UNIVERSITY OF SOUTHAMPTON

FACULTY OF ENGINEERING, SCIENCE AND MATHEMATICS

School of Civil Engineering and the Environment

The Transport and Related Characteristics of the Residents of Private Category II Sheltered Housing for the Elderly

by

Allan James Burns B.Sc., M.Sc., C.Eng., M.I.C.E., M.I.H.T

Thesis for the degree of Doctor of Philosophy

June 2004

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF ENGINEERING, SCIENCE AND MATHEMATICS

SCHOOL OF CIVIL ENGINEERING AND THE ENVIRONMENT

Doctor of Philosophy

THE TRANSPORT AND RELATED CHARACTERISTICS OF THE RESIDENTS OF PRIVATE CATEGORY II SHELTERED HOUSING FOR THE ELDERLY

by Allan James Burns B.Sc., M.Sc., C.Eng. M.I.C.E., M.I.H.T

The number and proportion of the elderly in our population is increasing and is expected to continue to do so for the foreseeable future. There is a need for housing designed to meet the specific needs of this part of the population. One such form of housing is Category II Sheltered Housing.

This research focuses on the transport characteristics of the residents of this form of housing. It looks at the trip generation of sheltered housing developments and the factors that may or my not influence this, such as the size of the apartments, the locational characteristics of the sites and car ownership in the area. It also looks at the car ownership, car parking and cycle parking requirements, taking into account the latest guidance from central government, and the other modes of travel used by the residents, their visitors and the house managers.

The study looks at the other characteristics of the residents of the developments. One such characteristic in influencing car ownership and use is likely to be the age of the residents, and others could include sex of residents.

The study uses data collected in a number of ways, including questionnaire surveys, telephone surveys and traffic counts.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DECLARATION OF AUTHORSHIP

I, ALLAN JAMES BURNS declare that the thesis entitled

"The Transport and Related Characteristics of the Residents of Private Category II Sheltered Housing for the Elderly"

and the work presented in it are my own. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself, jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

Signed [redacted]

Date 9 July 2004

Acknowledgements

My sincere thanks are due to three groups of people, those at Southampton University, those at McCarthy and Stone (Developments) Limited, including the Planning Bureau, and those closer to home.

I am grateful to my first supervisor at Southampton University, Dr Glenn Lyons, who has now moved on, and to his successor as my supervisor, Dr Nick Hounsell. Both have given me encouragement and helpful guidance and advice.

It would not have been possible to complete this study without the agreement of McCarthy and Stone. I have been allowed to use data collected by and for the company, which has cooperated in the collection of data specifically for the study. I wish to thank Mr Keith Lovelock, the Chief Executive, for his cooperation, Gary Day, now the company's Director responsible for Land and Planning matters and also members of the Planning Bureau, the planning consultancy wing of the company. Although no longer with the Planning Bureau, I must thank Jane Crass for her assistance in organising and implementing the surveys.

I must thank Mike Turner, a friend, who has proof read more than one of the later versions of the thesis and who has pointed out typing and similar errors and who has also asked pertinent questions on the content. Finally, I must thank my wife, Audrey, for her patience in accepting that much of my limited spare time, including during a number of holidays, has been spent undertaking this study. Her additional proof reading has also been invaluable.

1. Introduction

1.1 Background

Sheltered Housing is a unique form of housing. It has its own specific characteristics. Before progressing to consider that transport characteristics of this form of development, it is essential to understand the nature of the people and the form of housing being considered in this research.

The people are the elderly residents of Category II Sheltered Housing, which is defined below. However, peoples' understanding of the term "elderly" will vary and many, probably the majority, will not be aware of the nature and characteristics of this form of housing.

1.1.1 The Elderly

The definition of sheltered housing, as given below, refers to *"the elderly"*. It is, therefore, necessary to define what is meant by this term. Its use may be considered to be more polite or diplomatic than *"old age"*.

Various dictionaries define *"elderly"* as follows:-

"past middle age" - from Concise Oxford Dictionary

"getting old" - from Chambers Essential English Dictionary

"being past middle age and approaching old age; rather old"
-from "yourDictionary.com" and others

For the purposes of this study, the elderly will be defined to include everyone aged 60 years or more. With the life expectancy of the population steadily rising, many people in their sixties may not consider themselves to be elderly. However, 60 is the age at which a retirement pension is currently payable to women and has become a much more common age of retirement for men.

1.1.2 Entry Age Restriction

As described in more detail in paragraph 4.2.1 below, the age of 60 is also the normal minimum age limit for people entering Category II sheltered housing. This effectively predetermines the definition of the elderly to be used in this research.

Given the increasing level of life expectancy, as referred to below, there may be a case for increasing the age at which residents can enter this form of housing. However, this study has to be based on the existing age restrictions.

1.1.3 Life Expectancy

With the improvements in medicine and better nutrition, for example, those of us in the developed world may well be delaying the onset of the effects of "old age", although of course we cannot prevent it. In the United Kingdom the life expectancy of both sexes has been increasing. There has been a steady increase since about the beginning of the 20th century, with an occasional variation from the norm, such as about the time of the Second World War.

Those males born in 1901 would have had a life expectancy of 45 years, with females having an expectancy of 49 years. By contrast, those born in 2000 would have life expectancies of about 75 years for males and 80 for females (National Statistics Office – 2003).

This represents an increase of some 3.6 months per annum over the last century for males and about 3.7 months per annum for women. However, the increases were more pronounced in the earlier part of the last century. Table 1.1 gives the life expectancy, at birth, for the males and females of the population born in the period from 1980/82 to 1998/2000.

Table 1.1 Increasing Life Expectancy

Date	Male	Female
1980-82	70.81	76.80
1981-83	71.06	77.02
1982-84	71.34	77.25
1983-85	71.54	77.39
1984-86	71.73	77.55
1985-87	71.91	77.68
1986-88	72.15	77.92
1987-89	72.41	78.05
1988-90	72.61	78.23
1989-91	72.86	78.41
1990-92	73.16	78.69
1991-93	73.35	78.78
1992-94	73.65	79.01
1993-95	73.79	79.09
1994-96	74.05	79.30
1995-97	74.24	79.39
1996-98	74.50	79.56
1997-99	74.73	79.69
1998-2000	75.00	79.9

(Government Actuary's Department)

Over these 18 years, life expectancy of males has increased at an average rate of 2.79 months per annum. Female life expectancy has increased at an average rate of 2.07 months per annum. As described below, this has tended, and will tend, to result in an increase in the overall numbers of older people and also an increase in the proportion of the population who can be considered as "elderly". The birth rate will also influence this proportion. However, because of the boost in the population that occurred in the late 1940s, after the war, there will also be an increase due to the fact that those born at that time are now in their fifties and will be classed as "elderly" within the next 10 years.

1.1.4 Census Data

The 1991 Census showed that, at that time, 17.9% of the population of Great Britain were of pensionable age. The 2001 census shows that 21% of the population were then over the age of 60.

The proportion of older people in the population has increased steadily throughout the last century, through a combination of increased longevity and decline in birth rates later in the period. The 2001 Census shows that there were 9.4 million people over the age of 65, which represents an increase of some 51% compared with 1961. Similarly, there were 1.1 million people aged 85 or over, over three times as many as in 1961.

Population projections indicate that the proportion of older people in the population in England and Wales will continue to rise in the early part of the 21st century. In 1995, there were fewer than 9 million people over 65 years of age in the United Kingdom, but by the year 2030 there are expected to be almost 50% more. Between 1997 and 2040, the number of people aged 65 and older are expected to increase at ten times the overall rate of population growth . Those over 80 will have nearly doubled between 1995 and 2040, increasing from 2.4 million to 4.4 million (Government Actuary's Department).

The portion of the population of the United Kingdom, which can be described as "the elderly", is already increasing. This is shown in table 1.2 below.

Table 1.2. Increasing Retired Population

	Total Population (Million)	Retired Population (Million)	Percentage of Population Retired
1984	**56.5**	**10.11**	**17.9%**
1997	**59.0**	**10.70**	**18.1%**

(Office for National Statistics).

There has been an even more pronounced increase in the number of people over 75 years of age. This is illustrated in table 1.3 below.

Table 1.3. Increasing Population Over 75 Years of Age

Year	Total Population (Million)	Population over 75 (Million)	Percentage of Population over 75 Years of Age
1984	56.5	3.56	6.3%
1997	59.0	4.25	7.2%

(Office for National Statistics).

Help the Aged, in a report referred to in Section 2 of this thesis, notes that by the year 2021, one in three people in the United Kingdom will be over 60 years of age. (Help the Aged Transport Council - 1998).

The number of households headed by someone of pensionable age is also set to increase. By 2020, this is projected to rise from the present 28% to 31%. The number of single pensioner households will increase over the same period from 14.6% of all households to 16.4% .

Of particular interest in relation to this study is the fact that the 2001 Census showed that 68.2% of single pensioner households had no access to a car.

1.1.5 Lifestyles

Many elderly people will continue to live in their family homes while many will move to bungalows, or similar smaller dwellings, during their retirement. However, a significant number will, at some stage, move on into accommodation specifically designed for the elderly. This includes sheltered housing.

Such housing can be provided by both the public authorities and the private sector. This thesis considers the travel and associated characteristics of those residents in the most common form of private sector developments.

In light of the increasing elderly population, the travel and related characteristics of this part of the population will become increasingly important, even if the journeys made will still only represent a relatively small proportion of the total. The occupants of sheltered housing form a small, but significant and growing part of this group.

1.1.6 Sheltered Housing

An advice note on "Sheltered Housing For Sale" (House Builders Federation1988) defines sheltered housing as being:-

> *"Housing which is purpose-built or converted exclusively for sale to elderly people with a package of estate management services and which consists of grouped, self contained accommodation with an emergency alarm system, usually with communal facilities and normally with a resident warden".*

Two different categories of sheltered housing were defined by the government (Ministry of Housing and Local Government). Although the circular providing this definition has now been withdrawn, this does not affect the validity of the definition given, which is still generally in use in the industry and the planning process, as a guide to provision. The full definitions given are as follows:-

"Category I"

Self contained dwellings to accommodate one or two old people of the more active kind, and designed to the standards set out in Sections A, B, C, D, E, F, G(i), H and I below. Schemes involving this category of dwelling may include the optional extras set out in Section J paragraphs 1, 2 and 4.

"Category II"

Accommodation in grouped flatlets to meet the needs of the less active elderly people and designed to the standards set out in Sections A, B C, D, E, F, G (ii), H and L. Such dwellings must as a minimum be provided with the communal facilities set out Section J, paragraph 3 and may include the optional extras set out in Section J, paragraph 4.

For reference purposes, the content of Sections A to J from the circular, are reproduced in Appendix I to this thesis.

Category II flats would be expected to be about 10% smaller than Category I flats or bungalows, perhaps reflecting the higher level of communal facilities provided and a possible lower occupancy level. Category II developments should normally contain such facilities as a warden's apartment/dwelling, an emergency alarm system, a common room, a laundry room, and accommodation for guests.

The key aspect of these definitions is that the Category II developments, which are the subject of this study, are designed to meet the needs of the ***"less active elderly".*** This is not to suggest that the residents will be wholly inactive, or even incapable of a reasonable level of activity, but they will normally be less able to undertake all the activities that the more active elderly can. This will inevitably have an impact on the lifestyle, car ownership levels and travel characteristics.

A very significant majority of sheltered housing developments can be described as Category II. This is probably related to a higher demand for facilities by the *"less active elderly"* and the ability of the more active elderly to continue to live satisfactorily outside any form of specialist housing.

It has become evident, when dealing with the residents of this form of housing, including during this research, that some residents are sensitive to the use of the term *"sheltered"*. Many prefer the term *"retirement apartments"* or *"retirement housing"*. The reason for this has not been investigated, but may reflect their image of sheltered housing as involving some form of charity and catering for those who are perhaps less able than themselves, in terms of physical or mental abilities, or even financial resources.

The pioneer, and the major provider, of this form of housing in the private sector, and in particular Category II sheltered housing, is McCarthy and Stone (Developments) Limited. It has been providing this form of housing since about 1978. As at August 2002, the company has sold over 25,000 apartments in some 500 development schemes throughout England, Scotland and Wales.

This company has approximately 60% to 65% of the market and currently sells some 1,600 to 1,700 apartments per year. It is also expanding its business. This research uses data collected by and for the company, which is supplemented by data collected specifically for this study, with the full co-operation of the company.

Appendix II contains further information, illustrated by photographs, on the nature of this form of housing. The features include an emphasis on security, with controlled entry to the building via a TV or telephone link, and with each apartment having its own "front door", keeping it separate from the communal areas. There are various alarm systems, including a "Careline" system, which allows residents to call for assistance in emergencies, either from the house manager or an external care provider, if the house manager is not available.

A residents' lounge is normally provided, where residents can meet up and hold social events. A guest suite is also a common feature, which allows relatives and friends to visit, without having to share the use of the relatively small individual apartments. Indeed to do so may well be in contravention of one of the terms of the lease, restricting the age of residents. A communal laundry is also usually provided. The upkeep of these communal facilities, along with the maintenance of the gardens and buildings, are funded from the service charge, which all residents pay.

1.2 Aims and Objectives

1.2.1 Overall Aim

Experience has shown that many people, including many of the professionals who have to consider the planning requirements of proposed developments or this nature, often have an incorrect image of the characteristics of this form of housing. Some expect the traffic generation characteristics and car parking requirements to be similar to the overall population. In some cases, the fact that the developments cater for the elderly is recognised, but the expectations of the characteristics and requirements are based on a knowledge, experience or impression of how the elderly behave within the community as a whole. The fact that this is a specialised form of housing is not taken into account.

At the other extreme, some people consider sheltered housing as being the same as nursing home accommodation, with a high level of nursing care being provided, and expect the traffic and car ownership characteristics to be similar to nursing homes. Residents are sometimes thought to be incapable of walking even a relatively modest distance.

A paper given by Lady Sally Greengross, at a conference on the role of government and the professions in providing for the elderly (Greengross, Lady S), includes the comment that there is a tendency to:-

"*lump people together in an age cohort as if they were all the same*".

She rightly criticises this approach.

This study aims to correct any such misconceptions and to investigate if the residents in this form of housing are part of one group with common characteristics. In doing so, it is necessary to understand and explain, as far as is possible, what the characteristics of this form of housing and their residents are and how they do, or might, explain the traffic generation, travel and car ownership characteristics of this form of housing. This is the key aim of this study.

1.2.2 Overall Objectives

The key objectives of this research are:-

i) to derive a robust and practical means of estimating the traffic generation of Category II Sheltered Housing Developments in Great Britain and the factors that influence this generation, in order to allow the traffic impact of any proposed development to be assessed,

ii) to provide guidance on the likely car ownership characteristics at such developments in order to consider an appropriate level of car parking provision, taking into account this and all other relevant considerations

iii) to give the relevant information to allow the nature of this form of development and the factors that influence the transport characteristics of its residents to be understood.

Whilst each of the first two of these aims would appear to be more significant than the third, the third is important in providing an understanding of why the traffic generation and car parking requirements or car ownership levels are as they are.

1.2.3 Introduction to Structure of this Thesis

As Category II sheltered housing is aimed at the "*less active elderly*", the facilities provided reflect this. These are described, along with the definitions used, in section 1.1, above.

There are a number of factors, which **may** have an influence on the car ownership levels achieved in sheltered housing developments. These factors can also have an associated influence on the number of parking spaces required and possibly the trip generation. Chapter 2 of this thesis provides a review of some of the relevant literature on this general subject. Chapter 3 describes how data used in this research has been collected and some of the statistical techniques used to analyse this data.

Chapter 4 of this thesis considers, in detail, a range of characteristics of residents, providing important background to the analyses of residents travel characteristics presented in Chapter 5. The primary characteristic that affects the behaviour of the residents of this form of housing is their age. Section 1.1 has already described the demographic characteristics of the population of the country, which shows the relevance of this research. This has to be considered in the context of section 4.2.1, which gives the restrictions that apply to occupancy of this form of housing. Sections 4.2 and 4.3 give further information on the actual age characteristic.

Although there is no specific requirement for residents to be retired, the overwhelming majority will have done so well before entering a Category II sheltered housing development. Therefore, the age of the residents ensures that there are unlikely to be any significant numbers of journeys to or from work. The need to own a car may also be significantly reduced.

Although the normal, and most practical, means of defining traffic generation and car ownership uses the unit of accommodation, and in this case specifically the apartment, as the basic unit, trips are made by, and cars owned by, people of both sexes. Consequently, the nature and number of occupants of the apartments is also a relevant consideration. This is considered in sections 4.4, which looks at the sex of residents, and section 4.5, which considers the occupancy of apartments.

Even within the development, not every apartment is the same. There is generally a choice of smaller apartments with a single bedroom and larger ones with an additional room, sold as being a two-bedroom apartment. The possible influence of this factor is also addressed.

Being elderly, residents may be affected by some form of disability. This can influence their travel requirements and potential. Section 4.6 looks at this characteristic of the residents of this form of housing.

The lifestyle of residents, which will have travel implications, may be determined by the residents' interests, attitudes and habits. These are considered in sections 4.7, 4.8 and 4.9.

Developments will be managed by a house manager, sometimes described as a warden. There will also, normally, be a guest suite that can be used by visitors to residents. The characteristics of these elements of the development are considered in Section 4.10.

Chapter 5 looks at the travel characteristics of residents and their visitors. In order to drive a car, residents require a driving licence and then a vehicle. These factors are considered in Sections 5.2, 5.3 and 5.4 below. In designing to accommodate the vehicles of residents, and visitors, the nature of vehicles owned may be an important consideration and is described in Section 5.5.

Of course residents do not only travel by a car, or other motor vehicles owned by them, but may walk, cycle or make use of public transport. Section 5.6 considers cycle ownership of residents and Section 5.7 the modes of travel adopted.

Section 5.8 looks at the car parking provision that should be made in this form of housing and 5.9 considers cycle parking requirements. Section 5.10 derives the recommended approach to predicting traffic generation.

Chapter 6 gives the general conclusions of the research and Chapter 7 suggests what additional research would be beneficial.

1.3 Methodology

The research strategy has been to use an empirical approach, based on data from existing sheltered housing developments. An inductive approach is adopted and, where appropriate, hypotheses are brought forward and tested. Possible trends are also considered, where the data permits.

McCarthy and Stone has been collecting limited data related to car ownership and car use for a number of years. The level of data collection has increased significantly in recent years, particular with a major survey undertaken in 1996, as described in Section 3 below. This data has been used in this study, as has additional data, collected in 2000/2001, specifically for this study.

