Table 7-1 Questionnaire responses identifying the Online possible groups

In 30 cases missing data (i.e. people who did not complete the whole questionnaire) prevented the allocation of the responses into one of the potential groups. The distribution of the remainder is shown in Figure 7-1. Where statistical comparisons are made between the possible groups in the analysis which follows, only those who completed all the relevant questions are included.
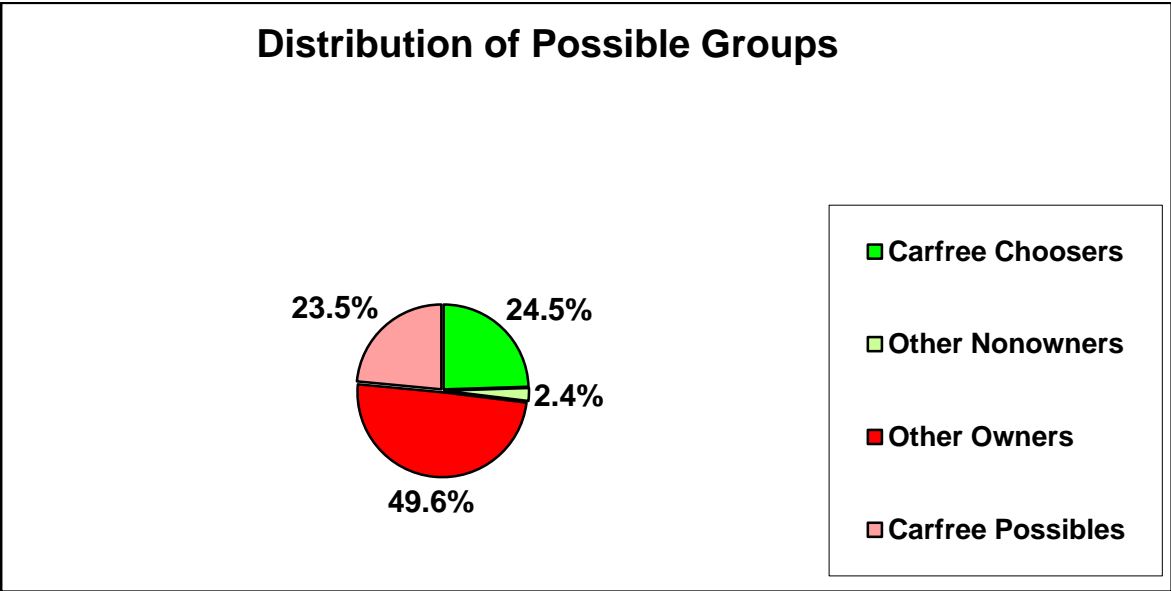
Carfree Choosers	221	Other Nonowners	22
Carfree Possibles	212	Other Owners	447
		Total valid responses:	902

Figure 7-1 Online Survey – Proportions & Sizes of Potential Groups

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The overall proportion of non car owners, 27% compared to 19% nationally. As the proportion of Carfree Choosers[4] was greater than 19% it can be concluded that, as expected, the sample included a higher than average proportion of this group. No direct national comparison was available for the Carfree Possibles, although following the discussion in Section 5.3, 23.5% is probably greater than the national proportion.

The very small proportion of Other Nonowners was expected to make separate statistical testing of this group difficult, although some significant differences were found between this group and the Carfree Choosers, as described below.

7.3   Carfree Choosers and Total Sample Compared to Census Data

The analysis which follows will compare 2001 Census data for England and Wales with the total sample and the Carfree Choosers.

The overall sample, influenced particularly by the cyclists, was weighted towards the middle age groups with the under 30s and over 60s both under-represented. The Carfree Choosers were younger – half of them were aged between 20 and 39. A Chi-square test on the proportions under and over 40 was significant at the 99% level.

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[4] Unlike the Census category the definition of the Carfree Choosers in this survey includes some people with cars in the household. As discussed in the next section this applied to just 20% of the Carfree Choosers, so the comparison here remains valid.

Online Survey - Age Distribution (Q.25)
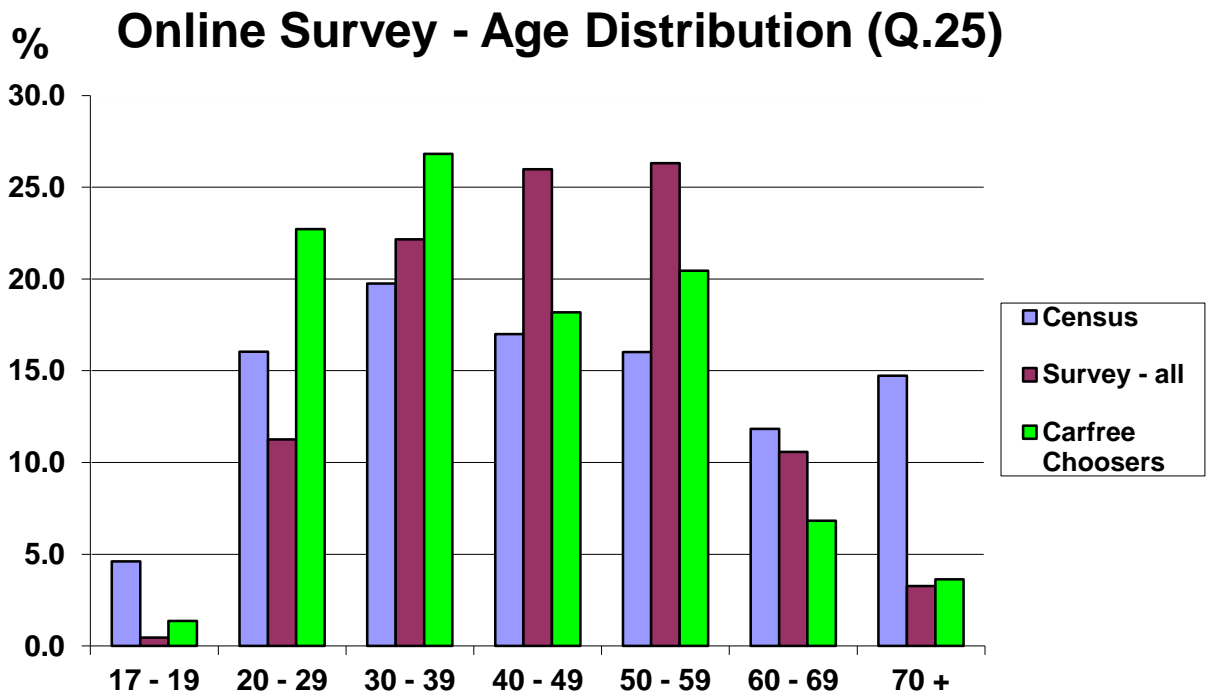
Figure 7-2 Online Survey – Age Distribution

The household size of the overall sample was larger than then national average, but this was less so for the Carfree Choosers (again the difference was significant at the 99% level).

Online Survey - Household Size (Q.4)
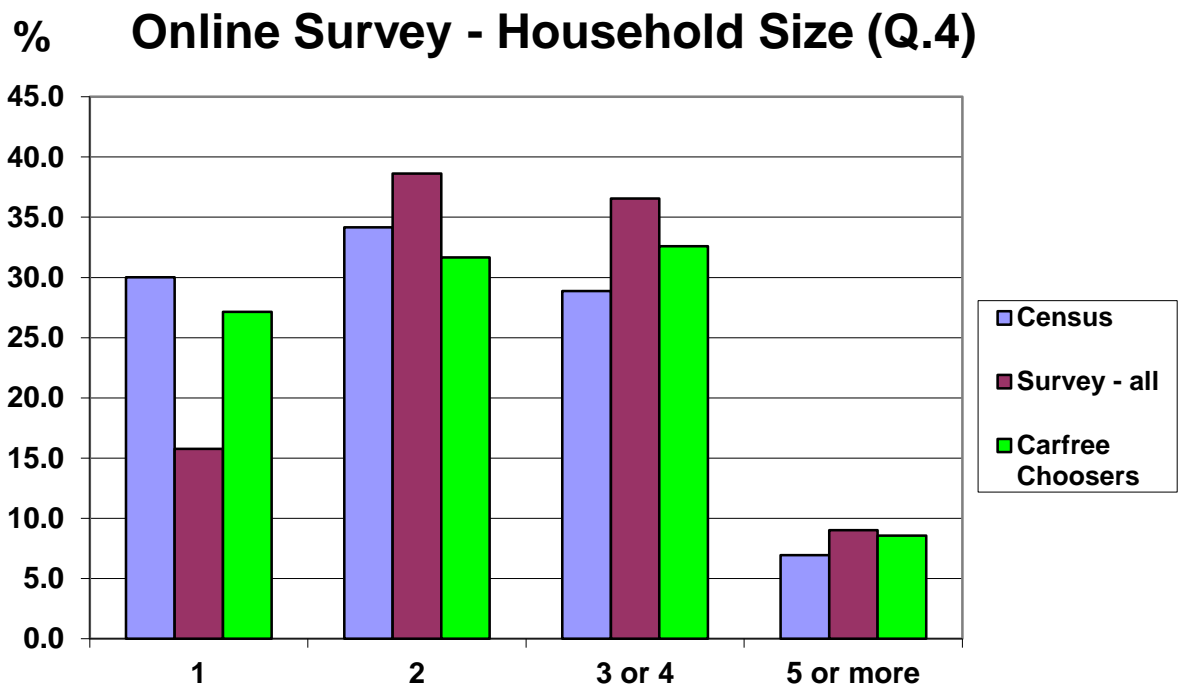
Figure 7-3 Online Survey – Household Size

Just over a third of the overall sample had children – slightly above the national average of

31.4% (ONS 2009 Census table CS014 – proportion of adults, rather than households).   The proportion of Carfree Choosers with children was significantly lower: 19.9%.

% **Online Survey - Income Comparisons (Q27)**

* Note small numbers
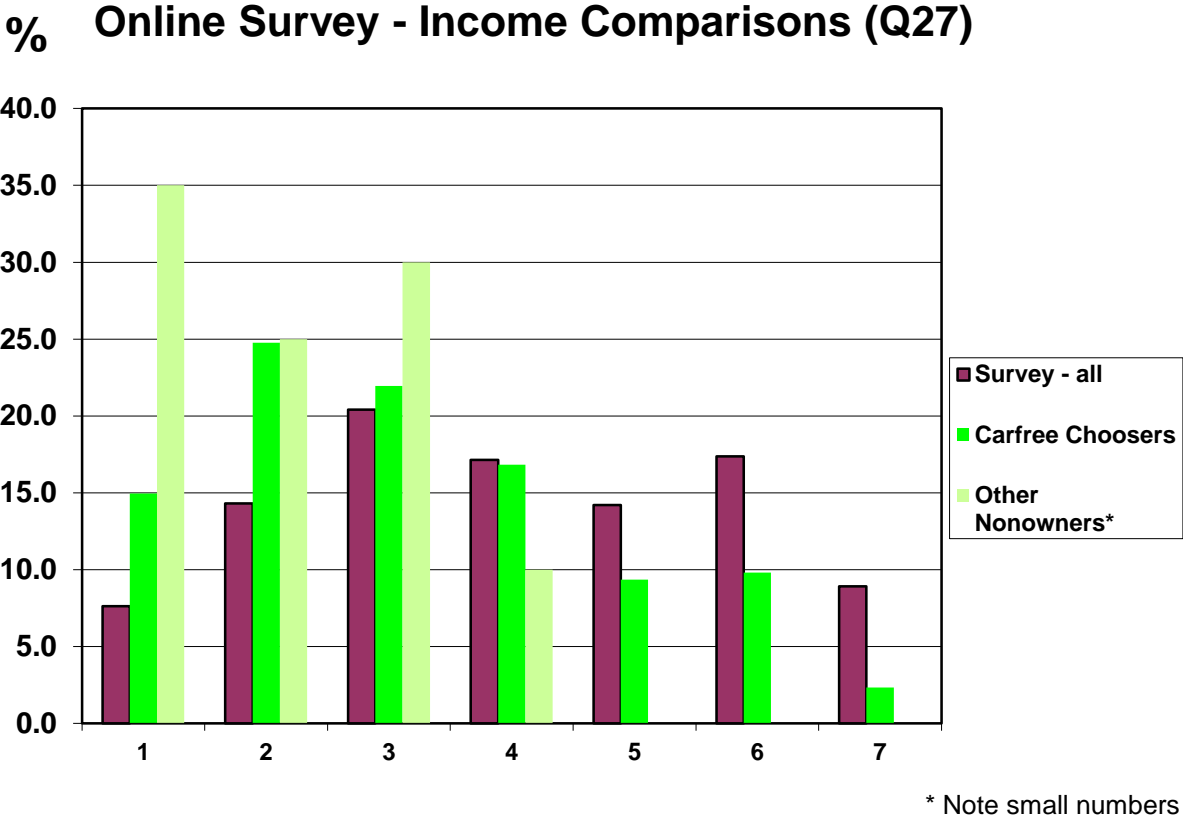
Figure 7-4 Online Survey – Income Comparisons

The Carfree Choosers had a lower income distribution than the rest of the sample, partly due to the higher proportion living in single person households (see Figure 7-3). The income levels of the Carfree Choosers were higher than the Other Nonowners – a Chi-square test on the proportions earning over and under £30,000 was significant at the 95% level. In considering the implications of this finding, it should be noted that the definition of the Carfree Chooser category included people who chose to live without a car for financial reasons (a primary or secondary reason for 60%). The Other Nonowners group included people with physical or health impediments (presumably associated with low incomes) and would also include respondents (if any) who could not afford a car but would like to acquire one if and when their financial situation improved.

Banded comparisons of national income distribution were not available from National Statistics but comparing Figure 7-4 with Figure 7-5 (from Jones 2008), indicates that the lowest income groups are under-represented amongst the overall sample. Although their incomes were lower than the rest of the sample, the median household income towards the middle of the £20,000 to £30,000 band was in line with the national median of £23,030 shown in Figure 7-5. The caveats about the

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definitions and people's perceptions of household income discussed in Section 5.6 should be re-iterated here: these comparisons cannot be considered precise.

UK Gross Household Income 2006/7 - Averages of Each Quintile

	1	2	3	4	5
Average	4,900	11550	23080	37,980	72,890

Source: Jones (2008)
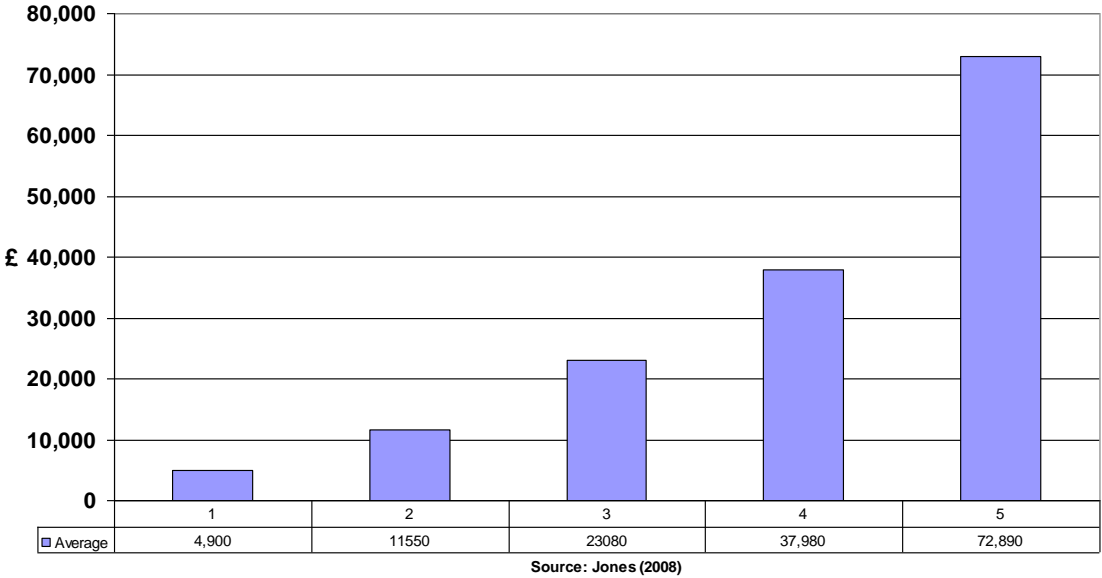
Figure 7-5 Average Household Income Within Quintiles 2006/7.

Employees, particularly full-time employees were over-represented in the survey population (ONS 2009 Census table CS061). The difference between the Carfree Choosers and the rest of the sample in this respect was not statistically significant. The underrepresented 'other categories', included carers, unemployed and people claiming long-term sickness or disability benefits.

% Online Survey - Economic Status (Q. 26)
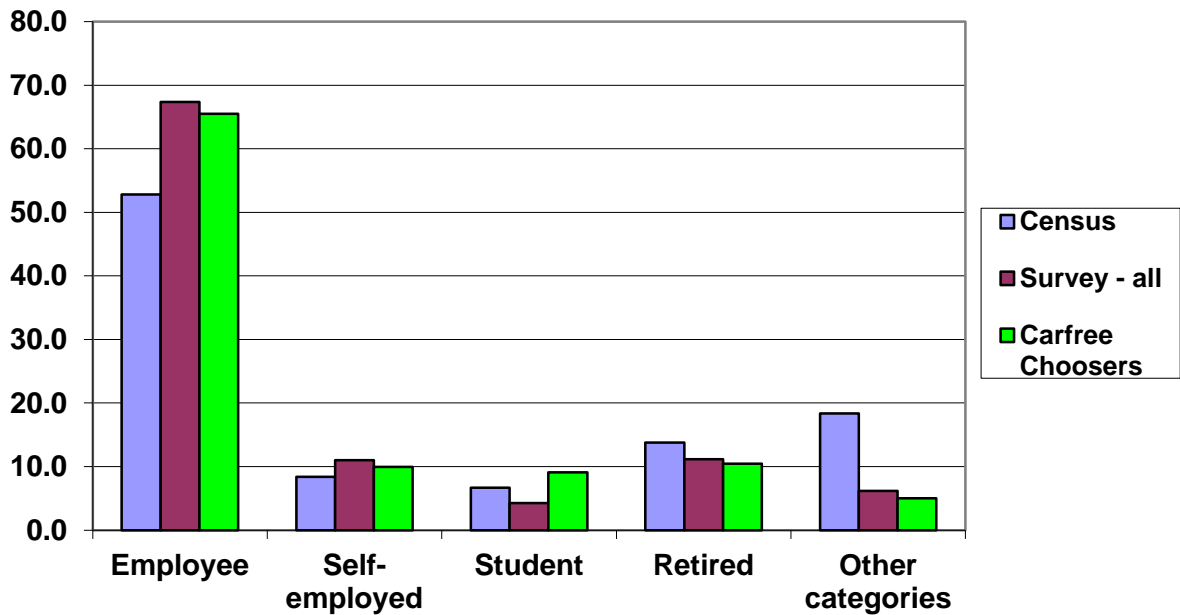
Figure 7-6 Online Survey – Economic Status

The proportion of home owners amongst the Carfree Choosers was lower than the national average and significantly lower than the rest of the sample. It should be noted however that most (56%) of the Carfree Choosers were still owner occupiers. Most of the 'other' category in the survey was made up of private tenants – differences of definition with the Census (ONS 2009 Census table CS050) prevented any disaggregation of this comparison. People in social rented accommodation were under-represented across the survey.

% Online Survey - Tenure (Q. 3)
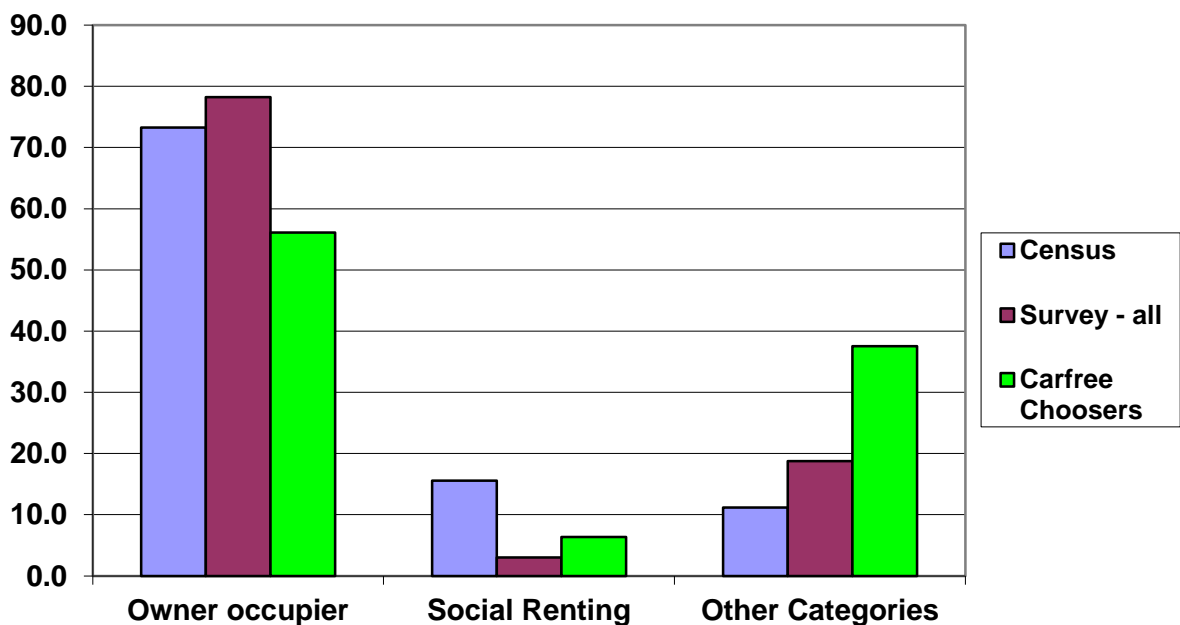
Figure 7-7 Online Survey - Tenure

The sample respondents lived in similar housing types to the general population (ONS 2009 Census table CS049). Two thirds of the Carfree Choosers lived in flats or terraced houses – significantly more than the rest of the sample.
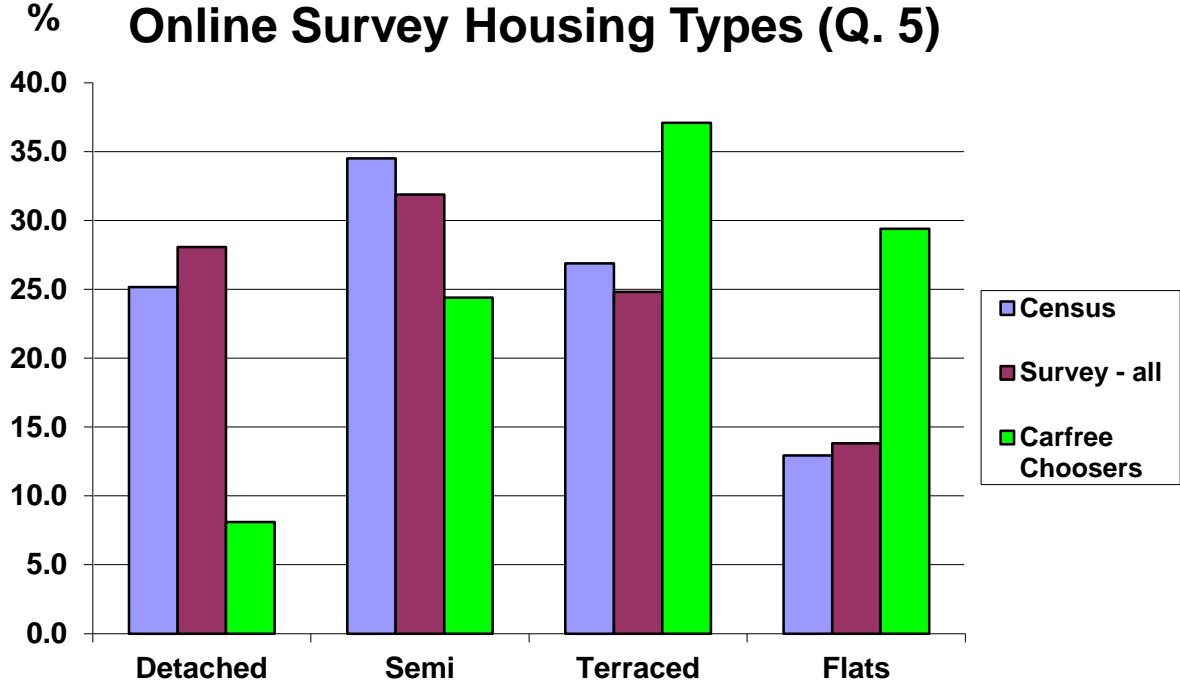
Figure 7-8 Online Survey - Housing Types

The other categories of housing – not shown – were very small in all cases.

Three quarters of the total sample indicated that they lived in a 'town or city'. By way of comparison, National Statistics estimate that 'nearly 80%' of the population lived in urban areas in 2001 (ONS 2009) – again the self-reporting would not necessarily correspond to the official definition. The Carfree Choosers are, as expected, significantly more concentrated in urban areas (90.5%). They make up 28% of the online urbanites and only 9% of the rural dwellers.

Online Survey - Urban/Rural Split
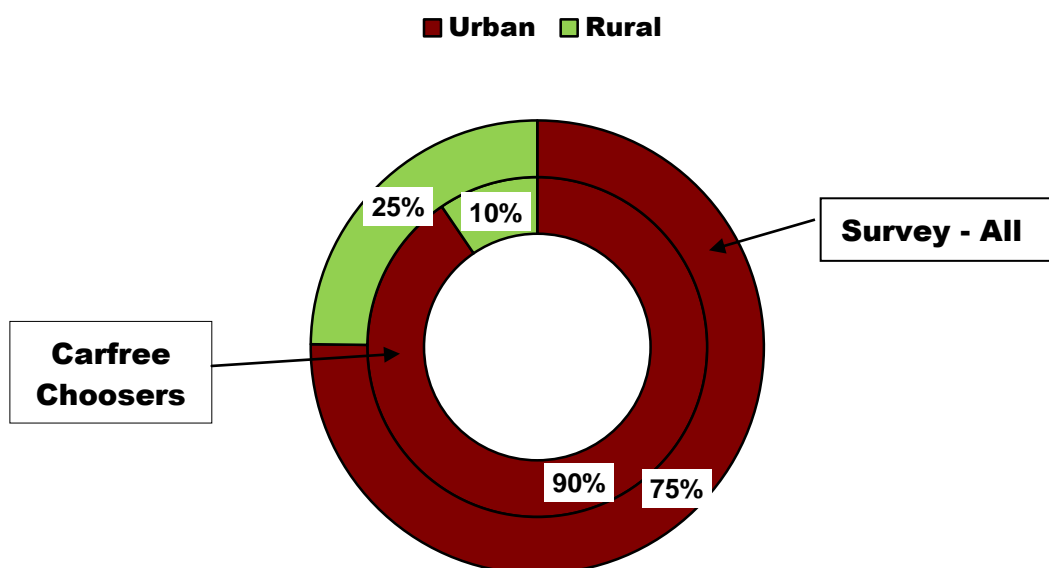
■ Urban □ Rural

Figure 7-9 Online Survey – Urban/Rural Split

This concentration in urban areas helps to explain the pattern of responses from the Carfree Choosers to several of the other questions, as discussed below.

Car Ownership and Travel

Around two-thirds of the *respondents* owned a car (Q.11); around a third of *households* had two or more (Q.10). The household car ownership rates were slightly lower than the national averages (ONS 2009 Census table CS061) – a difference which may be more significant when bearing in mind the under-representation of single person households in the survey. As discussed in Section 5.2, the definition of the Carfree Choosers did not preclude other members of the household owning cars, providing the Carfree Choosers did not drive them. As shown in Figure 7-10, this situation applied to one in five of the Carfree Choosers.

% Online Survey - Cars in Household (Q.10)
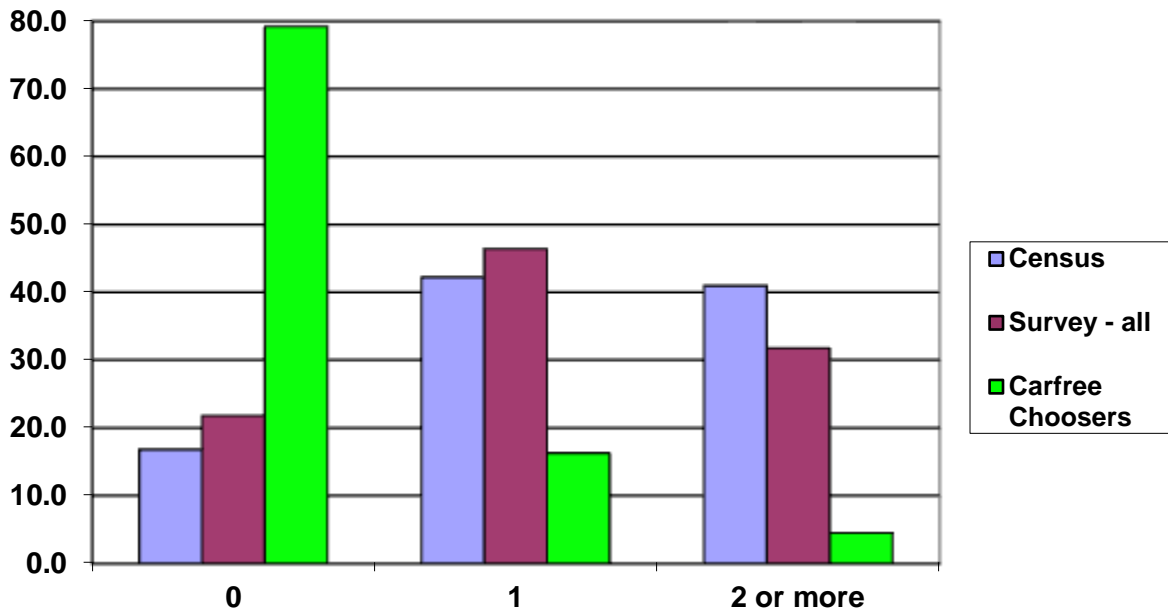
Figure 7-10 Online Survey – Cars in Household

Question 17 asked the Carfree Choosers why they lived without a car, offering main and secondary reasons. The most frequent 'main reasons' were:

Q. 17: Reasons for living without a car – Carfree Choosers	
Environmental reasons	61%
No need for a car	39%
Don't like driving	31%

Table 7-2 Most Frequent Responses to Q.17 – Carfree Choosers

The high proportion of environmental reasons was a notable but not unexpected difference from the national surveys cited in Table 4-4. Cost was cited as a main reason by 21% and a secondary reason by 39%. Lack of parking was a main reason for just 2% and a secondary reason for 15%.

Nearly three quarters of the sample said they drove a car. These split fairly evenly between those who drove most days, most weeks and only occasionally. 21% said they never drove (Q.9). 56% of respondents cycled on most days; 24% on most weeks. 44% walked at least 10 minutes most days: 34% most weeks. The proportions using public transport were considerably smaller.

Although the travel patterns revealed by Question 9 are not directly comparable with national statistics it is possible to draw some broad contrasts with the National Travel Survey ('the N.T.S.:' DfT 2006b). In order to juxtapose the N.T.S. data with the survey, it is necessary to re-express the survey frequencies as a percentage of the total in each column so that each column sums to 100%

(not the case in Appendix iii). So, for example, the 'Most days' column roughly equates to the modal shares on most days (though note that respondents could tick more than one 'Most days' option):

	2005 N.T.S.*	Survey			
		Most days	Most weeks	Occasionally	Never
Car as a driver	41.7%	17.2	19.1	9.3	9.6
Car as a passenger	22.6%	1.5	14.2	21.8	6.2
Train	1.5%	5.3	10.7	22.4	5.2
Underground, light rail or tram	0.7%	2.0	3.9	15.8	20.3
Bus	6.1%	4.4	9.8	18.2	11.9
Motorcycle, scooter or moped	0.3%	0.3	1.0	1.9	41.9
Cycle	1.4%	38.7	17.0	4.0	4.0
Walk#	23.5%	30.6	24.4	6.7	1.0
Other	2.0%	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0

Table 7-3 Comparison of Online Survey With National Travel Survey

* Frequency of trips for all purposes

for at least 10 minutes in the survey, at least 20 minutes in the N.T.S.

The survey respondents clearly cycled considerably more than the national average. As expected, this applied particularly to the cycling members, but also to the 'other' group – roughly half of whom cycled most weeks or days. Train use would appear to be higher – typical amongst middle aged men (Sloman 2006). Car driving and particularly car passenger travel would appear to be lower than the national average. The differences of definition make it difficult to draw any firmer conclusions from this table.

Combining the first two categories 'most days' and 'most weeks' Figure 7-11 shows the regular travel patterns of the Carfree Choosers compared to the total sample.