In most cases it is only necessary to present the data in a comprehensible form and to realistically interpret and sensibly comment on the findings. Where possible, comparisons are made with other available data.

However, some of the data needs to be analysed using recognised statistical techniques in order to clearly show its significance. Where it is considered appropriate, this approach has been adopted.

2. *Literature Review*

Experience over the past 16 to 17 years in the field of advising on the transportation aspects of sheltered housing developments, for various developers but principally McCarthy and Stone, has made it evident that there is a very limited amount of information generally available concerning the travel, or indeed other, characteristics of the residents of this form of housing. Other than information collected by or for McCarthy and Stone, the major supplier of this form of housing, there appears to be little reliable data available. Importantly, even the other data that has been collected and published does little to help the understanding of the travel characteristics.

There appears to be relatively little information of direct relevance to this study available on the internet. On a matter as detailed as *"the parking requirements for elderly housing"*, for example, the only reference, in the Zoning and Land Use Forum (USA based), suggested "*First make sure you define elderly housing or assisted living. I have seen a parking requirement of 1 space per staff member on duty and ½ space per dwelling unit".*

A search of the University Transport Research Group (UTSG) references on CD ROM reveals no papers mentioning sheltered housing. This demonstrates that little or no relevant research has been undertaken on the transport characteristics of this form of development.

Some of the research that has been undertaken will now be considered under specific topic headings.

2.1 The Elderly

In his classic work "A Portrait of Dorian Gray", Oscar Wilde allowed the title character to defeat the ageing process, by passing this characteristic to his portrait. However, away from the fictional world, it is impossible to avoid this process, even with the aid of plastic surgery. We are all ageing and will eventually become elderly, unless premature death intervenes.

However, being elderly, or experiencing old age, is something that many people are reluctant to admit to. Lady Astor, for example, is quoted as saying "*I refuse to admit that I'm more than fifty-two, even if it does make my two sons illegitimate*". Bernard M Baruch once said "*to me, old age is fifteen years older than I am*", but perhaps Maurice Chevalier summed up most people's views, when he said *"Growing old isn't so bad when you consider the alternative."*

An interesting source of general information is the proceedings of the conference organised by the AA Foundation for Road Safety Research in 1993. The proceedings include 9 papers. The paper by P Bly (Bly P.H. – 1993) emphasises the need for the elderly to take a full part in social activities. It considers the increasing number of elderly people and explains that the over 70s make less use of a car than do children, in their capacity as passengers.

He reports that the majority of people over 70 do not have access to a car, and for the over 80s, only a tiny minority drive. It also states that "*improvements in health care and medical treatments will mean that people at a given age will be more physically able than they were in the past, but the overall increase in life expectancy will provide greater numbers of people at higher ages where the physical problems are more severe.*" It also suggests one means of addressing the transport problems of the elderly as being "*the relocation of older people into suitable housing placed conveniently close to the necessary facilities*". Providers of sheltered housing normally endeavour to locate their developments close to such facilities.

In his paper, P G Headicar (Headicar P.G. – 1993) explains that most older people are retired and so do not need to undertake the journey to and from work, and are not constrained as to where they live. The importance of the amenity of their homes increases, due to the additional time spent there. It also discusses the problems of frailty, vulnerability etc.

The then chairman of the Health Education Authority, Sir Donald Maitland (Maitland – 1993), describes the significant increase in life expectancy over the past 50 years or so. The paper also states that "*only one person in fifty will not escape some form of rheumatic complaint in their lifetime*". This would appear to be an error, but would be logical if the word "not" were to be omitted.

The role of the doctor was described by J Bevan (Bevan J – 1993). He points out the medical effects of the ageing process, including the impact on vision that affects night driving and the faster onset of fatigue. He considers that doctors should be prepared to advise older drivers on how they should change their driving habits to avoid potential problems and even when they should cease driving.

The final paper, by Lady S Greengross, (Greengross – 1993) points out that for the first time in history we can now expect to enjoy some 20 to 25 years of active, healthy life after full time employment ceases. The 10.5 million people over pensionable age include 7 million women. She also points out that the elderly population varies considerably, and yet there is a tendency to "*lump people together in an age cohort as if they were all the same*". The identification of the different forms of housing for the elderly and recognition of their different characteristics is in line with her thinking.

She explains the difficulty of creating a new social life etc. when a partner dies. Also, along with a number of contributors, she points out the vulnerability of the elderly, when they are involved in accidents. For example, over half of the pedestrian fatalities are over the age of 60.

She refers to an AA Public Policy Report, which confirmed that women drivers today see their cars as the key to an independent and emancipated life. However, older women are not as confident as men and tend to be worried about night driving and travelling by motorway.

One of the assertions of Lady Greengross is supported by Mr Trevor Roberts (Roberts - 1999). Under the heading *"immediate action"*, he lists *"some things we can do at once"*. These include the stopping of stereotyping, with the need to obtain *"more detailed information about the structure, characteristics and aspirations of people in the 60 to 100 age groups"*.

2.2 Car Ownership

In considering car ownership levels, it is interesting to note the findings of the study undertaken for the Automobile Association (Rabbitt - 1996). The report on this study states:-

"More ex-drivers (17.8%) than drivers (7.8%) live in a city and slightly more ex-drivers (31.4%) than drivers (26.7%) live in a town, while more drivers than ex-drivers live in suburban and rural areas. These differences between drivers and ex-drivers are statistically significant and may reflect two factors: the relatively high socio-economic circumstances of drivers and, possibly, also the greater need to maintain a personal car in suburban and rural areas which are not well served by public transport".

This tends to suggest that location could be a significant factor in car ownership.

2.3 Trip Generation of the Elderly

In his paper on the role of the bus planner, D Baylliss (Baylliss – 1993) picks up the point that although, in the past, more men than women were able to drive, in recent years this imbalance has been reduced. However, men may still drive more than women.

He links the growth of car use in general with *"suburbanisation and dispersal of facilities"*.

As indicated later in this thesis, the merits of the location of sheltered housing developments, which is carefully chosen for the relative convenience to facilities, is generally appreciated by the residents. Based on the comments made by D Baylliss, car use would not be expected to be high.

Baylliss also identifies that older people make fewer journeys, on average, at about 8 or 9 per week as opposed to about 19 for those between 19 and 59 years of age. Of course, the differences at the household level may be even more pronounced, as household sizes tend to be much lower for the elderly. Many residents of sheltered housing live alone, so, irrespective of any other special factors that might apply to residents of this form of housing, a comparatively low generation rate, per apartment, would be expected.

Barbara Noble, (Noble - 2000) prepared a report on the travel characteristics of older people. This is of particular interest, in that it sets a benchmark, against which the characteristics of sheltered housing residents can be compared. The introduction indicates that most of the statistics used are derived from the National Travel Surveys for 1985/86 and 1996/98. The key findings of the report include:-

> *"Travel declines with age. People aged 80 and over make less than half the number of journeys, and travel less than a quarter of the distance of those aged 50-54."*

> *"Older people are travelling more than a decade ago. For example, men aged 75-79 travelled 3,500 miles on average a year in 1996/98, nearly half as far again as men in this age group in 1985/86."*

"About two thirds of women aged 50-54 are drivers in households with a car. In contrast, three quarters of women aged 80 and over live in households without a car."

"Just under two thirds of people past retirement age in households without a car had a bus pass in 1996/98, compared with less than a third in households with two or more cars. Men are less likely to hold a bus pass than women."

"For those aged 80 and over, nearly half of the men and more than two thirds of women have some form of mobility handicap."

"Currently, there are over 2 million people aged 70 and over who hold a driving licence. Over the next 15 years, increasing licence holding, and an increasing population of older people could mean that this figure may double to about 4.5 million people still holding a licence over the age of 70."

Table 2.1, below, is an extract from this report. It gives the comparison of the total annual number of journeys made by males and females, by age group. The age groups under 60 year of age have been included for comparison purposes. The percentages indicated are added to the data from the report.

Table 2.1 General Travel Characteristics, by age (1996/98):-

Age	Journeys per person per annum by men	Journeys per person per annum by women	Womens' journeys as proportion of mens'
25 to 49	1199	1270	106%
50 to 54	1210	1137	94%
55 to 59	1223	958	78%
60 to 64	1102	879	80%
65 to 69	1071	822	77%
70 to 74	936	750	80%
75 to 79	817	623	76%
80 and over	562	410	73%

The data shows a significant decline in the number of trips made by women, when compared to those made by men. For the under 50s, women made some 6% more trips, whereas for the over 80s, this had dropped to 73% of the trips made by men. For men over the age of 80, the number of trips made have fallen to some 47% of the number made by under the under 50s and for women the reduction is even greater, to less than one third of the number for the under 50s. This decline in the number of journeys made would suggest that the trip generation for the elderly, by all modes, would be lower than for the overall population.

However, this decline in journey making is less pronounced than in the data for 1985/86. Also the comparison of journeys by men and women show a greater differential in the earlier period. For example, in 1985/86, for those under 50, women undertook 97% of the number of journeys of their male counterparts and for the over 80s, the percentage was 58%.

The report then looks at the mode of journeys. It states that the patterns were generally similar in 1985/86 and 1996/98. Travel by car drivers decreases with age. However, the decline in car driver trips does not lead to an increase in car passenger trips, except for the very elderly. In each age group, women are much more likely to be passengers than men.

It shows that car travel is partly replaced by travel on foot by men in their late 50s and in their 60s, and by bus for older men. Travel on foot remains fairly constant for women, but travel by bus increases with age.

The following table, 2.2, is an extract from one in the Barbara Noble report. It shows the number of journeys undertaken by mode of travel, by the average person per year, in 1996/98. The percentages have been added, for better comparison on the sets of data.

Table 2.2 Part 1. Annual journeys by age and main mode - Males (1996/98):-

Age	Walk	Car driver	Car passenger	Bus	Other	Total
25 to 49	224 (18.7%)	764 (63.7%)	93 (7.6%)	32 (2.7%)	86 (7.2%)	1199
50 to 54	213 (17.6%)	838 (69.3%)	68 (5.6%)	27 (2.2%)	64 (5.3%)	1210
55 to 59	265 (21.6%)	783 (64%)	81 (6.6%)	35 (2.9%)	59 (4.8%)	1223
60 to 64	269 (24.4%)	672 (61%)	69 (6.3%)	39 (3.5%)	53 (4.8%)	1102
65 to 69	361 (33.7%)	558 (52.1%)	62 (5.8%)	49 (4.6%)	41 (3.8%)	1071
70 to 74	301 (32.2%)	465 (49.7%)	61 (6.5%)	78 (8.3%)	30 (3.2%)	936
75 to 79	268 (32.8%)	366 (44.8%)	59 (7.2%)	89 (10.9%)	34 (4.2%)	817
80 +over	198 (35.2%)	172 (30.6%)	83 (14.7%)	64 (11.4%)	45 (8%)	562

Table 2.2 Part 2. Annual journeys by age and main mode - Females (1996/98):-

Age	Walk	Car driver	Car passenger	Bus	Other	Total
25 to 49	327 (25.7%)	604 (47.6%)	227 (17.9%)	60 (4.7%)	53 (4.2%)	1270
50 to 54	266 (23.4%)	496 (43.6%)	276 (24.3%)	57 (5%)	43 (3.8%)	1137
55 to 59	267 (27.9%)	307 (32%)	283 (29.5%)	59 (6.2%)	43 (4.5%)	958
60 to 64	244 (27.8%)	229 (26.1%)	270 (30.7%)	90 (10.2%)	47 (5.3%)	879
65 to 69	260 (31.6%)	180 (21.9%)	259 (31.5%)	88 (10.7%)	35 (4.3%)	822
70 to 74	264 (35.2%)	117 (15.6%)	218 (29%)	114(15.2%)	36 (4.8%)	750
75 to 79	227 (36.4%)	69 (11.1%)	189 (30.3%)	105(16.9%)	34 (5.5%)	623
80 + over	150 (36.6%)	32 (7.8%)	129 (31.5%)	69 (16.8%)	29 (7.1%)	410

The significant rise, i.e. a doubling in the proportion of car passenger trips by men in their 80s or older is likely to reflect them being driven by their younger relatives or friends. Up to that age the proportion of trips made as car passengers is very low. The proportion of walking and public transport journeys can also be seen to increase significantly with age. However, even in their 80s men are car drivers more than twice as frequently as they are car passengers.

Women tend to be passengers for a higher proportion of journeys and from 60 years of age and above they tend to be passengers more than they tend to be car drivers. Their increase in walking is less pronounced than for men, but the increased use of public transport is significant, with increasing age.

For the very elderly, other modes, mostly private hire buses, but also taxis and minicabs, become more important as a proportion of all trips.

This Noble report goes on to consider the distances travelled by these modes. This data is shown in table 2.3 below. As before, the percentages are added for comparison purposes.

For men aged 80 and over, the total distance travelled falls by over 80%, with some 72% of distance travelled being by car. For women, the reduction in distances travelled is almost as pronounced, but starts from a much lower base. Only some 58% of journeys by women in the over 80s age group, are by car, with the vast majority of these trips by the women being as passengers, although for males the majority was as a car driver. "Other" travel by private hire buses and taxis accounted for a quarter of the distance travelled by the most elderly women, almost twice the proportion undertaken by men.

Table 2.3 Part 1. Distance travelled (in miles) per annum by age and main mode - Males (1996/98):-

Age	Walk	Car driver	Car passenger	Bus	Other	Total
25 to 49	145 (1.3%)	8612 (75.7%)	1145 (10.1%)	143 (1.3%)	1333 (11.7%)	11378
50 to 54	139 (1.2%)	9086 (78.7%)	914 (7.9%)	116 (1%)	1285 (11.1%)	11540
55 to 59	158 (1.7%)	7234 (76.8%)	947 (10%)	145 (1.5%)	940 (10%)	9424
60 to 64	179 (2.4%)	5780 (77%)	683 (9.1%)	153 (2%)	710 (9.5%)	7505
65 to 69	210 (3.5%)	4480 (74.5%)	583 (9.7%)	176 (2.9%)	564 (9.4%)	6013
70 to 74	200 (4.3%)	3098 (67%)	678 (14.7%)	304 (6.6%)	347 (7.5%)	4627
75 to 79	168 (4.8%)	2006 (57.1%)	518 (14.8%)	303 (8.6)	516 (14.7%)	3511
80 +over	117 (5.5%)	981 (46.5%)	538 (25.5%)	193 (9.1%)	280 (13.3%)	2110

Table 2.3 Part 2. Distance travelled (in miles) per annum by age and main mode - Females (1996/98):-

Age	Walk	Car driver	Car passenger	Bus	Other	Total
25 to 49	178 (2.4%)	3662 (50.1%)	2438 (33.4%)	240 (3.3%)	785 (10.7%)	7303
50 to 54	151 (2.2%)	2875 (41.4%)	3080 (44.3%)	235 (3.4%)	609 (8.8%)	6951
55 to 59	152 (2.5%)	2179 (36.5%)	2784 (46.7%)	215 (3.6%)	637 (10.7%)	5967
60 to 64	145 (2.8%)	1282 (25%)	2665 (52%)	375 (7.3%)	656 (12.8%)	5123
65 to 69	158 (3.4%)	1089 (23.4%	2454 (52.8%)	328 (7.1%)	620 (13.3%)	4649
70 to 74	157 (4.4%)	629 (17.7%)	1793 (50.4%)	389(10.9%)	586 (16.5%)	3555
75 to 79	99 (3.6%)	276 (10%)	1502 (54.5%)	387 (14%)	492 (17.9%)	2756
80 + over	61 (3.7%)	99 (6.1%)	847 (51.9%)	217(13.3%)	407 (25%)	1631

The Barbara Noble report also includes the car ownership data by age of the head of a household. This data is reproduced in table 2.4 below. This table shows the decrease in car ownership, with age, and also the higher car ownership levels where the male is the head of the household.

Table 2.4 Part 1. Car ownership by age and sex of household - Males (1996/98):-

Age	No car %	One Car %	Two+ Cars %
50 to 59	12	45	43
60 to 69	19	58	23
70 to 79	35	54	10
80 +over	59	37	4

Table 2.4 Part 2. Car ownership by age and sex of household - Females (1996/98):-

Age	No car %	One Car %	Two + Cars %
50 to 59	41	50	8
60 to 69	60	38	2
70 to 79	75	24	1
80 +over	90	10	-

The table shows that, for male heads of households in their 60s, more than four households in five had a car, and nearly a quarter had two or more. In contrast, households headed by a woman (which are more likely to be single person households) had much lower car ownership levels. For households headed by a woman in her 60s, three in five had no car, rising to nine in ten for households headed by a woman aged 80 or more.

As people grow older, there is, as might be expected, a significant decline in the number of work and education related trips. This is illustrated in table 2.5 below:-

Table 2.5 Part 1. Percentage of journeys by purpose and sex (1996/98):- Males

Age	Work and Education	Escort	Shopping/personal business	Visiting friends	Other leisure
25 to 49	37%	10%	26%	16%	11%
50 to 54	36%	9%	28%	15%	13%
55 to 59	28%	9%	33%	15%	15%
60 to 64	22%	10%	35%	16%	17%
65 to 69	7%	8%	46%	17%	23%
70 to 74	4%	7%	55%	16%	17%
75 to 79	-	6%	54%	20%	20%
80 +over	-	-	62%	20%	18%

Table 2.5 Part 2. Percentage of journeys by purpose and sex (1996/98):- Females

Age	Work and Education	Escort	Shopping/personal business	Visiting friends	Other leisure
25 to 49	22%	22%	31%	16%	10%
50 to 54	26%	7%	37%	15%	14%
55 to 59	19%	6%	41%	19%	16%
60 to 64	11%	5%	48%	20%	16%
65 to 69	3%	4%	51%	22%	20%
70 to 74	2%	3%	56%	19%	20%
75 to 79	-	-	61%	21%	18%
80 +over	-	-	60%	23%	16%

Personal business trips include trips to the doctor or hospital and also errands such as going to the bank and library. This set of trips increases, as a proportion of the total, with age, possibly reflecting a reduction in trips made for other purposes. However, this increase was not quite as evident for women, who made a greater proportion of shopping and personal business trips at younger ages. Men aged 65 and over made more trips for these purposes than women of the same age. This might reflect a possible change in responsibilities around retirement age.

The Barbara Noble report also looks at the take-up of available concessionary fare schemes by age and sex. This data is shown in table 2.6 below.

Table 2.6 Percentage taking up available concessionary fare schemes. (1996/98):-

Age	Males	Females
60 to 64	*	50%
65 to 69	43%	56%
70 to 74	49%	60%
75 to 79	54%	58%
80 +over	51%	49%

*Concessionary fares would not usually be available to men prior to their normal retirement age of 65.