% Regular (most weeks) Travel by Mode (Q.9)
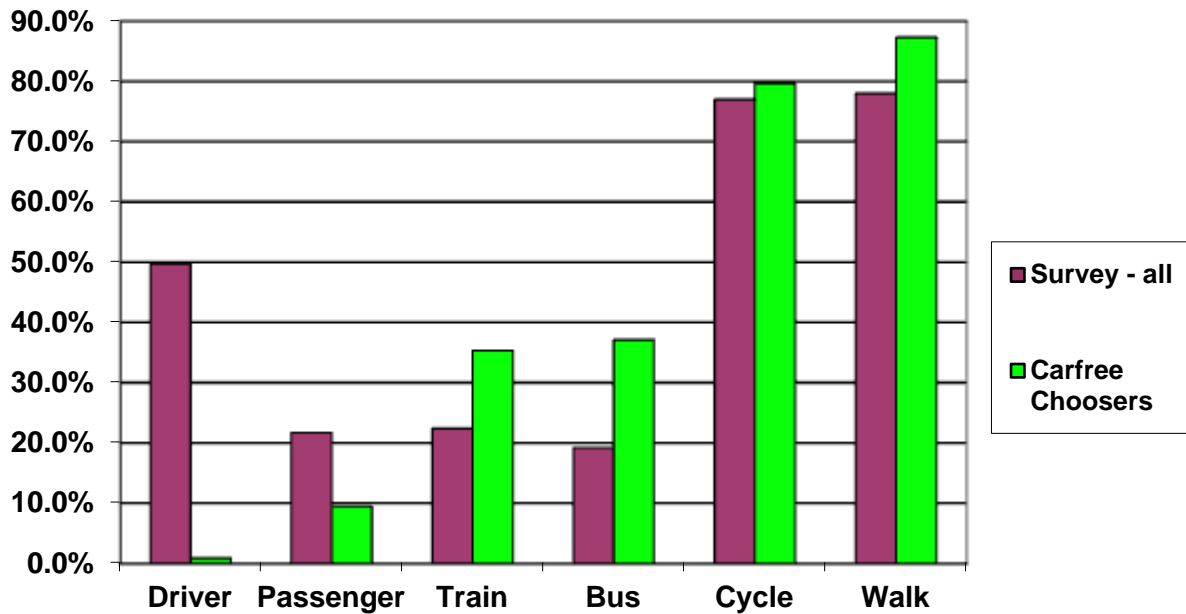
Figure 7-11 Online Survey Regular Travel by Mode

The Carfree Choosers rarely drove (76% never), travelled less as car passengers (72% occasionally), walked more (87% regularly) and used all forms of public transport more than the other groups (all of these comparisons were significant at the 99% level). Whereas more used buses (39%) than trains (35%) regularly the proportion who never used a bus (7%) was higher than the proportion who never used a train (3%). The Carfree Choosers cycled more than the other groups. The higher level of regular cycling (80% compared to 72%) was not statistically significant, but the difference in cycling 'most days' (64% compared to 53%) was significant at the 99% level.

% Regular (most weeks) Travel by Mode (Q.9)
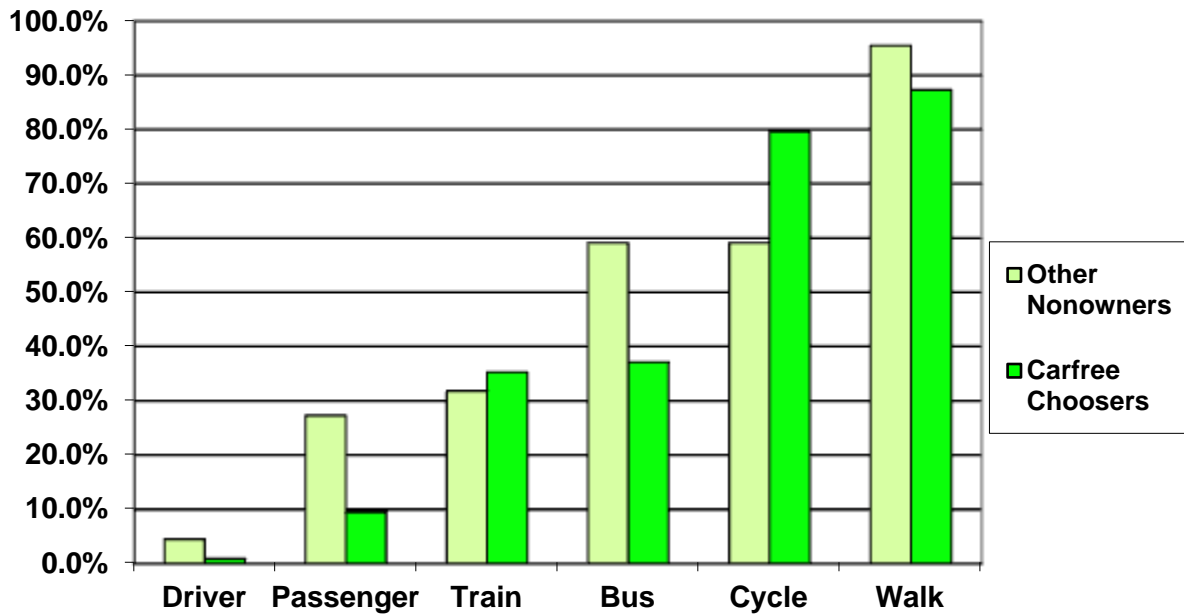
Figure 7-12 Online Survey Regular Travel of Non-Car Groups by Mode

Following the discussion in Section 4.2 it was also interesting to compare the travel behaviour of the Carfree Choosers and Other Nonowners. Of the differences shown in Figure 7-12, two were statistically significant: the Carfree Choosers cycled more and travelled less regularly as passengers in a car. The Other Nonowners used buses more regularly than the Carfree Choosers (59% versus 37%), consistent with the literature on bus travel and income/deprivation, although the difference was not quite significant at the 95% level (ρ = .061). The inverse relationship between cycling and bus use for these two groups was consistent with the findings of Dudleston et al (see Section 4.2) and suggests some degree of substitution between the two.

Attitudes to Neighbourhoods and Moving Home – Total Sample

Questions 7 asked respondents to tick any 'advantages to you of the area where you live'. Of the 11 listed, the top four are shown in Table 7-4:

Q. 7: Advantages of Current Neighbourhood – Survey All[5]	
Close to countryside	57%
Close to city/town centre	56%
Accessible public transport	46%
Quiet road without much traffic	42%

Table 7-4 Most Frequent Responses to Q.7

Available parking was the least ticked (12%). The fact that respondents did not tick a particular box might indicate either that they did not have that advantage or that it was not important to them, or both.

7.5% ticked the 'other' box, which invited further comments. The range of responses was broad. Proximity to a range of different attractions (the sea, towns, countryside) and positive points for cycling were the two most common themes, accounting for about a third of responses. In the latter category, two respondents mentioned cycle routes. A third theme, mentioned by six respondents was relative affordability.

Question 8 presented a similar list of 11 problems. The top four are shown in Table 7-5:

Q. 8: Problems of Current Neighbourhood – Survey All	
Too much traffic in the immediate area	48%
Poor or inaccessible public transport	30%
Distant from family/friends	29%
Lack of community	28%

Table 7-5 Most Frequent Responses to Q.8

The responses to the 'other' box revealed a design problem with the survey, which wrongly compelled respondents to tick at least one box, although the 'other' box could be used to indicate that there were no problems. Two respondents indicated that they would not otherwise have ticked some of the boxes they did. The data was corrected to remove these distortions.

13% indicated other problems with the areas where they lived. The most common themes in this case related to cycling, traffic and anti-social behaviour (including the succinct: "VANDALS, YOBS, SCROTES, CHAVS") – together accounting for about a third of the 'other' responses.   Amongst the cycling problems, six respondents mentioned a lack of cycle routes, or their poor quality; six mentioned house prices or affordability.

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[5] Note that in these and subsequent 'multiple option' tables, responses are expressed as percentages of those who ticked one or more of the options in that question; the absolute numbers are shown in Appendix vi

One third of all respondents indicated no intention to move house; the rest were distributed between varying levels of intention (Q. 19 – see table in Appendix iii). Of these two thirds, 60% indicated that they would buy a property and could afford to (Q. 20). 21% indicated that they would only move if and when they could afford to. 13% said they would rent privately; very few would consider any other option.

The preferences for housing and tenure type in Questions 20 and 21 were in most cases significantly associated with people's existing situations. For example, home owners were most likely to say they could and would buy (77%). Private sector tenants were most likely to prefer or consider private renting (50%). The small minority in social rented accommodation were the only group likely to express any significant preference or consideration for social renting (47%).

Amongst the housing types, the highest preference was for detached houses (38%). Although this preference was strongest amongst people already living in detached or semi-detached houses, it cut across all the categories. The other housing types were all more 'considered' than 'preferred'. Flat dwellers were the only group where most (78%) said they would prefer or consider flats.

Interpretation of these questions is complicated by their tabular and optional nature. Although a 'not consider' option was provided, some respondents ticked none of the four options in some of the categories. For some elements, the relative responses may be more illuminating than the absolute numbers. For example, only 16% of those in detached houses would prefer or consider moving to a flat, but only 27% said they would *not* consider it. Presumably many of the others overlooked a category they considered irrelevant.

Question 21 also asked about the types of area people would like to move to, or whether they would prefer to stay 'near to where I live now'. From this, and the question about existing areas, the following cross-tabulation was made:

Crosstabulation: Urban/Rural Preferences Q1 Current Area (non-movers excluded)

			Q.1 – Current Area		
			Town or City	Rural	Total
Urban/Rural Preferences	Neither	Count	163	31	194
		% within 1 area	33.6%	23.7%	31.5%
	Prefer Urban*	Count	223	10	233
		% within 1 area	46.0%	7.6%	37.8%
	Prefer Rural	Count	99	90	189
		% within 1 area	20.4%	68.7%	30.7%
Total		Count	485	131	616
		% within 1 area	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Df	ρ
Pearson Chi-Square	121.724	2	<.001
Likelihood Ratio	122.940	2	<.001
Linear-by-Linear Association	56.171	1	<.001
N of Valid Cases	616		

*   This variable computed from Questions 1 and 21 includes urban dwellers preferring to 'stay where I live now' plus those from any area preferring to move 'somewhere else in a town or city'. A similar computation was made for 'Prefer Rural'.

This shows that *relatively speaking* urban dwellers, prefer to remain urban, and rural dwellers to remain rural. When the 'consider' column is included (not shown), there are more urban dwellers willing to move to rural areas (67%) than vice versa (52%).

Only 5% expressed a preference for newly built properties, although 53% would consider one – compared to just 36% in the ODPM's national survey (2003 cited in Leishman et al. 2004). There was no significant association between the responses to this option, and the respondents' existing house types.

There were significant positive associations between the advantages online respondents cited concerning their current locations (questions 7 and 8) and the corresponding factors they would seek when moving home (question 22). So for example, people who ticked 'accessible public transport' as an advantage of their current location, were more likely to seek somewhere with accessible public transport when moving home – see Appendix vi.

Question 22 asked which out of 11 factors would influence moving choices.   The top three are shown in Table 7-6:

Q. 22: Influences on moving choice	
Well served by public transport	50%
Close to countryside	48%
Minimal traffic in the immediate area	43%

Table 7-6 Most Frequent Responses to Q.22

The least important factors were: parking (11%) and good schools (16%). The latter would equate to roughly half of those with children.

Cross-tabulating urban and rural dwellers against these factors produced some fairly predictable results. The following differences were significant at the 95% confidence level:

Q. 22: factors influencing moving	Valid percent				
	Urban	Rural	ρ	X^2	df
Minimal traffic in the immediate area	39.8	**51.9**	0.013	6.20	1
Close to countryside	42.3	**67.9**	<.001	27.24	1
Close to town/city centre	**31.3**	13.7	<.001	15.99	1
Close to shops and other amenities	**41.4**	22.9	<.001	15.13	1

Attitudes to Neighbourhoods and Moving Home – Carfree Choosers

The Carfree Choosers were more likely to be considering a home move than the rest of the sample: 76% of them ticked one of the first three options in question 19 compared to 67% for the rest of the sample (difference significant at the 99% level).

In the questions dealing with advantages and problems of where you live, and preferences on moving, the Carfree Choosers exhibited the differences generally associated with urban respondents. The main advantages they cited for their current neighbourhoods are shown in Table 7-7:

Q. 7: Advantages of Current Neighbourhood – Carfree Choosers	
Accessible public transport	70%
Close to city/town centre	68%
Close to shops or other amenities	52%
Convenient for work or study	43%

Table 7-7 Most Frequent Responses to Q.7 – Carfree Choosers

Their perceived problems are shown in Table 7-8:

Q. 8: Problems of Current Neighbourhood – Carfree Choosers	
Too much traffic in the immediate area	60%
Lack of community	33%
Far from family or friends	27%
Far from countryside	27%

Table 7-8 Most Frequent Responses to Q.8 – Carfree Choosers

The Carfree Choosers were more likely to be considering a move in the next two years (43%). They were more likely to prefer to move to an urban area (47% compared to 34% of the other groups) and less likely to prefer a rural area (22% compared to 37%). They were more likely to express preferences for living in areas well served by public transport, close to shops and services and town or city centres (36%). Parking was only a concern for two of them (1.2%). Their most frequent responses to this question are shown in Table 7-12:

Q. 22: Influences on moving choice	
Well served by public transport	60%
Close to work or study	45%
Close to shops and other amenities	44%

Table 7-9 Most Frequent Responses to Q.22 – Carfree Choosers

The Carfree Choosers were more likely to consider private renting (28%) and less likely to be in a position to buy (38%). This figure was actually lower than the proportion of home owners amongst the Carfree Choosers (56%). This initially surprising result was explained by two factors: respondents who indicated that they had no intention of moving were not asked this question – a higher proportion of these were home owners. Secondly, some of the home owners ticked 'I would only move if I could afford to buy' which might suggest an intention to 'trade up' at some future time, or a concern about the cost of moving.

In line with their existing housing types, the Carfree Choosers were more likely to prefer or consider terraced houses (80%) and to prefer or consider flats (59%). They were less likely to prefer detached houses (20%).

Attitudes to Carfree Neighbourhoods

The responses to the hypothetical question about carfree neighbourhoods are shown in Table 9-5:

Q. 23: Attitude to living in a carfree neighbourhood	Survey All	Carfree Choosers
Be keen to move there even if it meant moving some distance	13%	24%
Consider moving there, if it were somewhere convenient	61%	65%
Possibly consider the idea	20%	9%
Not consider moving there	5%	1%
Don't know	2%	1%

Table 7-10 Most Frequent Responses to Q.23 – Carfree Choosers

The more favourable responses from the Carfree Choosers were significant at the 99% level, consistent with the hypothesis in research question 3. A cross-tabulation was also performed to test the hypothesis that Carfree Choosers would be more favourable than Other Nonowners. Combining the first two categories ('keen' or 'consider') the Carfree Choosers were indeed more favourable (89% compared to 69%). The difference was not quite significant at the 95% level however. As shown on Appendix vi, the Fisher's Exact Test, needed because the expected value of one cell was less than 5 showed $\rho = 0.056$.

As mentioned above, the vast majority of Carfree Choosers lived in urban areas. Amongst those who expressed an interest in living in carfree neighbourhoods, the proportion was greater still. Amongst the 128 who gave their addresses, 96% lived in cities and towns of the sizes shown in Figure 7-13:
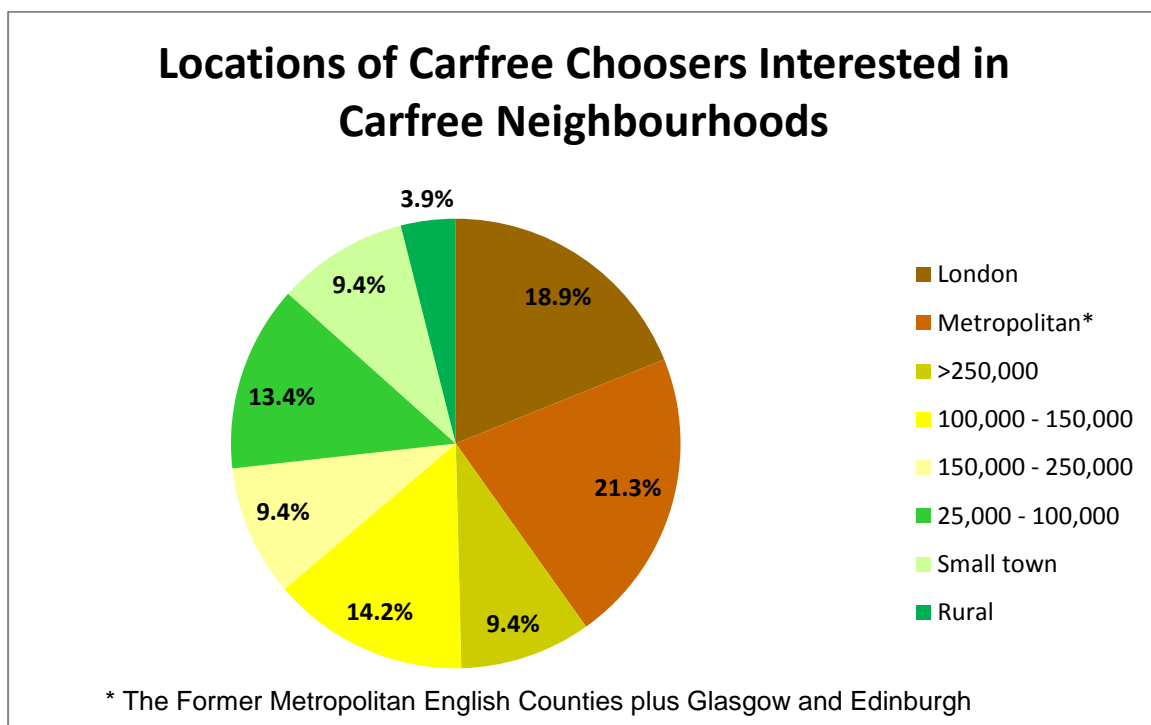
Figure 7-13 Carfree Choosers Interested in Carfree Neighbourhoods by Settlement Size

The distinction between the 'Rural' and 'Town or City' categories was defined by the respondents, with the latter manually separated by settlement size according to the addresses given. If settlements with populations of over 100,000 may be described as cities, nearly three quarters of these people were city dwellers.

Two cross-tabulations were also performed within the Carfree Choosers, to assess whether those who had expressed an interest in carfree neighbourhoods were more or less likely to prefer to move to an urban or rural area. Although neither was statistically significant, these produced the expected differences: those who were interested in carfree neighbourhoods were more likely to prefer an urban area (48%) and less likely to prefer a rural area (21%) than other Carfree Choosers. When a similar cross-tabulation was performed on the total sample the same pattern emerges, and the differences were statistically significant – the full tables are shown on Appendix vi. To some extent these differences may reflect the wording of the question – the reference to a built neighbourhood may have implied an urban area to many respondents, so those who did not like urban living might be less favourable towards carfree neighbourhoods.

7.4   Carfree Possibles

333 respondents, half of the drivers, responded to Question 12 indicating that they would like to live without a car if circumstances changed (only 11% said they would never want to give up their car). Of these, 121 had never lived without a car in the past, so were classified as Other Owners, leaving 212 Carfree Possibles – just under a quarter of the total sample. For 43% of these people, their period of carfree living was relatively short: under a year (Q.14).

Q 13 asked those drivers who would like to give up, what would be necessary for them to give up car ownership. The most frequent responses are shown in Table 7-11.

Q. 13: Changes necessary to live without a car	
Improved public transport where I live	59%
Changing circumstances of my family or spouse/partner	45%
Other	31%
Moving to a different place	28%

Table 7-11 Most Frequent Responses to Q.13

The responses were similar for both the Carfree Possibles and the Other Owners. The 'other' category responses most commonly described specific family circumstances, or referred to national public transport improvements. One respondent wrote: "I dream of Deutsche Bahn in the

UK". 19 respondents mentioned issues related to cycling, particularly cycling infrastructure. As one put it:

> "improved cycle ways, not a bit of white paint on a pavement which is very dangerous or painted track on the road which disappears whenever the road narrows."

12 mentioned better availability of car sharing or hiring. Ten referred to, or hinted at inertia, suggesting they could probably give up their cars already. One woman said: "divorce – I can't get my husband on a bike" and another wrote simply "Growing wings!"

A key objective for the qualitative interviews was to probe the credibility of, and circumstances surrounding the Carfree Possibles' responses to this question: under what circumstances might the aspiration to give up car ownership realistically be realised? As described in the next chapter, the interviews cast doubt on many of these responses.

The Carfree Possibles in the online survey emerge as a very different group from the Carfree Choosers, generally more similar to the overall sample.   They were older than the Carfree Choosers, with a third of them concentrated between 40 and 49, as shown in Figure 7-14:
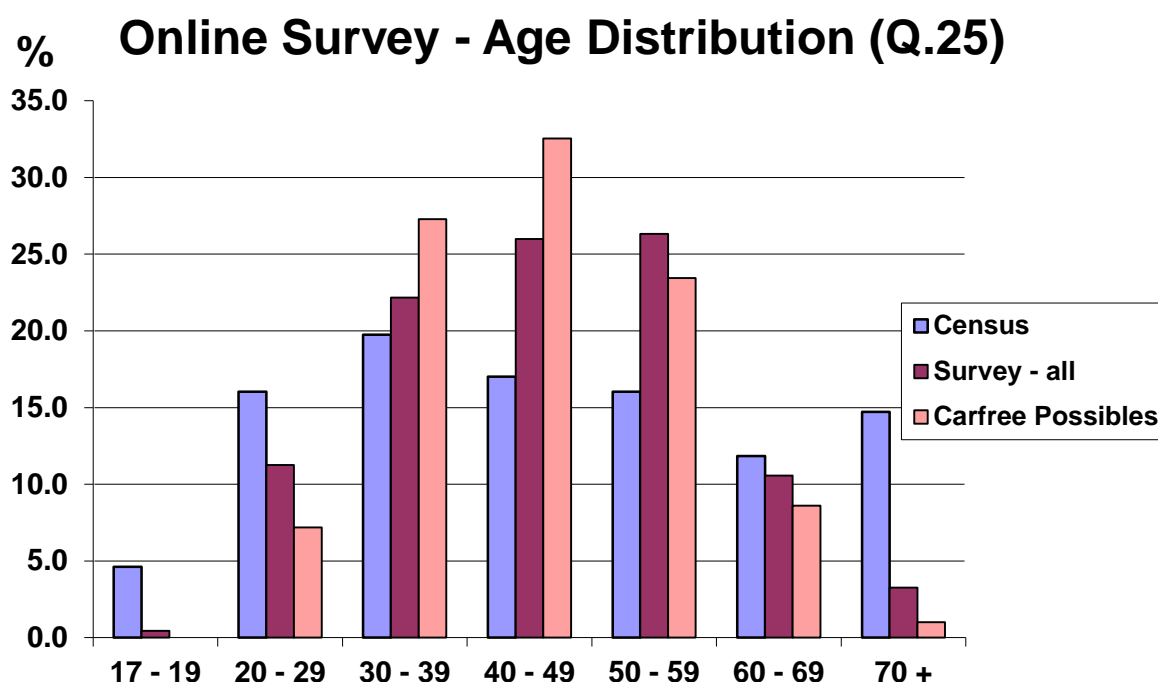
Figure 7-14 Online Survey Carfree Possibles Age Distribution

The definition of this category would have influenced this to some extent, since they had all acquired, given up and reacquired a car. They were more likely to be living in a family (52%), with children (42%) and working full-time (67%). More of them came from the cycling organisations

(74%) with a corresponding gender split (69% male). Again, compared to the Carfree Choosers, more of them lived in rural areas: 23%, similar to the overall sample.

The Carfree Possibles had a higher income than the Carfree Choosers; 66% of the former reported a household income over £30,000. This was significantly higher than the rest of the sample. The income distribution of the Carfree Possibles, shown in Figure 7-15 was similar that to the Other Owners (not shown).

% Online Survey - Income Comparisons (Q27)
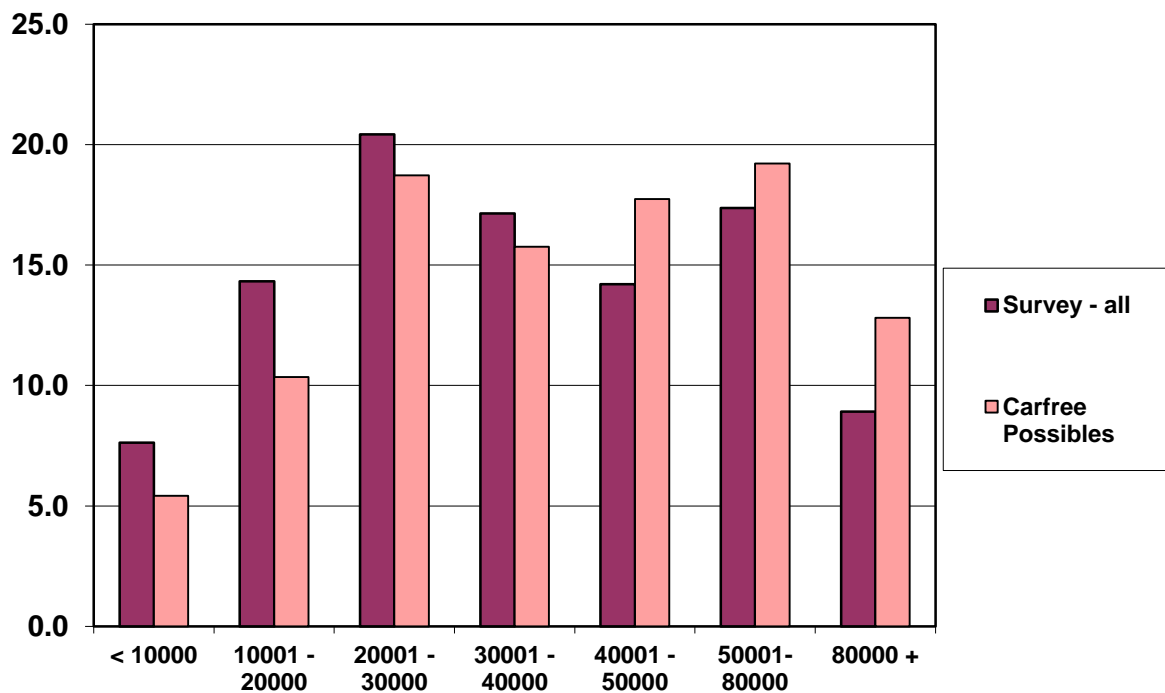
Figure 7-15 Online Survey Carfree Possibles Income Comparison

The housing tenure of the Carfree Possibles was also similar to the Other Owners, with a significantly higher proportion of owner occupiers than the overall sample:

% Online Survey - Tenure (Q. 3)
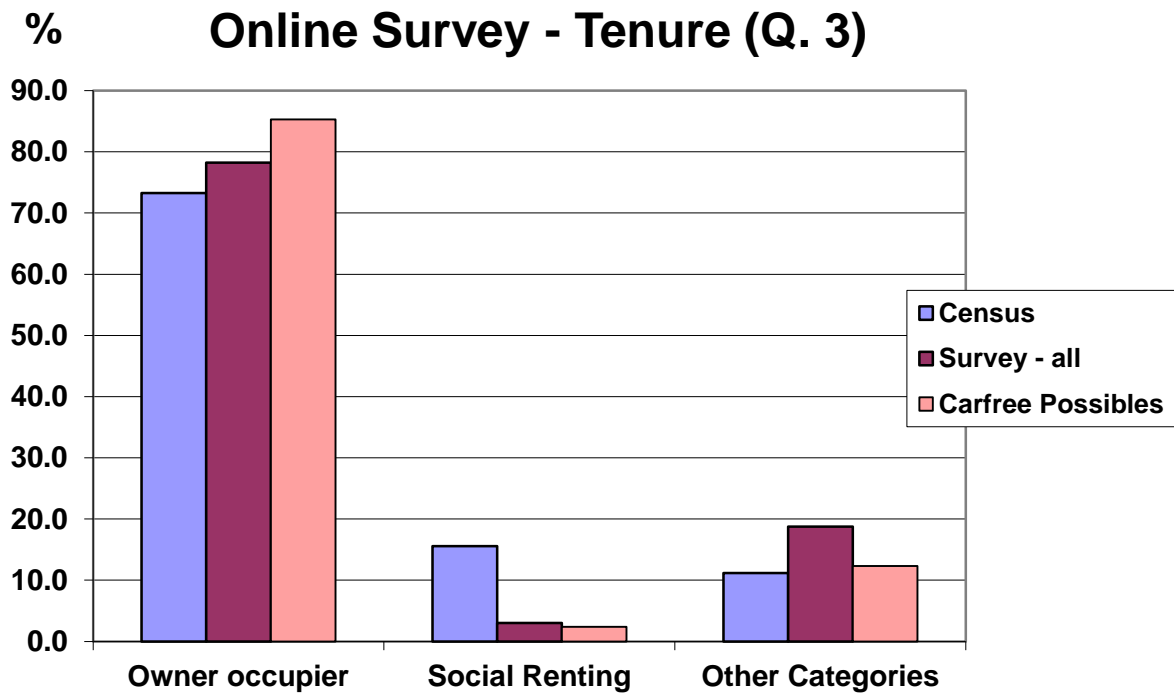
Figure 7-16 Online Survey Carfree Possibles Tenure

Unlike the Carfree Choosers, the housing types of the Carfree Possibles were fairly similar to the overall sample and the Census data, with more of them in detached or semi-detached houses:

% Online Survey Housing Types (Q. 5)
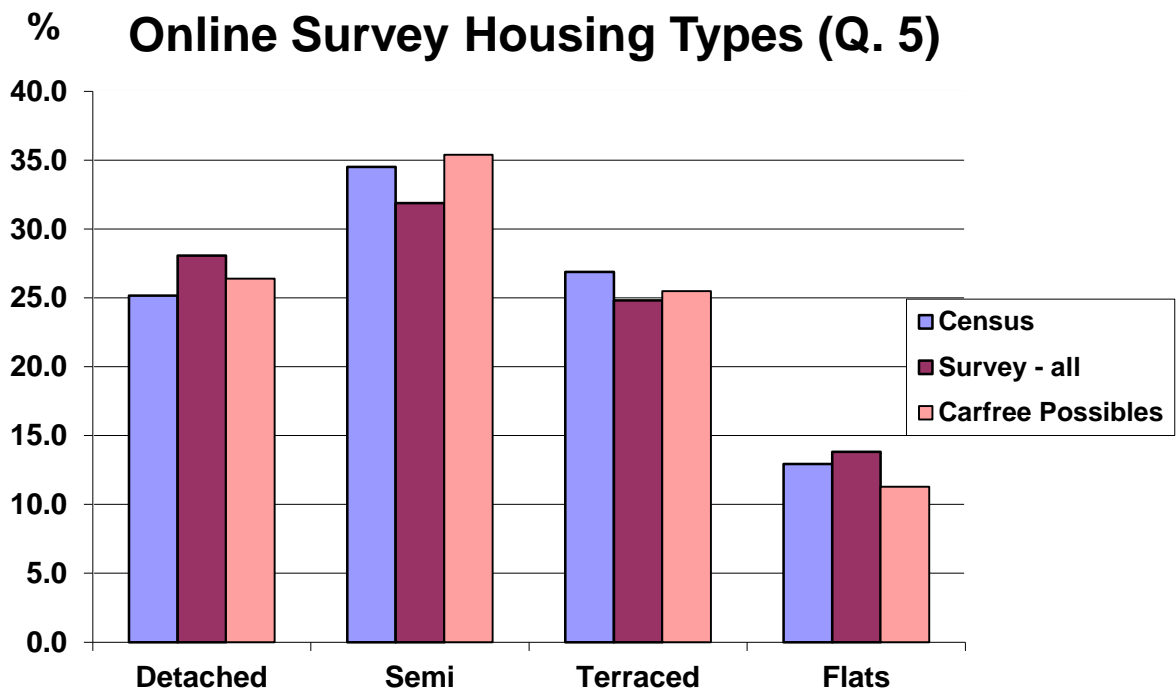
Figure 7-17 Online Survey – Carfree Possible Housing Types

A third of the Carfree Possibles had more than one car in their household, a significantly lower proportion than the Online Owners (45%):

% Online Survey - Cars in Household (Q.10)
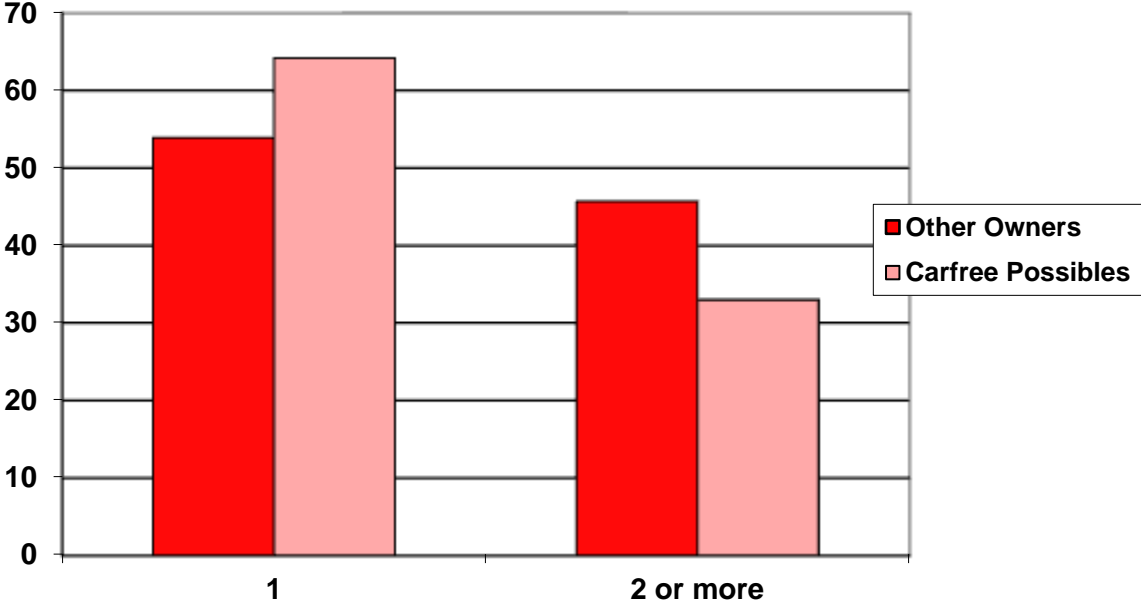
Figure 7-18 Online Survey – Cars in Car Owners' Households

In interpreting the responses on travel behaviour, the source of the sample – mostly members of cycling organisations – needs to be borne in mind. The Carfree Possibles, as expected, drove more (19% on most days, 43% occasionally) but cycled almost as much as the Carfree Choosers (62% on most days).

Figure 7-19 compares the regular (daily or weekly) travel modes of the Carfree Possibles and Other Owners. The lower proportion of Carfree Possibles' driving regularly (57%) and the higher proportion travelling by train (24%) were both significant at the 99% level. The higher proportion cycling (85%) was significant at the 95% level. Most of them regularly walked (79%), few regularly travelled as a car passenger (23%), and fewer regularly travelled by bus (15%). There were no significant differences between the two groups of car owners in these respects.

% Regular (most weeks) Travel by Mode (Q.9)
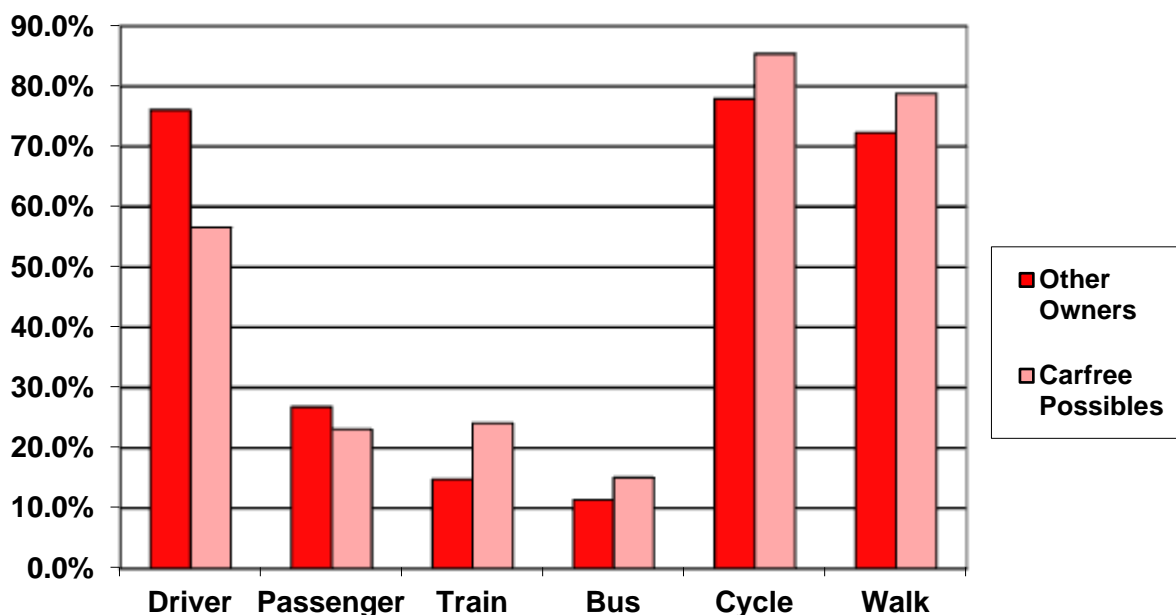
Figure 7-19 Online Survey Regular Travel of Car Owning Groups by Mode

Attitudes to Neighbourhoods and Moving Home

When asked about the advantages of the area where they lived, the responses of the Carfree Possibles nearly always fell between the Carfree Choosers and the rest of the sample. Thus they were less likely than the Carfree Choosers but more likely than the other groups to cite: proximity to a town or city centre, accessible public transport, and close to shops; vice versa for close to countryside, quiet road and available parking. Their most frequent responses are shown in Table 7-12:

Q. 7: Advantages of Current Neighbourhood – Carfree Possibles	
Close to city/town centre	58%
Close to the countryside	57%
Accessible public transport	48%
Convenient for work or study	41%

Table 7-12 Most Frequent Responses to Q.7 – Carfree Possibles

The responses of the online Carfree Possibles concerning problems of their neighbourhoods followed the same pattern as the advantages – falling between those of the Carfree Choosers and the others. Their top responses are shown in Table 7-13:

Q. 8: Problems of Current Neighbourhood – Carfree Possibles	
Too much traffic in the immediate area	49%
Distant from family/friends	33%
Poor or inaccessible public transport) Lack of community)	30%

Table 7-13 Most Frequent Responses to Q.8 – Carfree Possibles

A similar pattern can be observed in the Carfree Possibles' responses to the questions about moving home. Thus, they were less likely than the Carfree Choosers but more likely than the rest of the sample to prefer or consider terraced houses (69%), flats (40%) and to prefer urban living (35%). Conversely, they were more likely than the Carfree Choosers, but less likely than the others to prefer rural living (29%). The main factors influencing their moving choices are shown in Table 7-14:

Q. 22: Influences on moving choice – Carfree Possibles	
Well served by public transport	54%
Close to place of work or study	46%
Close to countryside	44%
Minimal traffic in the immediate area	42%

Table 7-14 Most Frequent Responses to Q.22 – Carfree Possibles

Of the 69% of Carfree Possibles who would consider moving home, two thirds stated that they could afford to buy – similar to the rest of the sample and substantially more than the Carfree Choosers.

Attitudes to Carfree Neighbourhoods

The responses to the hypothetical question about carfree neighbourhoods are shown in Table 7-15:

Q. 23: Attitude to living in a carfree neighbourhood	Survey All	Carfree Possibles
Be keen to move there even if it meant moving some distance	13%	14%
Consider moving there, if it were somewhere convenient	61%	69%
Possibly consider the idea	20%	12%
Not consider moving there	5%	3%
Don't know	2%	1%

Table 7-15 Most Frequent Responses to Q.23 – Carfree Possibles

The Carfree Possibles responses were significantly more favourable than those of the rest of the sample (though less so than the Carfree Choosers) consistent with the hypothesis in research question 3. Following the comments about their car ownership, above, this raised the issue of how robust these responses would prove under questioning. This issue will be discussed in Chapter 9.

7.5   Key Findings from the Online Survey

The responses to the on online survey appear to confirm the hypothesis in research question three. Both the Carfree Choosers and the Carfree Possibles were more likely than the rest of the sample to state that they would move or consider moving to a new carfree neighbourhood. A large majority of both these target groups would consider such a move. As discussed in Chapter 5, these responses were subsequently probed through telephone interviews – the findings of these will be discussed in Chapter 9.

The Carfree Choosers tended to be younger than the other groups, living in smaller households. Partly because of this, their household incomes were lower than the rest of the sample, but significantly higher than the Other Nonowners, as expected. Most of the Carfree Choosers were home owners, although the proportion was lower than in the other groups. More of them lived in flats and terraced houses. 91% of the Carfree Choosers lived in urban areas, and their attitudes towards neighbourhoods and preferences on moving house generally reflected this: well served by public transport was their most frequently cited factor influencing moving home, followed by proximity to work and shops. The Carfree Choosers who expressed an interest in carfree developments were even 'more urban' than the rest: 96% lived in urban areas, 73% in cities of over 100,000 people.

The Carfree Choosers rarely drove, cycled more and used public transport more than the other groups. Compared to the Other Nonowners, they cycled more and used buses less (the latter comparison was not quite statistically significant at the 95% level).

The Carfree Possibles were generally older (partly due to the way the category was defined) and had higher incomes than the rest of the sample. They lived in larger households with more children than the Carfree Choosers. Their housing was similar to the rest of the sample, with more home owners in detached and semi-detached houses than the Carfree Choosers. Compared to the Other Owners they had fewer cars, drove less and used the train more. They also cycled more – almost as much as the Carfree Choosers. Few of them travelled regularly by bus. In their current locations, their attitudes towards their neighbourhoods and their preferences on moving house, they appeared 'more urban' than the rest of the sample, but less so than the Carfree Choosers.

The large sample sizes in the online survey generated many illuminating statistically significant differences between the possible groups. Whether the household surveys would yield similar differences or different perspectives will be explored in the next chapter.

8 Household Surveys

8.1 Overview

Chapter 6 described the Camden wards of Bloomsbury and Kings Cross and the new 'low car' development of Poole Quarter. Section 5.4 explained the reasons for the selection of these as survey sites; the development and distribution of the two household surveys were described in Section 5.7. This Chapter will set out the findings of each these surveys in turn. Section 8.4 will look at the differences between these findings and those of the online survey, and consider the implications for the research questions.

8.2 Camden Survey

Appendix iv lists the questions, frequencies and percentage responses from the survey of the Camden wards of Bloomsbury and Kings Cross. 199 people responded, including the pilot survey, representing a 9% rate of return. Low rates of return are common in postal surveys within Inner London. The population of these wards is relatively mobile. Just over 5% of the questionnaires were returned by Royal Mail as the addressee had left or was not known at the address.

Unlike the online survey, respondents were able to miss out questions or ignore instructions like: 'please tick three or four', which many of them did. In a few cases, it was possible to impute missing data from responses to other questions e.g. number of adults and children in a single person household. In Question 11 two additional categories were introduced at the data entry stage to capture those who had missed out the question but were identifiable as drivers or non-drivers of cars.

The questions used to identify the possible groups were the same as those described in Table 7-1 for the online respondents, although the question numbering was different, as shown in Table 8-1:

Possible Group	Question	Responses
Carfree Choosers:	16	I live without a car by choice
Carfree Possibles:	13	I would like to live without a car if circumstances changed
	&: 12	options 2 or 3 (have lived without a car in the past)
Other Nonowners:	16	options 2 or 3 (would like to own a car, or I am unable to)
Other Owners:	13	options 1 or 2 (would not give up car, or not possible)
	&/or: 12	options 1 or 4 (never lived without a car since passing test)

Table 8-1 Questionnaire responses identifying the Camden possible groups

199 (9.5%) of the questionnaires were returned. In 21 cases missing data prevented their classification into to one of the potential groups. The distribution of the remainder is shown in Figure 8-1:

Distribution of Possible Groups

Carfree Choosers	104	Other Nonowners	32
Carfree Possibles	10	Other Owners	32
		Total valid responses:	178
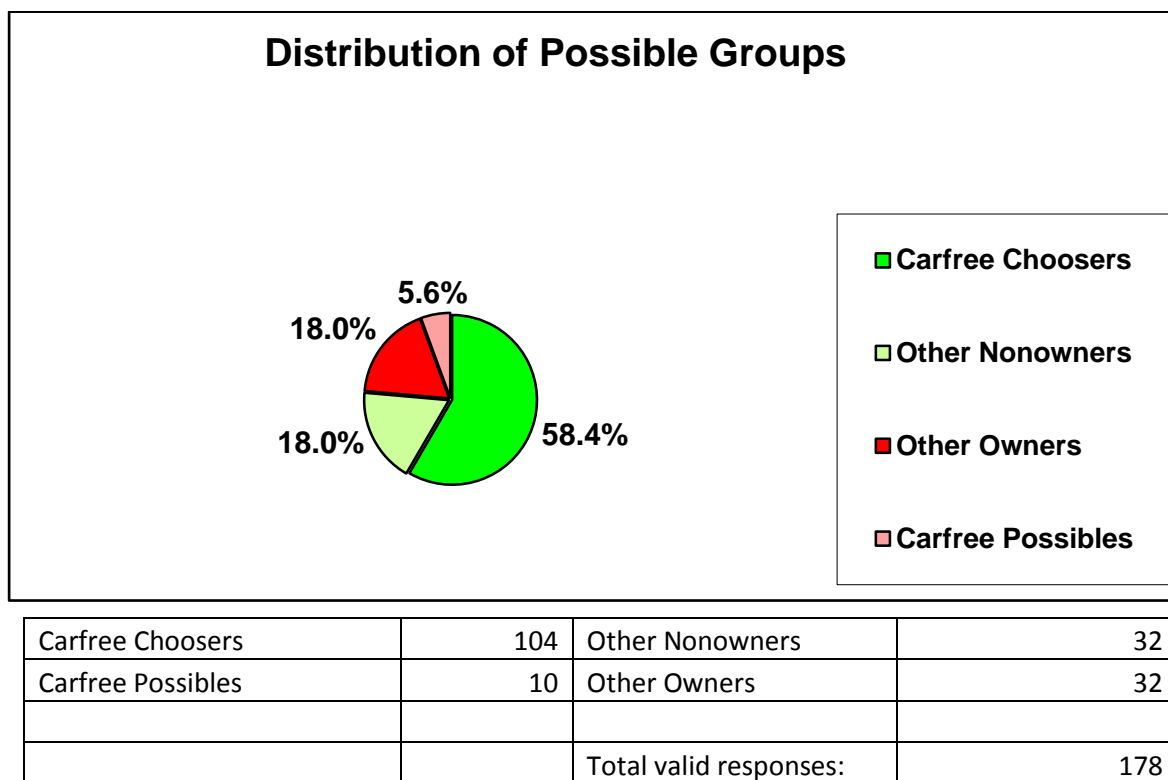
Figure 8-1 Camden Survey – Proportions & Sizes of Potential Groups

The high proportion of Carfree Choosers confirmed the hypothesis which led to the selection of these two wards. The small number of Carfree Possibles precluded any separate statistical analysis of that group. There are fewer statistically significant associations in the Camden sample for two reasons: the smaller sample size and its greater homogeneity. The entire sample was by definition living in similar inner urban conditions.   The rest of this section will compare the total sample with data for the two wards, from the 2001 Census – and in one case the Greater London Authority. Comparisons were made between the Carfree Choosers and the rest of the sample for all of the variables below. Most of these were found to be statistically insignificant; some exceptions are described below.

The demographics of the Bloomsbury and Kings Cross wards are rather different from national averages. One striking example is the age distribution, skewed towards the 18 – 29 bands (ONS 2009 Census table CS010). Amongst the survey respondents These groups were under-represented – and most of the older groups over-represented as shown in Figure 8-2.

Age Distribution (Q.24)

%
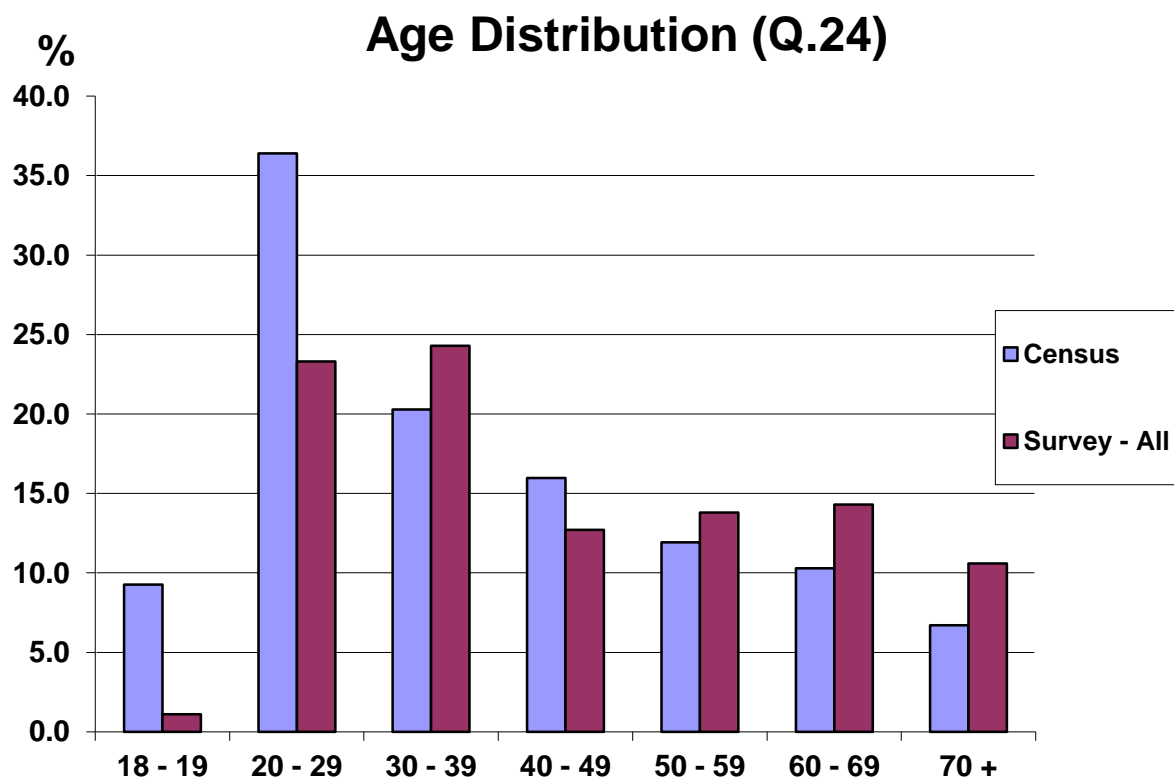
Figure 8-2 Camden Survey - Age Distribution

The proportions sum to 100% i.e. children have been excluded. The differences between the Carfree Choosers and the rest of the sample were not significant. The 18 – 29 year olds in the Census data, but missing from the survey sample, fall mainly into the 'other' categories shown in Figure 8-3. These include unemployed, carers, and people claiming long-term sickness or disability benefits (which collectively made up 6% of the 18 – 24 year olds in the Census). There were significantly more (69%) employed and self-employed people amongst the Carfree Choosers.

Economic Status (Q.25)

%
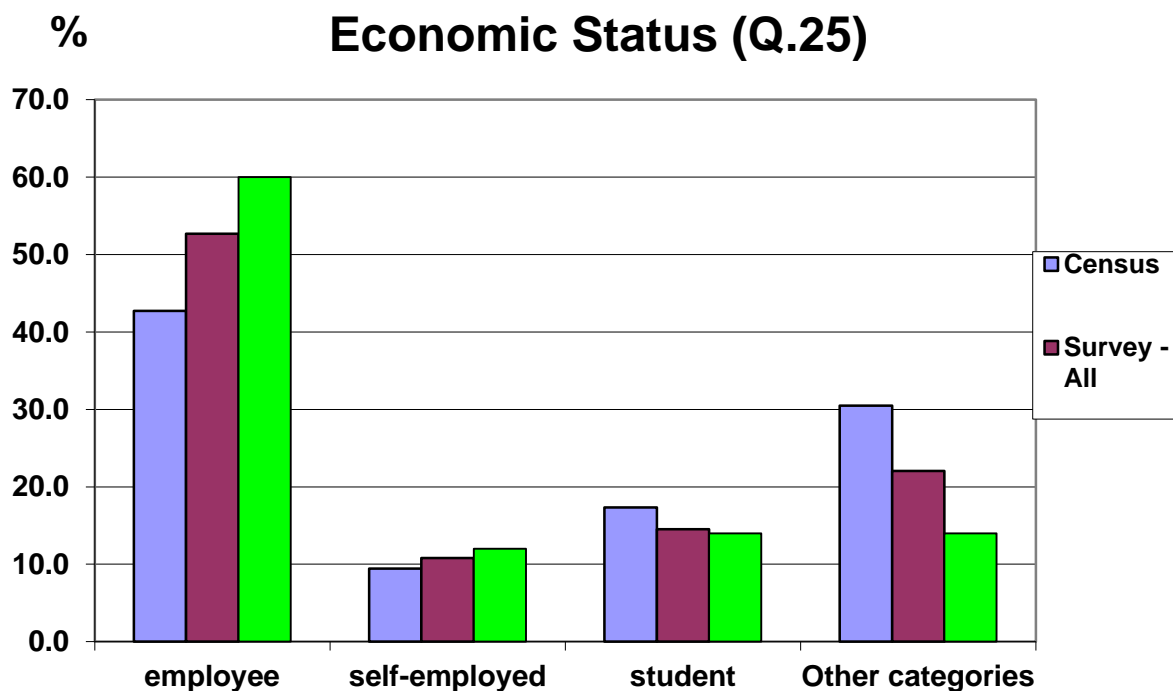
Figure 8-3 Camden Survey - Economic Status

Unlike the online survey, there was no significant **gender** bias amongst the respondents (51% female – Q. 23).   45% of the sample were **born overseas**; only 22% within London (Q. 27). The Carfree Choosers were similar to the rest of the sample in these respects.

Single person households form a particularly large proportion of the local population in inner London. As with the online survey, they were under-represented amongst the survey respondents:

Household Size (Q.3)
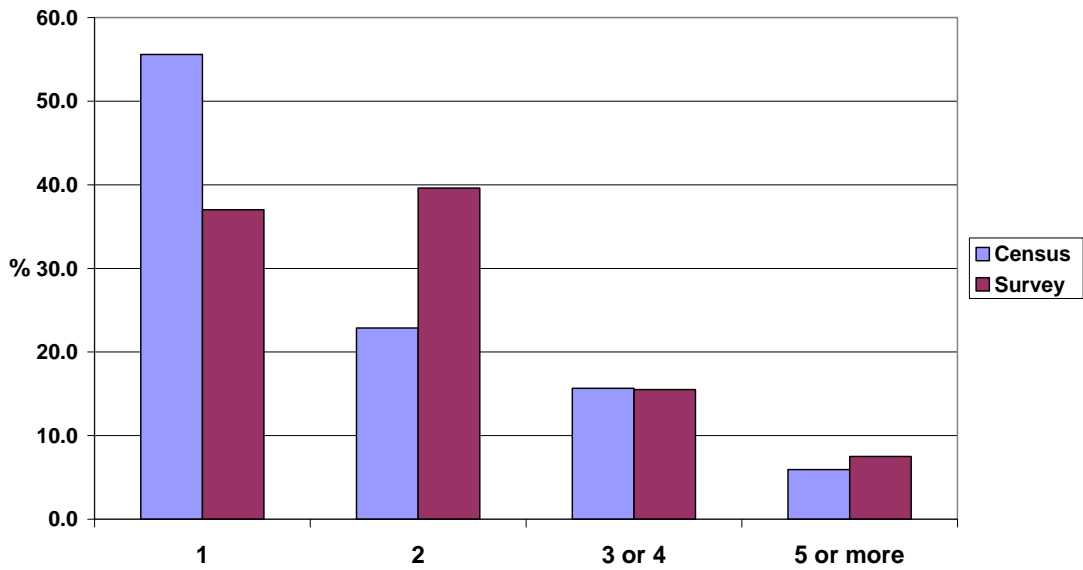
Figure 8-4 Camden Survey - Household Size

The proportion of adults with **children** was low in the two wards 22% (ONS 2009 Census table CS014), slightly lower (18%) in the sample, and significantly lower amongst the Carfree Choosers (11%).

The graph below shows a smoothed line between points at different data intervals indicating that the lower and higher income levels are both over-represented somewhat amongst survey respondents. The household size shown above – higher in the sample than the general population – does not appear to be reflected in higher incomes.

Distribution of Household Income (Q.26)
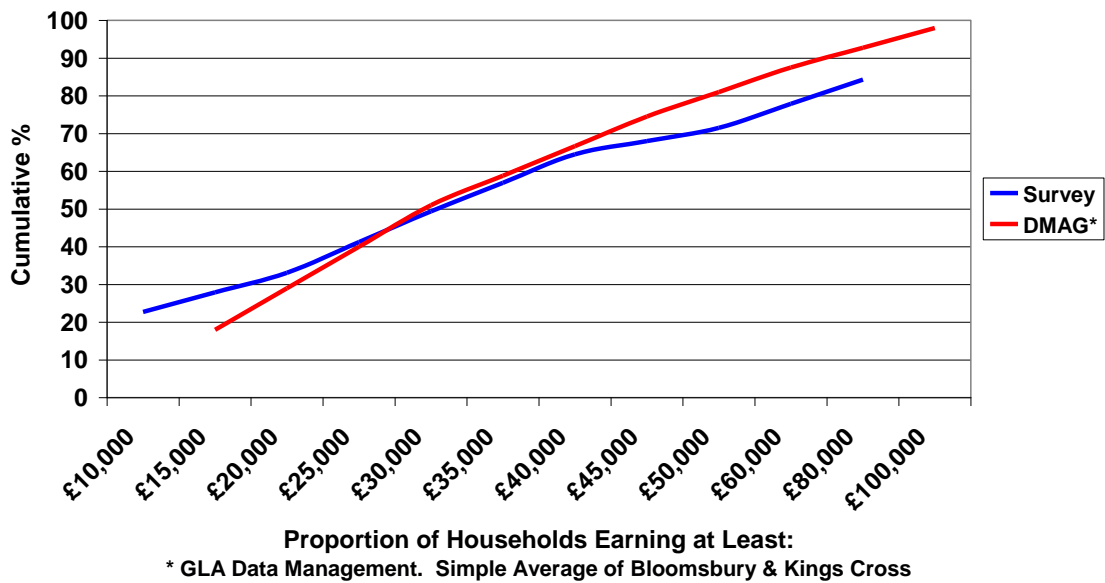
Figure 8-5 Camden Survey - Distribution of Household Income

The Carfree Choosers had a similar income distribution to the rest of the sample, but as in the online survey, a significantly higher income than the Other Nonowners (49% and 20% earned over £30,000, respectively).

As with the online survey, people in social rented accommodation are under-represented compared to the Census data (ONS 2009 table CS050):
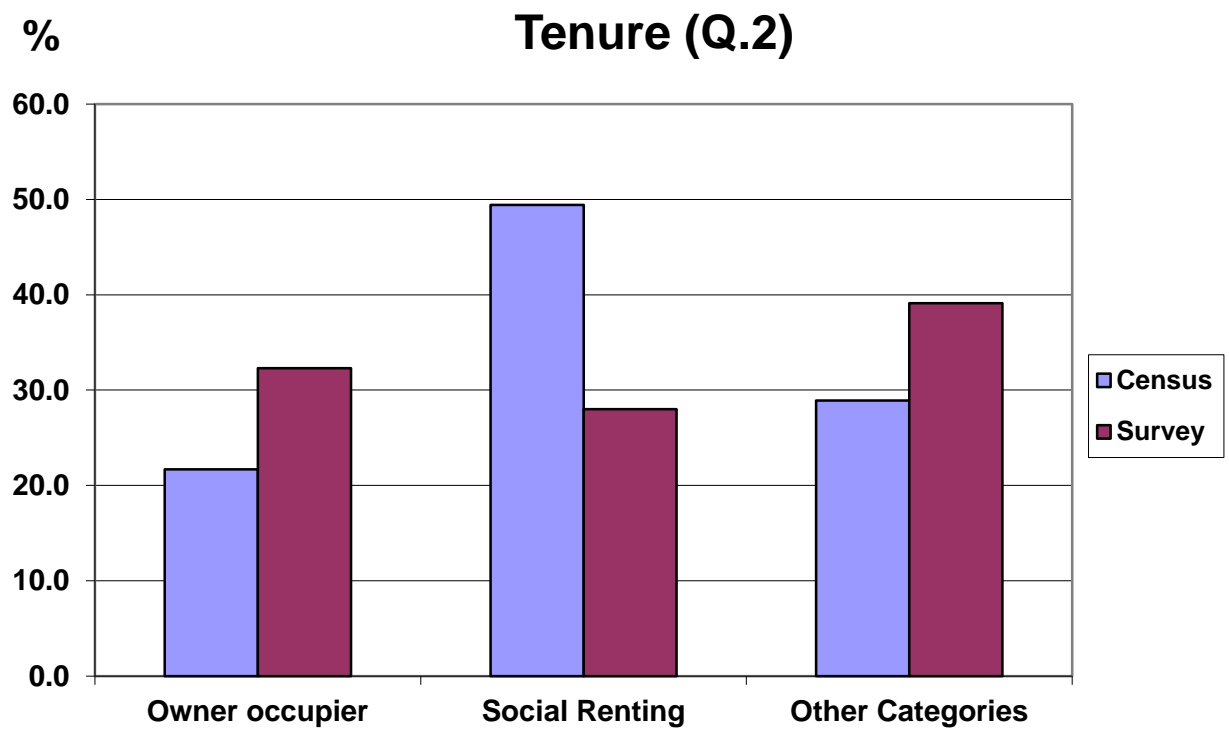
%   **Tenure (Q.2)**

Figure 8-6 Camden Survey - Tenures

Individual houses make up just 4% of the dwellings in the two wards. The vast majority of these are terraced or town houses, so the survey did not attempt to distinguish between house types. 43% of the dwellings had just one bedroom – including studio flats and bed-sitters (Q. 8).
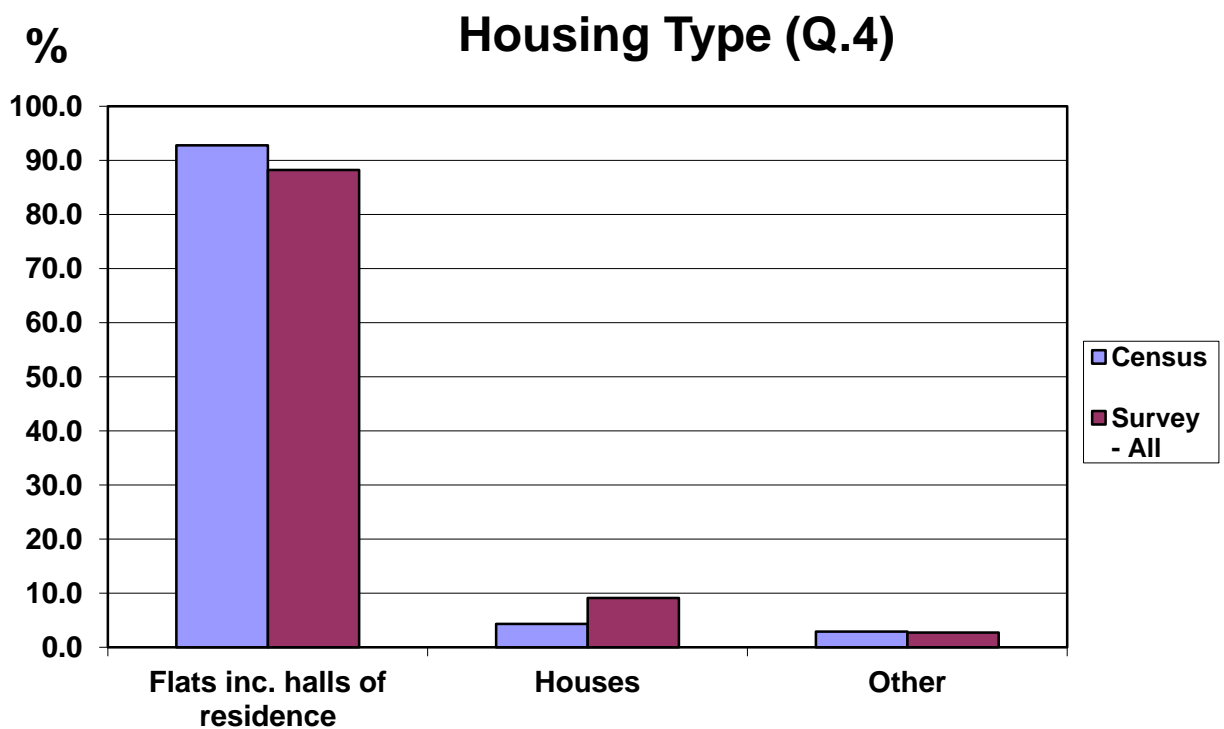
%   **Housing Type (Q.4)**

Figure 8-7 Camden Survey - Housing Type

Just over a quarter of respondents indicated that their address in Camden was not their sole residence (Q. 5). A quarter of these were students. Half had household incomes over £50,000 and half were home owners.