The report states that the take-up rates are higher for women than for men, except for those aged 80 and over. These rates are highest for men in their late 70s and women in their early 70s, who are likely to be still mobile but no longer driving. Take up rates declined during the 1990s, as car access increased among older people.

The National Travel Survey, which is the basis for this report by Barbara Noble, also asked questions about physical disabilities or long standing health problems that make it difficult to go out on foot or to use buses or coaches. The survey, as illustrated in table 2.7 below, shows increasing levels of mobility difficulties with increasing age.

For those aged 80 and over, in the period 1996 to 1998, nearly half the men and over two thirds of the women had some form of mobility difficulty.

The survey is reported as asking people who had difficulty using buses or going out on foot if they had given up driving, and why. Whilst sample sizes were small, of those aged 55 and over, 77% of men and 55% of women in 1996/98 who had given up driving did so because of some disability. However, no details are available for other people who may have given up driving for a variety of reasons, but were still able to use buses and go out on foot.

Table 2.7 Part 1. Percentage of people with mobility difficulties by age and sex (1996/98):-

Males

Age	Total with mobility difficulty	Difficulty with buses only	Difficulty walking but walks unassisted %	Difficulty walking – needs help and uses special aid	Does not go out on foot – but could do with difficulty	Unable to go out on foot
25 to 49	4%	-	3%	1%	-	1%
50 to 54	9%	1%	5%	2%	1%	1%
55 to 59	18%	1%	11%	2%	2%	1%
60 to 64	23%	1%	15%	3%	2%	2%
65 to 69	24%	1%	17%	2%	2%	2%
70 to 74	29%	2%	17%	4%	3%	3%
75 to 79	40%	2%	24%	4%	5%	4%
80 +over	49%	1%	24%	6%	9%	8%

Table 2.7 Part 2. Percentage of people with mobility difficulties by age and sex (1996/98):-

Females

Age	Total with mobility difficulty %	Difficulty with buses only %	Difficulty walking but walks unassisted %	Difficulty walking – needs help and uses special aid %	Does not go out on foot – but could do with difficulty %	Unable to go out on foot %
25 to 49	5%	1%	3%	1%	-	-
50 to 54	15%	1%	6%	2%	1%	1%
55 to 59	18%	1%	11%	2%	2%	1%
60 to 64	21%	2%	12%	3%	2%	1%
65 to 69	28%	2%	17%	4%	3%	3%
70 to 74	34%	2%	18%	6%	4%	4%
75 to 79	47%	3%	24%	8%	6%	5%
80 +over	68%	3%	22%	12%	12%	17%

A report by Bebbington and Darton (Bebbington 1996), indicates that, in 1996, a male might expect 59.2 years of healthy life, with 15 years of illness. Women would expect 62.2 years of health and 17.4 years of illness. Of course these figures are averages, with some people being ill for much of their lives and others being much healthier.

2.4 Sheltered Housing

A book on housing for the elderly by Heumann and Boldy (Heumann – 1982) describes the development of sheltered housing and looks at the variations between countries in the western world. It considers sheltered housing to be a form of *"assisted independent living"*. It allows the elderly, who are in need of some assistance, to remain out of institutions for the old and infirm.

This book describes sheltered housing as follows:-

> *"The typical sheltered housing scheme is made up of independent apartments or bungalows which look like conventional housing. However, each private apartment and its surroundings are intended to be "barrier free", so as to make the activities of daily life as easy and convenient as possible. The private units are often supplemented with communal spaces that make socialising and shared domiciliary care easier as persons become more frail and housebound. Each unit is connected by an alarm or intercom system to nearby help, usually in the form of peripatetic staff, sometimes in the form of permanent on site staff, but in all cases the philosophy is that support is only provided at the margin of assistance needed to maintain independent living. The individual's privacy and independence are the unique and essential ingredients of sheltered housing."*

It describes the range of sheltered housing as being from *"minimal service"* at one end of the spectrum to *"service rich"* at the other. In Britain, the latter is sometimes described as *"very sheltered"* housing.

Heumann and Boldy state that, contrary to expectations, developments with minimum services, such as a lounge and laundry room, are not just suitable for the younger, more able, elderly. They then state that *"The British experience shows that the support provided by these facilities addresses the varied needs of the elderly as they become increasingly disabled".*

The authors indicate that there is growing evidence of the popularity of sheltered housing. It allows for the segregation of the elderly, without the need to leave the larger community, family and younger friends. They also suggest that residents of sheltered housing *"appear to live longer, remain functionally independent longer and avoid total care institutions more often than do the elderly remaining in conventional housing".*

The book describes the difficulties of attitude surveys of the elderly. It states that "*It is a well-established fact that when interviewed, the elderly tend to be less critical than younger persons*". Therefore, when asked to comment on their living environment, they tend to express favourable views. This may be an important consideration, when assessing some of the data referred to below.

The book describes the origins of sheltered housing. Britain was the pioneer in this form of housing, with possibly the first of its kind being provided in Sturminster Newton, Dorset. Britain was some 20 years ahead of other western countries in developing national policies. Britain was unique in developing residential homes for the elderly, in addition to nursing homes. In the former, there is no presence of nursing staff and no long-term medical services are provided. These differences led to variations in the form of management of the homes and these variations *"predisposed the early development of sheltered housing"*. In contrast, *"countries that have adopted the nursing home model for long-term housing of disabled elderly are not as likely to recognise the need for assisted independent living"*.

Britain also pioneered the role of the warden as the primary daily contact for the residents of sheltered housing. The warden is not a highly trained nurse.

Reference is made to the definitions of Category I and II sheltered housing, which are referred to in Chapter 1 above. A table gives the percentage of residents in each form of sheltered housing who are unable to do certain tasks. As an example, it shows 34.1% of residents in Category II developments are unable to do *"heavy housecleaning"* as compared with 17.88% in Category I developments. For *"cooking"* the percentages are 4.3% as opposed to 1.8%, for *"shopping"* they are 19.3% as opposed to 11%.

The social life of residents of the two forms of sheltered housing also appears to vary, with those in Category II developments tending to remain within the development more than those in Category I developments. The authors commend the use of more than one form of sheltered housing, to better meet the needs of the elderly.

The book describes the warden in British developments, who is now often known as the house manager, as being a *"friendly neighbour"*. Typically, the warden is a young to middle-aged housewife, who lives with her family in one of the apartments. No special qualifications are needed, beyond *"a loving/caring nature, self confidence and common sense"*.

Back in the mid 1980s, McCarthy and Stone initiated a major national survey, by the Harris Research Centre, of a number of aspects of sheltered housing (Harris Research Centre - 1989). The report considers the residents of sheltered housing, including their characteristics, lifestyle etc, and also includes a survey of attitudes towards this form of housing. This research is not a repeat of that of Harris Research Centre, but, where appropriate, a comparison will be made of the findings of the two studies in an attempt to identify any changes or trends.

A brief summary of the findings of the Harris Research Centre study shows that the split of sexes in private sector sheltered housing was 63% females and 37% males. Some 5% of the residents were single, 44% married, 47% widowed and 4% separated or divorced. Effectively, some 56% lived alone. Some 70% had had children. The main features of the developments that were considered very important to residents included the *"completely self-contained"* nature of apartments (83%), the *"walking distance of shops"* (49%), the *"house manager"* (49%), the *"removal of worries about garden"* (49%) and the *"built in call system"* (46%). The location of the development was also a very important feature, for residents.

Some 45% of residents moved less than 5 miles to the sheltered housing apartment, with a further 27% moving between 5 and 20 miles. Over 90% of residents sold their previous home to purchase what 72% considered to be a good investment. Some two thirds of residents, who sold their previous home, *"traded down"*, giving them additional accessible capital.

The main advantage perceived by the residents was *"safety/security"* at 43%. Others were *"easy to look after"* (18%), *"independence"* (15%), *"no worries"* (13%) and *"house manager/warden"* (13%). When asked about disadvantages, 44% said there were *"no problems"*.

A more recent report was also commissioned by McCarthy and Stone and published in 2003 (McLaren - 2003). The report aims to *"contribute to the wider debate on the needs and wellbeing of older people, ensuring appropriate housing choice and, in particular, the importance of housing in delivering a good quality of life."* It concludes that:-

> *There is a shortage of private sheltered housing in the UK.*
> *Private sheltered housing helps older people engage in the local community.*
> *Private sheltered housing promotes independent living.*
> *Private sheltered housing is a home for life.*
> *"Stay put and adapt" is not the best solution for many older people.*
> *Local economies benefit significantly from private sheltered housing schemes.*
> *Private sheltered housing schemes alleviate pressures on the NHS.*
> *Private sheltered housing schemes increase the availability of ordinary local housing stock.*
> *Private sheltered housing offers sufficient space and high standard specifications for older people.*
> and *Private sheltered housing transforms the quality of life of its residents.*

The report indicates that "*private sheltered housing attracts older people who have reached a stage in their lives where they wish to act to secure their independence. The importance of housing in achieving this is paramount; hence the demand for well located, well designed homes, which optimise mobility, security and freedom. 70% of current residents emphasised the importance of the mobility-friendly aspects of the design and the access facilities offered in private sheltered housing in influencing their decision to move*".

When residents were asked which of a list of factors were important in their decision to move into the accommodation, "*walking distance to shops/facilities*" was equal first in priority with the "*availability of Careline*", with 84% of residents considering these issues to be very or quite important.

When considering the characteristics important when assessing the location of housing for older people, the "*proximity to shops*" achieved the highest score, at 9.23 out of 10. When asked what they need to enjoy independent living "*mobility*" and "*good health*" scored equal highest score, with a score of 9.04 out of 10.

It reports that "*the decision to move to private sheltered housing becomes more straightforward as the frustrating aspects and worries of living in ordinary housing increases over time. Whilst an event such as the death of a spouse or the onset of disability can prove to be a catalyst for moving, for the vast majority of residents and prospective residents, the decision is caused by an amalgam of factors.*"

Although residents considered mobility important, as referred to above, 61% disagreed with the statement that "*I live a more active life here than I used to before moving here*".

The report refers to the use of the National Health Service. This is significant in the understanding of the operation of the housing, in terms of visits by health professionals that need to be catered for. The report states that "*the good health of residents is clear from their use of the National Health Service: only twenty one percent of residents have received inpatient care over the last year. Over half (54%) of residents have received no outpatient treatment and thirteen percent have not needed to visit their GP in the last year*". It also reports that "*on average over a year, residents visit their GP only 4.2 times and their practice nurse 2.5 times. This is far lower than amongst the general population in that age group. People aged 65-74 had an average of five NHS GP consultations a year in 2001 and six consultations per year for those aged over 75*". In considering visits by health professionals it indicates that "*three out of four residents have not required a GP to visit them in their home in the past 12 months and less than a fifth (18%) have required a practice nurse to do so*".

The study obtained comments from local businesses situated close to sheltered housing developments. The following quotes are included:-

> "*I would guess that twenty percent of our customers are retired. They're in and out of here all day long: they don't go into town much. Older people tend to shop more locally than younger people. They always come here first and if we don't have what they want they then go into town*".
> (Local shop/post office)

> "*Lots of elderly people use us. They go on all sorts of journeys from a short one to Sainsbury's to longer journeys to the coast. Any housing development for the elderly is perfect for a taxi company as it provides us with more customers. They are less likely to have cars and they make lots of short journeys*".
> (Local Taxi Company)

"The Scheme has had a positive impact on my business. I have them all together there. I don't need to travel: I try to do all their hair in one go, its about one afternoons work per week."
(Local hairdresser)

Annex B to the report gives the average weekly expenditure of households in McCarthy and Stone developments. Out of an average total expenditure of £250, motoring accounts for only £22.86 and fares (and other travel costs) a further £7.60. It indicates that a typical scheme occupies 0.4 hectares of land, providing 45 retirement apartments for about 55 residents. This equates to some 1.22 persons per apartment.

2.5 Trip Generation of Sheltered Housing for the Elderly

The Trip Rate Information Computer System orTRICS database (TRICS) has data on the traffic generated by some 17 *"sheltered housing"* developments. In recent years, a trip rate of 2 vehicle movements per household per day has been suggested as being the average. However, as indicated above, sheltered housing takes a number of forms, which are almost certain to have significantly different characteristics. Reference is made above to one of the other forms of sheltered housing, i.e. Category I, which caters for the more active elderly, probably of a younger age, who are likely to have different traffic generation characteristics. The developments surveyed for the TRICS database vary significantly, but are treated as if they are all of the same form. Consequently, at the time of undertaking this research, the reliance that can be placed on this data is, therefore, quite limited.

Although McCarthy and Stone is the major provider of this form of housing, in the private sector, only one of its sites is included in the TRICS data. Of the other developments, one consists mainly of bungalows, one has a sales office still in operation, some are local authority or housing association schemes for rent, one has a *"volunteer bureau"* and a *"community day centre"* on the site, one has three wardens and another is made up of cottages. Whilst, if used with care, it may be possible to obtain some guidance from the use of this data it, is unlikely that the results can be confidently relied upon to assess the traffic generation of Category II sheltered housing developments.

2.6 Transport and the Elderly

A report on "Safe, Accessible, Reliable, Affordable" transport requirements of the elderly (Help the Aged Transport Council -1998) describes these headings as *"the top four issues"*.

It starts by stating that *"the lives of older people are being constricted by the lack of safe, accessible, reliable and affordable transport"*. It discusses the general needs of older people and how the transport system, and in particular public transport, should reflect these needs. As an example, it includes the statement that *"Detailed analysis of people's needs must be done and used as a basis for building a tailored, flexible and liberating transport system."* It ends with over 30 relevant recommendations. The report does not include any detailed survey information, but is based more on an assessment and interpretation of the aspirations of the elderly, as ascertained from meetings with groups of such people.

2.7 Other Relevant Characteristics of the Elderly

Such bodies as "Age Concern" have web sites (Age Concern). The Age Concern site gives a number of interesting facts, but few with any direct relevance to this study. One fact that may be of interest is that *"58% of older women and 38% of older men live alone"*.

Some 50 young professionals expressed their views on how society might develop in "Society and Styles (Lyons – 2000). It recognises the increasingly ageing population. It recognises that *"high density living in urban areas"* will result in people making shorter journeys. One possible option for the future that is considered is the ability of people to opt for euthanasia and the refusal of medical treatment. The increase in the retirement age to 70, or more, is also considered likely.

These young professionals recognise the effects of the ageing population and concludes that "*understanding the travel requirements and limitations of the over 65 group is essential in providing a mobility for all strategy. Other concerns relate to the increasing reliance of the over 65 age group on the automobile, particularly as the baby boom generation reaches retirement age.*"

In contrast to the relative dearth of information relating specifically to sheltered housing, from sources other than McCarthy and Stone, there is a very significant volume of research relating to the elderly in general. A review of papers produced for recent annual conferences of the University Transport Studies Group has revealed some 3400 references to the elderly. The majority of the papers produced deal with such issues as the accident record and safety concerns associated with elderly drivers, how they respond to new high-tech aids and how public transport services can best cater for the elderly. None were found to be of direct relevance to this research.

A report for the Automobile Association (Schlackman - 1988) recognised the limited research undertaken on motoring and the older driver and consequently undertook a survey amongst older drivers, from the age of 55 upwards. However, as nearly 60% of respondents were in the 55 to 64 range, the results may only be of limited relevance to this research, where the residents being considered tend to be significantly older, as described above and below. Some findings are, however, of interest. These include the importance of the car and the considerable effects on lifestyle of giving up driving. Health, along with the advice of doctors, and finance, were envisaged as the main reasons for ceasing to drive, but the decision was considered as a personal one, with a strong influence from a doctor. Headlamp glare was found to deter older drivers from driving at night.

It is also of note that most of these drivers felt that by the age of 75 their skills would have deteriorated to the point that ceasing driving should be considered. They would also welcome more advice and guidance about ceasing to drive and how to adapt their driving to compensate for the effects of ageing.

A report on when and why older drivers give up driving (Rabbitt - 1996) provides a significant amount of information that might be useful as background and for comparison purposes. The report indicates that, in 1992/94, 54% of the population between 60 and 74 were women and for the population aged 75 and over, 63% were women.

The survey undertaken found that the average age of respondents, when they had given up car ownership, was 72.1 years. However, those who had not given up car ownership did not envisage doing so before, on average, the age of 79.3 years.

There is a sharp rise in people suffering from disabilities, including minor ones, from 17% for 55 to 60 year olds, 22% for 60 to 65 year olds, 30% between 70 and 75 year olds, 38% between 75 and 80 and 60% for those over 80. It should be noted that this does not indicate that those surveyed as suffering from some form of disability were registered disabled.

The study found that those drivers who took up driving later in life, tended to give up earlier. With more people starting to drive at an early age, it is suggested that more older people will continue to drive. However, prior to giving up driving, there tends to be a decrease in the number of miles driven per week.

This report gives the reasons why some 334 elderly drivers gave up car ownership. The most common reason given was "accident/safety". It states that a feeling that increasingly poor health is making driving difficult in ways that are not in one's personal control is likely to be a strong factor in causing people to consider giving up. These reasons can be compared with those obtained from this study.

Those who still drive do not see that car ownership adds to their troubles. The fear of loss of mobility and independence is strong. However, those who have already given up are more convinced of the advantages.

The AA has provided further references with some relevant information. One such reference (Rabbitt - 1996), gives the perceived disadvantages of giving up driving. Whilst *"restricted independence"* is most important amongst both drivers and those who have given up, the different degree of concern suggests that the fear of losing independence is stronger than the reality.

2.8 Summary

There is no relevant literature concerning the specific transport and associated characteristics of the residents of sheltered housing. Indeed, with the exception of the Heumann and Boldy (Heumann – 1982) description of how sheltered housing has evolved as a form of housing for the elderly, and the two reports commissioned by McCarthy and Stone, on Sheltered Housing, (McLaren - 2003 and Harris Research Centre – 1989) there appears to be little information in general on this form of housing.

It is clear from the available literature that all old people should not be considered as having common characteristics. As clearly indicated in the report by Barbara Noble, (Noble – 2000) their transport and associated characteristics change as they get older and their physical, and possibly mental, capacities change. Although differences may be become less pronounced, elderly men and women do have significantly different travel characteristics, with men continuing to drive for longer than women.

The literature indicates that people in their 70s are likely to give serious consideration to giving up car ownership.

This research attempts to fill in the gaps in the knowledge of the specific characteristics of the residents of sheltered housing. The average age of residents is clearly an important consideration, given the variation of travel characteristics with age. However, this alone would not allow for an adequate assessment of the travel characteristics of the residents.

3. Data Collection and Analysis

3.1 Data Collection

As indicated above, under the heading "Methodology", this study uses the analysis of empirical data to meets its aims and objectives. This data has been obtained by using a number of surveys.