Car Ownership and Travel

Two thirds of households had no car (Q. 10), which compares very closely with the Census data (ONS 2009 table CS061). 9% of the Carfree Choosers lived in a household with a car (difference significant at the 99% level).
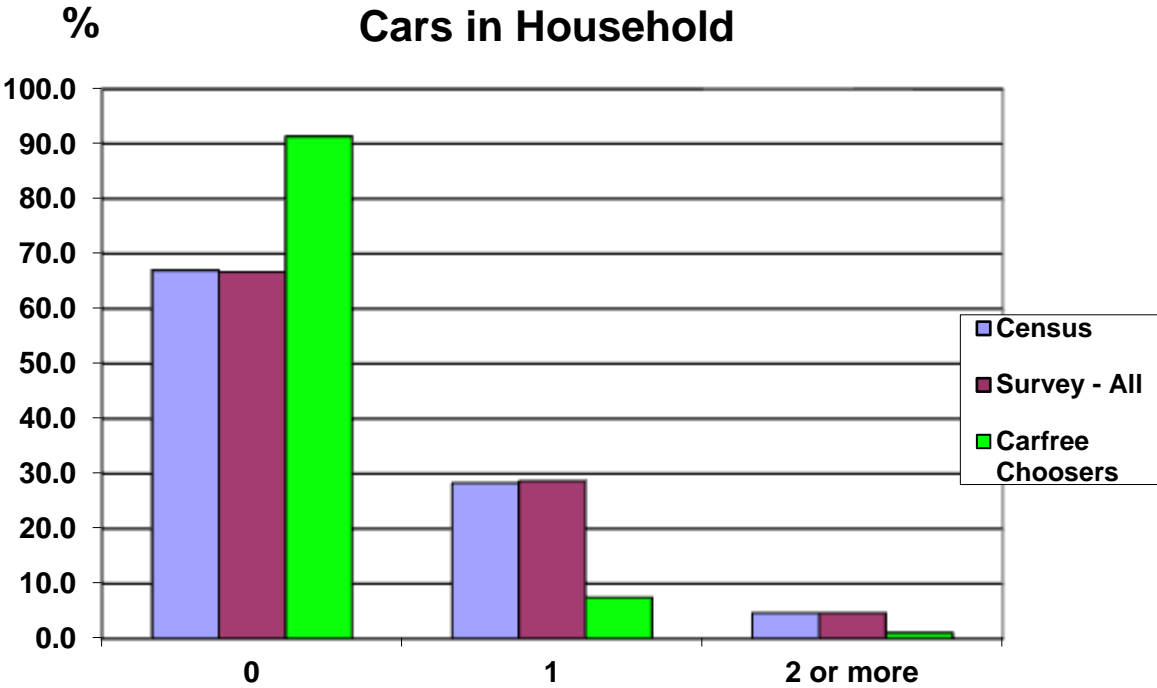
Figure 8-8 Camden Survey - Car Ownership

Amongst the car owners, 47% had some experience of living without a car (Q.12) but 42% said they would not want to give up their car under any circumstances (Q. 13) – compared to just 11% in the online survey.

Half of the non-owners said they had never owned a car (Q. 15). Three quarters – the Carfree Choosers – said they lived without a car by choice (Q. 16). Their reasons for this (Q. 17) were markedly different from the online survey; half cited 'no need' as the main reason, followed by cost (24% main, 54% secondary). The environment and lack of parking were more secondary than primary reasons.

Only 8% of respondents drove on most days; 53% never drove (Q. 9). 81% of respondents walked most days, used buses (34%), the underground (22%), and bicycles (12%).

The frequencies in Question 9 need to be treated with some caution. Unlike the online survey, there was no mechanism forcing respondents to tick the relevant box relating to each mode of transport. Appendix iv shows the frequencies and percentages of those who ticked one of the four boxes for each mode, so no assumptions are made about missing values (note the different basis used for comparison in the table below). This probably overstates the percentage for cycling, where most of the (larger number of) missing values are likely to be non-cyclists.

All purpose modal share statistics were not available down to ward level. The Census does provide a modal split for travel to work, however (ONS 2009 table CS119). Work journeys only make up a minority of the total, so can only provide a basis for broad observations. Table 8-2 juxtaposes the Census figures with the survey frequencies from Question 9 re-expressed as a percentage of the total in each column (so, for example, the 'Most days' column roughly equates to the modal shares on most days, though note that respondents could tick more than one 'most days' option):

	2001* Census	Most days	Most weeks	Occasionally	Never
			Survey - All		
Car as a driver	8.7	4.0	8.7	10.3	22.2
Car as a passenger	1.3	1.4	8.2	21.7	10.8
Train	4.3	3.2	12.8	24.9	3.4
Underground, light rail or tram	25.1	13.3	29.7	18.9	2.5
Bus	10.5	21.9	26.2	17.4	1.5
Motorcycle, scooter or moped	0.7	0.4	0.5	0.9	32.3
Cycle	4.0	5.0	2.6	4.3	25.8
Walk	43.1	50.7	11.3	1.7	1.5
Other	2.3	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0

Table 8-2 Camden Survey - Travel Compared to Census

*proportion of trips to work (main mode, excluding home workers)

Subject to those caveats, the above table appears to suggest higher bus use and possibly lower car use than the Census. Bus patronage in London increased by 48% between 2000/1 and 2006/7 (Knowles, Abrantes 2008) which would account for part of this. None of the other modes obviously differ from the Census data.

Figure 8-9 shows the regular (most weeks or most days) travel by mode[6]. The only statistically significant differences were the Carfree Choosers' higher rate of walking and lower rate of driving.

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[6] The proportions are shown as a percentage of those who ticked one of the options for that mode. Unlike question 9 in the online survey, there was no mechanism forcing a response. This graph is not therefore directly comparable with Figure 7-11 its equivalent for the online survey.
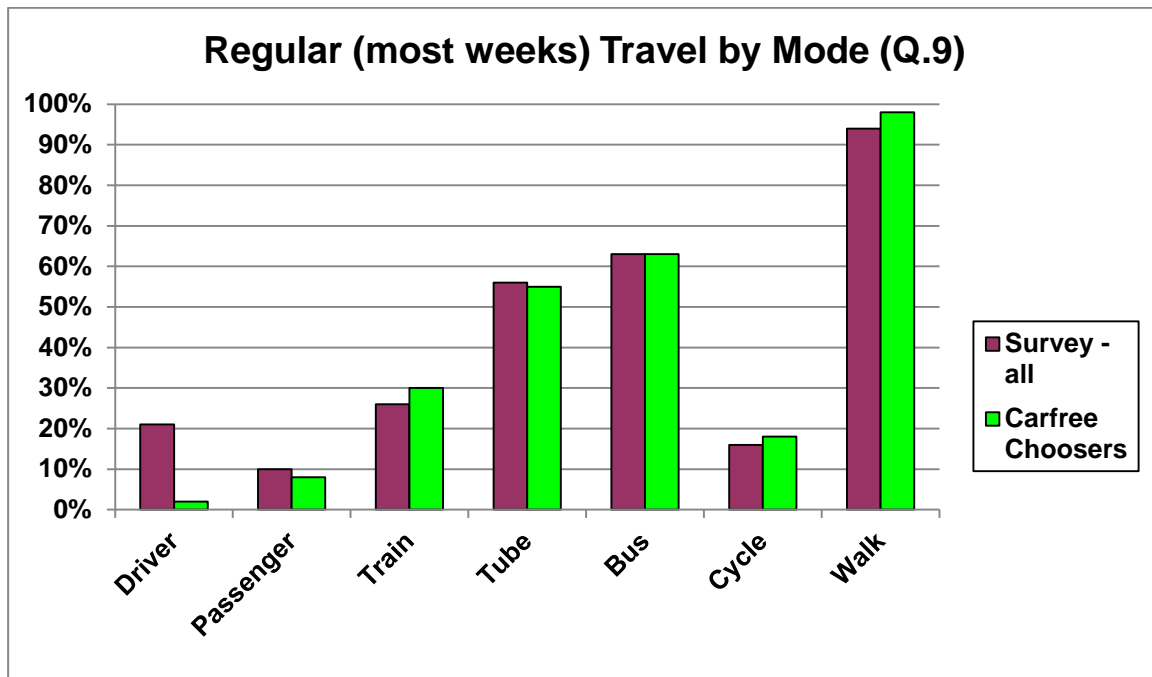
Figure 8-9 Camden Survey Regular Travel by Mode

Attitudes to Neighbourhoods and Moving Home

The three most frequently ticked advantages of living in the area are shown in Table 8-3:

Q. 6: Advantages of living in the area	Survey – All
close to central London	93%
accessible public transport	71%
convenient for work/study	67%

Table 8-3 Most Frequent Responses to Q.6

These were also the top responses for the Carfree Choosers. The only significant differences in their responses to this question were a higher proportion ticking convenient for work/study (73%) and lower proportions ticking close to family/friends (14%) good schools (4%) and available parking (4%).

The top three problems of living in the area are shown in Table 8-4:

190

Q. 7: Problems of living in the area	Survey – All
too much traffic in the immediate area	50%
distant from countryside	45%
lack of parking	38%

Table 8-4 Most Frequent Responses to Q.7

Although strongly associated with car ownership (see Appendix vi), 23% of Carfree Choosers also cited parking problems. In other respects, their responses to these questions were similar to the rest of the sample.

23 people (16%) entered an 'other' problem, seven related to noise and five related to anti-social behaviour.

11% of respondents planned to leave the UK in the next two years (Q. 18); 27% had no intention of moving. Of the remaining 62%, just over a third would and could buy; a quarter would only move if and when they could buy (Q. 19). Preferences to rent privately or from a social landlord (17% each) largely reflected existing tenures (see Appendix vi).

71% of the 'potential movers' would prefer to stay near where they lived – double the proportion in the online survey (Q. 20).   Preferences for flats and terraced houses were higher in the Camden survey than the online survey. A quarter would prefer and three quarters would consider a flat, with slightly lower proportions for terraced housing (20%, 47%). Preferences for detached and semi-detached houses were lower. These preferences may simply reflect the realities of the housing stock in that area.

The top four factors influencing moving choices are shown in Table 8-5:

Q. 21: Influences on moving choice – Survey – All	
Well served by public transport	68%
Close to central London	66%
Close to place of work or study	45%
Close to shops and other amenities	45%

Table 8-5 Most Frequent Responses to Q.22 – Carfree Possibles

The only significant differences between the Carfree Choosers and the rest of the sample were lower frequencies for schools (4%) and available parking (4%).

Attitudes to Carfree Neighbourhoods

Interest in carfree neighbourhoods (Q. 22) was not quite as high as the online survey, as shown in Table 8-6. The slightly more favourable responses of the Carfree Choosers were not significantly different from the rest of sample.

Q. 22: Attitude to living in a carfree neighbourhood	Survey All	Carfree Choosers
Be keen to move there even if it meant moving some distance	4%	5%
Consider moving there, if it were somewhere convenient	45%	47%
Possibly consider the idea	19%	23%
Not consider moving there	19%	15%
Don't know	13%	11%

Table 8-6 Attitudes to Carfree Neighbourhoods – Camden Survey

Significance of the Camden Findings

The small proportion of Carfree Possibles and the absence of statistically significant differences between the Carfree Choosers and the rest of the sample mean that this data cannot be used to address research question two in the same way as the online data. There was, likewise, no support for the hypothesis in research question three. Two areas of the findings are relevant in these respects, however. The high proportion of Carfree Choosers confirmed the expectations which led to the selection of the two wards for survey. Secondly, the lack of statistically significant differences was partly due to the smaller sample size but also because the answers of the Carfree Choosers were more similar to the rest of sample in this survey: this applied to their responses on travel behaviour (Q9) and their attitudes towards: their neighbourhood (Q 6 & 7), moving home (Q21) and moving to a carfree neighbourhood (Q22). This suggests that the characteristics and attitudes of Carfree Choosers are more similar to those of the general population in Inner London, where conditions are more supportive of carfree living, than they are elsewhere. The next chapter will explore some of the reasons for, and influences on, these attitudes.

8.3   Poole Survey

Appendix v lists the questions, frequencies and percentage responses from the survey of Poole Quarter. There were noticeably fewer errors and omissions compared to the Camden returns, which may reflect the improvements referred to above, but also the profile of the respondents – with English as the first language for all but a tiny proportion of Poole residents (see Section 6.2).

The questions were similar to those of the other surveys, except that most of the questions about moving house were not included (the exception, about carfree neighbourhoods, is discussed

below). The questions used to identify the possible groups were the same as the other two surveys, although the question numbering differed again, as shown in Table 8-1:

Possible Group	Question	Responses
Carfree Choosers:	19	I live without a car by choice
Carfree Possibles:	16	I would like to live without a car if circumstances changed
	&: 15	options 2 or 3 (have lived without a car in the past)
Other Nonowners:	19	options 2 or 3 (would like to own a car, or I am unable to)
Other Owners:	16	options 1 or 2 (would not give up car, or not possible)
	&/or: 15	options 1 or 4 (never lived without a car since passing test)

Table 8-7 Questionnaire responses identifying the Camden possible groups

A total of 97 (42.5% of the) questionnaires were returned. In 9 cases missing data prevented their allocation into one of the potential groups. The distribution of the remainder is shown in Figure 8-1:

Carfree Choosers	11	Other Nonowners	11
Carfree Possibles	1	Other Owners	65
		Total valid responses:	88
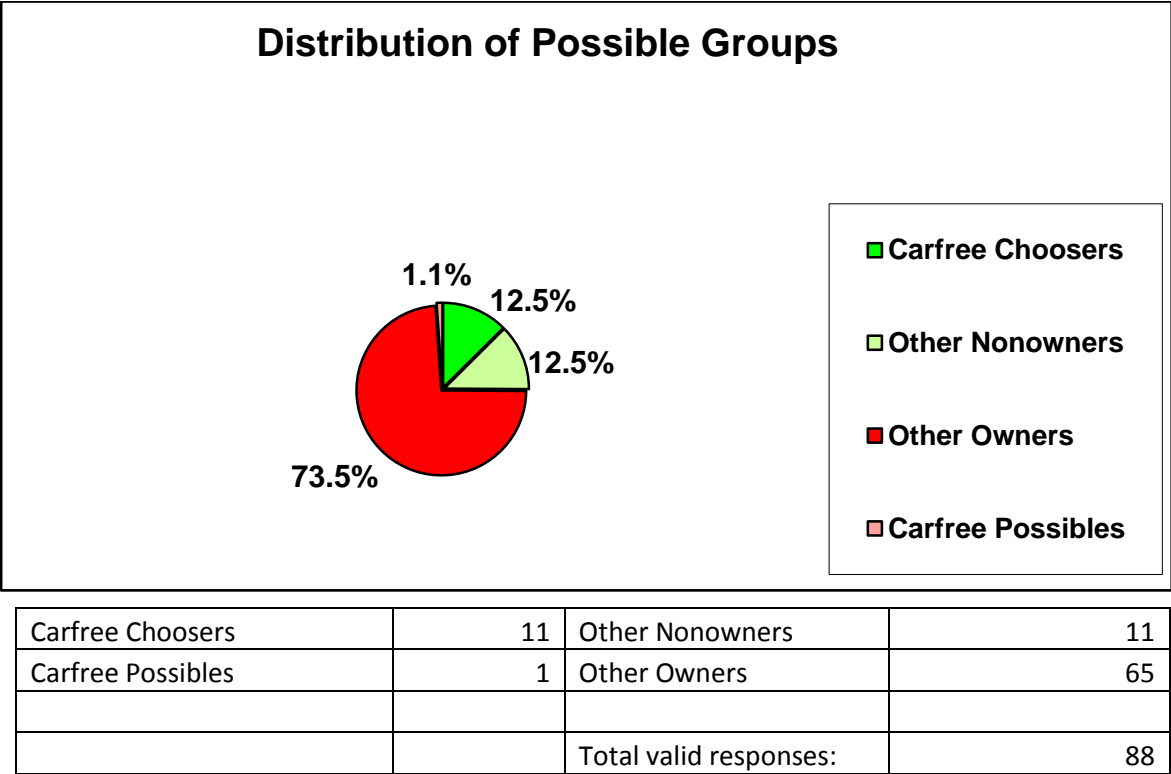
Figure 8-10 Poole Survey – Proportions & Sizes of Potential Groups

Three of the four groups were too small to permit any meaningful statistical comparisons between them. The target groups were smaller than in the other samples. The proportion of Carfree Choosers was double the estimated national average (around 6%, on a slightly different measure – see Section 5.4), and probably higher than average for Poole Town Ward, where 18% of adults lived without access to the car. The following analysis will compare some of the survey responses to Census data for Poole Town ward, where Poole Quarter was located (for some of the questions, the comparison would be inappropriate). The definition of the possible groups will then be re-

examined, proposing a different subdivision of the 'Other Owners' (Car Limiters) offering another perspective on the question of potential demand for carfree developments.

The housing tenures of the sample were very different from those of the other surveys. At the time of the survey, the affordable housing on the site was substantially complete, whereas much of the open market housing was still under construction. 'Buy to let' investors have also found the development attractive. These factors help to explain the distribution below and much of what follows.

%   **Poole Survey - Tenures (Q.2)**
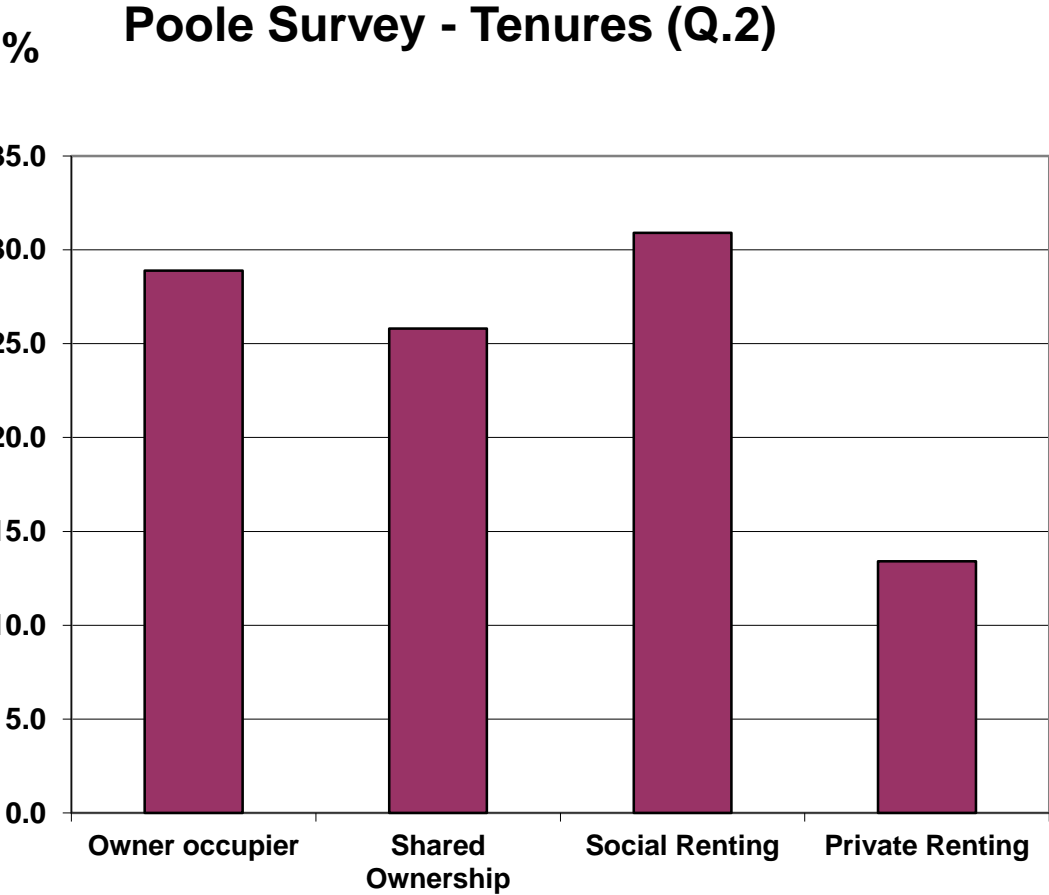
Figure 8-11 Poole Survey - Tenures

76% of the dwellings were flats, reflecting the density and design of the development. Most had two (58%) or three (21%) bedrooms.

The age distribution is markedly different from both the other two surveys, and Poole Town ward. A sheltered housing block for older people was under development at Poole Quarter but not occupied at the time of the survey, so the proportion of over 70s, high in Poole generally, was relatively low in the sample.

The home owners were significantly older (82% over 40) than other respondents (see Appendix vi). Hence, the small proportion of owner occupiers contributed to the relatively young sample; the 20 – 29 age group was well represented amongst all the other tenures.

Poole Survey - Age Distribution (Q.26)
(Compared with Census data for Poole Town ward)
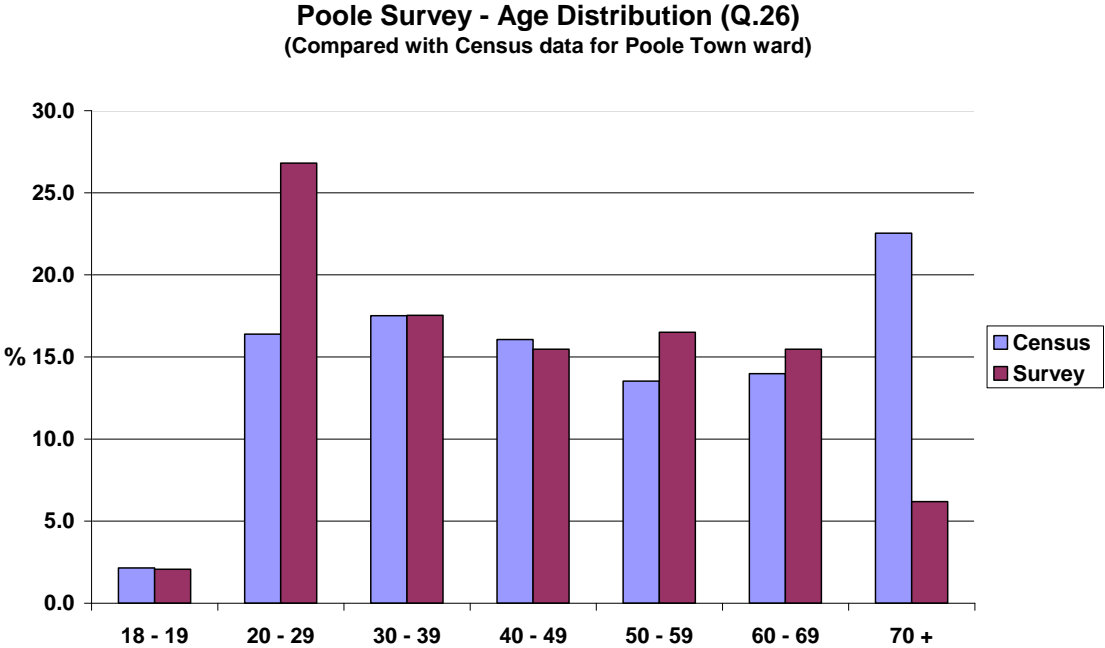
Figure 8-12 Poole Survey - Age Distribution

The relatively high proportion of households with three or four people was largely due to the affordable housing allocation policies of the local authority: two thirds of the social tenants had children. Overall, 31% of the sample had children compared to a ward average of just 20%.

Poole Survey - Household Size (Q.3)
(Compared with Census data for Poole Town ward)
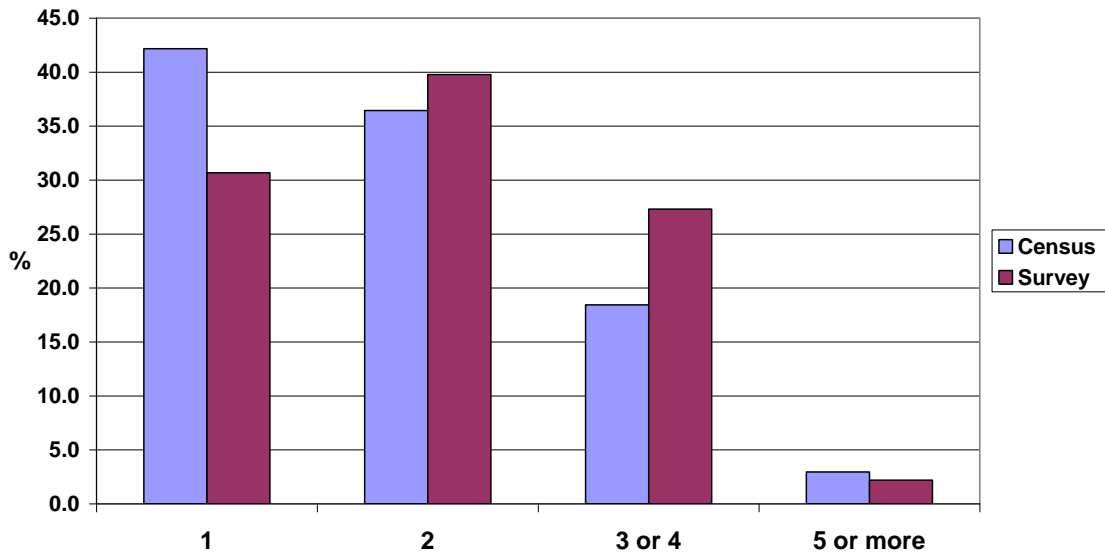
Figure 8-13 Poole Survey - Household Size

Interestingly, given the high proportion of social and affordable housing, employees, mostly full-time, were again over-represented.

Poole Survey - Economic Status (Q.25)
(Compared with Census data for Poole Town ward)
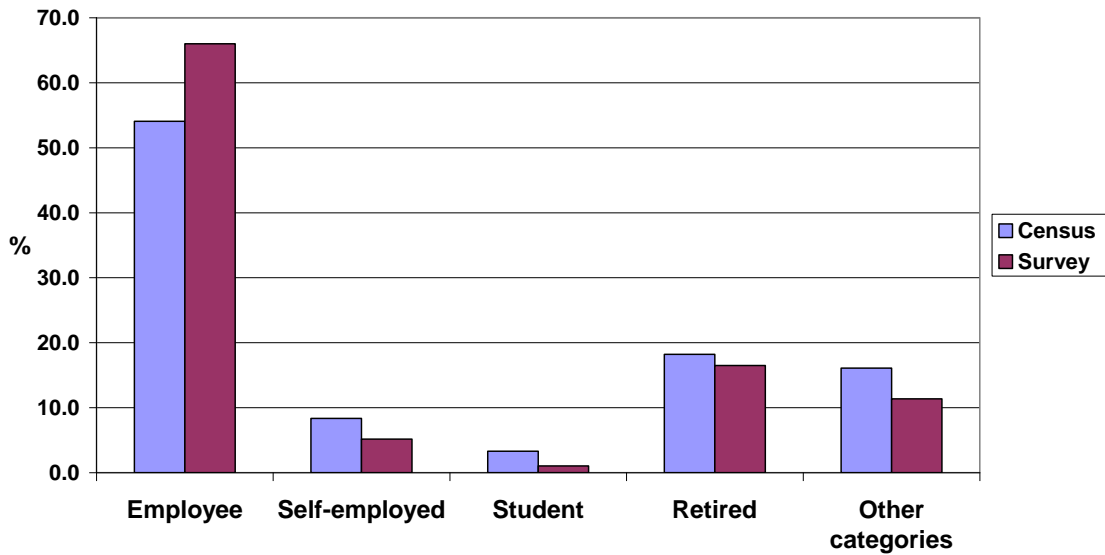
Figure 8-14 Poole Survey - Economic Status

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The income distribution, particularly amongst the social tenants (see Appendix vi), indicated a lower median than for the Borough as a whole, estimated as £26,399 by Poole Borough Council in 2005 (Charles Arthurs 2007, personal communication October 3).

Poole Survey - Household Income (Q.28)
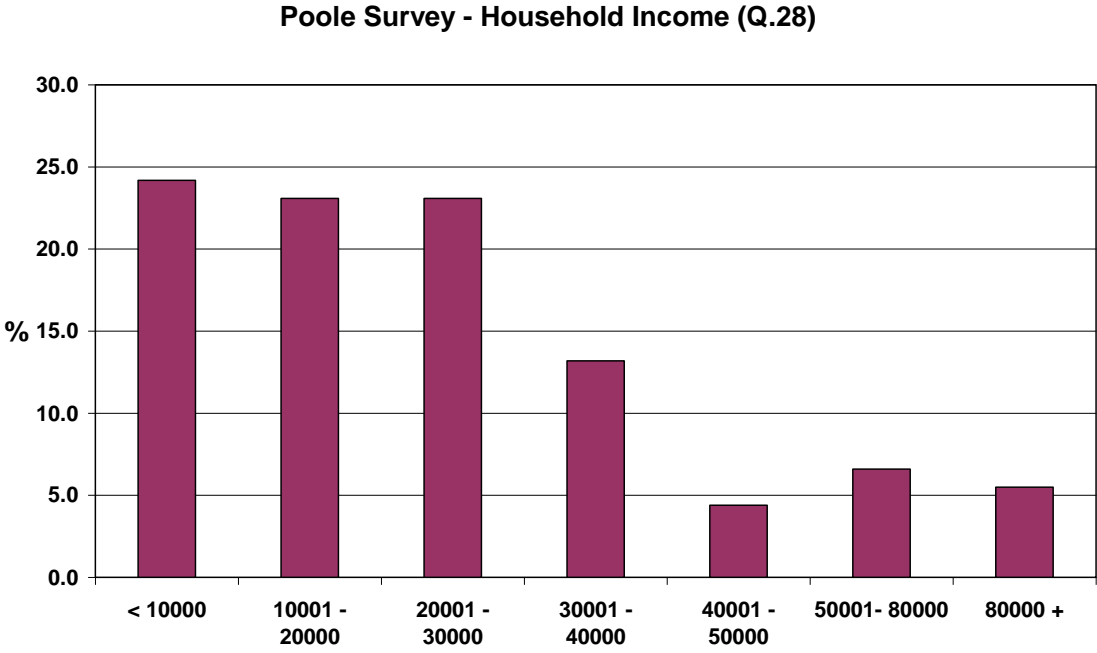
Figure 8-15 Poole Survey - Household Income

Car Ownership and Travel

Nearly two thirds of the sample had one car in their household. 29% of the households had just one adult. For the others, the parking policy at Poole Quarter would make it difficult to keep more than one car in or near the site. The proportion without a car (19%) was similar to the average for the ward.

Poole Survey - Cars in Household (Q.10)
(Compared with Census data for Poole Town ward)
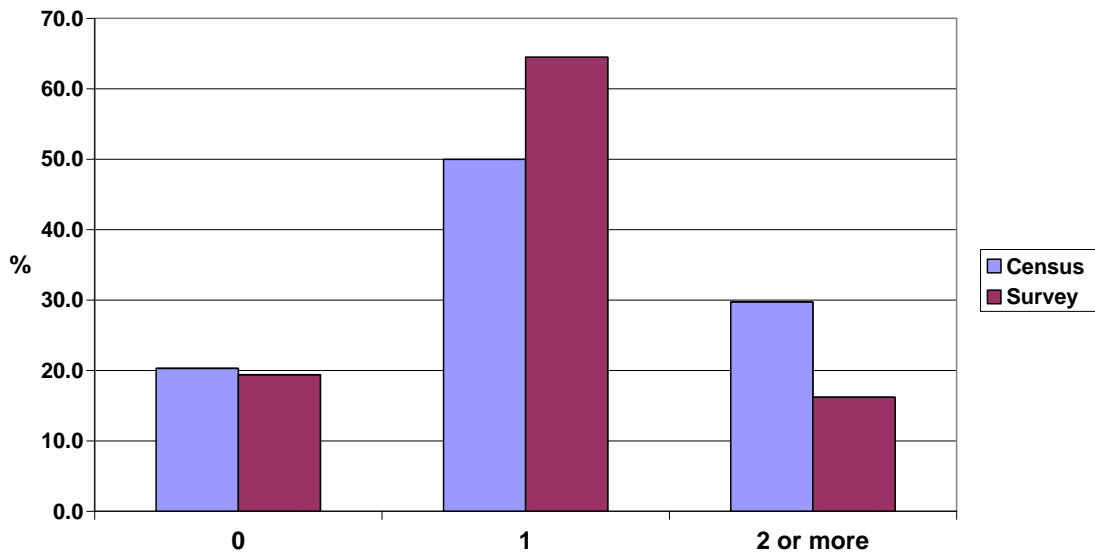
Figure 8-16 Poole Survey - Cars in Household

Table 8-8 below has been derived from Question 9 in the same way as the Camden comparison above (Table 8-2), and illustrates, subject to the same caveats, a very general comparison. It seems to suggest the respondents may drive a little less, walk, cycle and use the bus a little more than people elsewhere in the ward. Although the mainline station is within walking distance, there was only one regular rail user in the sample – and few in the rest of the ward.

(% of responses in each column)	2001* Census	Survey			
		Most days	**Most weeks**	**Occasionally**	**Never**
Car as a driver	49.2	41.7	19.3	7.8	9.8
Car as a passenger	5.4	6.3	15.8	23.5	4.9
Train	2.1	0.8	7.0	22.5	13.4
Underground, light rail or tram	0.2	-	-	-	-
Bus	6.7	6.3	12.3	22.5	13.4
Motorcycle, scooter or moped	1.5	3.1	3.5	2.9	35.4
Cycle	5.1	7.1	12.3	10.8	23.2
Walk	28.7	34.6	29.8	9.8	0.0
Other	1.1	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0

Table 8-8 Poole Survey - Travel Compared to Census

*Poole Town ward – proportion of trips to work only

The following questions show a very clear pattern of change in travel behaviour since moving to Poole Quarter. Comparing the responses to Questions 11 and 12, 28% of respondents reported that the ownership of cars in their household had fallen since immediately before moving. The

proportion of households with more than one car had fallen from 38% to just 16%, although the proportion without a car had risen only slightly, from 17% to 19%.

In some cases these changes were linked to changes (generally reductions) in household size, but this explained only part of the fall. Overall, the mean household cars per adult fell from 0.67 to 0.60 on moving. Also, excluding those where household size had changed: in 11 cases the number of cars had fallen, in 42 it remained the same. In only one case had it risen.

Similarly, Table 8-9 shows a widespread shift towards more sustainable modes of travel, although the question (13) did not seek to quantify the terms 'more' and 'less':

% of responses to each section	More	About the Same	Less	Total
Car as a driver	5.3	52.0	42.7	100.0
Car as a passenger	16.7	50.0	33.3	100.0
Train	20.5	69.2	10.3	100.0
Underground, light rail or tram	0.0	73.7	26.3	100.0
Bus	32.7	58.2	9.1	100.0
Motorcycle, scooter or moped	13.6	77.3	9.1	100.0
Cycle	51.4	43.2	5.4	100.0
Walk (for journeys of at least 10 minutes)	77.0	21.6	1.4	100.0

Table 8-9 Poole Survey - Changes in Travel Behaviour Since Moving

In a marked contrast to the other surveys, very few car owners (9%) had lived without a car for longer periods, and nearly two thirds ticked that they would not want to give up their car under any circumstances (Q.16). Only 11 people – the Carfree Choosers – stated that they lived without a car by choice (Q.19).

Questions 21 to 23 appeared to present a paradoxical picture in the light of the above responses concerning changes in travel behaviour. Three quarters of respondents were aware of Poole Quarter's travel plan objectives. Only 27% of respondents believed the plan was working – as against 41% who believed it was not, and 32% who did not know. Nearly half of respondents believed nonetheless that councils and developers ought to follow such principles elsewhere (Q.23). The reasons for this apparent contradiction were explored in the interviews, as discussed in the next chapter.

Attitudes to Poole Quarter and Carfree Developments

Occupation of Poole Quarter began in 2005, but 92% of respondents had moved there since 2006 i.e. within the previous two years. Question 7 asked about factors influencing the move. Clearly the choices open to social tenants would be constrained to some extent: one indicated that they had been on the Council's waiting list for ten years. One of the shared owners also indicated that this option was "rare". Apart from these open responses, only one factor showed a significant

association with tenure: 'convenient for work', was cited by 75% of the private tenants, which could be expected amongst a relatively mobile group. The top three reasons for the sample as a whole are shown in Table 8-10:

Q. 7: Reasons for Moving to Poole Quarter	Survey – All
Near to the town centre	64%
The flat or house itself	58%
Near to the sea	50%

<div align="center">**Table 8-10 Most Frequent Responses to Q.7**</div>

The top three problems in Question 8 are shown in Table 8-11:

Q. 8: Problems of Poole Quarter	Survey – All
Lack of parking	57%
Too many flats in a small area	31%
Lack of green spaces or play areas	31%

<div align="center">**Table 8-11 Most Frequent Responses to Q.8**</div>

Nine of the social tenants and shared owners listed other concerns relating to speeding cars and problems with and for children. Most of these respondents had children themselves.

Question 24 concerning carfree developments was phrased in a different way to its equivalents in the other surveys, reflecting the fact that respondents had just moved and might not be open to the idea of moving again. The responses shown in Table 8-12 were less favourable than in the other surveys. As with nearly all of the questions described in this section, there was no significant difference between the Carfree Choosers and the rest of the sample.

Q. 24: Attitude to living in a carfree neighbourhood	Survey All
Be keen to move there even if it meant moving some distance	2%
Consider moving there, if it were somewhere convenient	15%
Possibly consider the idea	13%
Not consider moving there	40%
Not applicable – I don't expect to move again	20%
Don't know	11%

<div align="center">**Table 8-12 Attitudes to Carfree Neighbourhoods – Poole Survey**</div>

Car Limiters

In Section 5.2, in defining the target groups it was decided to leave aside the possibility that a minority of residents in carfree developments could continue to own cars. In practice, this was the

case in all the developments described in Chapter 3 and others in the literature. The Poole responses included only one car owner willing to contemplate giving up her car altogether. Several multi-car owners had reduced their car ownership, however, and a substantial proportion of car owners had reduced their car use since moving there. This suggested a different group, relevant to the possibility above:

Car Limiters: people willing to reduce their car use on moving to a carfree or low-car environment

This group was identified from the survey by their responses to question 13: those who indicated less car driving since moving to Poole Quarter. 31 respondents (32%) fell into this group. Of these 28 had a car in their household two occasionally used a car belonging to a friend or family and one used an 'other' car, possibly from the on-site car club. Like the sample as a whole, most (77%) had one car. Twelve (40%) of them had also reduced their car ownership since moving to Poole Quarter.

In terms of the categories proposed in Section 5.2 (Table 5-1) they are mainly a sub-division of the Other Owner group. Thirteen (59% of the valid cases) said they would never give up car ownership; five (23%) said that giving up car ownership would not be possible for them.

In some respects such as age distribution, Car Limiters were similar to the total sample. Some differences such as fewer with children (32%) were evident but not significant due to the small sample size. Some differences were significant however: the Car Limiters included nine of the 13 private sector tenants in the sample and twice the proportion (46%) of households earning over £30,000.

Although the differences were not significant, 26 (83%) reported walking more and 9 (29%) reported cycling more since moving. They drove significantly less than the rest of the sample (46% on most days) but interestingly, also used buses less than the others: only two on most days; eight ticked never. Eight of the Car Limiters reported using buses more following the move, however.

Interestingly, and contrary to initial expectations, they were significantly less likely to cite accessible public transport as a factor which influenced their move to Poole Quarter (17% against 42% - Question 7). This may have been related to their lower bus use – the reasons for this and their changes in behaviour was explored in the interviews described in the next chapter.

Their responses to the question about moving to a carfree neighbourhood were similar to those of the overall sample: 16% said they would consider it. This question was also explored in the telephone interviews.

8.4   Significance of the Household Survey Findings

Compared to the online survey, the two household surveys produced fewer statistically significant differences between the possible groups. From the perspective of research questions 2 and 3 the Camden survey included a large proportion of Carfree Choosers, as expected, though not enough Carfree Possibles to permit valid statistical analysis. On some issues, including the key question of attitudes to carfree neighbourhoods the answers of the Carfree Choosers displayed the same tendencies as those in the online survey but the differences were not statistically significant. The smaller sample size provides only part of the explanation for this: their responses were more similar to the rest of the sample than was the case in the online survey. The reasons for this will be explored in the next chapter.

The Poole findings did not include enough of the original target groups to permit valid statistical comparisons. The Car Limiter category was developed as another way of dividing the large majority of car drivers there. This group might provide part of the potential demand for carfree housing, where peripheral parking is available, but their responses to that question were largely negative. The reasons for this were explored in the telephone interviews, as discussed in the next chapter.

The questions about the Poole Quarter travel plan revealed an apparent contradiction. The balance of responses to that question suggested that the plan was "not working", but the responses also indicated that the balance of changes in travel behaviour since moving to Poole Quarter was strongly towards the more sustainable modes, with many people reducing their car use. The reasons for this were also explored in the telephone interviews.

The findings show that, as expected, the Camden wards exhibit many of the characteristics which support carfree living. Poole town centre would appear to support lower levels of car use, but with less evidence of carfree living or desire to live in carfree developments. The implications of this will be considered when discussing research question four in Section 9.6.

9   Interview Analysis and Discussion

9.1   Overview

This study began with a general aim to explore the feasibility of European style carfree development in the UK. Section 5.2 narrowed the focus of the study towards questions of potential housing demand, and target groups expected to provide it. The analysis in the previous chapter offered a partial response to those questions. It also revealed a number of areas where a different approach was needed. In each of the surveys, some of the key questions were hypothetical (e.g. 12, 22 and 23 in the online survey). How robust were the responses to these, and how sensitive to changing circumstances in the real world?

Several of the questions related to attitudes, towards neighbourhoods, housing and car ownership. As discussed in Section 5.3, the qualitative stage would probe the responses to these questions and explore the meanings which respondents attached to them. The questions about moving and carfree neighbourhoods were of particular interest, and also those about car ownership and travel behaviour: what did the Carfree Choosers mean when they ticked 'I do not own a car by choice'? Under what circumstances might the Carfree Possibles give up their cars, and were any of these circumstances likely to occur in practice?

The telephone interviews described in Section 5.8 will be discussed over the next four sections. The next two sections will consider the responses of each of the target groups. Section 9.4 will consider the Car Limiter category which emerged from the analysis of the Poole survey findings. Where appropriate, discussion sections will follow the interview analysis, drawing on the literature reviewed in earlier chapters. Section 9.5 will discuss the responses of all three groups towards the prospect of carfree neighbourhoods and will discuss the broader issues of potential circumstances and locations for carfree developments raised by research question four. The final section will draw together the findings, considering what they reveal about potential demand for carfree development in the UK.

9.2   Carfree Choosers

19 Carfree Choosers were interviewed from across the three surveys. Some of their key attributes are shown in Table 9-1 (more details shown on Appendix viii).

Area	Tenure	Household	House Type	Age	Employment	Household Income
Southampton	Private Tenant	alone	flat	20 - 29	full-time	20001 - 30000
Bristol	Private Tenant	sharing	terraced	20 - 29	self-employed	10001 - 20000
Southampton	Owner occupier	family	terraced	30 - 39	full-time	40001 - 50000
Glasgow	Owner occupier	sharing	flat	20 - 29	full-time	20001 - 30000
Leeds	Owner occupier	family	semi	40 - 49	full-time	30001 - 40000
Stafford	Private Tenant	couple	terraced	20 - 29	full-time	20001 - 30000
Spalding	Owner occupier	alone	terraced	60 - 69	self-employed	40001 - 50000
Birmingham	Owner occupier	family	terraced	40 - 49	full-time	50001 - 80000
Huddersfield	Owner occupier	couple	flat	30 - 39	self-employed	10001 - 20000
Manchester	Private Tenant	sharing	semi	20 - 29	student	< 10000
Bradford Avon	In family home	family	semi	20 - 29	student	10001 - 20000
Leeds	Owner occupier	sharing	terraced	20 - 29	student	10001 - 20000
Camden	Private Tenant	Couple	flat	20 - 29	full-time	> 800000
Camden	Rent free	sharing	flat	20 - 29	full-time	20001 - 30000
Camden	Private Tenant	Couple	flat	20 - 29	full-time	30001 - 40000
Camden	Social Tenant	Couple	flat	60 - 69	student plus	50001 - 80000
Camden	Social Tenant	Couple	flat	30 - 39	full-time	40001 - 50000
Camden	Owner occupier	Living alone	flat	50 - 59	full-time	30001 - 40000
Poole	Shared owner	Living alone	flat	50 - 59	full-time	10001 - 20000

Table 9-1 Key Attributes of Carfree Choosers Interviewed

Carfree Choosers made up 25% of the online sample and 58% of the Camden sample. The Poole interviews concentrated on the Car Limiters as they were the only group for whom statistically valid comparisons were available – hence only one of the Carfree Choosers interviewed came from the Poole survey.

This section will explore the implications of the interviews for: the distinctions between the possible groups, the Carfree Choosers' explanations for not owning cars, their attitudes to urban living, the influence of transport factors on their choice of location, and their housing preferences.

Distinctions Between the Possible Groups

The interviews revealed some grey areas between the possible groups. The key survey question asked: 'do you drive a car?' Those who answered 'no' and 'I do not own a car by choice' were classified as Carfree Choosers. One of the interviewees classified as a Carfree Chooser was married to a woman who owned a car; another man classified as a Carfree Possible was living with a woman who owned a car. The first man did not have a driving licence, whereas the second one did, although he rarely drove his partner's car. According to the definitions, both were correctly classified, although their situations, in respect to car ownership and use, were quite similar.

The Camden interviewees shown in Table 9-2 were non-drivers who had ticked "I would like to own a car", thus were categorised as Other Nonowners. However, neither of them expressed any desire to own a car during interview; both seemed to have made a positive choice not to own one – in one case for partly financial reasons, but both seemed to feel it was neither easy nor necessary to own a car in inner London. One was particularly enthusiastic about the concept of carfree neighbourhoods. For the purposes of the interview analysis these two were included with the Carfree Choosers.

Area	Tenure	Household	House Type	Age	Employment	Household Income
Camden	Social Tenant	Living alone	flat	30 - 39	full-time	20001 - 30000
Camden	Owner occupier	Living alone	flat	30 - 39	full-time	50001 - 80000

Table 9-2 Key Attributes of Other Nonowners Interviewed

Reasons for Not Owning a Car

The interviews with the Carfree Choosers tended to confirm their statements about living without a car by choice. Whatever the original reasons – which sometimes differed from their current explanations – their expressed views about carfree living were always more positive than negative. Several of the Carfree Choosers mentioned the environmental factors which were prominent in the online survey. In some cases this was in the form of a simple statement:

"I'm a greeny. I'm an environmentalist so I try not to do anything too damaging"

One woman in Camden believed the reasons for favouring public transport over car use in London were self-evident:

"I wouldn't have thought there was any need to ask…I mean, it's ridiculous, I mean the number of cars you see round Kings Cross with just one driver… You're rubbing up against your fellow human beings on public transport rather than sitting in a metal box."

A couple of the other interview responses implied criticism of other people's travel behaviour in similar ways, although one Camden respondent acknowledged "It's easier to have ethics if you live in a big city!"

This linking of environmental factors with other personal values was evident in several of the responses. Some explained how their environmental reasons for non-car ownership had evolved over time, e.g.:

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"I guess it was through having not driven for a while that I began to think about the implications and the idea of driving again, … I've always been aware of the environmental implications and the social implications and all that sort of thing. But it's only really in the last 2 or 3 years that I've started making decisions because of not wanting to own a car"

These accounts are consistent with Jain's (1998) observation that 'going carfree' contributes to environmental awareness.

Retirement and divorce were both associated in some cases with giving up a car. One man explained that he "wouldn't have a lot of money" following his divorce, so he moved to Poole Quarter because of its convenience and let his ex-wife keep the car. Conversely, children were often cited as a factor in acquiring a car. Two of the male interviewees classified as Carfree Choosers (because they had no driving licence) with children had wives or partners who drove – one of these had acquired a car between the survey and interview.

Ex-Car Owners

Just under half of the Carfree Choosers had owned a car at some point in their lives. In most cases this was for periods longer than a year. Eight of these people were interviewed; most explained that giving up the car was associated with a move to a more accessible location. For some this was the fulfilment of a personal preference. In others it followed as a consequence of moving for other reasons. For example, one man explained that he gave up the car, mainly for financial reasons, after starting university. He initially intended to buy another after graduating, but found, on starting work and moving to Stafford, that he did not need one:

"there was no real thing that said to me: right I must get a car. 'Cos I'd got so used to using a bike I was actually quite happy with how I was doing it and I was also enjoying not spending the money on it. I'd started to do longer trips on the bike as well. Not only was I getting used to that, I sometimes quite enjoyed it."

Urban Living

'Close to city/town centre' was an advantage of their current neighbourhood cited by two-thirds of the online Carfree Choosers; 93% of the Camden Carfree Choosers cited proximity to Central London. In the interviews, this was referred to both by people living in city centres, and inner suburbs. The positive views about urban living suggested by the survey responses were generally confirmed during the interviews. Broader (e.g. social or cultural) advantages of urban living were generally raised in one of two contexts. The first, as explained by a man from Birmingham, related to proximity:

> "…it's walking distance of most shops that you could want in day-to-day life… supermarkets, hardware stores, those sorts of things. They're all within walking distance… very close to good public transport links, plenty of pubs and restaurants, libraries, doctors, everything you could really want to live your life is pretty much on the doorstep."

Alternatively, advantages of urban life were contrasted with the perceived dullness of life in smaller towns or suburbia. Similar views were expressed by interviewees living in Birmingham and Bristol, and several from the Camden sample, e.g.:

> "…my ex-partner had a property in Hemel Hempstead, and he loved that, and it was quite nice to go there for the weekend, but I loathed the town. It was so boring, and that's what would put me off going to places like that. The town centre was so incredibly dull, when I think that I'm used to central London. Just very down market, I found it, really depressing. So art and cinema and all those things are important. And the quality of shops."

'Close to shops' was another advantage cited by just over over half of the Carfree Choosers in the online survey. Some interviewees explained that living without a car necessitated more frequent shopping. The group was not homogenous in its shopping preferences, as illustrated by the following quotes from women in Camden and Manchester respectively:

> "…good local shopping – I don't particularly like using mega supermarkets, but I'd have to be able to get there relatively easily. This thing of having to travel miles to get to those mega complexes – I loathe them, which is why having a car isn't any sort of lure to me…"

> "…the only thing that's bad about [where I live] is supermarkets. If you live in the centre of Town there are all those little local ones like local Sainsbury's and Tesco Express and all of them, and the range is quite poor on them but I still take my bike out once a week and cycle down to the big Sainsbury's or the big Lidl or the big Aldi or the big Asda."

The general preference of Carfree Choosers for urban living was far from universal, however. Most of the Camden interviewees talked of advantages and disadvantages of London life, e.g.: "the whole thing about London in general, which is just that it's big and noisy".

Although 'close to countryside' was negatively associated with this target group, it was still cited by just under half in the online survey. Some of the interviewees explained that their location combined reasonable proximity to both urban centres and countryside. Others expressed conflicting preferences such as:

> "I suppose ideally I would like to live in the countryside rather than the city. I was brought up in the country and therefore like the green open spaces, but unfortunately it…does make the whole commuting by bike more difficult, out in the country and working in the city, then commuting by bike – the journey takes a lot longer."

Too much traffic in the immediate area was the greatest problem identified by the online Carfree Choosers. This was sometimes mentioned directly during interviews, and sometimes, particularly amongst the Camden respondents, implied within more general negative comments about noise or pollution.

Travel Preferences, Employment and Residential Location

Nearly all of the Carfree Choosers explained, in a range of different ways, how their location decisions were influenced by their non-car transport preferences. In the online survey accessible public transport was the top advantage of current neighbourhood and the most frequently cited influence on moving home for the Carfree Choosers. The interviews were consistent with these two observations. Most mentioned access to relatively good public transport in their current location, defined in terms of proximity and/or frequency. Some, such as the following woman from Glasgow, expressed this as a deliberate active process:

> "I live and work in a situation where I don't need to drive. I've done that on purpose. I've made choices so that I don't have to drive."

Work tended to define the general location for most interviewees of working age. For some, having chosen a job with little reference to transport factors, non-car transport then became the key factor in choosing more specifically where to live:

> "I had a short-term rental, close to the university, when I initially moved down here, then looked for somewhere more longer-term – having seen how Southampton works I needed to

see that cycling to work was a suitable possibility and therefore trying to find somewhere within a reasonable cycling distance."

For some of these people (including the man above), career ambitions or the short-term nature of their employment might make them consider work in locations which would oblige them to reconsider their non-car ownership. Their preference for carfree living was thus a pragmatic one, depending upon circumstances.

These observations about Carfree Choosers suggest that they are atypical of the general population in this respect. Flamm and Kaufmann (2004) conclude that personal networks for most people are "first and foremost the result of individual projects whose goal is personal fulfilment" and in which mobility factors are usually only a minor consideration. They call for more research into the minority of people who choose their location for reasons related to their mobility preferences. This evidence suggests the Carfree Choosers tend to form part of that minority.

Another aspect of these choices, which Flamm and Kaufmann do not explicitly raise, is the degree or manner in which people may constrain their employment choices for mobility reasons. The Carfree Choosers differed in this respect from the Carfree Possibles, discussed in the next section. Some of the Carfree Choosers interviewed, not wishing to move, deliberately sought employment opportunities constrained by the ability to get to work by non-car means, for example:

> "I've made the choice quite consciously, to be city based. Because I work in the voluntary sector, quite a lot of work would involve going out to see clients on a daily basis – people would be expected to drive for that, and I have avoided that kind of work specifically."

For another group, the potential conflict between work and residential location was not one they considered likely to arise as long as they continued living in their current location, since most potential work opportunities were likely to be accessible by public transport. This was particularly the case, as several of the Camden interviewees explained, in London. This might nonetheless imply some less conscious constraints on job searching – where the individual would feel no need to look for opportunities elsewhere.

In two other cases – one man who had worked on the railways and another who ran a cycle business – the nature of the employment encouraged carfree living and location choices designed to facilitate this.

There were suggestions in some cases, however, that the strategy of choosing locations to facilitate carfree living might change in the future. Several of the younger Carfree Choosers talked

of longer-term aspirations or expectations of moving somewhere less urban, which might oblige them to acquire a car:

> "I don't know, if I decided to get married and have kids and sort of move out to the suburbs, and then you need a car to sort of, ferry them around to…stuff."

As discussed in Chapter 3, the European carfree developments contained many examples of families who had made different choices in this respect. The implications of these two observations for the question of potential demand in the UK will be considered in Section 9.6

Attitudes to Public Transport

The Carfree Choosers expressed more positive views about public transport than members of the other groups. Only two of them made any negative comments about public transport. These related to the limited times of the day covered by trains and buses in medium-sized towns (Spalding and Stafford).

Both trains and buses appeared important for the Carfree Choosers, in different ways. From the online survey, whereas more used buses than trains regularly, the proportion who never used a bus (7%) was higher than the proportion who never use a train (3%). From the DfT's national omnibus survey (DfT 2003), by way of comparison, 35% of the general population never use a train and 31% never use a bus or tram. The higher use of trains by the Carfree Choosers can be contrasted with the ODPM's (2003a) study of non owners of cars in deprived wards which showed higher bus use but lower rail use than the general population.

In the Camden survey train use was higher amongst the Carfree Choosers but the difference was not statistically significant. Two thirds of Carfree Choosers used buses regularly – similar to the rest of the sample. Bus use is both more frequent and less socially segmented in London than elsewhere: unlike the online survey, there was no significant association between income and bus use.

Access to rail was clearly important to the Carfree Choosers interviewed, most of whom mentioned either their use of it, or in 11 cases their proximity to a station. For some, this was a key factor in deciding where to live. For example:

> "I was looking for somewhere that was in easy reach of London by train but much cheaper in price – houses [in Spalding] are half the price they are in Surrey, where I was. I wanted somewhere that was in easy walk of the town centre and the station, that had a train service via Peterborough to London, a good train service..."

Two of the Camden interviewees indicated that proximity to rail would be important if they were to move out of London.

Most of the carfree interviewees who did not specifically refer to rail mentioned public transport in general, their questionnaire responses indicating that this included some use of rail or the tube. There were two exceptions to this. One woman from Glasgow (whose questionnaire indicated occasional use of rail) said:

> "…there's a train service but I tend not to use that because it's ever so slightly further to walk away – the buses are very good."

And one woman from Camden said she had stopped using the tubes due to anxiety, partly related to terrorism, but more generally following a panic attack. Her fears did not extend to overground rail, but she had not had cause to use that for some time.

The frequency of buses and choice of services available were also mentioned in several of the interviews. Proximity to bus services was mentioned by several interviewees but there was only one suggestion that this might have been a factor in deciding where to live, and this was qualified as follows:

> "I think proximity to bus routes has always been something that I've had in my mind. It's not been an overriding factor."

In interpreting these differences it may be that frequent bus services are 'taken for granted' by many people in the urban areas where most Carfree Choosers live, whereas living near a station with particular levels of service might imply more specific location constraints. In general, it can be observed that good bus services and access to rail are both important to Carfree Choosers. The implications of this for the locations of carfree development will be considered in Section 9.6

Housing Preferences

As discussed in Section 7.3, the online Carfree Choosers were more likely than the other groups to prefer flats or terraced houses . Some of the interviewees expressed a clear preference for one or the other. Others said they had no strong preferences.

The questionnaires did not specifically ask about gardens. This was covered in most of the interviews. The Carfree Choosers did not seem noticeably different from the other groups in this

respect. Most said they would prefer a garden. Some said this would be an important requirement; others indicated more flexibility:

> "A garden would be very good… or safe play space and allotmenty type stuff… so it could be shared..."

As discussed in Section 8.2, preferences for flats and terraced houses were generally higher in the Camden survey – the Carfree Choosers were similar to the other groups in this respect. 92% of those who answered the question would prefer or consider flats, which may be a simple recognition that a house would be unobtainable in inner London. As one female homebuyer put it:

> "yes, well it's London. You live in what shoebox you can find! We're buying a flat at the moment, or trying to and we've been trying to find a place with a garden and we have seen a few, but you get used to the fact that anything you buy in London is going to be three inches by two."

House price constraints were clearly the overriding factor for many of the Camden interviewees. Several made points similar to the following:

> The moment that house prices become anything like realistic, I would be delighted to live in Bloomsbury for the rest of my life; but we're going to be moving, probably South of the river [Thames].

Carfree Choosers – Circumstances and Attitudes

The interviews with the Carfree Choosers were generally consistent with their questionnaire responses (one area of exception to this is discussed in Section 9.5). The combination of preferences for urban living and concerns about traffic suggests the Carfree Choosers should be receptive to the advantages of carfree developments. The attitudes of Carfree Choosers, and other groups, towards carfree neighbourhoods will be discussed in Section 9.5.

These interviews also support the view from the literature (in Sections 4.2 and 4.3) that personal circumstances, neighbourhood circumstances and attitudes all exert an influence on car ownership decisions and travel behaviour more generally. Some changes of personal circumstance such as having children often lead non owners to acquire a car but the European evidence suggests that carfree developments can alter those relationships for at least some people. One of the benefits of carfree development may therefore lie in its ability to *prevent* behavioural change, as well as encouraging behavioural change amongst car owners.

9.3 Carfree Possibles

Nine Carfree Possibles were interviewed, one from the Camden survey and eight from the online survey, as shown in Table 9-3:

Area	Tenure	Household	House Type	Age	Employment	Household Income
Stirling	Owner occupier	couple	detached	60 - 69	retired	50001 - 80000
London	Owner occupier	couple	terraced	60 - 69	retired	20001 - 30000
Aylesbury	Owner occupier	couple	detached	40 - 49	student	> 800000
Thame	Owner occupier	family	detached	40 - 49	self-employed	< 10000
Kidderminster	Owner occupier	family	detached	60 - 69	self-employed	10001 - 20000
Taunton	Owner occupier	family	terraced	40 - 49	full-time	30001 - 40000
Manchester	Owner occupier	family	semi	40 - 49	full-time	> 800000
Burnley	Owner occupier	couple	semi	40 - 49	part-time	30001 - 40000
Camden	Owner occupier	Family	flat	30 - 39	part-time	50001 - 80000

Table 9-3 Key Attributes of Carfree Possibles Interviewed

The Carfree Possibles, who made up 24% of the online sample, emerge from their questionnaire responses as rather different group from the Carfree Choosers (their numbers in the other surveys were too small for statistical analysis). Two key questions to explore in the interviews were how realistic their professed willingness to give up car ownership would prove, and the circumstances which might facilitate or hinder such decisions. This section will begin with these questions, followed by a discussion around: travel patterns, attitudes to existing neighbourhoods and the prospect of moving home.

Question 13 asked "which of the following changes would be necessary for you to live without a car". As shown on Table 7-11 , the most frequent responses were: improved public transport, changing circumstances of family, spouse or partner and moving to a different place. The Carfree Possibles interviewed had all ticked one or more of these three options and their interview explanations were generally consistent with their questionnaire responses.

With hindsight the 'you' in question 13 was ambiguous; it could be interpreted as applying to a household or just the individual interviewee. Those who ticked the 'spouse/partner' option were by implication replying with respect to their family unit. Two of the men interviewed clearly interpreted this differently. Both had ticked the 'better public transport' option in the second question, but not the 'spouse/partner' option. They explained how they might be able to live without a car – one was looking for a job closer to home so he could give up one of the two cars in their household – but in both cases, they believed their wives would want or need to continue driving.

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None of those interviewed retracted their general statement that they would like to live without a car if circumstances changed, but none gave the impression that those circumstances were likely to change in the foreseeable future.

One woman said she and her husband used their car very little – they had considered joining a car club, which might enable them to give up their car. When asked why she had not done this yet, she replied: "there's no particular reason. It's just that we haven't got around to it."

Another woman suggested that, apart from work-related reasons, having acquired a car, she might prefer to keep one, because of:

> "things like standing at freezing cold bus stops, getting fed up of it after several months, especially winter months, so yeah, lack of reliability of public transport that makes you end up standing there for long periods of time getting cold and miserable…"

All of the Carfree Possibles (by definition) had lived without a car at earlier times in their lives.   The questionnaire asked whether this was for periods of longer than a year (57% ticked this) but not how long ago.   For several of the interviewees this was a long time ago when their circumstances were very different. One man had lived without a car when living abroad, and another when living in London, before moving to Manchester. In two cases the availability of cars depended on living arrangements with other people: one woman had previously had use of a car belonging to someone she was living with. When this arrangement ended, she acquired one of her own. A retired man had only gained access to a car during those times of his life (including the present) when he was living with a girlfriend who owned one.

Travel and Public Transport

The Theory of Planned Behaviour described in Section 4.2, suggests that car owners are likely to have both less positive attitudes towards alternative modes, and weaker 'perceived behavioural controls' towards them i.e. they are likely to believe that travelling by other modes would be more difficult for them. The interviews supported these observations. The Carfree Possibles, along with the Car Limiters, generally made more negative comments about public transport. These comments covered lack of frequency, reliability and co-ordination, e.g. the following man from Manchester:

> "the buses were de-regularised a couple of years ago, so that's pretty chaotic. They're getting better but they're not that well coordinated. If you buy a return ticket, you can't always use all the buses to get back."

Two of the eight Carfree Possibles interviewed mentioned that accessing rail was difficult for them. In both cases this appeared to be a factor in their car ownership:

> "There is a train line but that is not in Thame. It's Hadenham and Thame Parkway and it's two miles away. It is cyclable if you're brave, and I do do that. But most people balk at the thought of cycling on the road because it's such a hazardous road."

Two of those interviewed lived in rural areas and mentioned that this would make living without a car unfeasible, both with reference to public transport:

> "at the moment we are living in a rural location and the public transport is atrocious and the cycling is pretty poor as well. Not having a car would be extremely difficult, living here"

Work was frequently a factor in the car ownership of the Carfree Possibles. Some people raised the difficulty of getting to work by public transport. Others mentioned that a car was needed during the course of their work. One man from Taunton said he commuted to Bristol by train most of the time, but appeared to prefer the flexibility to choose different modes:

> "while I use the train it is nice to have the car as an option for the times when I need to stay on and do extra work and not be tied to a set time when – coming back on the train…I know if I bought a monthly rail card I'd get a reduction, so it'd then work out slightly cheaper, but the idea of being stuck on the train every day of the week – it's just nice to say: right I'm going to do something different today and use the car."

Other research findings (e.g. DfT 2002) have suggested non-users of public transport have more negative perceptions of it than regular users, but most of the Carfree Possibles did use public transport, albeit less regularly than the Carfree Choosers. The interviews did not include any Other Owners (apart from the sub-category of Car Limiters in Poole). Their questionnaire responses suggested that their attitudes towards public transport were probably even more negative than the Carfree Possibles. Thus, as observed with several of the questions analysed in Section 7.4, the Carfree Possibles fell between the Carfree Choosers and the more common patterns found in the general population.

Neighbourhood Advantages and Problems

One of the issues where this observation applied was the advantages of the areas where they lived. Thus they were less likely than the Carfree Choosers but more likely than the others to cite: proximity to a town or city centre, accessible public transport, and close to shops; vice versa for close to countryside, quiet road and available parking.

When interviewed, the Carfree Possibles rarely mentioned any advantages of urban life. The two exceptions to this were a man who had recently moved to Stirling on retirement, and a woman who had moved to a more rural location, who acknowledged the "swings and roundabouts" of this choice:

> "In some ways it's very nice to live here because it's very quiet and peaceful and you've got the space around you, but at the same time we miss the amenities of having shops and cinemas and theatres on your doorstep, where you could just catch a bus in ten minutes or cycle or whatever…"

The responses of the online Carfree Possibles concerning problems of their neighbourhoods followed the same pattern as the advantages – falling between those of the Carfree Choosers and the others. Too much traffic in the immediate area was the problem most cited by the Carfree Possibles (49%), though not as frequently as the Carfree Choosers.

Moving Home

This pattern also applied to their preferences on moving home: the Carfree Possibles were less likely than the Carfree Choosers but more likely than the others to prefer or consider terraced houses or flats and to prefer urban living. Conversely, they were more likely than the Carfree Choosers, but less likely than the others to prefer rural living.