These surveys are described in general terms below. Each of these surveys is described in greater detail in Appendix III, where the survey questionnaire forms are included.

When reference is made to the source of the data analysed, each survey, or type of survey, will be referred to using a letter of the alphabet. This will allow for ease of reference, so that the source of the data referred to below can be readily identified.

The data used in this research is derived from a number of surveys and types of survey.

3.1.1 Telephone Surveys (A)

The first and the simplest type is a telephone survey, in which the house managers of each of the existing McCarthy and Stone developments were asked to give details of such facts as the occupancy of the apartments and the car ownership levels of residents. These surveys have been undertaken by The Planning Bureau on behalf of McCarthy and Stone over a number of years and have been aimed at assessing the car ownership and the associated parking requirements in the company's developments. When referred to below, these surveys are grouped together under the label *"Survey A"*, followed by a date, indicating the year of the survey.

3.1.2 Questionnaire Surveys (B and C)

In addition, detailed questionnaire surveys of the residents and house managers of the developments have been undertaken. Two major surveys of this form were carried out, one in 1996 and another spread over 12 months in the years 2000 to 2001.

In 1996, the questionnaire survey took the form of a survey of a sample of the residents, with an associated survey of the house managers. The questions asked were aimed at ascertaining information relating to the requirement for car parking for Category II Sheltered Housing developments. The author of this research was closely involved in the design of the 1996 survey and its analysis. This survey is labelled *"Survey B"* and is described in more detail, with the survey forms, in Appendix III.

In 2000/2001, a further questionnaire survey was undertaken, with a view to obtaining additional data for this research. Again the author played a major role in designing this survey and in coding and analysing the data. Some of the questions were necessarily repeats of those in the 1996 survey. However, this survey also sought additional information on other related matters. These questions were intended to add to the knowledge of the lifestyle of residents. Many of the questions were related to the transport characteristics of the residents, although a number were of a more general nature and were, in part, included to meet the specific requirements of McCarthy and Stone. The resulting data will only be referred to in this research where it is considered it could have some relevance to transport issues, although some less relevant data will be included in the Appendices. This survey is labelled *"Survey C"* and is also described in more detail, with the survey forms, in Appendix III.

3.1.3 Other Surveys (D)

In addition to these surveys, taking in all of the developments of McCarthy and Stone completed at that time, a number of more limited surveys were undertaken at a much smaller sample of the developments. These generally took the form of traffic counts. These surveys will be grouped under the label *"Survey D"*. These surveys include manual and automatic traffic counts, as described in Appendix III.

3.1.4 Overall Approach

In all surveys it is essential to look critically at the method used and to look for possible sources of error or bias. This critical appraisal may be particularly important when the population being surveyed is the elderly, including some of the oldest members of society. The elderly are likely to include a greater proportion of people with disabilities, including visual impairment, for example. One might expect a slightly greater proportion of the younger and/or fitter members of this population to respond to any questionnaire surveys. Such people may well be the more active members of this population and this may be reflected in the results obtained.

This does not mean that such surveys should not be carried out, as this is sometimes, indeed often, the only means of obtaining the relevant information. Without such surveys the needs of this part of the population may go unrecognised and their views may not be heard.

In this research, every effort has been made to recognise where there is likely to be any bias and to verify the results, where realistically possible.

3.2 Data Analysis

3.2.1 Hypothesis Testing

Where appropriate, the data is used to test the validity of specified hypotheses. In line with good statistical practice, the null hypothesis is first put forward for testing. In this form of hypothesis, it is assumed that there is no relationship between the specified variables. This hypothesis is only rejected if the relationship is found to be statistically significant, in that it shows a probable relationship that would not be compatible with the null hypothesis. An alternative hypothesis is put forward for consideration.

3.2.2 Statistics

The general public are often sceptical of statistics presented in support of some proposition. This scepticism was reflected, perhaps in an extreme manner, by Benjamin Disraeli, who is reported to have once said *"there are three kinds of lies: lies, damned lies and statistics"*.

However, the real concern of most people may be that the quoting of figures is done in such a way as to justify a predetermined theory. If this is the case, the concern was better expressed by Andrew Lang, who said "*he uses statistics as a drunken man uses lamp posts, for support rather than for illumination.*"

Such scepticism is only valid if the analysis and use of the data does not follow the general principles of sound statistical analysis and if the researcher has a predetermined view as to what the research should, or should not, show and sets about ensuring that the analysis supports this view. In practice, the researcher should bring his or her own scepticism into the analysis of the data. Aaron Levenstein describes statistics as follows:- "*Statistics are like a bikini – what they reveal is suggestive, but what they conceal is vital*".

Research such as this must be undertaken with no over-riding preconceptions. It is not the aim to prove some theory, but to investigate the facts and to try to explain them clearly and in an unbiased manner. The aim will be to try to reveal what might otherwise remain concealed.

3.2.3 Sampling

Determining the appropriate sample for any study is essentially a matter of compromise. The higher the sample used, the greater confidence that one can have in the results. However, total confidence can only come from sampling 100% of the population. There are other factors, such as cost, time etc., that militate against attempting to achieve an unrealistically high sample rate. One such factor is that funding may not be available for a survey with a very high sample rate. In addition the results may take so long to obtain, because of the high level of work involved, that they could be out of date, that the validity of the whole survey and research would be put into doubt.

The statistician Perry R Hinton (Hinton 1995) discusses sample size. He advises the researcher to:-

"*Select the largest sample size you can sensibly test. If you have limited resources, time or access to subjects these restrictions may have priority. The best thing to do is to select the sample size you are able to test given these restraints, then test them*".

3.2.4 Data Analysis - Linear Regression

A linear relationship is the simplest form of relationship between variables. The analysis of the data in this thesis will assume that relationships will generally take this form. It is generally assumed, for example, that the trip generation of a development is linearly related to some component of the development, such as floor area or number of houses or apartments. This form of relationship is used in the TRICS data referred to above. This is a logical assumption, with the possible exception of where there could be economies of scale, such as where combined trips for the deliveries to more than one house or apartment are made. However, as a proportion of the total trips made, this may be of limited significance.

In this study, the aim is to be able to understand and, in certain instances, possibly predict one characteristic of this form of housing, or the residents, such as the number of vehicle trips likely to be made to and from a proposed development, using identifiable characteristics of that development and well established statistical procedures. Characteristics such as the number of trips are the "dependent variables" in that they depend on the other factors, such as the number of apartments. These other factors are considered as being the "independent variables", in that they do not depend on the dependent variable or indeed each other. However, it is necessary to investigate if these other variables are truly independent. The dependent variable, such as the number of trips, may be influenced by one or more of these independent variables.

By establishing the correlation between the dependent variable and these other independent variables, such as number of apartments, development age etc. the statistical analysis can assist in determining which factors have a significant influence on the variable being considered, and which are unlikely to do so. The "likely" characteristics of a future development can then be predicted with some level of confidence.

The relationship between these variables can be assessed using the Pearson Correlation Coefficient (r). This is a statistical measure of the correlation between the two or more variables, i.e. the dependent and the independent variables. The higher the value of this coefficient, the greater is the correlation between the two variables. A value of 1 would be the maximum possible and would show a "perfect" relationship. However, in the real world, such a relationship is rarely obtained.

The more sets of data analysed, the greater degree of "random" variation, or even error, likely to be introduced and so a lower value of the coefficient (r) would be expected. Standard tables are available, which indicate what value of the coefficient should be achieved, given the number of sets of data, to show a significant relationship. The tables generally show two levels of significance. In one, the significance level is given as 0.05, which indicates that one can be 95% confident of the relationship established between the variables, if the value of the coefficient is at or above the level shown in the table. The other level, 0.01 level of significance, indicates a higher confidence level, of 99%.

A further feature of this statistical tool is that the square of the coefficient obtained, i.e. r^2, gives an indication of the proportion of the variation in the data explained by the relationship. With a correlation of 1, the perfect fit, r^2 also equals 1, indicating that all of the variation in the dependent variable is explained by the relationship being tested. A correlation coefficient of, say, 0.8, would have an r^2 value of 0.64. In such a case, it would be likely that the independent variable being considered would account for some 64% of the variation in the dependent variable. The remaining 36% would be dependent on some other factors, including possible random ones.

However, although r^2 summarises how well the regression line fits the relation between the dependent and independent variable(s), it is dependent on the number of predictor (independent) variables. The adjusted r^2 value takes account of the number of predictors (independent variables), so that the values of the adjusted r^2 values can be compared when additional predictors are used.

The calculation of the correlation coefficient has been undertaken using the Microsoft Excel computer program and the addition of an "add-on" statistics package entitled "Analyse-It".

The results of the linear regression analysis give values of the variable p. This indicates the effect of each of the predictors, or independent variables, on the dependent variable. A low p value indicates that the predictor has a significant effect on the response or dependent variable. Predictors with little or no effect on the response variable, i.e. those with high p values, can be dropped from the regression, which can then be performed again to simplify the fitted regression line.

In this study, we are considering the actions of human beings, who have a significant degree of freedom in such decisions as to how they spend their time and therefore how frequently and by what mode they travel. They will be influenced by a very large number of factors, some of which they may not even recognise themselves and many of which cannot be identified for assessment in any study such as this.

The fact that the subjects of the study are elderly residents of sheltered housing does not make their activities, such as trip making, any more predictable than for the remainder of the population. There will, therefore, be a significant degree of what can be considered random or unexplainable variation in the variables, such as generation rates, for various developments. In some cases, the value of the variable will be higher than might be expected and in other cases it will be lower.

The best means of minimising the uncertainties is to have as a high a sample as is realistically possible, in the hope that these unexplainable variations will tend to be balanced amongst the samples. A reliance on too small a sample would tend to maximise the impact of such random variations and therefore introduce an avoidable bias. However, it is important to recognise that a "perfect" statistical correlation will not be achievable.

There will, however, be a significant constraint on the data that can be used in such matters as the traffic generation of developments. The cost of surveying the traffic generation of developments is quite high and so the number of developments that could be surveyed is restricted.

3.2.5 Data Analysis - Multiple Linear Regression

This technique looks at how a number of independent variables might be contributory factors in determining the dependent variable. The independence of these variables is first considered and those that are significantly correlated are not all included in the analysis. Each independent variable can be looked at, in turn, and if it makes a significant contribution to the determination of the dependent variable, it is included in a resulting formula. This may include several independent variables. The statistical technique considers whether these variables have a linear relationship with the dependent variable.

The relationships are again assessed using the correlation coefficient obtained. Consideration is also given to the probability of each independent variable making a significant contribution to the variation in the dependent variable.

3.2.6 Data Analysis - Percentiles

The "x^{th} ile" is the measurement that is only exceeded by 100 – x % of the population. For example, the 85%ile traffic speed of vehicles passing along a road is the speed that is exceeded by only 15% of the vehicles.

This measure is often used to determine what might be considered a realistic "maximum" figure for design purposes. If a mean value is established, or the mode level, which equates to the 50%ile, is used, there will be a significant number of examples where the provision made on this basis would be inadequate. In the case of the mode, this number will equal 50% of the population, and in the case of the mean, the number is likely to be generally similar.

In designing, particularly for safety purposes, it would be unacceptable to design to cater for only 50%, or thereabouts, of the population. However, it may be unrealistic to base a design on the maximum value observed. It may be that a small percentage of the population, for example, will drive at outrageously excessive speed and that it would be impractical to base one's design criteria on the characteristics of such people.

The use of percentile figures, whether this be the 85%ile, the 90%ile or the 95%ile allows for the needs of the significant majority to be taken into account, whilst not being excessively influenced by an unrepresentative and possibly irresponsible small minority. With safety being a high priority, the percentile figure adopted may need to be nearer 100% than would be the case where lesser concerns, such as convenience, might be the relevant factor.

3.3 Summary

The data used in this study has been collected in a number of ways. These include data collected from the house managers of developments about the car ownership etc. of the residents, questionnaire surveys of residents themselves and counts of traffic movements into and out of developments.

Survey sample levels have been kept as high as realistically possible, given the constraints of finance and time.

Where appropriate, sound statistical techniques have been used to analyse the data. However, in considering how the data collected is analysed and used, significant weight will be given to the practicalities of the use of the data.

4. Residents' Characteristics

4.1. Introduction

As indicated earlier, if one is to understand the logic of any findings concerning the travel characteristics of the residents and visitors of sheltered housing, it is necessary to obtain some understanding of the characteristics of the residents themselves. One such characteristic that is clearly different from the population in general is the age of the residents. However, even this needs further clarification.

This chapter will describe the characteristics of the residents of this form of housing, both as individuals and as groups who live in individual apartments.

The characteristics may also be influenced by social class factors. However, there is no reason to expect that the residents of private sheltered housing will be of varying social classes, given that all the residents have been able to finance the purchase of their apartment and the continuing service charges.

4.2. Entry to Sheltered Housing

4.2.1 Age Restriction

Reference was made, in the description of sheltered housing, to the age restriction imposed on residents. This is currently set, by general practice, at 60 years of age, based on the retirement age for females, with a co-inhabitant being allowed to be up to 5 years younger. From simple observation and the findings referred to in Section 2 above, it is evident that, if this were the typical age of entry, the residents could have a relatively high level of car ownership and possible car usage. Other trip making characteristics could also be significantly affected.

The age of entry is governed by the lease taken out by residents. However, it is often also governed by a planning condition or legal agreement between the developer and the planning authority. The standard legal agreement used by McCarthy and Stone defines "Elderly Person" as:-

(i) being a single resident any person who has attained the age of sixty years unless the survivor of those persons mentioned in (ii)

(ii) being joint residents one of whom has attained the age of sixty years and the other the age of fifty five years.

Consequently, at least one resident must have reached the age of 60 and any partner of such a person must be at least 55 years of age. Should the person qualifying as being over 60 die, the surviving resident will not be expected to leave the apartment.

4.2.2 Reasons for Entering Sheltered Housing

However, experience tends to suggest that, for most residents, the desire or need to enter sheltered housing, with its additional security and facilities, does not arise until well after retirement. It is not simply reaching the age of 60 that prompts people to consider sheltered housing, but generally it is their specific needs that this form of housing is expected to satisfy. This part of the research will investigate what these "needs" may be and what the average age of entry is.

Given that life expectancy is increasing, the population who are or will reach the age of 60 in the future may well be fitter and healthier than their predecessors, at the same age. This too could affect the car ownership and use and travel characteristics. Consequently, this part of the research will also consider if the average age of entry is changing with time.

A report commissioned by McCarthy and Stone(Harris Research Centre 1989) investigated the reasons why residents entered this form of housing. It shows the most important reasons for moving to sheltered housing. It is understood that each resident could give only one main reason for entering sheltered housing. The results are shown in table 4.1 below.

Table 4.1 – Reasons for Entry to Sheltered Housing –

(Source:- Harris Research Centre 1989)

Reason for Entry	Percentage
Safety and Security	16%
Nearer to Family	14%
Previous House Too Large	12%
Onset of Disability	11%
Too Much Effort to Maintain Garden	10%
Too Much Effort to Maintain House	10%
Previous house too difficult to get around in	5%
Companionship	5%
Death of Spouse	3%
Family Moved Away	1%
(Not Stated)	13%

Survey C also asked why residents entered this form of housing. In this survey, residents were able to give more than one reason, as it was thought likely that a number of factors could be relevant. This may better reflect the views of the residents, as a decision to move to this form of housing is likely to be based on a number of considerations. In the following analysis, some 999 residents gave their reasons. The reasons given are shown, along with the proportion of residents specifying them, in table 4.2 below. It should be noted that the "other" reasons, which make up about 1% of the total, include:-

To Enjoy Retirement	*<1%*
Financial Reasons	*<1%*
Inherited Apartment	*<1%*

Table 4.2 - Reasons for Entering Sheltered Housing (Source – Survey C)

Reason for Entry	Percentage
Security	53%
Previous House/Garden Unsuitable	43%
Nearer to Family	35%
Death of Spouse	27%
Health Reasons	25%
Companionship	24%
Location	4%
Age	2%
Others	1%

It should be noted that residents were given the option of ticking any, or all, of the first 6 of the above, in order to assist them in considering the issue. This may account for the considerably higher frequency of these responses, as some of the respondents may have found it easier to tick one or more of these than to indicate a different reason. However, it is interesting to note that the first three reasons are effectively the same as in the Harris Survey of 1989, with security being the major reason. The second and third reasons were reversed in order.

Perhaps the biggest difference is that the death of a spouse comes much higher up in importance in the more recent survey. This may indicate that it is a "secondary" reason, albeit an important one, which did not, therefore, show as being so prominent in the Harris survey. It may not figure highly as the major reason, but residents may seek increased security, or wish to be nearer the family, for example, as a result of the loss of a spouse. Companionship may also be a similar, secondary reason.

Health reasons, as referred to in the later survey, would include "onset of disability", from the earlier survey.

As a number of these reasons are related to the "frailties" of the potential residents, the question arises as to what age residents would tend to enter this form of housing and whether, with the increasing life expectancy, and the possible corresponding delay in the onset of frailty, the age of entry to sheltered housing might be increasing.

Whilst transport is not specifically mentioned in these survey findings, they are indicative of the nature of the residents of sheltered housing. For example, if the reason for entry is health related or related to difficulties with managing a former home, this indicates a level of fitness that may well influence the residents' ability to drive a car or walk significant distances and also limit the overall number of trips made.

4.2.3 Average Age of Entry

The 1996 questionnaire survey (Survey B) data allows a calculation to be made of the age at which the residents entered sheltered housing. Using the data on the age of the resident and also the year of entry into sheltered housing, the age of entry has been calculated. The average age of entry has then been related to the year of entry. This would, at least in theory, indicate if the average age of entry is changing. Essentially, it could answer the question "are residents entering the developments now younger or older than was the case in the past?" Is there a detectable trend?

From the survey data, the average age of residents when first entering sheltered housing appears to be increasing. Although the survey does have some information for the period up to 1984, it is evident that the sample sizes for this period are very small. However, for the thirteen year period from 1984 to 1996, the average ages of those entering sheltered housing is shown in table 4.3

Table 4.3 Average Age of Residents by Year of Entry to Sheltered Housing

(Source – Survey B)

Entry Year	Average Age – Male	Average Age – Female	Average Age – Combined
1984	70.17	73.27	72.79
1985	70.95	69.74	70.05
1986	72.05	71.43	71.58
1987	71.50	69.39	69.82
1988	71.92	71.95	71.94
1989	73.13	71.49	71.88
1990	72.57	71.91	72.07
1991	72.47	72.63	72.59
1992	72.72	72.60	72.63
1993	72.56	74.06	73.70
1994	73.28	74.46	74.14
1995	73.98	75.01	74.73
1996	74.03	76.10	75.49

(Source – Survey B)

From the latest date, it can be seen that the average age of entry in 1996 was some 75 years and 6 months.