Four of the Carfree Possibles interviewed had indicated that they preferred rural life (two were already living in rural areas). One of these believed that it should be possible to live without a car in a rural area, although he would continue to need a car for his business and for carrying musical instruments. For most of these people the desire for rural living conflicted with, and would probably over-rule the desire to live without a car. One woman living in Thame explicitly recognised this:

> "…we're more likely to move to the countryside where we'll become more dependent on a car, unfortunately."

The interview responses of the Carfree Possibles concerning location and the role transport played within it were similar to those of the Car Limiters – the other group of car owners interviewed, as discussed in the next section.

Carfree Possibles – Attitudes and Circumstances

As with the Carfree Choosers, the relationships between personal circumstances, attitudes and the built environment help to explain the car ownership decisions and travel behaviour of the Carfree Possibles. For most of them, long periods of car ownership would seem to make a decision to give up the car more difficult or less attractive. This is partly because locational decisions change the objective conditions (e.g. moving to somewhere less accessible by public transport) and partly because these locations, and car use itself both change attitudes – towards car ownership, towards other alternatives and towards the ease or difficulty of using alternatives. This observation is consistent with the literature reviewed in Section 4.3 although none of those studies attempted to track the evolution of attitudes over time.

The interviews suggested (despite their questionnaire responses) that the Carfree Possibles were unlikely to give up their cars in the foreseeable future, but all of this group and nearly half the Carfree Choosers had changed their car ownership status at some point in their lives, generally linked to changes in personal circumstances. Could changes in the built environment alter the relationships in some of these cases, or would it be right to conclude that Carfree Possibles would not form a significant part of the demand for carfree development? This question will be addressed in Sections 9.5 and 9.6.

9.4   Car Limiters and the Poole Quarter Travel Plan

The Poole survey was the only one of the three which asked specific questions about changes in travel behaviour, so the Car Limiter group, which emerged from the analysis of that survey, was only identified in the Poole survey, where they made up 32% of the sample. Five Car Limiters were interviewed as shown in Table 9-4:

Tenure	Household	House Type	Age	Employment	Household Income
Private Tenant	Living alone	flat	50 - 59	full-time	10001 - 20000
Private Tenant	Living alone	flat	50 - 59	self-employed	10001 - 20000
Private Tenant	family	terraced	30 - 39	full-time	50001 - 80000
Social Tenant	family	flat	30 - 39	full-time	10001 - 20000
Shared owner	Couple	flat	70 +	retired	10001 - 20000

Table 9-4 Key Attributes of Car Limiters Interviewed

The key issues to explore with this group were: their car ownership decisions and attitudes, the reasons for their reduction in car use, and their reasons for moving to Poole Quarter.

Car Ownership

Five Car Limiters were interviewed, of whom two had reduced their household car ownership (as well as their car use). One of these was due to a separation and smaller household size. Another older couple explained their decision partly in personal terms and partly related to the parking restrictions:

> "Well mainly because it appeared that they didn't want you coming in with two, and, we didn't want to keep two. Our finances weren't – it was clear that my husband wasn't going to be able to work again. So we kept the smaller one of the two. Having said that, some of the residents that came didn't take a blind bit of notice of it."

A third family had rented a property at Poole Quarter for a temporary period, and had moved on by the time of the interview. During their time at Poole Quarter, the man explained:

> "…it was a bit of a pain with the cars. Eventually my sister took one car back to Weston-super-Mare to look after it while we moved down there, because we could only have the one car space. We didn't actually need a car really, I mean, I walked to work, my wife walked to town and to the nursery groups with our son, so that was all very good."

So, although this sub-sample was very small, there seems to be some evidence that the parking limitations had contributed to lower car ownership, as found in some previous studies (Stead, Marshall 2001).

The parking situation at Poole Quarter was the source of several complaints, sometimes relating to the behaviour of other residents, and sometimes relating to a lack of free parking within the site for visitors. Metered parking on the surrounding streets was considered by some to be unsafe – one man reported that some cars had been vandalised.

Just over half of the Car Limiters indicated they would not want to give up their car under any circumstances. The reasons for this were explored during the interviews. For three of the five it was related to work. One of these worked outside of normal hours (and had, in any case, bad experiences of public transport). Another sometimes needed a car during the course of his

working day. One man mentioned the advantage of a car for longer distance travel and another for bulk shopping.

A retired woman who generally preferred travelling by bus with her husband (both entitled to free bus passes) explained that to go to the hospital they needed to change at Poole bus station, so they would use the car for that journey. For more mobile people, the bus station would be within walking distance.   This discussion was the only mention in any of the 35 interviews of someone making a two-bus journey.

Change in Travel Behaviour

Although the differences were not significant, 26 of the Car Limiters reported walking more and 9 reported cycling more since moving. They drove significantly less than the rest of the sample (most did not drive on most days) but interestingly, also used buses less than the others: only two on most days; eight ticked never. Eight of the Car Limiters reported using buses more following the move, however.

The interviews confirmed the pattern revealed by the questionnaires of lower car use and greater use of other modes following the move to Poole Quarter. In most cases this was related, as expected, to its location, generally more central than most of the places where the people had moved from:

> "I'm five minutes' walk from the bus station and ten minutes walk from the train station, so it's easy to use that transport, I mean if – say I was going to Weymouth, taking the kids down the beach for the day, from here, I would catch the train, which I have done in the past anyway, and as I said, if I go to Bournemouth I take the bus, so yeah, I mean, where I live is really close to the bus and the train station, so there's no need to take the car really."

Walking, cycling and public transport featured in different ways in the five interviews. Proximity was the common factor. Interestingly one woman mentioned "the bus station, the train station on my doorstep" as an advantage of the location, although she herself did not use either. She had still reduced her car use because she now walked more.

As discussed in Section 8.3, the questionnaire responses revealed an apparent contradiction concerning the effectiveness of the travel plan in changing behaviour. The questionnaire asked respondents whether they believed the travel plan was working or not. A higher proportion of the Car Limiters (42%) answered 'no' to this question (although the difference was not significant) despite the fact that they were reporting lower car use themselves. The original intention of this

question was to ascertain whether people believed the plan was reducing car use across the development. Not all the respondents interpreted it in this way.

One man referred to those aspects of the travel plan which were most directly visible to residents as follows:

> "I looked at the cost of the train and the vouchers they were giving weren't relevant for what I was going to use it for, and the bus travel is cheap round here anyway, so their travel plan has not made any difference to me whatsoever. I think you get a discount if you went and bought a bike in a certain place, but if you shop around you can get those sorts of discounts anyway. I don't think it was particularly relevant to be honest."

Another woman, when asked why she had ticked that the travel plan was not working replied with reference to public transport in general:

> "Well, because I've had experience of public transport. It is so unreliable. It's expensive. It doesn't take you where you want to go. It doesn't run when you want it to run. It's no good for somebody that wants to use if for their life – getting backwards and forwards to work or visiting people, it's just so unreliable."

The bad experience to which she was referring occurred in her previous home, in an outer suburb of Poole. Partly influenced by this, she had not used public transport since moving to Poole Quarter.

A third man explained his 'not working' response with respect to the general parking situation, and a view that it was easier to get to some places such as Bournemouth by car than bus.

Reasons for Moving to Poole Quarter

In the questionnaire, the most frequently cited reasons for moving to Poole Quarter related to its proximity to the town centre and the sea as well as the flat or house itself. There were two significant differences between the groups on this question: the Car Limiters were more likely to cite 'accessibility to public transport', and less likely to cite 'allocated parking'. The interviews explored the reasons for moving to Poole Quarter. Proximity to the sea and a general liking for the town were both mentioned by more than one. Other reasons were more personal such as downsizing and proximity to family. In two of the cases chance appeared to play a part in their decision to (privately) rent a property there:

"I looked around loads. I just got this one by chance really. I'd actually found somewhere else, and that fell through at the last minute and the agent said: 'try this place'."

As discussed in Section 8.3, the Car Limiters were less likely to cite accessibility to public transport as a reason for moving to Poole Quarter – an unexpected finding from the questionnaire, which was probed in the interviews. In fact, all five Car Limiters (and the one Carfree Chooser from Poole) did mention accessibility factors amongst their reasons for moving to Poole Quarter. All of them mentioned that being close to the Town Centre or other, more personal, destinations enabled them to travel by non-car means but only one person (the retired woman who preferred travelling by bus) said that a preference for travel by non-car means was a factor in choosing that location. This was a key difference between the Car Limiters and Carfree Choosers. Many of the latter said they chose to live somewhere because it enabled them to travel by non car means. For the Car Limiters, the connection was more indirect: they chose Poole Quarter partly because it was close to places important to them. This proximity led to more travel by non-car means but they were less likely to cite a preference for non-car travel as a *direct* reason for choosing that location.

Self-selection and Behavioural Change

Referring back to the 'self-selection' issue within the literature (see Section 1.2), the observations within this section provide some evidence that a new development like Poole Quarter exerts an independent downward influence on car use (compared to not developing the site or developing it less intensively with fewer dwellings). Its influence on travel behaviour cannot be explained solely with reference to the types of people who chose to move there, since these people were behaving differently in other places immediately before moving. Although accessibility factors played a part in some of the moving decisions, in other cases, the main reason for the move was different, sometimes related to chance events. Had these people moved somewhere less accessible or less well-served by public transport, most of them would probably now be driving more.

Low Car Developments and the Paradox of Intensification

Although the parking policy seems to have played a part in reducing car ownership and use, the general location, with its proximity to the town centre was at least as, if not more important in reducing car use. This would support the view that intensification near town centres can help to reduce overall car use; but direct benefits to the residents would be more difficult to identify. A comparison with Vauban is apposite here. Whereas some Vauban residents expressly moved there in order to benefit from the carfree residential environment, it would be difficult to imagine anyone (and no responses suggested this) moving to Poole Quarter *because of* the travel plan. The parking arrangements were viewed by most respondents as a problem, and several also referred to traffic problems and an unsuitable environment for children to play in. In this respect,

this form of development illustrates the paradox of intensification discussed in Section 1.2: it brings wider benefits, but at the expense of some negative factors for the residents themselves.

Car Owners: Location, Employment and Travel

By contrast to the Carfree Choosers, the Car Limiters and Carfree Possibles (from the online and Camden surveys) interviewed, were less likely to explain their location and employment choices with reference to transport factors. Most of the car owners emphasised the intrinsic merits of the areas where they lived, or were planning to move to. In some cases – including most of the moves to Poole Quarter – these decisions had reduced the need to drive, although this was not a principal reason for the move. In other cases, including a move away from Poole Quarter and a move away from Bloomsbury, longer commuting by car or other means would result.

None of the drivers mentioned constraining their employment opportunities for transport reasons. Although few employment choices are completely unconstrained by transport and location factors, this appeared to illustrate a difference at least of perception compared to many of the Carfree Choosers.   Thus the car drivers – of all categories – tended to conform to the 'normal' expectation of Flamm and Kaufmann, where preferences around employment or location influence personal mobility networks more than vice versa.

The analysis in this and the previous two sections suggests that carfree developments well-located for travel by non-car means would have a greater power to attract Carfree Choosers than Car Limiters or Carfree Possibles. The questionnaire responses of the Car Limiters suggested little interest in such a move, although the Carfree Possibles did declare high levels of interest. To what extent the interviews would support these responses will be considered next.

9.5   Attitudes to Carfree Neighbourhoods

The analysis of the online survey supported the hypothesis that Carfree Choosers and Carfree Possibles would both be more favourable towards the prospect of living in a carfree neighbourhood. They also suggested that people living in Camden were more favourable to the prospect than those living in Poole Quarter. Table 9-5 summarises the responses from the various groups across the three surveys:

Survey/Groups	Keen to move there	Keen/Consider if convenient
Online – Carfree Choosers	24%	89%
Online – Carfree Possibles	14%	84%
Online – Others	5%	59%
Camden – Carfree Choosers/Possibles	6%	54%
Camden – Others	2%	41%
Poole* – Car Limiters	0%	16%
Poole* – Others	3%	17%

Table 9-5 Target Group Attitudes to Carfree Neighbourhoods

* Note small sample sizes

Section 9.3 discussed one respect in which the telephone interviews provided a different perspective, casting doubt upon some of the questionnaire responses, relating to the willingness of Carfree Possibles to give up their cars. In a similar way, the interviews probed the responses about carfree neighbourhoods. Most of those selected for interview had made positive responses to that question in the questionnaires (see Appendix viii). How robust were those responses, and what sort of circumstances did respondents suggest would make their declared intentions more likely to be realised? This section will discuss these issues, beginning with the specific question of moving, followed by the influence of transport, housing and location preferences.

As discussed in Section 5.8, two residents of The Brunswick (the small carfree development illustrated in Figure 6-9) were interviewed. Their experience of living in a carfree area, and how it influenced their views on carfree development generally, are briefly discussed at the end of the section.

Willingness to Move to a Carfree Neighbourhood

The proportion of people keen to move to a carfree development regardless of distance was fairly small across all the samples. As shown in Table 9-5 the largest proportion was concentrated amongst the Carfree Choosers in the online survey (particularly concentrated amongst the members of environmental organisations). The interviews included 12 respondents from the 'keen to move' groups. The interviews aimed to probe both the general attitudes and the personal factors which would encourage or constrain the interviewee from moving to a carfree neighbourhood if this became a real possibility.

Several of the interviewees had experience of carfree areas from overseas: Venice, a 'hippy commune in Copenhagen' (probably Christiania), parts of Amsterdam and Swiss ski resorts were all mentioned. Others had read articles, including one written by the researcher in *Cycle* magazine on Freiburg and Vauban. In most cases the concept needed to be explained, however.

The questioning emphasised the distinction between aspirations and constraints, to test the seriousness of the questionnaire responses, and draw out any constraints. For example, it was pointed out that a few carfree developments might be initially be built in different parts of the country, not necessarily near where the person lived:

> "Could you foresee a circumstance where you might **actually** be in a position to move to somewhere like that, or is that just one of those: would be nice, but likely not to be practical?"

When pressed in this way, most of the 'keen' group revealed factors particularly related to work or family which would constrain their ability to move to other places. Like the general sample of home buyers interviewed by Stanbridge (2007, see Section 4.4), travel concerns did not appear likely to prompt a move. After describing the specific constraints, the following response was typical:

> "there are so many different, other factors that come into it…if I were going for a job in a particular area of the country and there was a carfree place that was close to it, that would be a first choice to look at…it would be in that order rather than necessarily saying: oh yes I'm going to find this carfree place and then perhaps find a job…"

Only one of the 'keen' group eventually conceded that he would be unlikely to move to a new carfree area as he was "happy where I am" – in Poole Quarter.

The people who had ticked "consider moving there if it were somewhere convenient" displayed a similar range of attitudes towards the prospect of living in carfree neighbourhoods. Some were enthused by the idea, making comments like "I'd move there in a flash." Amongst the attractions of carfree areas, phrases such as "cleaner and greener" were used several times. Some mentioned a better environment for children to play in. Another theme related to a sense of community, sometimes related to "like minded people", who were expected to move to such places.

Further questioning revealed constraints mainly related to work, family and public transport connections, and a range of preferences, on neighbourhood and housing type, for example, as discussed below.

Overall, the interviews suggested that the declared willingness of the Carfree Choosers to consider moving to carfree neighbourhoods was credible, providing their personal circumstances facilitated a move to the location, and the neighbourhood was able to accommodate their housing and other preferences.

Attitudes of Car Owners

Following the analysis of the Carfree Possibles and car ownership, their responses to the questions about moving to carfree neighbourhoods were also probed in a similar way. When describing the concept of carfree development to car owners, the researcher explained that some car ownership might still be possible, but parking would be limited, separated from the housing and might not be free. Several of the nine Carfree Possibles interviewed were undeterred by this; some were as enthusiastic about the concept as the Carfree Choosers, although in some cases potential obstacles emerged during the interview.

Three of the interviewees mentioned that partners or other family members might be less keen on the prospect; in two of these cases the partner had a greater perceived need for the car than the interviewee. One of the Carfree Possibles (the woman from Thame quoted at the end of Section 9.3) specifically conceded that her household was unlikely to move to a carfree neighbourhood, if this was in an urban area. Another Carfree Possible was positive about the idea of carfree living but in a small rural eco-community; he had given some thought to a form of community transport which might service it. Whether carfree developments could realistically be planned in less urban locations will be discussed in the next section.

The remaining four Carfree Possibles did not reveal any particular obstacles to moving to a carfree neighbourhood: whether with or without a car was not specifically probed. One man aged 60 – 69 thought the concept might be particularly suitable for older people if their needs were accommodated in the design. He was thinking about his own situation in the future when he might need some form of supported living, and prefer to live closer to local services.

Given the smaller sample size, the responses to the Poole questionnaire need to be treated with some caution, but the less favourable attitudes to carfree neighbourhoods are consistent with the issues about location and carfree living discussed in Section 4.3 – people in Poole were willing to adjust to lower car use and possibly lower car ownership, but generally believed access to a car to be important.

Most of the Car Limiters had indicated they would not consider living in a carfree neighbourhood, and these subjects were only raised in a couple of those interviews. It was pointed out that carfree neighbourhoods do not necessarily preclude people from owning cars, although the parking would be more limited than in Poole Quarter and would not necessarily be free. This confirmed the view of the woman with the poor experience of public transport quoted earlier:

> "No, I think that's wrong. I think people should have the right to have a car and have that freedom to move around as they wish – I mean, I don't agree with people having four wheel

drives and stuff like that, for a couple or one person, I think that's wrong, but I don't think you should be charged for having a car, for having that freedom, no."

Location and Housing Preferences

The start of the interviews coincided with the start of the Eco-towns process, when it was becoming apparent that recommendations on carfree areas were likely to appear in the transport guidance for the Eco-towns. The questioning about carfree developments mentioned the possibility of carfree developments within existing cities and Eco-towns, trying to bring out any differences in attitudes towards the two.

Several of the interviewees said that a carfree area within an existing city – usually the one in which they were living – would be of more interest than an Eco-town in a new location, either because they did not want to move away from the city where they lived, or because they perceived that existing cities offered a greater range of experience, for example:

> "I would want there to be somewhere there was some sort of mixed nightlife… where you can go for a curry one Saturday and a Chinese the next, you know, those sort of things are quite important to us…"

Over two thirds of potential movers in the Camden survey indicated a preference to stay in the area, with a further 21% preferring to move within London. This helps to explain the small proportion of 'keen movers' relative to those who would consider a carfree neighbourhood "if it were somewhere convenient".

Some of the respondents did express positive views about moving to an Eco-town, but these were usually accompanied by caution on some issues e.g.

> "I think in principle yes. I'd like to know a little bit more about it because it's a case of: this is a carfree town but it's surrounded by massive park and ride places then I wouldn't be quite so impressed by it, but if it was a genuinely carfree town where public transport, walking and cycling were the way to get around and you were actively encouraged from owning cars within it then yes it would be a place that I'd be interested in."

It was pointed out in this context that Eco-towns would be newly built; interviewees were asked about their attitudes to this. Several expressed a preference for older properties and/or more established areas. The word 'soulless' was used several times to describe new developments built in recent years in this country. The strength of the preferences varied; several people said it would

depend on the quality of the design. This point was made both in respect of the housing and the wider areas, for example:

> "I've always been a bit of a snob on that, and preferred older houses, but I think… I think that's because architecture in Britain has tended to be nicer pre- 1950s really. After the 1950s it seems like they've wanted to whack up as many new buildings as possible and they didn't care about the design, but if it was a nicely designed building, new buildings? Yeah, might be pretty good."

Some interviewees again contrasted the poor quality of recent British development with more inspiring examples from overseas. Similar points were made when discussing high density living, e.g.:

> "I'm not opposed to high density or high-rise, even, living…I believe in some European countries there are some quite interesting examples of really nice high rise flats that have, you know with roof gardens and terraces and all that sort of thing."

Public open spaces, green areas and 'a feeling of openness' were all mentioned as factors which would make a new development or a dense development more attractive as a place to live. One woman from a small town was attracted to this idea, but remained sceptical about its application in this country:

> "I've seen programmes of settlements they've got on the continent, where they try to ameliorate this with having clever planting and stuff, and I don't know if having different green spaces might make it feel different and change the psychology of the situation, but at the moment, going on how housing in Britain tends to work I would rather go with the space, myself."

Although more of the online Carfree Choosers and Possibles would prefer to move to an urban area; a substantial minority (22% and 29% respectively) would prefer to move to a rural area. The interview sample included some of this minority. In three of these cases the declared preference for a rural area did not appear to be very strong, or was even contradicted in the interview. One man had considered rural living at one point in the past but would now prefer to stay in Bristol for the foreseeable future. Another man said he would like to move from Manchester to a smaller town, but not a village or open countryside. In a third case, a woman in Huddersfield had moved quite frequently and seemed to be fairly open-minded about where she lived, as long as it was not in the Southeast.

Three of the other interviewees were more explicit about their preference for rural living. The woman from Thame (as quoted in Section 9.3) recognised that this would mean greater car dependency. Two of the others – Carfree Possibles – believed that rural living and lower density housing did not have to mean owning a car, although both had found car ownership necessary in their current circumstances. The man interested in a rural eco community was mentioned above. One woman was interested in the prospect of living in a carfree Eco-town, but would like "space around us" and would not consider living in a flat or terraced house.

The housing preference most frequently mentioned in the interviews was for 'environmentally friendly' or 'eco' homes – those who expanded on these terms mainly mentioned insulation for thermal efficiency. In a couple of cases, people contrasted these things with what they believed to be generally poor standards of building in this country:

> "eco sort of housing, I suppose, well built, not cheapo Gerry built houses where you can hear the next door neighbours having a pee!"

Transport Issues

When asked what would make them more or less likely to consider a move to a carfree development, several interviewees – including some Carfree Possibles – mentioned similar transport factors to those raised by the Carfree Choosers in the context of moving home generally. Several mentioned access to rail, either in terms of proximity to a station or a convenient rail link to their place of work. For the Camden respondents this typically meant good rail links into central London. The importance of evening transport was mentioned by a couple of interviewees, one contrasting it with services which "suddenly stop at half seven in the evening". Some interviewees mentioned the need for occasional car use, either through car sharing or a car club.

Cycling was an important mode for both Carfree Choosers and Carfree Possibles, and this was reflected in some of their responses on carfree areas. Cycle routes or paths were mentioned by several interviewees, sometimes comparing their poor quality in this country with experience from overseas. The following woman from Camden did not cycle in London because she felt the roads were too dangerous:

> "When I was living in Germany, I cycled in Bonn and that was absolutely blissful because there were enormous wide cycle lanes along the side of every road, sectioned off from the traffic by the little mini islands or whatever – bollards in the middle of the road, or whatever, and they were wide and they were comfortable and they were smooth and there were no potholes and nobody tried to kill you…"

Amongst the reservations expressed about Eco-towns, two people had picked up on concerns in the media about transport links:

> "But isn't the issue with them that where a lot of them are planned to be, that there's no transport there. They're not on railway lines, for example, so you have to have a car. It's more likely that you'll need a car to get in and out of them."

Residents of The Brunswick

As discussed in Section 6.1, Bloomsbury ward contains a small development which may be considered carfree as defined in this study. Two residents of The Brunswick were interviewed: one young Carfree Chooser who lived with his father and a female Carfree Possible whose husband drove a car. Both liked the traffic-free environment there. The young man said:

> "there's an enormous amount of open space you look out on. You don't often get that in Central London. That really makes living there very nice. You can breathe easily. I suppose you don't have the problem of traffic which is a nice thing."

For different reasons, both were planning to move away from the area: the young man for work reasons, the couple for a combination of reasons, including a desire for more space. The experience of living there made both interviewees positive towards the concept of carfree development. Both indicated that they would like to live somewhere similar if it were available in the places where they were planning to live (and if it contained the right sort of housing, for the couple). The young man qualified this by saying that if his work took him further out of the city he might "look to have a car".

The woman pointed out that parking was available for residents, so she did not consider The Brunswick to be carfree. As car ownership in Bloomsbury was low in any case (particularly amongst social tenants who made up the majority of Brunswick residents), the relatively small number of parking spaces may not have constrained car ownership, although the cost – £20 per month – may have done, to some extent.

9.6   Potential Demand for Carfree Development – Implications of the Findings

The aims of this study were to explore the feasibility of carfree development and the circumstances under which it might be more widely adopted in the UK. Research questions two to four focussed the study on more specific issues related to the existence and nature of potential demand for housing. The evidence reviewed so far will be used to address the specific questions and also

shed some light on the broader aim which suggested them. This section will analyse these issues beginning with the hypothesis in research question three and its implications for potential demand, followed by a discussion of the issues of location and circumstances raised in research question four.

Is There Potential Demand Amongst the Target Groups?

The online questionnaire responses supported the hypothesis in the third question and the interviews suggested that the responses from the Carfree Choosers were generally credible in this respect, although the statement 'I would be keen to move there even if it meant moving some distance' was not interpreted as conceived when writing the questionnaire. The existence of a carfree development was unlikely to prompt a move. A range of personal and employment factors would prompt or constrain home moves: most of the Carfree Choosers would consider housing in a carfree development if the location was convenient and attractive to them. Although the interviews did not specifically ask about general attitudes towards innovation, there was evidence, particularly in their attitude to housing, of an openness to innovation amongst the Carfree Choosers, consistent with a role as potential early adopters.

The interviews cast doubt on the survey responses of some of the Carfree Possibles. Although several of them were positive about the prospect of living in a carfree development none of them appeared likely to give up their car ownership in the foreseeable future. Whether the Carfree Possibles are likely to provide a substantial proportion of the early adopters would depend therefore on the availability of some peripheral parking. The European evidence suggests that if car owners are able to move to a carfree development many will choose to give up their car ownership later. The cost of parking spaces, and the ability to re-sell them provides an ongoing incentive for this in some of the examples.

It should also be noted that the target groups are not static. At different points in the lives of most of the interviewees decisions were made to acquire or give up a car. Nearly half of the Carfree Choosers had owned a car at some point in their lives, and subsequently decided to give them up. At these points, car owners might become more receptive to the prospect of living in a carfree development. This implies that potential demand for carfree development may be larger in the longer-term.

If the findings of the online survey broadly vindicate the choice of research questions, the implications of the Camden and Poole survey are not so clear. What conclusions may be drawn from the paucity of statistically significant differences between the groups? As discussed in Section 8.2, the smaller sample size was not the only reason for this: in Camden the magnitude of the differences in responses between the groups were smaller than in the online survey (the small size of the Poole groups would make a similar comparison difficult there). The Camden respondents as

a whole were more positive about carfree living and carfree development than those in Poole. The discussion below, about locations and circumstances explains at least part of these observations. Although individual circumstances and preferences varied, a clear picture emerged from across the three surveys of the circumstances which would facilitate or constrain carfree living. The circumstances in Camden are clearly more favourable than in most parts of the country. Even in the town centre of Poole, a substantial majority of people believed a car to be necessary for them.

Although Poole Quarter is not carfree, and the proportions of Carfree Choosers and Possibles were relatively smaller, the findings from that survey have some significant implications for this research question. They support the view that changes to the built environment at the local level can help to change travel behaviour. Both the location, with its proximity to services and public transport, and the parking limitations contributed to the reductions in car ownership and use reported by its residents – as observed in the European carfree developments. This reinforces the point made above about longer-term demand. Decisions to change levels of car ownership tend to occur at significant life stages, and whether through cognitive dissonance or other more conscious processes, the built environment appears to exert an influence on attitudes following a move. The interviews produced several variations on the theme of: "I found I didn't need a car", for example. If attitudes do adapt to circumstances in the ways suggested here, then new carfree developments would, to some extent, help to create their own market, helping some Carfree Choosers to remain carfree, and some Carfree Possibles to become Carfree Choosers.

The Car Limiter category emerged from the Poole findings and the observation that European carfree developments all include significant minorities of car owners. The findings suggest little demand for carfree housing amongst this group in the short-term. The above analysis about churn within the groups would also apply to them however: some of them might give up car ownership in the future, but it seems the circumstances in a location such as Poole town centre would not generally encourage this. Although the interviews did not spend much time on this issue (and the respondents had little or no experience of the concept) the prospect of living in a carfree development and paying for remote parking does not seem attractive to many car owners, although some might accept it as the price of a better immediate environment. This is consistent with Nobis (2003) who found lower levels of satisfaction amongst car owners in Vauban, and Borgers' (2008) findings about the parking preferences of Dutch car owners (see Section 2.7).

Parking and Behavioural Change

If most of the potential demand for carfree developments comes from Carfree Choosers, there is not much scope for reducing their car use: they rarely drive anyway. The scope for Carfree Possibles or Car Limiters to reduce their car ownership and/or use is clearly greater. Although there is no survey information on this, it is likely that at least some of the people who moved to the

European carfree developments and subsequently gave up their cars made this decision after moving, in the light of their experience and possibly influenced by the social norms of their new neighbourhood. Carfree developments which are able to facilitate decisions of this kind will achieve greater global benefits than those which only attract Carfree Choosers. This implies, paradoxically, that carfree developments with some minimal parking, charged at a rate which provides an ongoing disincentive to car ownership, may bring greater global benefits than those with no parking, which only attract the more determined Carfree Choosers (although the latter may bring greater local benefits).

National Size of Potential Demand

This study has focussed on the existence and nature of potential demand rather than its size. The study did not include a representative national sample but some observations may be made on the size of one of the target groups. Carfree Choosers are a subgroup of the more easily identifiable group of non car owners. As discussed in Section 5.4, extrapolating from the literature, the Carfree Choosers might form around 6% of the adult population of Britain.

What proportion of the Carfree Choosers would become early adopters of carfree housing at a national level would also be difficult to assess from these findings. Responses to the question about living in a carfree development were more positive in the online than the Camden survey, both amongst the Carfree Choosers and the overall sample. This suggests that the Carfree Choosers are not a homogenous group. It may be inferred that the environmental attitudes and utility cycling which characterised (and to some extent defined) the online survey population exert an influence which is not fully captured by the two variables (car ownership and attitude towards it) which define the Carfree Chooser category. In this respect, the online Carfree Choosers appear to share some similarities with the small group indentified by Anable (2005) as 'Carless Crusaders' (see Section 4.2).

The number of Carfree Possibles has not yet been assessed at a national level. More research would be needed to assess this, and the size of potential demand for carfree development at the national level. The findings of this study provide more information about the nature of that demand and where it may be found.

Locations

All of the recently built European carfree developments have been in existing cities; there have been no direct equivalents to the Eco-towns programme. This appears to reflect a belief on the parts of the planners and activists that carfree living is easier within existing cities. It may also reflect the preferences of the broader group of people who form the potential market for carfree

housing: proximity to city centres was mentioned as an advantage in several of the study visits. The survey of Stellwerk 60 (see Section 3.5) provides some evidence for this view.

The evidence from the questionnaires and interviews suggests that the greatest potential demand in this country is likewise concentrated within cities. 91% of the online Carfree Choosers were concentrated in urban areas, and as illustrated on Figure 7-13, the Carfree Choosers who expressed an interest in carfree developments were particularly concentrated in larger settlements – three quarters of them in settlements of over 100,000. Poole, it may be noted, is at the smaller end of this range, while London is the largest. Although there will be many local variations, the overall pattern is clear.

This suggests an important qualification to research question two. **Carfree Choosers are more likely to choose carfree developments and they are more likely to make such a choice if they live in a larger settlement.** The telephone interviews tended to support these observations. Transport needs are a large part of the reason, as discussed below, but the Carfree Choosers interviewed (who had also expressed an interest in carfree development) also expressed more positive views than the Carfree Possibles about urban living in general. Proximity to shops and other services was mentioned as an advantage of their current neighbourhood, and/or something they would look for when moving. Some Carfree Choosers went further, describing cultural opportunities and the range and quality of services such as restaurants.

Housing and Density

The Carfree Choosers were also relatively favourable towards higher density housing, including flats and terraced houses, although these views were not held by all of them. A minority of them and a larger proportion of the Carfree Possibles expressed preferences for lower density housing, including detached or semi detached houses.

The analysis in this thesis has, and will continue to equate flats and terraced housing with higher densities (of both dwellings and population) than detached or semi detached houses. This is usually the case when comparing large areas of such housing. It should be acknowledged however that the relationship between housing type, gross density of dwellings, and population density is not straightforward. It is possible – and there are examples of this – to build flats and terraced housing at relatively low gross densities, where they are surrounded by other land uses. This was the case with many tower blocks built in Britain during the 1960s (Homes & Communities Agency 2007). Conversely, although a development of detached and semi-detached houses with a high population density is theoretically possible, in Britain today, where two thirds of households are made up of one or two people (ONS 2009), this is unlikely.

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None of the European carfree developments visited included any detached or semi-detached housing and flats were more numerous than terraced houses. This appeared to reflect general development policies and practice in those locations, although some of the developments visited were built at higher densities than the surrounding areas. Each local circumstance is different, but higher densities generally help to maintain shops and services within walking distance for a larger number of people, likely to be more important in a carfree development than elsewhere.

Tenure

In both the Online and the Camden Surveys, Carfree Choosers who said they were keen or would consider moving to a new development made up 16% of the total samples (including those with no intention of moving who were not asked the question). Within these two subgroups, there was a similar mixture of intentions with respect to tenure as shown in Table 9-6:

Intentions on Moving	Online	Camden
Can Buy	36.0%	38.7%
Would only move if and when I can afford to buy	24.0%	25.8%
Rent from council or housing association	3.3%	3.2%
Private rent	31.3%	25.8%
Shared ownership	5.3%	6.5%

Table 9-6 Moving Intentions of Carfree Choosers Interested in Carfree Development

The Camden responses were similar to the overall responses for that survey; 41% of the online subgroup were already home owners, compared to 78% of the overall sample. The Carfree Choosers were younger than average, so it seems affordability may be more of an issue for them. The median household income of this subgroup was towards the middle of the £20,000 to £30,000 band. This was lower than the rest of the sample but similar to, possibly slightly higher than, the national quintile averages shown in Figure 7-5 (although the comparison is inexact).

This analysis would suggest therefore, that to satisfy the potential market, carfree developments should contain a majority of properties for sale. A significant proportion of these would need to be sold to property management companies or 'buy to let' investors, to satisfy the demand for private renting. Based on current practice this would tend to reinforce the preference for locations close to city centres with high proportions of flats in the housing mix, although this is an area where more research is required.

Transport Networks

As outlined in Chapter 3, the European carfree developments were all served by rail or light rail in the immediate vicinity, and some of the stakeholders interviewed believed this to be essential. In a UK context, where urban rail systems are less well developed, this would be a much more restrictive criterion. This begs the question of whether the absence of these could prove a barrier to successful carfree developments, by discouraging potential residents and affecting the sale values of properties within them.

The evidence from Slateford Green suggests that at least for social tenants, an inner city carfree site well served by buses may not need the rail connectivity of the European sites. The high use of buses by all groups in Camden would also support this view. Different considerations are likely to apply outside these inner areas, particularly where the 'target market' is made up of higher income non owners of cars, which would include most of the Carfree Choosers.

Comparing the comments of the Carfree Choosers and Carfree Possibles sheds some light on the public transport provision which can facilitate carfree living. Infrequent, unreliable and uncoordinated bus services, indirect routes requiring changing, and living some distance from the nearest railway station were all mentioned as reasons for continuing to own a car. Conversely proximity to a railway station was mentioned by several of the Carfree Choosers as an important factor in their past and/or potential future residential location decisions. Proximity to bus services, the frequency and choice of bus services were often mentioned as advantages of current locations but only once (qualified as "not an overriding factor") as a location criterion. As discussed in Section 9.2 frequent bus services may be a 'taken for granted' advantage of inner city living.

Buses and trains were both important to the Carfree Choosers, in different ways. The online Carfree Choosers were three and a half times as likely as the rest of the sample to use buses on most days – although their bus use was lower than the Other Nonowners. Roughly twice as many used trains on most days; 97% used rail to some extent. This higher use of rail by the Carfree Choosers contrasts with the ODPM's (2003) study, which found that people on lowest incomes made relatively little use of rail. Within the online sample, the Carfree Choosers used rail slightly more often than Other Nonowners, although the difference was not statistically significant.

Some of those who mentioned the importance of proximity to a station reported only occasional use of rail in the survey suggesting that the importance of access to a mode in enabling carfree living may not necessarily relate to the frequency of its use. A similar observation may be made in respect of late evening public transport, mentioned in some of the interviews.

The number of Carfree Choosers in smaller settlements was not sufficient to draw any firm conclusions, but there were some suggestions from the interviews that proximity to rail may be more important in smaller settlements.

Cycling was particularly important for the Carfree Choosers, not only those who belonged to a cycling organisation. They cycled more than the Other Nonowners (who were more likely to use buses). This finding is consistent with the observations in the European carfree developments, and would suggest that good conditions for cycling would be a factor likely to encourage demand for carfree developments. Quality and continuity of cycle routes (often contrasted with the poor standard of such facilities in existing neighbourhoods) were most frequently mentioned by the interviewees in this respect.

Car clubs are also an important element in most of the European carfree developments. Convenient parking spaces are reserved for car club vehicles in all the larger examples. Carfree development would appear to bring an additional benefit of increasing demand for car clubs, making them more financially viable.

Design

Two thirds of the online Carfree Choosers would consider moving to a newly built home – more than the rest of sample. The interviews revealed openness to different designs and concepts, with several making references to European examples, coupled with negative views about the quality of recent construction in Britain and some scepticism about the likelihood of significant improvements. The comments about design applied to the neighbourhoods as well as the housing itself. In this respect the attitudes of the target groups probably reflect those of the wider population, although the Carfree Choosers may be more receptive to innovations. The interviews also suggest that ecological building standards would help to make carfree developments more attractive to the target groups.

Feasible Locations for Carfree Developments

The analysis so far suggests the greatest potential for carfree development from both a demand and design perspectives lies in denser areas of larger cities, particularly their inner areas. However, a substantial minority of the Carfree Choosers and the respondents of all groups who expressed interest in carfree developments, would prefer to live in a smaller settlement and/or lower density housing. Most of the interviewees who were open to the idea of carfree living said they would consider a carfree area within an Eco-town although concerns about remoteness and the adequacy of public transport were also raised. It may be asked to what extent might carfree

developments be feasible in smaller settlements, suburban or ex-urban developments, and with lower density housing.

Some of the criteria summarised in this section could, and in some places are, provided in smaller settlements and suburban centres: the range of day-to-day shops and services within walking distance, for example. Some other needs, particularly employment, would create a greater challenge. There was some evidence that Carfree Choosers are more willing than other groups to constrain their employment searches for transport reasons, or move home to pursue employment opportunities. But there were also some suggestions that future moves for employment reasons might necessitate the purchase of a car. Some of the Carfree Possibles – who were generally older and more likely to own their home – had reacquired a car for this reason.

The ability of Carfree Choosers to remain carfree would depend therefore on the range of needs accessible within the immediate area and their ability to satisfy other, potentially changing, needs elsewhere by public transport.

The questionnaires did not attempt to assess the specific public requirements of Carfree Choosers in terms of destinations, frequencies etc – more research would be justified in this area – the interviews do provide some insights, however. Although Carfree Choosers walk and cycle more frequently, access to public transport is clearly a key locational requirement for them. Their needs are varied and multiple: locations in which they live tend to permit travel in different directions with rail generally available for longer journeys. The absence of one or more of these factors was often cited by the Carfree Possibles as a reason for acquiring or continuing to own a car. The linear pattern of public transport networks in British cities means that their central and inner districts cities tend to benefit from both more frequent and multi-directional services.

Some smaller settlements and suburban centres benefit from better connections than others, and in some cases new development may facilitate improved connections; in such places carfree developments may also be feasible, but the challenges of providing sufficient accessibility would be greater there. The comments of the Carfree Choosers on public transport also imply areas with a relatively high population density, able to support higher frequencies and greater choice of services, although, as discussed above, patronage is likely to be higher than from conventional developments of a similar density.

At a small scale it may be possible to build a lower density carfree development in a location which was already well served in these two respects. A planning authority may wish to include a proportion of lower density housing within a higher density development, for example, although as illustrated in Poole Quarter, developers subject to overall parking constraints prefer to reserve the higher parking ratios for the larger, lower density housing, as they believe parking is more

important in marketing such houses. The desire of some of the Carfree Possibles to live in low-density housing in a carfree development may be possible to address in some circumstances, therefore, but these are likely to be relatively rare exceptions. Although this study has not sought to look into the longer-term future, for the foreseeable future, the greatest potential for carfree development lies within the inner areas of larger settlements. The next chapter will consider the policy implications of this analysis.

10 Conclusions, Reflections and Policy Recommendations

10.1 Outline

This thesis has been structured to develop and address the four research questions listed in Section 5.2. These can now be more specifically answered. Section 10.2 will address the first question about definitions. The following section will address the remaining research questions about the potential demand for carfree development in the UK.

These answers do not in themselves constitute policy recommendations. Following the principles of value separation discussed in Section 5.9, to move from what is, and what might be, to what ought to be done, the evidence needs to be reassessed on the basis of explicit value judgements. Section 10.4 will begin with a statement of value judgements, and will draw on the findings of the study to make the case for carfree development as a public policy. Section 10.5 will consider the circumstances under which it could and should be implemented and Section 10.6 will make some specific recommendations for Government policy guidance. The literature review in Chapters 2 and 4 identified many knowledge gaps in this area. This study has addressed some, relating to typology and potential demand for carfree development, but it has also identified several other areas where further research is needed. The final section of this chapter will summarise the most significant of these, ending with a reflection on carfree development as a small step towards longer-term sustainability.

10.2 Addressing the Research Questions: Typology and Definition

This thesis has been structured to develop and then address the four research questions. This section and the next one will consider each of the research questions in the light of all the evidence reviewed so far.

The literature and practice have used differing definitions of the term 'carfree' and have struggled with the distinction between carfree and 'low car' developments. The first research question was therefore:

1.   What types of existing developments can be defined as 'carfree'?

This was addressed through a review of the literature (in Chapter 2) and the five study visits described in Chapter 3. From these, as discussed in Section 3.7, three types of carfree development were found across the different European countries:

- Vauban model
- Limited access model
- Pedestrianised centre with residential population

In the **Vauban model** there are no physical restrictions on vehicles entering the carfree residential streets (although through traffic is not allowed). Vehicles are allowed down the residential streets at walking pace to pick up and deliver but not to park.

The **limited access model** places more physical restrictions on the access of motor vehicles to the core residential areas.

Groningen has extended the principle of **pedestrianised centres**, already prevalent in many British cities, over a wider area including many residents, who live with limited parking and correspondingly low car ownership, and varying levels of restriction on vehicular access.

Reflecting these three, the following **definition of carfree development** was proposed:

Carfree developments are residential or mixed use developments which:

- Normally provide a traffic free immediate environment, and:
- Are designed to facilitate movement by non-car means, and:
- Offer no parking or limited parking separated from the residences.

Neither the types nor the definition can be considered absolutes – hybrids of the three types are possible. All three of the defining criteria would need to be applied in a context-specific way. The level of parking which may be considered "limited" in one location (e.g. an inner city) may be lower than another (e.g. a suburban location). Based on European practice an absolute maximum parking ratio of 0.5 may be proposed: this would also ensure – with appropriate controls in surrounding areas – that most households would be carfree.

The distinction between carfree and low car developments is easiest to observe where there are differences in more than one of three criteria: a comparison between Poole Quarter and the new developments described in Chapter 3 provides one example. Poole Quarter has parking which, though limited by the normal standards of that area, is not separated from the residential area. As a result, it does not provide a traffic-free environment. Whereas there was evidence of reduced car use, this did not produce any tangible benefits to residents of the kind shown on Figure 2-4, as the European developments did. Where a pedestrianised area is built over underground parking as in The Brunswick (see Section 6.1) or Berlin's Woltmanweg, the dividing line between carfree and low car becomes more arbitrary, depending mainly on the parking ratios (many low car developments, such as Poole Quarter, would satisfy the non-car design criterion).

Benefits and Problems

The literature also provided evidence on the benefits and some problems of carfree development, discussed in Section 2.6 and illustrated in Figure 2-4. The European studies provide fairly strong evidence for the intermediate consequences claimed for carfree development: less car use, less land for roads and parking and more walking and cycling. Two of the studies also provided evidence of the ultimate benefits, relating to: CO_2 emissions and social contact between neighbours (Ornetzeder et al. 2008) and greater independence for young children (Nützel 1993). The study visits described in Chapter 3 supported these observations and provided some additional insights into the main problem of carfree developments: control of parking. This has proved a problem on the residential streets of Vauban, where compliance depends largely on social pressure. Overspill parking was a perceived problem in the areas surrounding several of the carfree developments visited. This was being addressed in some cases by the extension of parking controls.

10.3 Addressing the Research Questions: Potential Demand in the UK

The main aim of this thesis was to explore the feasibility of 'European style' carfree development in the UK. As described in Chapter 2 there are many research gaps in this area, relating to potential demand, potential supply and public policy. It was decided to focus this study on the potential demand amongst home buyers and tenants, because uncertainty about this was believed to be affecting the supply and policy factors. Section 5.2 distilled these aims into three further research questions focussed on two target groups, defined as follows:

Carfree Choosers   do not own a car by choice

Carfree Possibles   car owners who would like to give up car ownership under foreseeable and feasible circumstances, and have done this in the past

This section will now address, research questions two to four, drawing on and summarising the evidence about potential demand reviewed in this thesis.

Context and Methods

Although there are few examples of carfree developments in Britain (see Section 2.5) there is evidence about the nature and distribution of carfree living in this country. As described in Section 4.2, car ownership is strongly correlated with income. Pensioners, single people, social tenants, unemployed people and students are all disproportionately found in carfree households. The literature also suggests a distinction, however, between people who live without cars by choice and those who do so for financial or other reasons not of their choosing. The former tend to have higher incomes, more pro-environmental attitudes, they cycle more and use buses less than the latter group.

Diffusion of Innovations Theory reviewed in Section 4.5 suggested that the early adopters of an innovation like carfree housing would have higher social status and levels of education than the majority of non owners of cars. The nature of carfree developments might complicate the usual relationship with status (and particularly income) however, since carfree living implies rejecting an expensive commodity conventionally associated with status.

Car ownership is also correlated with settlement size, as discussed in Section 4.3. Although the relationship is not linear, ownership is lower in larger settlements. The areas with the lowest car ownership are the inner areas of larger cities. Accessibility to public transport only appears to influence car ownership in larger cities (Lucas, Jones 2009). This, together with the European evidence, suggested that the greatest potential for carfree development would be in the inner areas of larger cities in higher density housing. Whether this would correspond with the aspirations of potential residents was another gap in the literature which this study aimed to address.

Chapter 5 describes the approach adopted to answer the research questions below. This involved three questionnaire surveys:

- An online survey of members of cycling and environmental organisations
- A random postal survey of the Bloomsbury and Kings Cross wards of Camden, London
- A household survey of Poole Quarter, a low car new development in Dorset

A subset of 35 respondents from across these three were subsequently interviewed, to probe their responses to the questionnaires, as described in the previous chapter.
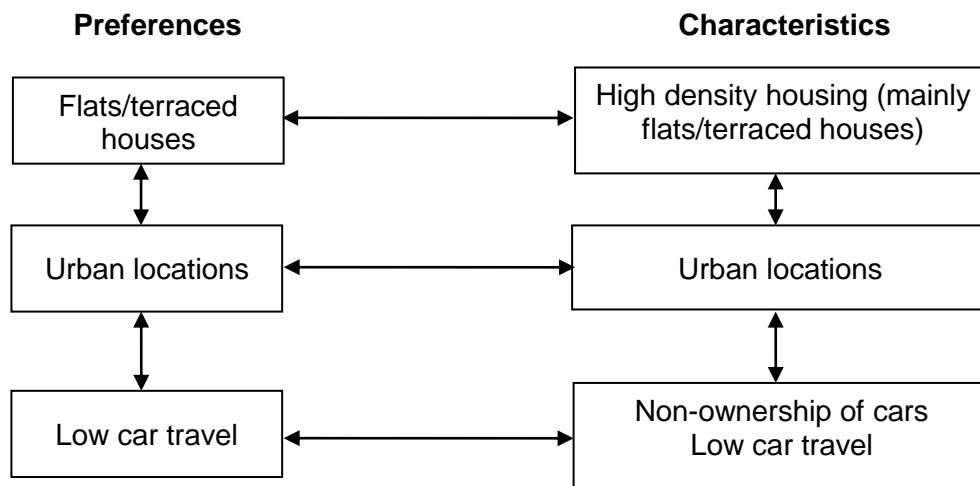
The first research question which the surveys aimed to address was:

2.   What characteristics of Carfree Choosers and Carfree Possibles distinguish them from Other Nonowners and Other Owners of cars?

Sections 9.2 and 9.3 summarised the principal demographic, housing and travel behaviour differences between Carfree Choosers, Carfree Possibles and other groups. Comparing the online Carfree Choosers to the other groups, the following are particularly relevant to the analysis which follows: their younger ages, urban locations and attitudes, high rates of cycling and the greater influence of transport and accessibility factors on their location decisions. The Carfree Possibles were older and had higher incomes than the rest of the sample. Their household and housing sizes were similar to the rest of the sample, larger than the Carfree Choosers. They were 'less urban' than the Carfree Choosers but more so than the other groups. Compared to the Other (car) Owners they drove less, used trains more and cycled considerably more.

The quantitative evidence for this analysis has come almost entirely from the online survey (Sections 7.3 and 7.4). In the Poole survey the numbers were too small for meaningful comparisons. The Camden survey contained few Carfree Possibles but the Carfree Choosers formed just over half of the sample. There were surprisingly few statistically significant differences between them and the rest of the sample. The analysis of urban living and attitudes towards it in Section 7.3 offers one explanation for this contrast. In the online survey the Carfree Choosers lived in more urban areas and the comparisons between Carfree Choosers and the rest showed a similar pattern to the (whole survey) urban/rural comparisons. In Camden, by definition, everyone was living in similar urban conditions, so the differences between the Carfree Choosers and the rest of the sample were less pronounced. This statement applies, as might be expected, to measures of travel behaviour and housing type but also to demographic factors such as age and number of children. Put simply, in Camden, the Carfree Choosers are more like the rest of the population.

Referring back to the discussion about self-selection (in Sections 1.2) and the literature on attitudes and behaviour (Section 4.2) supported by the Poole findings (Sections 9.4 and 9.6) some of the key distinguishing characteristics of the Carfree Choosers, and the relationships between them, can be represented in the following model:

Preferences

| Flats/terraced houses |
| Urban locations |
| Low car travel |

Characteristics

| High density housing (mainly flats/terraced houses) |
| Urban locations |
| Non-ownership of cars Low car travel |

Figure 10-1 Preferences and Characteristics of Carfree Choosers

Figure 10-1 recognises the two way relationships between attitudes and behaviour, and attitudes and the built environment found in the literature. It is a simplification: many other factors could be added, and aspects of the relationships could be refined. All of the boxes show **tendency statements compared to other groups** rather than absolute distinctions. The Theory of Planned Behaviour would suggest a number of intermediary variables in these relationships (e.g. control beliefs about public transport or cycling). This study did not attempt to measure TPB coefficients, nor to seek specific evidence of cognitive dissonance reduction (see Section 4.3). However, the questionnaire results did suggest, and the interviews did provide many examples of the two-way influences illustrated above. For some people, for example, giving up car ownership (for whatever reason) led to changes in travel behaviour and changed attitudes towards travel in general. This would influence future choices about where to live.

External influences (not shown on Figure 10-1 for simplicity) could – and in practice often do – influence any of the six elements, which would in turn exert influences on all the others. If one of the six were entirely changed (e.g. a move to a non-urban location, or a change in attitudes towards car ownership due to the birth of a child) this would make it more likely that the person would cease to be a Carfree Chooser (the model follows the data collection in treating other household members as external factors). A move to a carfree development would constitute an important external factor as discussed below.
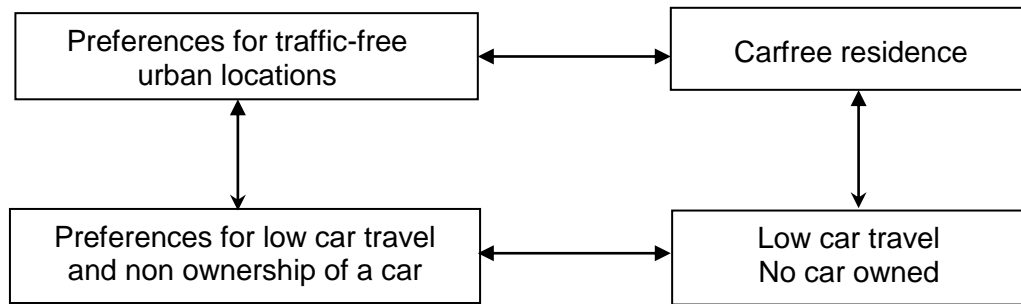
The 'urban locations' in Figure 10-1 reflect the online survey findings based on existing settlements and existing transport networks in this country. Thus 'urban' is associated with other relevant factors such as accessibility to services and public transport. Conceptually, 'urban' in this model could refer to any location associated with low car travel and high density housing. Whether new developments in less urban locations might generate similar relationships for Carfree Choosers, and whether the relationship with high density housing might change under some circumstances, are also discussed below.

3. Are Carfree Choosers and Carfree Possibles more likely than the other groups to choose living in a carfree development?

The findings of this study confirm that Carfree Choosers are more likely than other groups to choose to live in a carfree development. Significant proportions of them would be prepared to consider a move to a carfree development. Whether they would do so in practice would depend on the other issues, discussed below.

The first of the above statements is based mainly on the online survey, supported by the interview findings. In the Camden survey, the responses of the Carfree Choosers were mainly positive, and more positive than the other groups, although the differences were not statistically significant. The telephone interviews generally corroborated the responses of the Carfree Choosers to these questions, although the creation of a new carfree development was unlikely to prompt a move, even for those who had ticked 'I would be keen to move there even if this meant moving some distance'. As observed by Stanbridge (2007) life changes or housing-related factors were most likely to prompt a decision to move house, although there was evidence of Carfree Choosers constraining their location and even some employment choices to facilitate travel by non-car means.

In terms of the model shown in Figure 10-1, a preference for carfree neighbourhoods can be explained partly by the preferences for urban locations, low car travel and high density housing. The evidence from the European studies and the analysis of the findings relating to the Carfree Choosers suggests that a move to a carfree development is likely to generate similar relationships to those shown in Figure 10-1, as illustrated in Figure 10-2:

```
┌─────────────────────────┐        ┌─────────────────────────┐
│  Preferences for traffic-free  │◄──────►│   Carfree residence       │
│      urban locations       │        │                          │
└─────────────────────────┘        └─────────────────────────┘
         ▲                                    ▲
         │                                    │
         ▼                                    ▼
┌─────────────────────────┐        ┌─────────────────────────┐
│ Preferences for low car travel │◄──────►│     Low car travel        │
│  and non ownership of a car  │        │      No car owned         │
└─────────────────────────┘        └─────────────────────────┘
```

Figure 10-2 Preferences and Characteristics of Carfree Choosers in Carfree Developments

Thus Carfree Choosers are more likely than other groups to move to a carfree development and having made such a choice, are more likely to remain carfree. Again, external influences may change any of these factors, but the evidence from Europe, of families shopping and travelling with children by bicycle for example, suggests that living in a carfree development is likely to make the relationships more resistant to countervailing external influences.

Although the Carfree Possibles in the online and Camden surveys also indicated high levels of interest in moving to carfree developments, the interviews cast doubt on their declarations that they would be willing to give up car ownership, at least for the foreseeable future. When it was explained that some separated parking subject to a charge might be available on the peripheries of carfree developments, this did not deter some of those interviewed, although several revealed other obstacles to their moving.

Following the discussion in Section 5.3 about triangulation, it would not be appropriate to draw quantitative conclusions from the interview findings. It can be stated however that the Carfree Possibles are likely to form a smaller proportion of the potential demand than their questionnaire responses would suggest, and a smaller proportion than the Carfree Choosers. The availability of peripheral parking in carfree developments would clearly influence the extent of this.

There are reasons for believing that the situation for some Carfree Possibles might change in the longer-term. The target groups are not static. The options available to such people when they are considering a house move for other reasons may lead to changes in car ownership. Whereas many of the Carfree Possibles appeared to have become entrenched in car dependency, at certain moments in their lives it is possible that for at least some, different circumstances might have led to different choices. It is at such moments that the option of moving to a carfree neighbourhood might become a realistic possibility.

The Car Limiter category emerged from the Poole findings, so was not included in this research question. It would also be relevant to ask to what extent Car Limiters might form part of the

potential demand for carfree developments. As it was described to them, the Car Limiters showed relatively little interest in the prospect of moving to a carfree development. They are distinguished from the Carfree Possibles by their intention to continue owning cars, but following the analysis above, some of these intentions may change over time. The conditions in a development such as Poole Quarter favour reduced car ownership for larger households, but with one free parking space available per dwelling, give little incentive for carfree living. The European carfree developments, with parking separated from the home (reducing the convenience of car use) and charged at full cost rates, provide an ongoing incentive to give up car ownership altogether. In a provincial town like Poole, where free parking is the norm, this does not seem an attractive proposition to many Car Limiters. Although this study did not identify Car Limiters elsewhere, different considerations might apply in the inner areas of larger cities, particularly London.

4. What attributes of carfree developments would make these choices more or less likely?

Following the analysis above, the response to this question will focus mainly on the attributes which would influence the Carfree Choosers, expected to form the large majority of demand in the short-term. The factors preventing the Carfree Possibles from giving up their car ownership would suggest that for most of these people living in a carfree development would only be a realistic possibility if some parking were available, enabling them to continue owning cars at least in the short-term. By definition, this would also apply to the Car Limiters. As discussed above, parking separation and full-cost charges for parking would act as an incentive for any car owners in carfree developments to give up car ownership later on. The effectiveness of parking controls in the surrounding area would also have a bearing on this.

As some of the benefits of carfree development shown on Figure 2-4 depend upon the limitation of car ownership (through limited parking) there would be a trade-off between these benefits and the potential to attract existing car owners.

Urban and Rural Preferences

As discussed in the previous chapter, the vast majority of Carfree Choosers – 91% in the online survey – stated that they lived in urban areas, compared to 75% of the total sample. Amongst those who expressed an interest in living in carfree areas, the proportion was greater still: 96% in cities and towns, three quarters in cities of over 100,000 people, suggesting that Carfree Choosers are more likely to choose to live in a carfree development if they are already living in a larger city.

Most of the online and Camden Carfree Choosers would prefer to remain living in an urban area (most of the questions about moving home were not included in the Poole survey). Around a third would like to remain living near to where they are currently living (similar to the rest of the sample) and those who indicated a willingness to move some distance appeared constrained by other factors in practice. This suggests that locating carfree developments within cities would make them more attractive to most potential residents.

19% of the (mainly urban) Carfree Choosers who expressed an interest in carfree development said they would prefer to move to a rural area, although some of these responses were not reflected in the interviews with people who had made them. A larger proportion, 40% of the online Carfree Choosers would also prefer to live 'close to the countryside'. In most of the cases interviewed this did not imply a remote rural area, but could mean a smaller town or (though few mentioned this) a suburb. Some of those interviewed acknowledged a conflict between their desire for proximity to the countryside and proximity to other things, particularly employment and public transport. Proximity to shops and services were cited as a location criterion by half the online Carfree Choosers: when interviewed some went further, describing cultural opportunities and choice of services such as restaurants. Most of the respondents who were open to the idea of carfree living said they would consider a carfree area within an Eco-town but concerns about remoteness and the adequacy of public transport were raised. Some of the other factors discussed below would also have a bearing on the question of location, which will be returned to in the conclusion to this section.

Transport Needs and Constraints

Comparing the comments of the Carfree Choosers and Carfree Possibles sheds some light on the public transport provision which can facilitate carfree living. Infrequent, unreliable and uncoordinated bus services, indirect routes requiring changing, and living some distance from the nearest railway station were all mentioned as reasons for continuing to own a car. Conversely proximity to a railway station was mentioned by several of the Carfree Choosers as an important factor in their past and/or potential future residential location decisions. The proximity, frequency and choice of bus services were often mentioned as advantages of current locations but only once (qualified as "not an overriding factor") as a location criterion.

Although Carfree Choosers use buses less than the Other Nonowners, they do use buses significantly more than the rest of the sample – most of them regularly i.e. most weeks. A third of Carfree Choosers (roughly twice as many as the rest of the sample) used trains on most days; 97% used rail to some extent. Some of those who mentioned the importance of proximity to a station reported only occasional use of rail in the survey suggesting that the importance of access to a mode in enabling carfree living may not necessarily relate to the frequency of its use. A similar

observation may be made in respect of late evening public transport, mentioned in some of the interviews.

The European evidence suggests that carfree developments within cities do not necessarily need to be within walking distance of a mainline station providing they are well served by other modes (usually trams or metro systems in Europe), with good connections to the city's main station. The number of the online Carfree Choosers in smaller settlements was not sufficient to draw any firm conclusions, but there were some suggestions that proximity to rail is more important in smaller settlements.

Cycling was particularly important for the Carfree Choosers, not only those who belonged to a cycling organisation. This finding is consistent with the observations in the European study visits and suggests that carfree developments in this country would need to allow for much higher levels of cycle storage than more conventional developments. It also suggests that better conditions for cycling in the surrounding area is another factor which would make a carfree development more attractive to potential residents.

Housing Preferences and Density

The housing preferences of the Carfree Choosers would be consistent with higher density urban living, with 95% (excluding those with no intention of moving) willing to consider either a flat, or a terraced house, or both, although a significant minority (25%) would prefer a detached or semi-detached house, which raises the question: to what extent could carfree developments accommodate these sorts of preferences?

None of the European carfree developments included any detached or semi-detached housing and flats were more numerous than terraced houses. This appeared to reflect general development policies and practice in those locations, although some of the developments were built at higher densities than the surrounding areas. The gross densities varied from about 50 dwellings per hectare in Vauban to around 100 at GWL Terrein and Stellwerk 60, with the difference mainly explained by the higher proportion of non-residential uses on the Vauban site. Some of the preferences expressed by the Carfree Choosers would suggest a need for relatively high density developments. Most of the Carfree Choosers interviewed made some mention of walkable proximity in relation to their current location with comments like "everything I need is within a 15 minute walk" and "it's walking distance of most shops that you could want in day-to-day life". Both their survey and interview responses suggest that they would be looking for similar advantages when considering a move.

Their comments on public transport also imply areas with a relatively high population density, able to support higher frequencies and greater choice of services, although, as discussed above, patronage is likely to be higher than from conventional developments of a similar density.

The relationship between housing type, gross densities of dwellings and population density is not straightforward, as discussed in Section 9.6. In current UK conditions, however, it would not be possible to achieve the population densities of the European carfree areas (or Poole Quarter) in new developments with substantial proportions of detached or semi-detached houses. At a small scale it may be possible to build a lower density carfree development in a location which was already well served by public transport and other services. In general, however, substantial proportions of low density housing in carfree developments would undermine the accessibility which most of the people who form the potential market would require.

As discussed in Section 9.6, although most of the Carfree Choosers are home owners, a high proportion would be looking to rent in the private market. This means that attractiveness to property management companies and/or 'buy to let' investors would be important to satisfy the demand. Based on current practice this would tend to reinforce the preference for locations close to city centres and high proportions of flats in the housing mix.

Reference should also be made here to the innovativeness-needs paradox discussed in Section 4.5. Social tenants are not likely to provide many of the early adopters of carfree development as a new concept, but as many social tenants do not own cars, carfree social housing could offer significant benefits. The policy implications of this are discussed in Section 10.5.

New Building and Retrofitting

A majority of respondents in both the online and Camden surveys were willing to consider newly built properties, although the proportions who would prefer this were small, particularly in the online survey (5%, 19% in Camden). The Carfree Choosers and those interested in carfree developments were not significantly different from the rest of the sample in this respect. The interviews revealed openness to different designs and concepts with several interviewees making references to European examples, coupled with negative views about the quality of recent construction in Britain and some scepticism about the likelihood of significant improvements. The comments about design applied to the neighbourhoods as well as the housing itself.

A substantial minority in both surveys (28% online, 13% in Camden) would not consider newly built properties, which would suggest that carfree developments incorporating older housing would help to maximise the potential housing demand. This raises the question of whether, and under what

circumstances, 'retro-fitting' of existing residential areas to make them carfree might be possible. The policy implications of this are also discussed in Section 10.5.

Size and Perimeter Effects

Too much traffic in the immediate area was cited by the Carfree Choosers in the online and Camden surveys as the principal problem of their existing neighbourhoods. In Camden these were similar to the overall responses, in the online survey the Carfree Choosers were significantly more likely than others to cite this problem, reflecting the more urban locations in which they lived.

The interviewees who were most positive about the concept of carfree developments were attracted by a range of perceived attributes (e.g. less noise, less pollution, safer for children) explicitly or implicitly related to the absence of traffic. As discussed in Section 3.8, whether these perceptions are realised would depend upon the size and local circumstances of each development. Smaller developments are generally more vulnerable to the perimeter effects of surrounding traffic, whereas larger developments would be more able to offer the advantages of a traffic-free environment to more of their residents, regardless of location.

Location – Conclusions

The analysis under this question suggests that the European practice of building carfree developments within existing cities would also capture the greatest proportion of the potential demand in this country. As discussed in Section 9.6, Carfree Choosers are more likely to choose housing in a carfree development, and they are more likely to do so if they live in a larger city. Most Carfree Choosers live in existing cities and their preferences in respect of public transport and accessibility to services, as well as the feelings of some towards newly built areas, would all suggest that living in existing cities is more likely to help them remain carfree. Those who choose to move elsewhere, whatever their initial intentions, are more likely to acquire a car. Within cities, the lowest levels of car ownership are found within in inner areas. If sites able to minimise the perimeter effects are available in the inner cities of existing cities, these would offer the best opportunities for satisfying demand for carfree housing.