The observed data also indicates an approximate increase in the average age of entry of some 0.35 years per annum. This suggests that the average age of entry is increasing at a rate of approximately 1 year every 3 years or just over 4 months per annum.

However, there is a likely sampling bias incorporated into this data. There will probably be a bias towards a lower age of entry for the older developments, with the bias being at its greatest in the early years, such as 1984, 1985 etc., and steadily decreasing up to the latest year.

The likely bias is best explained by an example. Any residents entering these developments at the age of, say, 80 in 1984 would, in theory, be aged 92 at the time of the survey. There is a high probability that a number, if not most, of such residents will have died or moved to nursing homes etc. during this 12 year period, or have possibly become in some way disabled, such that they may not be available to respond to the survey. Had the responses of these residents been available, they would have increased the average age of entry in 1984.

From this survey it is not possible to assess the likely effect of this bias. However, it is clear that only limited weight can be given to this suggested trend. An alternative method, without such an inbuilt bias, has, therefore, been sought to test the following hypothesis, in line with the approach referred to in section 3.2.1 above.

The Null Hypothesis:- There is no change in the average age of entry to this form of housing

The Alternative Hypothesis :- The average age of entry to this form of housing is rising.

A study of a sample of the records of McCarthy and Stone was found to be the best means of confirming whether the average age of entry is likely to be constant or rising, and of giving a more accurate indication of any rate of that increase. The company records are not set up in such a manner that the data for all of its developments can be readily extracted in the format required. Consequently, a detailed study of a random set of the records has been undertaken.

The age of the resident was not available at the precise time of entry to the development. However, as part of the sales data collected, the age of the potential residents was recorded at the time that they reserved their apartment for future occupation. As the residents would move in after the date of reservation, and often several months later, the age of entry is likely to be a little higher than the reservation ages. However, as these ages are recorded for all residents, at the time of reservation, there is no bias incorporated as a result of asking residents for this information many years after the event.

Table 4.4 gives the average ages, when making a reservation for a Category II sheltered housing apartment, of a sample of residents for each year of entry, from 1995 to 2002. The residents gave their ages in years only. Consequently, no account was taken as to the additional months of age. The ages, or more precisely, the averages, are therefore increased by 0.5 years, in order to allow for this and give a more accurate indication of the ages of entry. Such an adjustment will have no impact on the rate of increase of the age of entry.

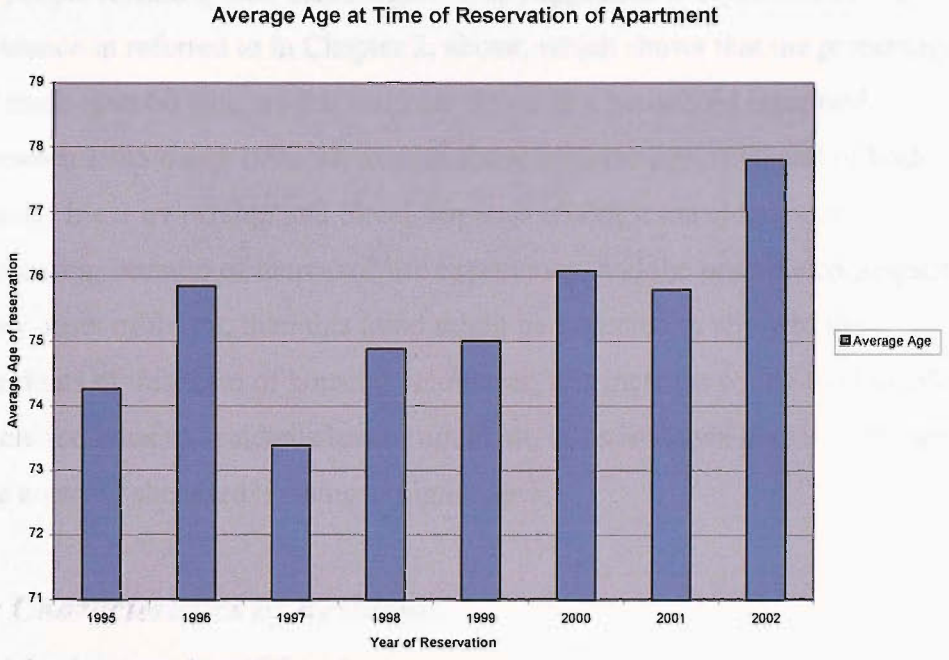
Table 4.4. Average Age of Entry to Category II Sheltered by Year of Entry – Based on McCarthy and Stone Sales Records

Entry Year	Sample Size (apartments)	Average Age
1995	132	74.26
1996	142	75.85
1997	43	73.38
1998	75	74.88
1999	157	75.00
2000	293	76.08
2001	281	75.79
2002	58	77.79

(Source – Survey D)

The trend is shown in Figure 4.1 below.

Figure 4.1 – Average Age of Reservations for Sheltered Housing Apartments



The regression line for this data has a gradient of 0.388, implying that the average age of entry has increased at a rate of 4.6 months every year. The correlation coefficient (r) is 0.72. This is significant at the 95% level. On this basis the null hypothesis cannot be supported and there is significant likelihood that the alternative hypothesis is valid.

As indicated above, the life expectancy of males has recently been increasing at some 2.79 months per annum, and that of females at about 2.07 months per annum. Given that the residents of this form of housing are made up of some 75% females, as described in section 4.4 below, the weighted average life expectancy increase of residents would be in the order 2.25 months per annum. This suggests that the rate of increase in the age of residents reserving apartments is somewhat higher than the increase in life expectancy.

Any such trend in entry age, or indeed the reason why the entry age appears to be increasing more quickly that the increase in life expectancy could be due to people remaining totally independent longer.

It is often suggested that car ownership amongst the elderly is increasing due to people retaining their cars longer. This suggestion is supported by the evidence in referred to in Chapter 2, above, which shows that the percentage of those over 60 who are the main car driver in a household increased between 1985/6 and 1996/98, even in those over the age of 80 and of both sexes. If car ownership and travel demands amongst the elderly are increasing because of increased life expectancy, and the possible consequent later onset of frailty, then this trend might be expected to apply to the residents of this form of housing. However, this increase would tend to affect sheltered housing residents less or not at all, if, as is shown here, the residents are entering sheltered housing at higher ages.

4.3 Age Characteristics of Residents

4.3.1 Average Age of Residents

The 1996 questionnaire survey (Survey B) shows that the national average age of residents, at that time, was 78 years 6 months. The average age of male residents was 77 years 8 months and that of female residents was 78 years 10 months.

The 2000/2001 survey (Survey C) also sought data on the age of the residents of the apartments. The results of this survey show the average age of the 1171 residents who responded to the question to be 79 years 4 months. This represents an increase of some 10 months in 4 to 5 years. This is an increase of approximately 2 months per annum, which is very much in line with the increase in life expectancy.

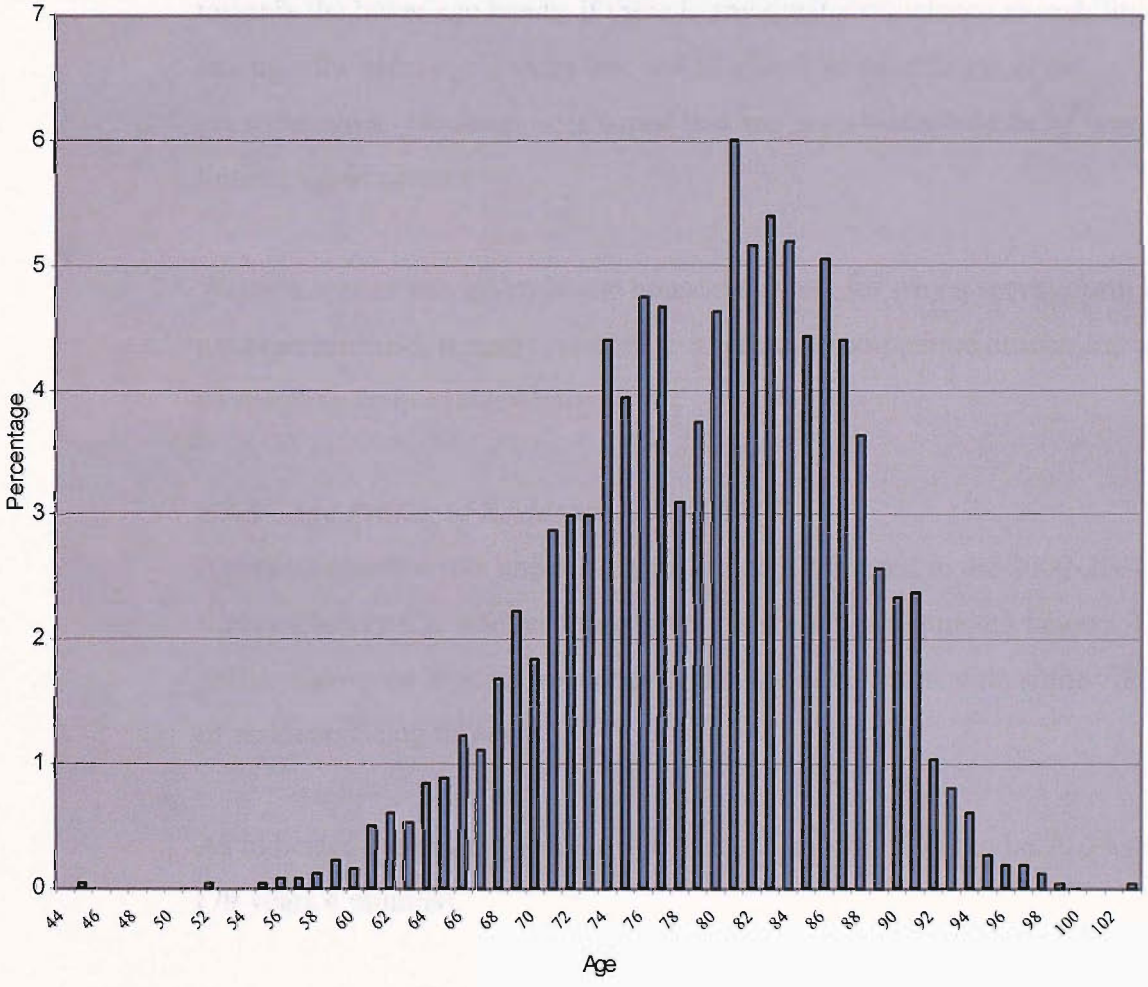
The average age of males, in 2000/2001, was 78 years 11 months, as compared to 77 years 8 months in 1996, an increase of some 15 months. The average age of female residents was 79 years 3 months, an increase from 1996 of 5 months. This suggests that the average age of the male residents is approaching that of the females. At this rate of change, the average age of male residents may soon exceed that of female residents. This would be in line with the relationship already found in Scotland.

4.3.2 Age Profile of Residents (1996)

The national overall age profile of residents in 1996 (Survey B) is shown in Figure 4.2, below. It shows a very small number of residents below the normal age of entry. This represents a very small percentage of the total of residents surveyed, i.e. 3 out of 2617 or 0.115%. It could be due to survey error, or to some other exceptional circumstances. In some agreements with local planning authorities, there is discretion over waiving the age restriction in cases where a person can demonstrate a pressing need for such housing.

It is also noticeable that very few residents qualify for residence under the provision that allows partners of those over 60 to be between 55 and 60.

Figure 4.2 Age Profile of Residents in 1996



(Source - Survey B)

Figure 4.2 shows that, in 1996, the highest frequency was at the age of 82 years, with 157 out of the 2617 residents (6%) responding to this question being this age. The oldest resident responding reported an age of 103 years. However, it has to be recognised that this age profile could be slightly biased towards the lower age bands, if there is any greater reluctance or inability amongst the older age groups that would affect the completing of the questionnaires. However, it is hoped that any such bias would be of very limited significance.

Where a reason was given by the house managers for why a survey form has not been returned, it rarely referred to a refusal to co-operate or inability to do so resulting from age/disability.

4.3.3 Age Profile of Residents (2000/2001)

A similar exercise was undertaken for the data collected in the 2000-2001 survey (Survey C). The resulting profile is shown in Figure 4.3 below. This profile shows the highest frequency at the age of 79 years, with some 7.85% of residents being this age.

As indicated earlier, the average age of residents was found to be 79.34 years (79 years 4 months)

Figure 4.3. Age Profile of Residents in 2000/01

The comparison of age profiles can be distorted in a number of ways, and may therefore be of limited significance. As might be expected, the age of the residents will tend to be younger in the more recent developments, than in the more established ones. Consequently, if the number, or in particular, the proportion, of new developments is higher in one set of data than another, then the age profile of that set of data could tend to show lower ages.

Subject to housing market conditions, the company has been developing sites at an increasing rate, which would tend to suggest a higher proportion of younger residents in the later sets of data, which include a higher proportion of new developments. However, this would be offset, in whole or in part, if the average age of entry is increasing, as suggested above.

The age profile of these surveys can be compared, in general terms, with the results of the 1988 survey by the Harris Research Centre, as referred to above. It indicated that only 51% of the residents in private sheltered housing were 75 or over. However, in the more recent surveys this proportion had increased to some 66% in 1996 and 74% in 2000/2001. This would also tend to suggest that the average age of residents is increasing, which has been found to be the case, and probably reflects the increased number of older developments, where average ages would be likely to be higher. It would also reflect the change in the age at which residents enter the new development.

It would appear that there is a steady increase in the average age of residents. The evidence suggests a 15% increase in over 75 year olds between 1988 and 1996, at an average of some 1.8% to 1.9% per annum, with an increase of a further 8% in the following 4 to 5 years, at an average increase of 1.6% to 2% per annum.

The Harris Research Centre report (Harris Research Centre – 1989) indicates that there was a significant difference between private and public sector provision in this respect, with the percentage over 75 years of age in public sector housing being 70%. The current survey suggests, therefore, that any such difference may have been significantly reduced, unless, of course the public sector age profile has similarly changed. The difference in 1988 may have reflected, at least in part, the relatively new provision of private sector sheltered housing, when compared with public sector provision. There is no information as to the current age profile for the public sector accommodation.

The Harris survey gives the percentages of residents in various age groups. The comparable data has been extracted from the 1996 and 2000/2001 surveys and a comparison is given in table 4.5 below.

Table 4.5 Age Group Comparison with Harris Research Centre Survey

Age Group	Harris Survey	1996 (Survey B)	2000/2001 (Survey C)
Up to 59	**Not given**	**1%**	**1%**
60-64	**7%**	**3%**	**3%**
65-69	**20%**	**8%**	**9%**
70-74	**19%**	**17%**	**14%**
75-79	**24%**	**21%**	**27%**
80-84	**18%**	**26%**	**23%**
85-90	**7%**	**18%**	**18%**
90+	**2%**	**6%**	**7%**

The comparison shows that there has been a significant reduction in the percentage of residents below about 75 years of age, with a corresponding increase in the percentage over this age. This is consistent with an increasing higher average age of residents, and an increase in the average age of entry to this form of housing.

4.3.4 Age of Residents in Relation to Age of Development

The relationship between the average age of the residents and the age of the development, as derived from the 1996 survey (Survey B) is shown in Figure 4.4. The average age of residents in developments built between 1977 and the mid 1990s tends to increase with the age of the development. Linear regression techniques applied to the 1996 data produce an equation of the form:-

$$Y = 75.56 + 0.28796\ X$$

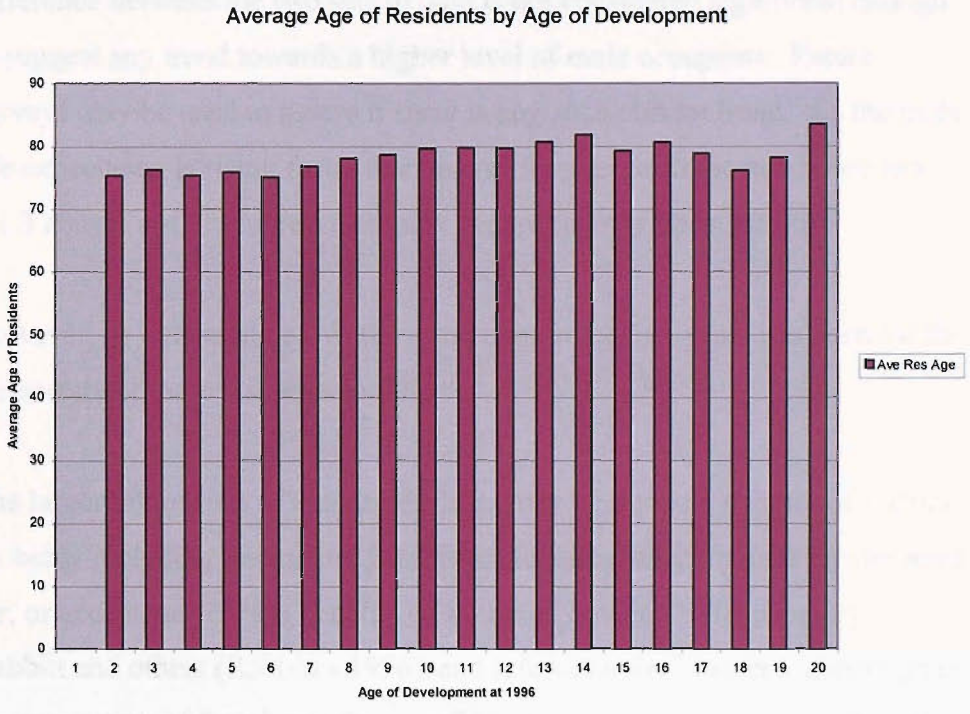
where; Y is the average age of occupants

and X is the age of the development as at 1996

(Correlation coefficients $r = 0.6795$, $r^2 = 0.4617$)

This regression line is significant at the 99% level of confidence. It shows that the average age of residents increases at 0.288 years per annum, or about 3.5 months per annum.

Figure 4.4 Average Age of Residents by Age of Development



If all the residents in a development remain in occupation, the average age would rise by 1 year, each year. The lower rate of increase reflects the changing population of the developments. This change might be expected to become more pronounced as the development ages.

On this basis, a linear increase is unlikely to be wholly realistic, particularly as the development gets older, at say 10 or 15 years of age or more. It is more likely that the growth would tend to level out, with older residents being replaced by younger ones more frequently than during the previous years of the developments. However, there is anecdotal evidence that many younger potential residents could be reluctant to enter some of the older developments, where they perceive the existing residents to be significantly older than they are.

4.4. Sex of Residents

Of the 2613 residents responding to the relevant question in the 1996 Questionnaire Survey (Survey B), 641 were males and 1972 females. This shows that 75.5% were females and 24.5% males. The comparable data for the 2000/2001 survey shows 74.5% females and 25.5% males. The difference between the two sets of data is not considered significant enough to suggest any trend towards a higher level of male occupants. Future surveys may be used to assess if there is any such current trend. As the male life expectancy is rising faster than that of females, as indicated in section 1.1.3 above, a slight increase in male occupants may be expected.

However, as indicated below, the trend over preceding years has been for the proportion of male residents to fall.

The larger proportion of female residents may be due to a number of factors, probably including the greater lifespan of females and perhaps a greater need for, or acceptance of, the benefits of sheltered housing. The paper by P Rabbitt and others (Rabbitt - 1996), and referred to in Chapter 2 above, gives the proportion of females in the over 75 age group as a whole as being 63%. Sheltered housing, therefore, appears to be somewhat more attractive to the female members of the population than the males.

Comparing these results with those obtained in the Harris Research Centre study, there now appears to be a greater proportion of females in these developments. The Harris report shows that 37% of residents in private sheltered schemes were males and 63% females, whereas the current studies show these percentages as being 24.5% and 75.5% in 1996 and 25.5% and 74.5%, in 2000/2001 As with the age profile, this could reflect the increase in the number of older developments, where the population is older and therefore the proportion of females is likely to be greater.

The Harris report suggested a significant difference between the composition, by sex, of the residents of private and public sector sheltered housing. It showed that some 71% of public sector residents were females, as opposed to 63% in private housing. However, the 1996 survey shows 75.5% females in private housing. The reason for these changes may well also result from the age profile of the developments.

When the Harris study was undertaken, private sector sheltered housing was a relatively new innovation, whereas the public sector facilities were perhaps somewhat better established, and therefore had more older developments where ages would be higher and therefore the proportion of females higher. In addition, the public sector developments may have adopted a restricted entrance policy, related to need, rather than relying on market forces, as is the case with the private sector.

Consideration will be given later to any link between car ownership and car driving and the sex of residents. This significantly higher level of female occupants could then be of real significance.

4.5 Occupancy of Apartments

The study results referred to above relate largely to the individual. However, residents do form groups, first in their apartments and secondly in their developments. This section of the thesis considers the data obtained at the apartment level.

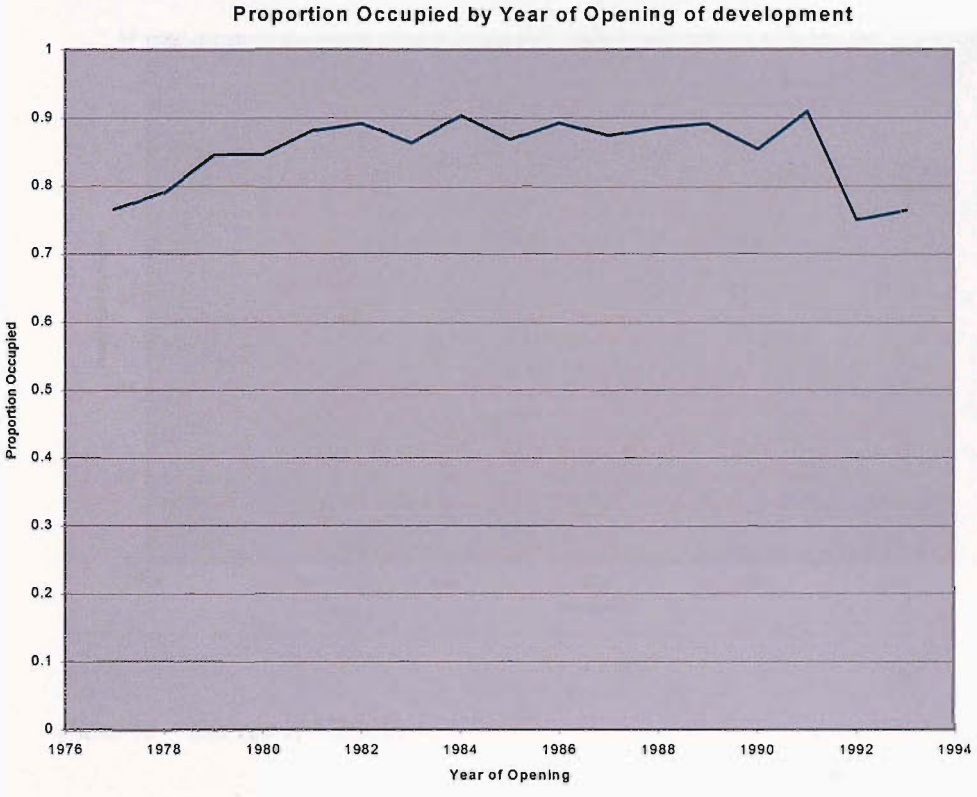
4.5.1 Occupied Apartments

It is not possible to accurately calculate the number of apartments occupied using either the 1996 or 2000/2001 questionnaire surveys. A nil response could be due to the apartment being vacant, temporarily unoccupied or equally to a resident not wishing to take part. However, from the data obtained by the telephone surveys, it has been possible to calculate the proportion of apartments that are "occupied" at those times. In this context, occupancy means that the apartment has a known resident, although the resident may be away on holiday, visiting relatives or in hospital, for example.

The survey suggests that , on average, only 87.3% of apartments were occupied at the time of the 1994 survey (Survey A – 1994). In 2000, this occupancy rate had risen slightly to 90.1% (Survey A – 2000). However, by 2002 (Survey A – 2002) the occupancy rate appears to have fallen to about 85%.

As very new developments may be in the sales period, a lower level of occupancy may be expected in such developments. Figure 4.5 below shows this effect quite clearly. This could affect the overall occupancy figures given above, depending on at what stage developments are included in the survey.

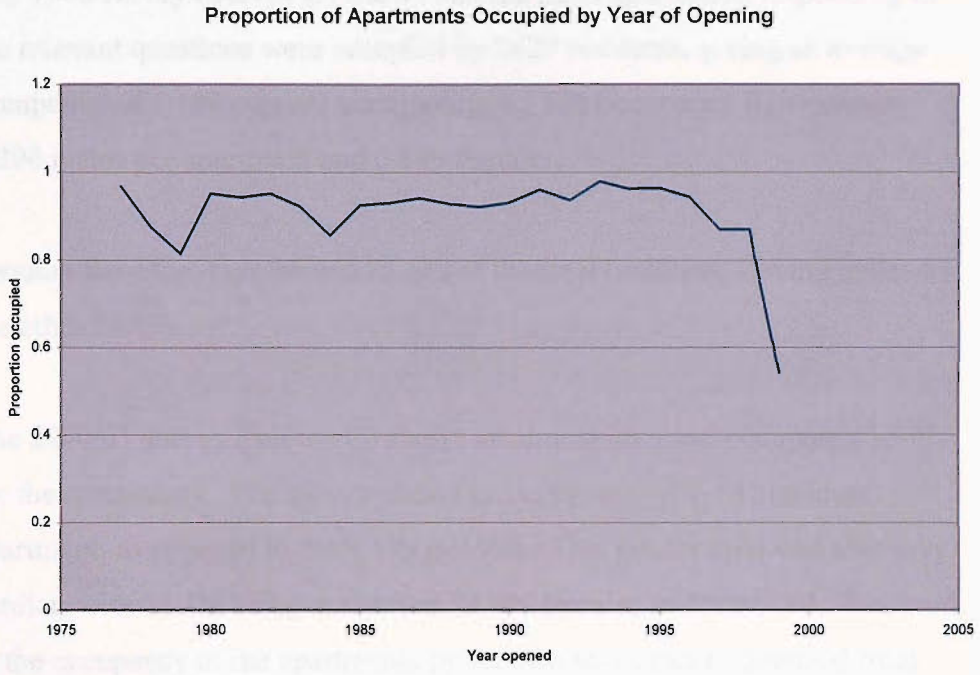
Figure 4.5 Occupied Apartments in 1994 by Year of Opening



(Source – Survey A - 1994)

Figure 4.6 below shows the proportion of apartments occupied in 2000 for developments, by the year of opening. This can be compared with figure 4.5 above, which gives the same data for 1994.

Figure 4.6 Occupied Apartments in 2000 by Year of Opening



(Source – Survey A - 2000)

Allowing for the fact that the average includes the relatively small number of very new developments, where it can be seen that occupancy levels are low, a more accurate assessment of the typical occupancy level in the post sales period will be obtained by excluding the most recent 3 years. This has been shown to give a normal occupancy rate of 93.2% in 2000.

The apparent low levels of occupancy for some of the older developments, in both sets of data, may be explained by the low number of apartments available prior to about 1980. This produces a low sample and therefore small changes in occupancy may well introduce relatively high proportional variations. However, it can also be caused by a greater turnover of apartments in older developments as the initial residents vacate the apartments. It may also be a little more difficult to sell the leases for these older apartments, as they may be a little less attractive than many of the newer ones.

4.5.2 Person Occupancy of Apartments

The 1996 survey (Survey B) shows that the 2209 apartments responding to the relevant questions were occupied by 2627 residents, giving an average occupancy of 1.189 persons per apartment. The occupancy figures show 0.290 males per apartment and 0.899 females.

Females therefore represented 75.6% of the total residents, leaving males as the other 24.4%.

The 2000/01 survey (Survey C) shows an almost identical occupancy level for the apartments. The survey shows an occupancy of 1.187 residents per apartment, as opposed to the 1.189 in 1996. The gender split was also very similar, with 25.5% being males and 74.4% females in 2000/2001. No trend in the occupancy of the apartments by the two sexes can be detected from these two sets of data.

4.5.3 Person Occupancy of One and Two Bedroom Apartments

The 1996 survey (Survey B) also shows that some 20.7% (457) of the 2209 apartments responding were sold as two-bedroom apartments. The remaining 1752 (79.3%) were built as one bedroom apartments.

However, only 88 (19.3%) of these 457 larger apartments were actually used as two-bedroom apartments. This results in only about 4% of the total apartments being used as two-bedroom apartments. The remaining 369 of the 457 apartments built and sold as "two-bedroom" apartments are not used as such.

The size of the apartment does seem to have an influence on the number of occupants. The 1996 survey shows that the average occupancy of all apartments is 1.189 persons. However, the occupancy of one-bedroom designed apartments is some 4% lower, at 1.143 persons and that of "two-bedroom" apartments, where only one such room is used as a bedroom, is 1.248 persons. This is some 9% higher than for those designed as one-bedroom apartments. This is shown in table 4.6 below.

Table 4.6 Occupancy of Apartments – One and Two Bedrooms

Apartment Type	Male Occupancy	Female Occupancy	Combine Occupancy
One Bed	0.260	0.883	1.143
Two Bed – Used as One Bed	0.323	0.925	1.248
Two Bed – Used as Two Bed	0.733	1.111	1.844
Two Bed – Combined	0.403	0.961	1.364

It can be seen that, where both the rooms are used as bedrooms, the occupancy is significantly higher, averaging 1.844 persons. This is some 61% higher than the occupancy of one-bedroom apartments. Combining those built as two-bedroom apartments, irrespective of the use made of the extra room, the occupancy is 1.364 persons per apartment. This is perhaps the most relevant figure, as it allows for the uncertainty of the use of the extra room.

It should be noted that these occupancy rates refer only to those apartments that are actually occupied. The rates do not take into account any vacant apartments. In predicting the likely overall occupancy of a development proposal, the likelihood of some apartments being vacant may need to be taken into account before these occupancy rates can be applied.

In addition to there being a noticeably higher level of occupancy of the two-bedroom apartments, there is also a slight increase in the proportion of male residents. The proportion of male occupants in single bedroom apartments is some 22.7%. However, the provision of an extra room increases this to some 25.9%, where it is not used as a second bedroom, and to 39.8% where it is. The overall effect of the second bedroom, whether or not it is used as such, is an increase to 29.5% of the residents being male. This may well have some influence on car ownership, if male residents are more likely to be car owners.

It is of interest to note that the 2000/2001 data shows a significantly higher level of two-bedroom apartments. The proportion had risen from 20.7% in 1996 to 23.5% in 2000/2001. Given that the 2000/2001 survey data includes the large number of developments surveyed in 1996, this indicates a significant increase in the proportion of two-bedroom apartments built over the intervening 4/5 year period. It is understood that McCarthy and Stone currently aims for about a 25% two-bedroom provision in its new developments. This change could indicate the cause for the slightly higher proportion of males in the more recent survey.

4.5.4 Sex Combinations in Apartments (Survey B Data)

Of the 2653 apartments responding to the relevant questions, 1992 (75.1%) were occupied by single women and 235 (8.8%) by single men. Therefore some 83.9% of apartments had only a single occupant. In this context, the term "single" does not imply marital status. Such residents could be unmarried, but also widowed, divorced or separated.

Only 15 (0.6%) apartments were occupied by 2 female residents, and none by two males. As might be expected, 409 (15.4%) apartments were occupied by couples, one male and one female. Only two apartments had three occupants. This is an insignificant proportion and could possibly reflect a survey error.

Therefore some 75% of the apartments are occupied by a single female, 9% by a single male and 15% by a couple, one male and one female. The two female apartments represent about 0.5%.

4.6 Disabled Residents

There is an increasing emphasis now on giving full consideration to the needs of disabled persons in the community. Consequently the 2000/2001 survey sought information on the number of residents with disabilities and the nature of these. This could have an impact on the transport characteristics of a development, such as the number of cars owned, the need for disabled parking spaces and the trips made.

4.6.1 The Proportion of Disabled Residents

The 2000/2001 survey (Survey C) shows that 164 of the 1233 residents responding to the appropriate question indicated that they were registered disabled. This represents some 13.3% of the residents, although this may be a slight exaggeration, as some residents did not go on to give the nature of any disability, as requested. Had they been registered disabled, it is assumed that they would have been able to clearly indicate the nature of the disability. However, any exaggeration could be offset to some degree by the possible underreporting by those incapable of responding to the survey.

Only 11 residents, i.e. some 0.89% of residents stated that they are confined to a wheelchair, although a further 66, some 5.35% indicate an occasional use of one.

4.6.2 Disabled Parking Requirements

Interestingly, some 9% of residents suggested that a *"wider than normal"* parking space is "essential". A number of these do not, however, claim to be disabled. This may, therefore, really be indicating a preference, as opposed to necessity.

4.6.3 Nature of Disabilities

The disabilities reported, some by persons not claiming to be "registered disabled", are as shown in table 4.7 below. In a very limited number of instances, more than one disability was reported.

Table 4.7 Nature of Residents' Disabilities

Disability	No. of Residents Suffering (Total 170)
Arthritis	**39 (22.9%)**
Blindness/partial blindness	**39 (22.9%)**
General walking difficulties	**25 (14.7%)**
Osteoporosis	**20 (11.8%)**
Stroke victim	**15 (8.8%)**
Deafness	**6 (3.5%)**
Asthma	**5 (2.9%)**
Miscellaneous (incl unclear)	**4 (2.4%)**
Parkinson's disease	**4 (2.4%)**
Angina/heart	**4 (2.4%)**
Spinal injury	**3 (1.8%)**
Emphysema/breathing disorders	**3 (1.8%)**
"Old age"	**2 (1.2%)**
Car Crash Injuries	**2 (1.2%)**
Multiple sclerosis	**1 (0.6%)**
Psychological	**1 (0.6%)**
Polymyalia Rheumatica	**1 (0.6%)**
Polio	**1 (0.6%)**

(Source Survey C)

These disabilities are as given by residents. No editing has been undertaken to remove any "disability" that might be considered inappropriate. Of course, in line with the comment made above, some single residents may be unable to complete a form, because of a disability, such as blindness, and so this is likely to be a minor underestimate, in some cases.

Whilst some of these disabilities would prevent the respondent from driving, such as impaired vision, others would allow this activity to continue, as a disabled driver.

4.7 Residents' Interests

Given that the residents are in retirement accommodation, their need to travel will not generally be related to any employment. It will be generated by other essential activities, such as shopping, visits to doctors etc. and also by the interests of the residents. In the 2000/2001 survey (Survey C) residents were asked to state their interests.

The 1167 residents responding to this question generated a list of "interests" which reached approximately 100 individual interests. The table below gives the most frequently quoted interests, along with the numbers of residents mentioning these and the percentage of the total doing so. Some residents specified very few interests, whilst others have produced lengthy lists.

In table 4.8 below, only those where 111 or more references have been made have been included. This limit represents reference by some 10% or more of the total residents responding to this question. A more comprehensive analysis is included in Appendix IV.

Table 4.8 Residents' Interests

nterest	No of references (from 1167 residents)	Percentage of residents with this interest – to nearest 1%
Television	983	84%
Crosswords	525	45%
Reading	494	42%
Bingo	218	19%
Walking	192	16%
Card Games	184	16%
Handicrafts (e.g. knitting)	156	13%

Of the interests indicated, including those referred to by less than 10% of residents, swimming (referred to by 3% of residents) and keep-fit (referred to by 2% of residents) are perhaps the two interests involving most physical exertion, followed by bowls (8%) and gardening (3%). However, some residents referred to "carpet bowls", which can be played in the residents' lounge. It is possible, and perhaps likely, that some of this 8% may have been referring to "carpet bowls" and not the full-scale version.

Activities, such as walking (referred to by 16% of residents), can range from being physically taxing to relatively gentle exercise.

The majority of interests quoted are generally of a passive nature. The first four most popular activities, watching television, crosswords, reading and bingo, are all such activities, as are the other popular activities such as card games, handicrafts, listening to music, or the radio, and board games. These can be undertaken within the resident's apartment, or, particularly in the case of bingo, possibly in the residents' lounge. However, some relatively passive interests, such as going to the cinema, theatre or church would involve the need to travel.

4.8 Residents' Comments

In the 2000/2001 survey, (Survey C), residents were asked to comment on some of the facilities provided at the development. The responses could have some relationship to the transport needs of the residents, albeit to a limited degree. As an example, if residents consider the facilities of the development to be inadequate, they are more likely to seek these facilities elsewhere. In this respect, if, for example, an inadequate provision of amenity space is being made, this might result in more trips to other open areas, such as parks. Similarly, if the residents are happy with the residents' lounge, they may be more inclined to remain within the development.

Details of responses on these matters are given in Appendix V.

Comments have also been sought and received on the locational characteristics of the developments. These are given below and used later, when traffic generation is considered.

Residents were asked to tick their comment from a range. The options were "very poor", "poor", "adequate", "good" and "very good".