A minority of Carfree Choosers live in smaller settlements and a larger minority would like to live near to countryside. The evidence from this study suggests that while this may be possible in some circumstances, the challenges, particularly in respect of public transport provision would be greater – most small towns and new exurban developments do not currently offer the degree of accessibility and connectivity needed to attract Carfree Choosers. Section 10.5 will consider the policy implications of this.

10.4 The Case for Carfree Development

This study began with a broad aim to consider the feasibility of carfree development in the UK. It has focussed mainly on questions of potential demand but has also shed light on several other aspects of the question, including substantial evidence about the benefits of carfree development. This section will now make the case for carfree development as policy objective, beginning with potential demand and its implications, followed by the benefits of carfree development and the circumstances under which it could and should be implemented in the UK.

As discussed in Section 5.9, in moving from what *might* be done to what *ought* to be done, the values of the researcher will inevitably exert an influence. Following the Weberian approach, these should be made explicit. The following value judgements underlie the recommendations in this and the next two sections:

- Public policy ought to address climate change and other environmental problems by reducing the use of fossil fuels and other non-renewable resources.
- Non-motorised modes should be encouraged for that and other reasons including the health related benefits (which the findings of this study would support but cannot prove).
- To the extent that planning and transport policies are able to influence these outcomes they ought to do so, rather than seeking to maximise the freedom available to developers or (in all circumstances) car owners.
- The challenges and potential disadvantages of carfree developments – mainly related to parking – do not outweigh the benefits described elsewhere in this study.
- Minority preferences for more sustainable forms of living should be supported, both for the direct benefits they bring – even if these are modest – and for their potential to provide exemplars for the future.

Potential Demand

The findings of this study show that potential demand for housing in carfree developments does exist in this country., The study did not include a representative national sample but as discussed in Section 9.6, by extrapolation from Dudleston et al (2005)'s national study in Scotland, the Carfree Choosers might form around 6% of the adult population of Britain. The samples in this study were atypical in two important respects: environmental attitudes in the online survey and the supportive nature of the built environment in Camden, so caution would need to be exercised in extrapolating the findings of this study to the national level. But they would suggest that a large proportion, possibly the majority of Carfree Choosers would, when looking to move house, positively consider a carfree development, providing it was in an area where they wanted to live.

This suggests the potential market is relatively small when viewed at the national level, although in those urban areas where carfree development is most appropriate, the concentrations will be larger. In Bloomsbury and Kings Cross, the Carfree Choosers who might move home and are willing to consider moving to a carfree development made up 16% of the sample. This would equate to around 2,800 adults across the two wards. These are the people who are most likely to provide the innovators and early adopters. In the longer term, the European evidence suggests supply can, to some extent, create its own demand. Although this would be difficult to quantify in advance, many people who are currently car owners may also be attracted to living in carfree developments once they have been built.

The existence of potential demand concentrated in inner urban areas provides one significant argument in favour of carfree development. As discussed in Section 2.6, in those areas where they are feasible, carfree developments can help to address the environmental, health and social problems discussed in Section 1.2. They reduce car ownership freeing up urban land for other purposes such as green space and/or more housing. They reduce car use, helping to reduce resource consumption, CO_2 emissions, local concentrations of other pollutants and (depending on other policy measures) congestion. They increase active travel, promote social contact between neighbours and greater independence for children, all of which are likely to have positive implications for public health.

The problems caused by car use particularly afflict the residents of inner urban areas who tend to have the lowest levels of car ownership. 'Too much traffic in the immediate area' was the problem cited most frequently in the Camden survey and the online survey, particularly amongst urban residents and Carfree Choosers. Thus, in common with many other environmental externalities, those who are least responsible for the problems are suffering their worst effects. Individuals often 'solve' this problem by moving away from these areas and acquiring a car. Carfree neighbourhoods in the inner areas of cities would offer the opportunity to at least some of these people to remain where most of them prefer to live, and avoid contributing to the problem.

Solving the Paradox of Intensification

This analysis also suggests that carfree development can help to address the paradox of intensification, discussed in Section 1.2. Intensified areas tend to suffer increasing congestion, pollution and pressures to allocate more land to roads and parking. They also offer some of the most appropriate locations for carfree developments. Intensification is often concentrated around city centres and public transport nodes; higher densities generally increase accessibility to services within walking distance. As discussed in Sections 2.6 and 9.4, carfree developments attract certain types of people, but self-selection does not explain the much lower levels of car ownership and use found within them: carfree developments also change the behaviour of their residents.

This implies that carfree development has the potential to address both parts of the paradox of intensification, the local and the global.

Exemplars and Public Spending

Given the above assessment of potential demand, the potential for carfree development to solve national or global problems under current circumstances is clearly limited, but its wider influence may exceed the limits of its direct contribution. Exemplars can help to change attitudes amongst policymakers, private sector developers and the general public. As discussed in Section 4.3, purportedly sustainable developments in the UK, whatever their other merits, have failed to provide examples of success in transport terms comparable to the carfree developments reviewed in this study.

The literature on transport and climate change briefly reviewed in Section 1.2 has revealed a gap between the scale of the challenge and the policies promoted to address it. Public and professional opinions in Britain are often sceptical that radical change is possible in transport. Successful exemplars of radical change are rare in this country: this study suggests that carfree developments offer an opportunity to stretch perceptions of what is, and might be possible.

This study has not examined the financial implications of carfree development in any detail: that is an area where more research is needed, as outlined in Section 10.7. The transport requirements of new ex-urban developments are a complex question, briefly considered in the next section. Within existing cities, carfree developments will generate larger increases in demand for public transport and lower demands for parking and road space compared to more conventional developments. The net financial implications of this will vary according to local circumstances, but there is no reason to believe that carfree developments would require greater support from public funds than more conventional alternatives. This reinforces the exemplar argument: in a context where public funds for infrastructure (and even 'softer' or 'smarter' measures) are likely to remain constrained for some time, carfree developments can help to promote modal shift without significant increases in public spending.

10.5 Where Should Carfree Developments be Built?

Although this study has not explored all the relevant factors (see the discussion Section 1.4) the findings suggest that the criteria listed in Figure 10-3 are important in assessing the feasibility of a site for a carfree development. The first two points apply to carfree and to some extent low-car developments. The others apply to carfree living whatever the form of development.

- Sufficient size, or separation from surrounding roads, to provide the benefits of a largely traffic-free environment
- Ability to control parking in the surrounding area
- Accessibility to shops and other services within walking distance
- Proximity to public transport, including rail
- Frequency of public transport
- The range of destinations, particularly those offering employment opportunities, served by direct public transport
- Conditions for cycling in the surrounding areas

Figure 10-3 Criteria for Assessing Suitability of a Site for Carfree Development

This study has not sought to quantify these criteria, and it is debatable whether such an exercise would be worthwhile. There are also some less tangible criteria affecting the attractiveness of an area to Carfree Choosers and ultimately, a judgement would need to be made against these (and other factors following further research) to assess whether a site would support a carfree development.

The ability of planners and developers to address the criteria in Figure 10-3 within, or funded by, a new development would depend partly on the size of the site and partly on its situation. The evidence reviewed in this study suggests the surrounding circumstances are most often satisfied in the inner areas of larger cities. This is where the greatest potential demand is concentrated. It is where the conditions to support potential demand (from whatever source) can be satisfied with least need for expensive new infrastructure, and it is where policies to reduce the concentration of cars and traffic are most needed. All of this suggests that public policy ought to promote carfree development in such areas.

The definition of 'larger cities' (and inner areas) may be debated. Clearly local variations will affect the suitability of each site. Figure 7-13 (locations of online Carfree Choosers favouring carfree development) might suggest a population of at least 100,000, but the Poole Quarter study suggested that Poole (population 138,000) does not provide particularly good conditions for carfree living. The smallest city reviewed in Chapter 3 was Groningen with a population of around 180,000. Figure 4-4 from Lucas and Jones (2009) suggests that public transport only exerts a downward influence on car ownership in settlements of over 250,000, although the bands for that analysis were wide. Between these figures some general guidance could be made but to make more confident statements would require more research.

Carfree areas in smaller settlements, suburbs, Eco-towns or urban extensions present greater challenges, particularly in respect of public transport. The survey and interviews revealed a desire amongst a significant minority of Carfree Choosers to live closer to the countryside, but this was tempered by concerns about access to public transport, including rail. Most of those interviewed were willing to consider a carfree area within an Eco-town, although they also expressed some scepticism about the likelihood of good transport connections and design standards.

This raises the questions of whether carfree developments would ever be feasible outside the inner cities and if so, should public policy promote them? A comprehensive answer to these questions would require further research as recommended in Section 10.7 but a number of points may be made on the basis of this study.

Smaller developments, in a suburb or small town would depend almost entirely on the circumstances already existing around the site. Most sites in such places would not satisfy the criteria in Figure 10-3. Larger urban extensions or Eco-towns will usually generate greater private funds and attract more public investment in new services and transport connections. Some changes would be more costly than others: building a new rail line, for example, would normally require a level of public funding beyond the financial capacity of private developers and local authorities. UK Governments could fund an expansion of the rail network to support new developments but as this has not occurred during years of public spending increases it seems unlikely to occur on any significant scale in the foreseeable future.

From time to time, geographical accidents (or deliberate policies of acquisition) will produce sites outside the inner cities with greater potential to address these criteria. The proposed Eco-town at Ford, in which the researcher had some involvement, was one such example.(Melia, Field 2009). The site benefited from an unusual range of rail connections and frequent services for what was mainly a greenfield site, as illustrated in Figure 10-4.
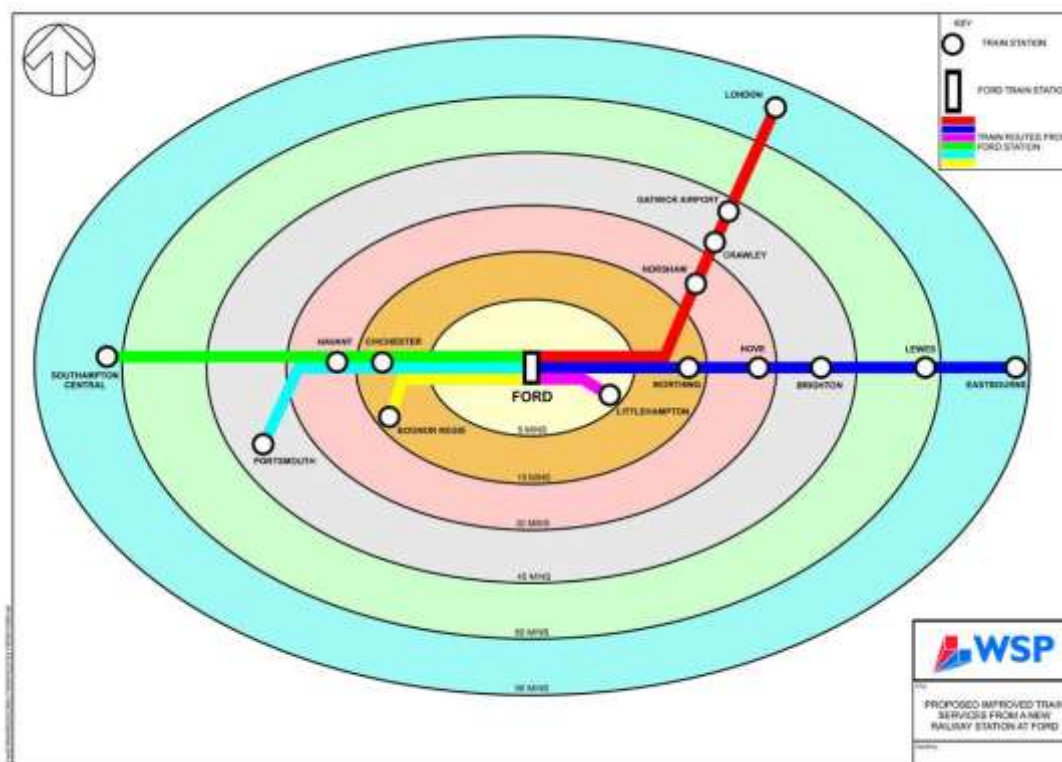
Figure 10-4 Ford Eco-town Rail Connections

That proposal was ultimately rejected by the Secretary of State for other reasons. Most of the other proposed sites, including the four which were approved for inclusion in the PPS (CLG 2009) would not be able to provide this level of transport connectivity.

A small carfree development within an Eco-town or urban extension might not justify substantial investment in new transport infrastructure, or changes to location decisions, but if the conditions to support carfree living are not satisfied, this is likely to have wider implications. As discussed in Section 4.3, many purportedly 'sustainable developments' have been built in the UK with little evidence of sustainable transport outcomes. High levels of car ownership have been identified as a factor in this pattern.

If the conditions to support carfree living are not fulfilled, then following the discussion in Section 1.2 about the relationship between car ownership and car use, this study would support the observation of Platt, author of the Cambourne study (2008), who was: "sceptical that Eco-towns will achieve significantly lower levels of car use even if they have superior links to main centres (Kochan 2008)." The same comment could be applied to urban extensions and other sites outside the inner cities.

Apart from issues of funding some of the required improvements to support carfree living will be subject to time lags, in attracting employment to new towns or districts, for example. This will have implications for the phasing of carfree areas within new ex-urban developments: to establish the

carfree principle, the conditions to support carfree living would need to be substantially in place before Carfree Choosers could be attracted to live there.

Although some of the problems discussed in Section 1.2 (e.g. congestion, local air pollution) are less serious outside the inner cities, where the conditions to support carfree living can be fulfilled, most of the benefits of carfree development illustrated in Figure 2-4 would still apply. So following the same logic, where feasible, carfree developments should be included in ex-urban developments and on (the rarer) appropriate sites in small towns and suburban centres.

Parking Control

As discussed in Section 3.8, the legal instruments used in German carfree areas would probably not be enforceable in Britain. In their absence more conventional parking controls would be needed to avoid the problem and the (probably greater) perceived problem of overspill parking. This issue is not confined to carfree developments. The DfT's (2005) Guidelines for residential travel plans recommend on-street parking controls to prevent overspill parking within "low-car or car-free" development and in neighbouring areas. The evidence reviewed here would support that recommendation. As the DfT Guidelines acknowledge, the introduction of Controlled Parking Zones can be contentious. Residents' parking schemes usually involve charging for parking which was previously available free of charge, hence they may be opposed by residents, despite the benefits of easier parking which they bring.

The inner areas of existing large cities usually contain Controlled Parking Zones, although they are not universally applied. In theory, CPZs would be easier to introduce in new ex-urban developments, but in practice, the opportunity to implement controls before occupation of the housing is rarely taken. If carfree, or low-car, developments are to be included within them, then the issue of parking control will need to be addressed from the outset.

Social Housing in Carfree Developments

Carfree Choosers, who are most likely to provide the early adopters of carfree housing, do not include many social tenants. As predicted by the innovativeness-needs paradox, the benefits of carfree development may be greater for groups who are less open to innovation: those who cannot afford to buy a car, or who struggle to maintain one. These benefits may become more apparent to such people if and when carfree developments become more widespread.

This poses a challenge to existing housing allocation criteria. The approach taken by Dunedin Canmore at Slateford Green, allocating homes with no reference to car ownership or attitude to carfree living could, if replicated in a larger development, create problems of reluctant tenants likely

to undermine the carfree concept. If carfree developments are to be developed on a larger scale (as proposed in the transport guidance for the Eco-towns: TCPA, CLG 2008) some mechanism for offering tenant choice would be needed to avoid these problems.

Can Existing Residential Areas Be Made Carfree?

Two of the three European models of carfree development have applied only to new developments. Mixed use city centres as in Groningen (see Section 3.6) provide another model. Existing precedents in Britain are almost entirely retail/commercial in nature. In the Exeter example illustrated in Figure 2-1 new flats were built as part of the redevelopment of such an area. An existing residential population with the ability to park cars is normally viewed as an barrier to pedestrianisation. Although, again, this study has not examined all aspects of this question, it may be asked to what extent pedestrianisation of existing residential or mixed use areas might be feasible in this country.

Under most circumstances, conversion of existing streets would entail blocking them to through traffic and removing or relocating existing parking. To the extent that blocking through routes reduces road capacity it will also tend to reduce car use elsewhere (as well as displacing traffic under some circumstances: Goodwin et al. 1998) but road closures of this nature will not achieve the full range of benefits observed in carfree developments.

Closing roads to through traffic is often popular with their residents, providing this does not affect their ability to drive and park close to their homes. In the UK, even the relatively limited changes to parking associated with retrofitting of home zones have provoked considerable hostility from car-owning residents (Sherwin et al. 2006 a Bristol study in which the author of this study observed one of the focus groups). To obtain the full range of benefits shown on Figure 2-4 would require pedestrianisation on a substantial scale, with separation of parking and lower levels of parking (to reduce or "lock in" low car ownership).

In areas where car ownership is already low, and alternative arrangements for displaced parking are available, it may be possible to pedestrianise some existing residential streets. Given the preferences of car owners for parking adjacent to the property (Borgers et al. 2008, LTT 2009), some opposition may still be anticipated but if a majority of carfree residents supported the changes this opposition might be overcome (this assumes that authorities would not impose such measures ignoring the views of residents).

The circumstances and locations where such a policy might be feasible would be similar to those appertaining to new developments, plus a number of additional requirements. There would need

to be either spare capacity in nearby car parks, or land available for additional parking nearby. This land would need to be purchased, or granted by a public authority as an experiment.

Alternatively, streets where parking is already unavailable could be considered for pedestrianisation. This could include some major thoroughfares where alternative routes exist, depending on the willingness of the authorities to reduce road capacity in the face of opposition from car drivers and possibly road haulage interests. The politics of such choices would provide material for another study in its own right.

The approach outlined here could be implemented incrementally, possibly through the designation of carfree planning zones within Local Development Frameworks favouring both pedestrianisation and small-scale new carfree developments as and when sites became available. As traffic was progressively removed from a neighbourhood, as in Groningen, the benefits would grow over time.

Summary

The criteria outlined at the beginning of this section can be most easily satisfied in the inner areas of larger cities. This is where potential demand is concentrated and also where the potential benefits are greatest. Redevelopment sites in such locations represent the easiest option for new carfree development. Road closure and pedestrianisation of existing residential or mixed use areas offers another possibility, with greater political challenges. In small town, suburban and ex-urban locations it is more difficult to provide the conditions to support carfree living and carfree developments. Most developments in such places in Britain – including many purportedly 'sustainable developments' – have not done this, and have suffered from high levels of car dependency as a result. In the relatively few locations outside inner cities where it is possible to satisfy these conditions, carfree developments could and should be built.

10.6 Recommendations for Government Policy

The evidence from this study suggests that public policy ought to encourage and facilitate carfree development because: it will promote local and global sustainability, it will help resolve the paradox of intensification, and it will provide a housing choice for which there exists a potential demand but no supply at present. From this and the value statements in Section 10.4 it follows that Government policy ought to encourage carfree development, where it is feasible.

The question of feasibility raises supply and policy issues not specifically addressed by this study. It may be noted, however, that the European examples in Chapter 3 were all built on publicly-

owned or publicly-controlled land. To answer whether purely private interests might initiate carfree developments in Britain (beyond the limited examples discussed in Section 2.5) would require more research, or a pioneering example. Whatever the answer to this question, national planning policy could and, this chapter has argued, should encourage the process. The policy recommendations which follow relate to: definitions, exemplar programmes and mainstreaming of carfree development.

Clarifying Definitions

As described in the previous chapter, the concept of 'car free housing' as it is generally understood in Britain to mean housing with no parking, has been and remains a significant obstacle to the wider adoption of carfree development as practised in Europe and defined in this study (see below).

The 'no parking' definition has been used in statutory planning guidance (DETR 2000, DETR 2001), other Government guidance (DfT 2005, ODPM 2004) and local planning documents (Camden LB 2000, e.g. Brighton & Hove CC 2005). The *Eco-towns Transport Worksheet* (TCPA, CLG 2008) is the first Government approved document to include a definition similar to the one used in this study. If carfree development is to make progress in this country, the concept will need to be more clearly distinguished from the more familiar one of 'car free housing' which offers no particular benefits to home buyers or tenants. This process would be assisted if Government documents made the distinction clear, using another term such as 'housing with no parking' or 'parking-free housing' in place of 'car free housing'.

Exemplar Developments – Eco Quarters

The evidence from the survey findings and the European study visits suggest that the greatest potential demand and the most propitious circumstances for carfree developments exist in the inner areas of larger cities (possibly including some outer areas of Greater London). This is also where they can make the greatest contribution to resolving the paradox of intensification.

The recommendations on carfree areas contained in the Eco-towns Transport Worksheet (TCPA, CLG 2008) could be used as the basis for a programme of carfree Eco-quarters on larger redevelopment sites in the inner areas of cities, or close to transport nodes in city suburbs. The definition of a city in this context would inevitably involve an arbitrary element: more research as recommended in the next section would help to provide greater precision.

A programme of this nature would require a range of site selection criteria, some relating to non-transport factors (Barton et al. 2010 suggests a possible approach). Specific criteria for assessing

suitability for carfree development are listed in Figure 10-3. If the sites chosen satisfy all these criteria, the carfree element should not require any additional public subsidy. Following the European examples, private sector reluctance to innovate in this respect could be overcome by using publicly owned sites (if and where these satisfy the criteria) for the first exemplar developments. When built and occupied they would provide evidence and reduce the risk for private developers considering the concept elsewhere.

Exemplar Developments: Eco-towns

The original concept of the Eco-town programme was to build freestanding new settlements (CLG 2007). Following widespread opposition, the first four locations approved included three urban extensions and one collection of fragments using former quarry sites (CLG 2009). The original transport guidance for the programme (TCPA, CLG 2008) included many radical recommendations, including substantial carfree areas within the Eco-towns. The Planning Policy Statement, against which future applications will be assessed was much less radical, and makes no mention of carfree areas (CLG 2009).

As discussed in the previous section, carfree developments would be more difficult to provide within Eco-towns. The public transport connectivity of the four approved locations would not satisfy the conditions outlined in that section, although one of the four, Whitehill-Bordon, has longer-term plans to build a new rail line, which would change the situation.

If the findings and values behind this study are accepted, it follows that providing the conditions to facilitate carfree living within Eco-towns should be regarded as essential. This would imply either reconsidering their locations or investing in improvements to the rail system (as well as bus and cycle networks). It would also imply that car ownership, and the parking controls necessary to reduce it, should be more explicitly addressed in the guidance and proposals for Eco-towns. If these conditions are fulfilled, Eco-towns could and should provide some of the exemplars described in the previous section. If carfree residential areas are built within Eco-towns without providing the conditions to support carfree living, then there is a danger that such housing will prove unattractive to buyers, and that reluctant future residents may exert pressure to change the parking arrangements, thus providing a negative exemplar.

Mainstreaming Carfree Development

Exemplar projects may be a useful a means of identifying pitfalls and overcoming objections to an untried policy. But this study has found no reasons, why, in appropriate locations, the benefits of carfree development could not be promoted more widely through mainstream planning policies.

This could include a guidance publication along the lines of the Guidelines for residential travel plans (DfT 2005).

Such a guide could draw on the European experience (and UK experience as and when more examples are built) with the three models described above, which could be applied to different situations in the UK. Where the Vauban model is followed, consideration must be given to how the carfree nature of the streets is to be maintained, either through enforcement of parking rules or design features which make unauthorised parking difficult. Leaving these matters to social pressure and agreement amongst neighbours, as in Vauban itself, would not be appropriate in a British context.

To establish carfree development as a permanent feature of mainstream planning policy, a policy such as the one below should be included in statutory planning guidance, such as a future revision to PPG 13 or PPS 3 (the wording follows the less specific approach of PPSs, see for example: CLG 2006)

Recommended Planning Policy on Carfree Development

Local planning authorities should consider the potential for carfree developments (* see definition in appendix) and identify appropriate sites in their local development documents. Where feasible, carfree developments can make a significant contribution to more sustainable travel patterns both amongst residents and, where significant trip generators are located within the carfree area, residents of surrounding areas. Carfree developments are most appropriate where:

- Public transport accessibility and frequency are greatest and sufficient capacity exists or can be created
- Good connections for walking and cycling can be provided
- Retail and other services are available or can be established within walking distance
- Parking can be controlled in the surrounding area

These circumstances will most usually be found in the inner areas of larger towns and cities and pedestrianised city centres where opportunities may exist to introduce new residential populations. Carfree developments may also be created within suburban district centres, new settlements and urban extensions where these are well served by public transport including rail or light rail. Existing residential or mixed use areas may be made carfree where car ownership is low and alternative arrangements can be made for limited parking nearby.

Carfree developments should generally be planned at higher than usual densities (to minimise walking distances) although their design should take into account the needs of families and older people, with public

or semi-private open spaces appropriate to their size. Physical restrictions will usually limit the access of non-emergency vehicles to the interior of carfree developments. Where vehicular access is allowed (to pick up and drop off, for example), consideration should be given to how the carfree nature of the development will be maintained in the longer-term, including design measures to restrict unauthorised parking. Consideration should be given to allocated parking spaces for car club vehicles near to carfree developments.

* Definition for Inclusion in an appendix:

Carfree developments:

- Are residential or mixed use developments providing a traffic free immediate environment.
- Are designed to facilitate movement by non-car means. This will include good connections for walking and cycling and access to high frequency public transport, either through new provision, or through location near to existing provision with sufficient capacity.
- Offer no parking or limited parking separated from the residences. Where parking is provided, its cost will be separated from the cost of the housing.

10.7 Further Research and Final Reflections

This thesis has suggested several areas where further research is needed. The most important of these are:

- A probabilistic national survey to assess the size of the target groups identified in this study.
- A study of the effect of carfree development (as opposed to housing with no parking) on land use budgets and the sale values of homes and flats, which could be used to assess the financial implications for developers.
- A more specific study of the public transport needs and preferences of Carfree Choosers and carfree possibles, and the implications of these for new developments with sustainable transport objectives.
- A longitudinal study of the health impacts of carfree neighbourhoods (possibly comparing these with both conventional and 'low car' developments like Poole Quarter).
- A study comparing the effects of filtered and unfiltered permeability on travel behaviour in otherwise similar circumstances in the UK.

This study has also touched on a number of broader areas where some evidence exists but gaps remain. One of these relates to the process of, and reasons, for changes in household car ownership. A study in progress will be examining these questions (Clark et al. 2010). Another is the influence of car ownership on car use, particularly in new ex-urban developments.

New research opportunities, re-framing the hypothetical research questions of this study in ways which can be answered with greater confidence, will become possible if and when larger new carfree developments are built in this country, as the researcher hopes, and intends to work towards.

This study has focussed on possibilities and policy recommendations for the short and medium terms, within the current economic paradigm. It has concluded that carfree development is desirable and possible, though not in all circumstances, and not in all locations. In the longer term different considerations are likely to apply. Section 1.2 briefly mentioned some more fundamental issues regarding longer-term sustainability. When viewed from the perspective of human life on Earth, the motor vehicle and car-dependent settlements are aberrations, likely to prove as short-lived as other technologies relying on the continuing use of finite resources. It would be difficult to predict what will eventually replace them, and when; but if humans are to survive in the longer-term, they will need to learn once again to live without motor vehicles.

That process may be planned and voluntary, or unplanned and involuntary, as part of more general dislocation caused by ecological and economic collapse. The final value-based argument in favour of carfree development is that it will enable one very small step in that re-learning process.

Epilogue: Reflections on the Methodology

In reviewing the literature on carfree development and carfree living, Chapters 2 and 4 revealed some fairly wide knowledge gaps in this area. This study has filled some of them in respect of the types, definition, and nature of potential demand for carfree development in the UK.

Section 5.2 signalled that the appropriateness of the research questions would be reassessed in the light of findings. The findings partially confirmed the hypotheses which were central to the study and in doing so, largely vindicated the choice of research questions. Higher than (national) average concentrations of Carfree Choosers were found in all three samples. Although no reliable comparison was available for the Carfree Possibles, the proportion was almost certainly higher than the national average in the online survey and lower than average in the Poole survey.

The telephone interviews supported the findings of the online survey that the Carfree Choosers were more likely than others to move to a carfree development. The findings in respect of the Carfree Possibles were more ambiguous – the differences between them appeared to justify their

inclusion as a category in the research questions even though the hypothesis in research question three was neither confirmed nor entirely rejected in their case.

A smaller than usual proportion of Other Nonowners was an expected corollary of the concentration of Carfree Choosers in the online sample, but the very small proportion of the former limited the ability to compare the two statistically – a different sample selection with more of the Other Nonowners might have yielded some additional insights.

Although the Camden and Poole surveys did not produce many statistically significant differences to answer the research questions as originally conceived, the absence of such differences and the differences between the two surveys as a whole revealed a number of other insights, which would, on balance, vindicate their selection.

Superficially, it would appear that previous findings about gender bias in online surveys have been confirmed. However the bias towards males (67%) came entirely from the cycling organisations – the vast majority of these respondents from the CTC, with a predominantly male membership. 58% of respondents from the other sources, mainly environmental organisations, were female.

The efforts made to publicise the online survey through non-electronic means: newspaper articles, printed newsletters and free magazines in the Demonstration Towns, produced very few responses compared to the electronic media. The reasons for this seem fairly clear: the reader of printed material might not have a computer available at the time of reading, might forget, and would need to go to greater effort than someone who is already sitting at a computer, reading an email or web page. These findings would seem to suggest that where efforts and resources are limited, these would be better concentrated on using electronic means to publicise electronic surveys or printed means to publicise printed surveys.

With hindsight, the project would have benefited from some further changes to the questionnaires. The learning process with respect to questionnaire design between the Camden and Poole surveys has already been described. The concept of the 'Car Limiter' evolved during the survey process. Neither the online nor the Camden survey asked questions to identify this group, which would have been useful during the analysis.

Some more specific questions about the use of rail, buses and interchanging between modes would have been useful for the policy analysis, although as indicated in the previous section, this is an area which would justify more detailed research in its own right. The questions on travel behaviour, at least in the online survey, could also have been amended to allow for more valid comparisons with national data. The published summaries of NTS findings (e.g. DfT 2004b) are not particularly helpful when trying to make comparisons of individual behaviour. However, during

the analysis, it was discovered that the DfT Omnibus Survey (DfT 2003), could have provided a more precise comparator, had the 'most days' category been changed to 'at least four days a week', for example.

The Census is the only comprehensive source of localised data, and this unfortunately only asks about travel to work, so a valid comparison for the Poole and Camden surveys would have been more difficult. The Census questions could have been replicated in the survey, which would have aided the statistical comparison, but at the expense of losing information about non-work travel and the frequency of travel by different modes. Alternatively, additional questions could have been inserted, at least in the online survey, although increasing the survey length might have reduced the response rates.

The telephone interviews revealed some of the benefits of using follow-up interviews to clarify interpretations of questionnaire questions. As illustrated by the discussion of the Poole Quarter travel plan, for example, the way respondents interpret a question will differ at times from the original intention. Interrogating these meanings can help to avoid misinterpretations of survey results.

The interviews were, to some extent, a learning process; the researcher learned to avoid influencing the respondents with his own views as the interviews progressed. This was a minor problem during the early interviews. For example, the beliefs of some respondents that low density housing can be compatible with sustainable transport were better explored the second time they were raised, when the researcher refrained from expressing his own contrary opinion.

A focus group was considered, and rejected, as an option for Poole Quarter. The interaction of a focus group might have revealed more about the dynamics of life there. On the other hand the telephone interviews produced some frank comments about the behaviour of neighbours and views on surrounding areas which might not have emerged, or have emerged in a distorted way, in a more public forum. The biographical information about people's pasts might also have proved difficult to obtain through a focus group. A combination of both would have been ideal, but this would have exceeded the time and resources available to this study.

The main limitation of the telephone interviews was their relative brevity. Some respondents indicated that their time was limited and these interviews were the shortest. The interviews produced many useful observations about past events in people's lives but it was not possible to follow a systematic biographical approach. The conclusions concerning life stages and their influence on car ownership must remain tentative as a result.

One overall impression of the people interviewed was that they were, on the whole, a noticeably articulate group of people. This was to some extent a consequence of the target groups on whom the selection focussed, although the difficulties of arranging interviews, particularly in Camden, may have meant that some potentially interesting subgroups were missed. Although there were some ethnic minority respondents and some born overseas, there were no recent immigrants who had difficulty expressing themselves in English, for example.

The reasons for not attempting a nationally representative survey were explained in Section 5.4. This would have been technically possible, but the size of such a sample would have been very large – online data collection could not have been used. As discussed in Section 9.6 in the absence of nationally representative findings, it would be difficult to make confident predictions about the national size of the target groups or the potential demand for carfree housing, although the literature helps to give a general idea of the size of the Carfree Chooser group. In any case, this study suggests that potential demand cannot be expressed as a single figure; it is a dynamic concept likely to change if and when carfree developments become a more familiar feature of British cities.

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