4.8.1 Convenience – Local Shops

Most residents are satisfied with the location of their developments, with respect to local shops. Only some 3% rated the location in relation to these local shops as being poor or very poor. Some 82% consider the location to be good or very good. This is one of the important factors in the siting of such developments. The recent survey (McCarthy and Stone 2003) shows this importance, with 84% of residents considering it an important factor in the decision to move to the development.

Figure 4.7 Comments on Location of Development in Relation to Local Shops

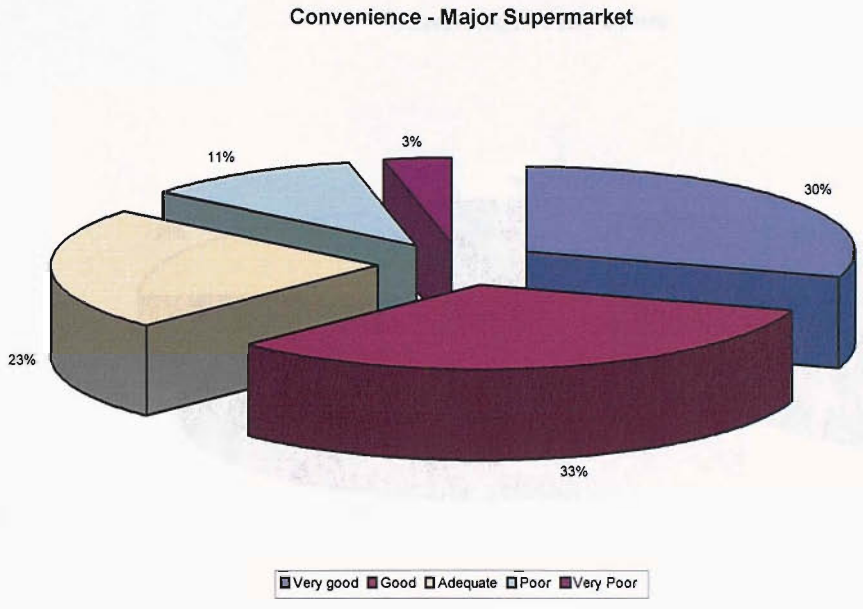
The ability to walk to these shops is likely to reduce the need to travel by car or public transport, and this may influence the level of car ownership.

4.8.2 Convenience – Supermarket

Not all developments are likely to be very well located in this respect. Major supermarkets tend to be large units addressing the needs of large catchment areas. They can, therefore, only be in close proximity to a small proportion of dwellings. They are likely to be much less accessible to most residential areas than the smaller local shops.

Nevertheless, the survey shows that over 60% of residents consider that their development is well located for one, or more, major supermarket, with 14% considering the location to be unsatisfactory, i.e. poor (11%) or very poor (3%). On balance, this appears to be a very satisfactory result.

Figure 4.8 Comments on Location of Development in Relation to a Major Supermarket

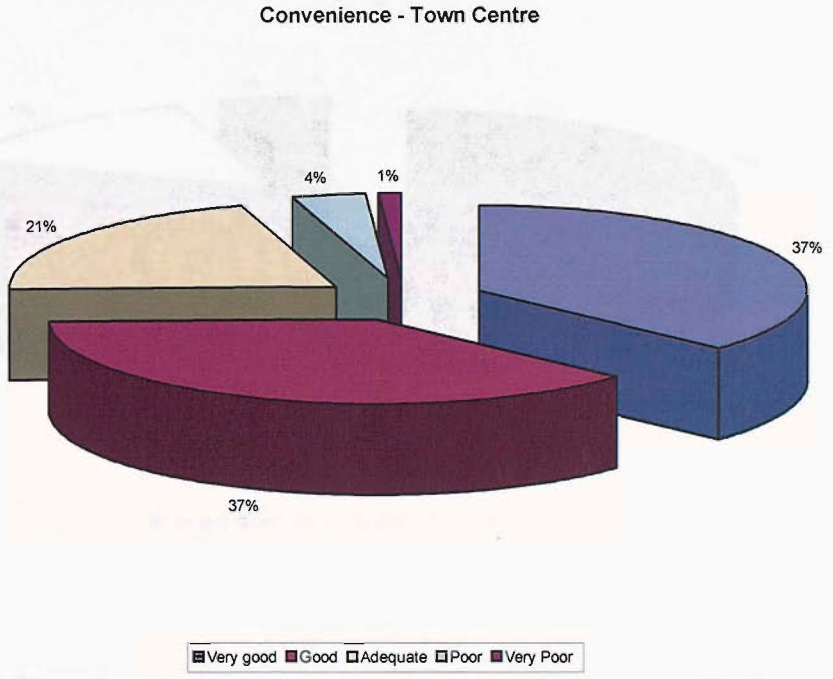


The importance of this relationship can be seen more clearly when the shopping habits of residents is considered in more detail in section 4.9, below.

4.8.3 Convenience – Town Centre

Again, not all developments can be close to town centres, although appropriate sites are sought within reasonable proximity to general shops, services and facilities. The residents appear generally satisfied with convenience for town centre services. Only 5% considered the location of their development to be poor or very poor and almost 75% of residents considered it good or very good.

Figure 4.9 Comments on Location of Development in Relation to Town Centre

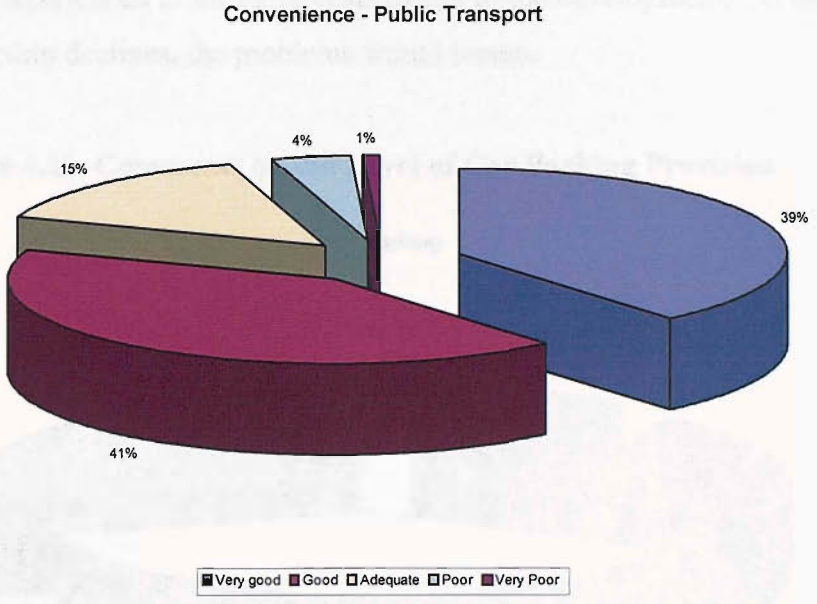


In terms of large supermarkets and town centres, the residents may consider access to be convenient not only if these are within easy walking distance, but also if it is within a relatively short drive or suitable public transport is available.

4.8.4 Convenience - Public Transport

Some 80% of residents consider access to public transport to be good or very good and a further 15% consider this to be adequate. Only 5% are not satisfied with the provision.

Figure 4.10 Comments on Location of Development in Relation to Public Transport Services



Access to alternative modes of travel to the car could well influence car ownership and car retention of residents and also the number of trips made by the private car.

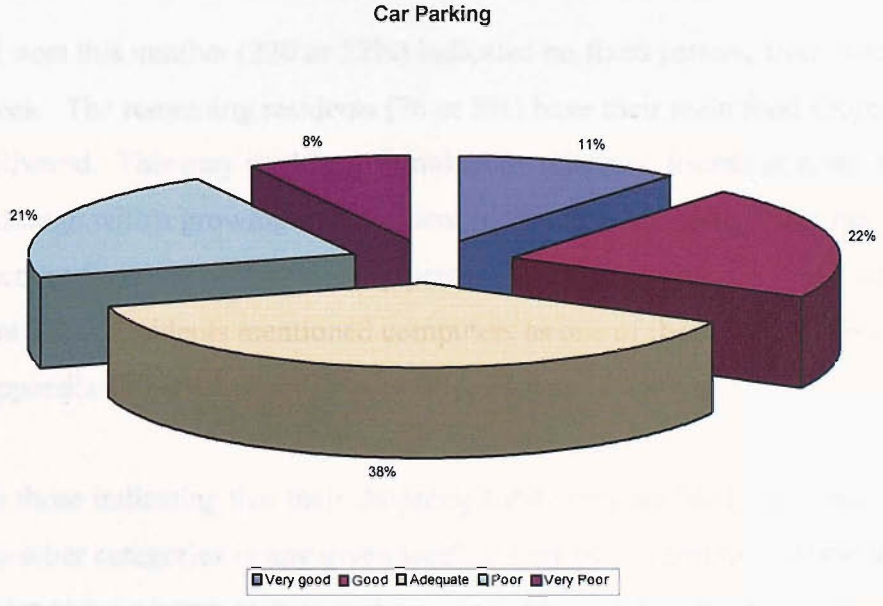
4.8.5 Car Parking

In light of Government policies on car parking and on maximising the use made of "brown field" sites, as referred to in some detail in Section 5.8 below, along with McCarthy and Stone's commercial requirement to make maximum use of sites, some degree of discontent in this matter would be expected. Any such discontent would be increased if, as suggested above, car ownership levels are increasing and the level of parking spaces provided is not correspondingly increasing.

The responses show that although 8% describe the provision as "very poor", and 21% as "poor", some 38% considered it "adequate", 22% "good" and 11% "very good". This is obviously the issue that raises most discontent amongst residents and yet still over two thirds consider the provision adequate or better.

In line with the results indicated above, car parking problems are most likely to be experienced in the early years of life of the development. As car ownership declines, the problems would lessen.

Figure 4.11 Comments on the Level of Car Parking Provision



As indicated below, only a relatively small proportion of residents own a car. It is possible, therefore that the degree of satisfaction on car parking will be higher amongst the non car-owning residents, yet very much lower amongst car owners. However, of those indicating that the car parking provision was "very poor", some 33% were car owners and 67% non-car owners. For those describing the provision as "poor", the proportions were very similar at 32% car owners and 68% non-car owners. The proportion of car owners indicating dissatisfaction is only a little higher than the overall proportion of car owners, which, during this survey was some 27%. The discontent amongst non car owners may reflect difficulties of the residents' visitors in finding parking space.

4.9. Residents' Shopping Habits

Of the 1011 residents giving information on their shopping habits, a significant proportion undertook food and grocery shopping more than once a week. Some 489 residents indicated this, which equates to over 48% of the total. Fewer than half of this number (226 or 22%) undertook a major shop once a week or less.

Almost this number (220 or 22%) indicated no fixed pattern, from week to week. The remaining residents (76 or 8%) have their main food shopping delivered. This may well be undertaken by relatives, friends or home helps, although with a growing development of "internet shopping", this may also account for some of this delivery percentage. In this context, it will be noted that 3% of residents mentioned computers as one of their interests (see – Appendix IV).

As those indicating that their shopping habits vary are likely to fit into any of the other categories in any given week, it may be prudent to set these aside in order to get a better picture of the overall shopping habits. In this case the number of responses considered is reduced to 791, of which nearly 62% shop more frequently than once per week, nearly 29% shop once per week or less and nearly 10% have their shopping delivered.

These shopping habits may be related to, and indeed influenced by, the car ownership of residents. Their use of cars may be influenced by their shopping habits. Deliveries will not necessarily involve residents having to undertake a shopping trip.

It appears that a significant number of younger families in the population at large undertake a major food/grocery shopping trip less frequently than once per week, and sometimes considerably less frequently. This may be linked to the availability of a car as a convenient mode of transport for such a trip. Infrequent shopping normally results in heavy shopping loads, which would be difficult to transport by other modes. A further contributory factor to infrequent shopping could be the availability of storage space in the kitchen, including that in a refrigerator/deep freeze.

It has been suggested that the residents of sheltered housing will need cars for their weekly shop. The evidence above tends to disprove this. The apartments tend to be relatively small, with small kitchen areas. Consequently the space for storing a high volume of groceries and for accommodating a large freezer, is limited.

The relationship between the shopping habits and residents' car ownership can be investigated by comparing the shopping habits of car-owning with non car-owning apartments. A total of 994 residents responded to both the car ownership and shopping habit questions. Of these 270 were car owners (27%) and 724 (73%) were non car owners.

The following table, 4.9, shows the shopping habits of these respondents.

Table 4.9 Shopping Habits (Main Food/Grocery)

	Once a Week or Less	More than Once a Week	Delivered	Varies from week to week
Car Owners	**86 (32%)**	**114 (42%)**	**4 (1%)**	**66 (24%)**
See note	**42%**	**56%**	**2%**	
Non Car Owners	**138 (19%)**	**368 (51%)**	**70 (10%)**	**148 (20%)**
See note	**23%**	**64%**	**12%**	

Note - These rows show the percentage split if those residents who indicated a variation of shopping habits are disregarded.

(Source – Survey C)

Setting aside those residents whose shopping habits vary from week to week, it can be seen that residents without cars are approximately 6 times more likely to have their shopping delivered. Those who own cars are significantly more likely to shop once per week or less. They are almost twice as likely to adopt this pattern of shopping.

The majority of each type of resident (car owners and non-car owners) shop on a more frequent basis than once per week, with non car owners being some 1.14 times more likely to do so.

As might be expected, the shopping habits of residents appear to be related to their car ownership. The survey does not show which is the causal factor. Are the shopping habits influenced by the car ownership, or is the need for a car influenced by the preferred shopping habits? The probability is that some apartments will comply with each of these options. It can be seen in section 5.3 below that some 25% of residents gave up car ownership because they had no further need for a car. The desire and/or ability to undertake shopping on a more frequent basis could contribute to this thinking.

It should also be borne in mind that some non car-owning residents will be able to take advantage of lifts to and from the shops by friends, including other residents, and relatives. For example, many of the 23% of non car-owning residents who shop once per week or less may well only do so because they can obtain a lift to and from the shops. Some may also use taxis for these trips, particularly for the return trip with a heavy shopping load.

4.10 House Managers' Apartments and Guest Suite

4.10.1 House Managers' Apartments

The role of the house manager is described in sections 1.1.6 and 2.4 above, and in Appendix II. House managers can be of either sex, although there appears to be a significantly greater number of females than males.

In the majority of cases, house managers occupy one of the apartments within the development, which is usually a two-bedroom apartment. In a minority of developments, which are usually the smaller ones, the house manager lives away from the development, but operates from the office provided within the development. The survey indicates that 138 (90.8%) of the 152 house managers surveyed are resident house managers, with the remaining 14 (9.2%) being visiting, non-resident, house managers.

Of the 137 resident house managers providing this information, the majority lived with one other person, presumably a spouse or other partner. Only a small proportion, about 7%, lived in a larger family group, as shown in table 4.10, below.

Table 4.10 Residents in House Managers' Apartments

(Source – Survey C)

Number of residents	Number of HM Apartments	Percentage of HM apartments
1	48	35%
2	80	58%
3	8	6%
4	1	<1%

4.10.2 Guest Suite

The guest suite is a small apartment provided for the use of residents' guests, as friends and relatives are not normally expected to stay in the residents' individual apartments.

Of the developments considered, some 8.5% or 1 in about 12, of guest suites were being used at the time of the survey. This suggests that the impact of these apartments on traffic movements and car parking is likely to be of a relatively minor nature.

Any vehicle movements associated with the guest suite are likely to be taken into account if the sample of developments considered in any study of traffic generation exceeds 12. Such a sample is likely to include at least one where the guest suite was occupied.

4.11 Summary

Although the age restriction requires at least one resident to be 60 years of age, the average age of entry is significantly higher at 75 years of age or more. There is an indication that the average age of entry has increased over recent years and may still be increasing.

The average age of residents of all developments is in the high eighties. The average age of residents generally rises, as the development ages, at least during the early years.

The desire for security is the most frequently given reason for entering this form of housing. This is followed by the complaint that the previous home was unsuitable.

Approximately 75% of residents are female. The average occupancy of the apartments is approximately 1.19 persons, although this is marginally lower for apartments sold as "one-bedroom" apartments and higher for those sold as "two-bedroom" ones. Indeed for those apartments where the extra room is used as a second bedroom, the occupancy is significantly higher, at about 1.85 persons per apartment. As might be expected, the proportion of male residents in these apartments is significantly higher than the average, at approximately 40%, as opposed to the overall average of approximately 25%.

Some 75% of apartments were occupied by single women and about 9% single men. Approximately 15% of apartments are occupied by mixed couples, with less than 1% being occupied by pairs of female residents.

The residents were generally satisfied with the convenience of their developments to such services as local shops, major supermarkets, a town centre and public transport. There was less satisfaction when the residents commented on the car parking provision.

Residents tend to undertake food and grocery shopping more than once per week.

5. Travel Characteristics

5.1 Introduction

The use of the private car by residents of sheltered housing is dependent on a number of factors. For those who may drive, the holding of a driving licence and the ownership of a car are the main pre-requisites. This chapter considers theses two characteristics of residents. It describes how car ownership varies with the age of the development and also considers whether overall car ownership is changing.

Many of the residents of this form of housing were once car owners and drivers. This chapter looks at the timing of, and reasons for, giving up car ownership.

The type of vehicles owned by existing residents is described and considered in the context of designing parking spaces for the developments.

Consideration is given to the likely requirements for car parking provision and to the corresponding requirements for cycles. Considering the car parking requirements, detailed reference is made to the current guidance from central government.

The modes of travel adopted by residents are also described, ranging from walking to travel by tramways or ambulance.

This chapter concludes by considering in some detail the traffic generation characteristics of this form of development. It looks at what factors may influence the traffic generation, the type of vehicle generated and the distribution of vehicle movements throughout the day.

5.2 *Driving Licences*

5.2.1. Driving Licence Holders

This data is obtained from the 1996 survey (Survey B) only. Of the 2637 residents responding to the relevant survey questions, 1458 (55.3%) have had driving licences and 1179 (44.7%) have never had a licence. Of the total of 643 males, 564 have at one time had a driving licence, representing some 88%. Of the 1994 females responding, only 894 have or did have a licence, giving a much lower percentage of 45%.

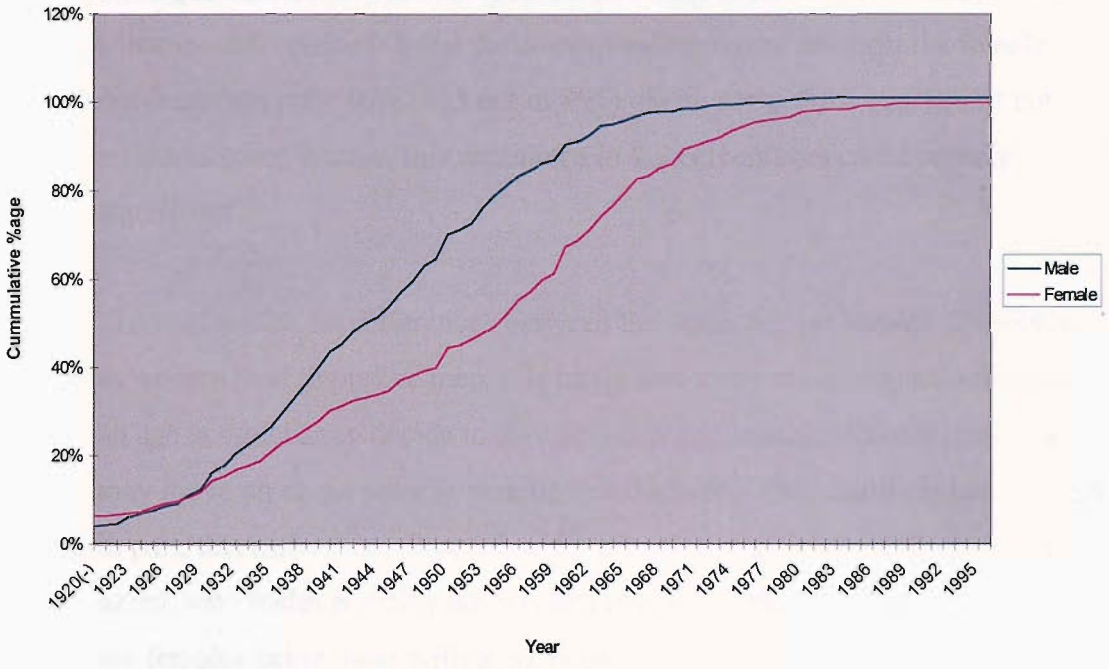
Looking at the current overall population of the country, at the turn of this century (2000) some 60% of females over the age of 17 had driving licences, a significantly higher level than was the case for the current female residents of sheltered housing. This 60% is still some 28% lower than for male residents of sheltered housing, but represents an increase of about one fifth in the previous 10 years (Source – National Travel Survey). This suggests, therefore, that the car ownership level of future residents of sheltered housing may be somewhat higher than at present, with the female residents having characteristics closer to those of the male residents. However, this is likely to be a gradual change over many years.

5.2.2 Dates When Licences Were Obtained

Noting that the proportion of female residents holding, or having once held, a driving licence, was significantly lower than the male residents, Figure 5.1 shows the dates when the driving licences were first obtained. The figure gives the cumulative percentage, such that each year shown also includes all those who have obtained licences in previous years. Therefore, by 1920 some 5% to 6% of residents who have had a licence had obtained it. By 1984, all of the men had obtained their licences, so the figure reads 100% for men. However, the survey shows that a small number of women did not obtain their licences until after this date, and so the figure shows a marginally lower percentage for the women.

Figure 5.1 Years by Which Driving Licences Were Obtained

(Survey B)



It does show that male residents tended to gain their licences somewhat earlier than the female residents. Some 50% of the men had their licences by 1943, when only 33% of the women had theirs. The women reached the 50% level in about 1955, when the men had reached 80%. By 1960, 90% of the men had their licences and 67% of the women had theirs. Almost all the men, 99%, had their licences by 1970, but 10% of the women were still to obtain theirs.

As referred to above, the later the driver commences to drive, the earlier they are likely to give up doing so. This would suggest that, as women take up driving at earlier ages, they will be less likely to give up driving as early as they do at present. However, the conclusion reached in the study may reflect the fact that those who take up driving later in life tend to be women and they tend to give up driving at an earlier age. If this is the case, the impact on car ownership in sheltered housing developments may be limited.

5.2.3 Retention of Driving Licences

There is also a very significant difference in the retention level between the sexes. The survey (Survey B) shows, from the 2642 residents responding to these questions, that 410 (73%) of the 561 male residents who once possessed a licence still retained it, but the corresponding figure amongst the female residents was only 46% (415 out of 895). With some three quarters of the residents being female, this difference in the percentages could be very significant.

The reasons for the differences between the sexes are not known. However, as women tend to outlive men, it is likely that many more women will reach an age at which they decide to give up a driving licence, whereas many men may move on or die prior to making this decision. This could explain, at least in part, this difference. It could, of course, also relate to the attitude of the sexes, with males possibly not wishing to rely on other modes of transport, but females being more willing to do so.

This greater willingness by the female residents to give up driving could, therefore, offset, at least to some degree, the potential increase in car ownership resulting from a greater proportion of the female population being car drivers, as referred to above.

5.2.4 Reasons for Giving Up Driving Licences

The reasons for giving up the driving licence are given in table 5.1. The total number shown is slightly higher than the number of drivers giving up their licences, because some residents gave a combination of reasons. The 151 males who had given up gave some 170 reasons and the 480 females gave 563 reasons.

Table 5.1. Reasons for Giving Up Driving Licences (Percentages)

(Source - Survey B)

Reason	Male%	Female%	Combined%
1. No further need	28.2%	32.0%	31.1%
2. Health reasons	38.2%	24.5%	27.7%
3. Death of Spouse	1.8%	10.5%	8.5%
4. Move to Retirement Housing	5.3%	8.7%	7.9%
5. Too much worry	2.9%	9.2%	7.8%
6. Safety reasons	13.5%	5.5%	7.4%
7. Financial reasons	3.5%	5.9%	5.3%
8. Other	5.3%	3.4%	3.8%
9. Road Accident	1.2%	0.4%	0.5%

The combined analysis shows that the main reason for giving up possession of a driving licence for residents of sheltered housing is "no further need". This may or may not be directly linked to the move into sheltered housing, but does tend to suggest that the location and facilities of the apartments contribute to this.

Health is the second most important reason given, with the death of a spouse being the third.

Although safety concerns rank in the same order as "too much worry" and "move to retirement housing", the influence of a road accident is very minor. This may well be due to the relative rarity of accidents and the earlier identification by the elderly person of increasing risk.

There are some noticeable differences between the sexes. Whilst the perception of the lack of further need is at a similar level for the two sexes, at about 30%, the male respondents are significantly more affected by health concerns (38% as opposed to 24%). Safety concerns are also significantly more important to the men.

These factors could indicate that men tend to wait until "forced" to give up their licences, whilst women do so more readily.

The death of a spouse is significantly more important to the women. As well as reflecting their greater life expectancy, it may also be that they may tend to give up car ownership at about this time and therefore do not need to retain a licence. The widow may have retained her licence in order to retain the opportunity to drive the family car, but may not have frequently done so and consequently may be have been happy to dispose of the car when her husband dies. The car may, at that time, be considered too much trouble. With no car, a licence is unnecessary.

However, the possession of a licence is not necessarily a reliable guide to the possession or use of a vehicle. As car ownership is considered in greater depth below, it is not necessary to investigate this particular aspect further, at this stage.

5.3 Car Ownership

Car ownership may well be influenced by a number of factors.

5.3.1 Overall Car Ownership - 1994 Telephone Survey (Survey A)

Overall car ownership data can be obtained from both the telephone surveys (Survey A), and questionnaire surveys (Survey B - 1996 and Survey C - 2000/2001). Although undertaken in different ways, the car ownership levels should be generally, if not directly, comparable. The telephone survey allows car ownership to be expressed as the number of cars per constructed apartment or per occupied apartment, and the questionnaire survey can only be expressed in the latter form. Each of these is considered below.

The overall car ownership in 1994 was 0.217 cars per apartment or one car for every 4.62 occupied apartments. However, if all the apartments are taken into account, not just those occupied at the time of the survey, the ownership rates fall to 0.189 cars per apartment or one car for every 5.292 apartments. This data is based on information for 14,823 apartments.

Car ownership varies from development to development and therefore from area to area. Car ownership for counties throughout England, Wales and Scotland is given in tabular form in Appendix VI. Looking at the county data, it may be interesting to note that there are only 9 counties where the number of cars per occupied apartments exceeds 0.333 (i.e. occupied apartments per car of less than 3).

5.3.2 Car Ownership in Relation to Census Car Ownership Data

Appendix VII shows the relationship between "car ownership" levels obtained from the 1991 National Census data and the car ownership of the McCarthy and Stone's developments at a county level in 1994. The table looks at the car ownership data of all households and for all pensioner households, as compared with that in sheltered housing. This data was not obtained for Scotland, and so the comparison is limited to England and Wales.

The relationship between the car ownership in the sheltered housing developments within counties and the overall car ownership in these counties or the car ownership in pensioner households was assessed using linear regression techniques. The Pearson coefficients (r) and the r^2 were obtained and are given in Table 5.2 below.

Table 5.2 Regression Analysis Results – Sheltered Housing Car Ownership Against General and Pensioner Car Ownership by County

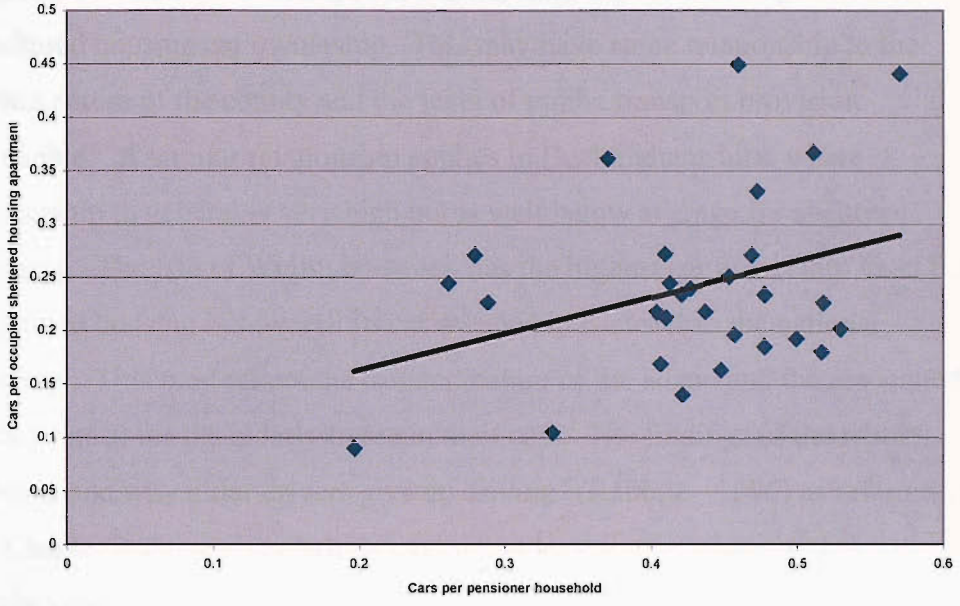
	Sample	All Households		Pensioner Households	
		R	r^2	r	R^2
All Sheltered Housing	45	0.01	0.0001	0.26	0.07
Selected Sheltered Housing	29	0.18	0.03	0.38	0.14

This indicates that there can be no confidence, at the 95% level, that there is a significant relationship between the car ownership in sheltered housing and that in the overall population, when considered at the county level. This applies irrespective of whether the counties where there are very few sheltered housing developments are removed from the analysis, as in the "selected sheltered housing" analysis.

This comment also applies to the comparison of all the sheltered housing developments to the pensioner person households. However, if the counties with a very low level of sheltered housing apartments are set aside, this relationship is significant at the 95% level. The value of the correlation coefficient, r, is 0.346 and that of r^2 is 0.1199.

This relationship is shown in Figure 5.2, below.

Figure 5.2 Relationship between car ownership in sheltered housing and in pensioner households – by county



The relationship is defined as follows:-

$$Y = 0.0943 + 0.3420\ X$$

where Y = car ownership in sheltered housing

and X = car ownership in pensioner households

This indicates that car ownership in sheltered housing developments is significantly lower, at about 50% or less, than for pensioner households in general. Furthermore, the rate of increase in ownership is much lower.

However, it must be borne in mind that this relationship does not take into account any variations in the developments, such as a high or low proportion of two bedroom apartments.

In addition it does appear that there are locational and other factors that influence car ownership in sheltered housing. For example, Surrey has the highest overall car ownership, but a lower than expected average level in sheltered housing car ownership. This may have some relationship to the urban nature of the county and the level of public transport provision available. A similar relationship applies in Buckinghamshire, where ownership in general is very high but is well below average for sheltered housing. The Isle of Wight, however, has the highest car ownership level for sheltered housing but overall its car ownership is closer to the national average. This may reflect the isolated nature of the island and the associated greater need for the elderly to retain their cars. The findings of the report "When and why older drivers give up driving" (Rabbitt – 1996) as referred to in Chapter 2 above, may help to explain, at least in part, some of these variations.

5.3.3 1996 Questionnaire Survey (Survey B) Car Ownership Data

The 1996 survey also collected car ownership data, but in a significantly different manner. The difference in the survey approaches, with the 1996 survey being based on only a sample of apartments, suggests that a detailed comparison of the results of the two surveys may not be wholly appropriate.

It can be seen that the overall car ownership level is given as 0.265 cars per apartment or one car per 3.77 apartments. This compares with a rate of 0.217 cars per apartment in the 1994 telephone survey. This would appear to show a significant increase in car ownership over the two-year period. However, it would not be appropriate to draw such a conclusion from such a comparison, and there may be reasons for this apparent increase, other than that the overall car ownership levels are increasing significantly. These are further investigated below.

5.3.4 2000/2001 Questionnaire Survey (Survey C) Car Ownership Data

The 2000/2001 survey (Survey C) shows a car ownership level of 0.271 cars per apartment, or one car for every 3.696 apartments, a similar car ownership level, albeit marginally higher, than the 1996 level, of 0.265 cars per apartment.

The data can be checked, in general terms, by comparing the results of the above survey with those of a telephone survey, undertaken by McCarthy and Stone, in January 2002. The full data for the telephone survey is given in Appendix VIII. The car ownership level from the telephone survey is approximately 0.26 cars per occupied apartment, just 0.01 cars per apartments lower than found from the questionnaire survey. This is very similar to, and therefore adds weight to, the findings of the 2000/2001 questionnaire survey. If there is any significance in the difference, it could result from some of the older, less able residents, who would tend not to own cars, being less able to respond to the survey.

The comparison with the 1996 survey data does suggest a minor increase in car ownership. However, the difference is not sufficiently great for this to be of clear significance and such variations can be explained in other ways, as indicated below.

5.3.5 Car Ownership of One and Two-bedroom Apartments

It can be seen from Chapter 4 above that the mix of one and two-bedroom apartments can influence the overall occupancy level and the ratio of male to female occupants. Consideration is now given to whether these factors have an influence on car ownership.

From the 1996 survey (B), it was found that there were 349 cars owned by the residents of 1782 one-bedroom apartments. This gives a car ownership level of 0.196 vehicles per occupied apartment, or 5.105 occupied apartments per vehicle.

For two-bedroom apartments, of which only one of the bedrooms is used for this purpose, the residents of the 371 occupied apartments owned 142 cars, giving a car ownership level of 0.383 cars per occupied apartment or 2.61 occupied apartments per car. This is approximately double the level of standard one-bedroom apartments.

If these larger apartments are used as two-bedroom dwellings, the car ownership increases further. The residents of the 90 apartments owned 59 vehicles, an ownership rate of 0.656 cars per occupied apartment, or 1.53 occupied apartments per vehicle. This represents a further significant increase.

Combining all "two-bedroom" apartments, however they are used, the residents of the 461 apartments owned 201 vehicles. This is a car ownership rate of 0.436 cars per occupied dwelling, or 2.294 occupied apartments per car. This is some 2.2 times the level of ownership for the standard one-bedroom apartments.

Of the 2243 apartments responding to this aspect of the survey, 461 were built as "two-bedroom" apartments. This represents 20% of the total. Therefore, if a development is being constructed with a greater proportion of two-bedroom apartments than this 20%, a higher than average level of car ownership can be anticipated and consequently there is a case for increasing the overall parking provision above the norm. Conversely, if the proportion is less than 20%, there is an argument that a lesser standard of parking would suffice.

The difference is, as indicated, quite significant. Disregarding, for the moment, any possible reduction in car ownership and car parking requirements as the development ages, a development of all "one-bedroom" apartments would only have approximately one vehicle for every 5 apartments, whereas, a development of all "two-bedroom" apartments would have one vehicle for approximately every two apartments.

Whilst the reason or reasons for this increased car ownership level is not known, two factors might explain the difference. The first is the higher level of male occupancy in the larger apartments and the second is the possible higher level of affluence amongst those that can afford the more expensive, larger apartments.

The 2000/2001 survey (survey C) gives a slightly less pronounced difference in the car ownership levels of one and two-bedroom apartments. For one-bedroom apartments the car ownership was 0.226 cars per apartments, but for two-bedroom apartments this was increase to 0.415 car per apartment. The ratio of these two car ownership rates is 1.84, as opposed to the 2.2 in the 1996 data.

There is no clear reason for this change. In fact the later survey, which does have a smaller albeit significant sample level, shows a rise in the car ownership levels for one-bedroom apartments from 0.196 cars per occupied apartment to 0.226, and a fall in the car ownership levels for two-bedroom apartments, from 0.437 to 0.415 cars per apartment.

Given that the increase in car ownership for one-bedroom apartments of 0.03 cars per apartment, is at a higher level than the decrease in car ownership for two-bedroom apartments, of 0.022, and the fact that there are significantly more one-bedroom apartments than two-bedroom apartments, it appears that the overall car ownership of the developments may be on the increase. However, the analysis that follows considers the car ownership levels in relation to the age of the development. This could add a further consideration in this assessment. If car ownership levels are higher in new developments and the number or proportion of new developments is higher than in the past, this could explain any overall increase.

In predicting the likely car ownership and consequential parking requirements of a development, it is only possible to use a limited number of criteria. The number of apartments will be known, as will the proportion of two-bedroom apartments. The car ownership levels of pensioner households in the area of the development may also be ascertained, although there is no sound basis on which to use this data. Emphasis should, therefore, be put on relationships that can be clearly established to see if a coherent means of predicting the car parking requirements can be derived.

As a corollary, the occupancy levels and gender split of residents will not be known in advance. These could be predicted, but only by using the factors referred to above. These are not, therefore, independent variables and can be set-aside in any prediction of car ownership or parking needs.

5.3.6 House Managers' Car Ownership

The 136 house managers, who responded with car ownership data, indicated a total car ownership of 1.12 cars per house manager's apartment. The car ownership split is given in table 5.3, below.

Table 5.3 Resident House Manager Car Ownership Levels

(Source – Survey C)

Cars Per Apartment	No. of Apartments	Percentage of Apartments
0	**11**	**8%**
1	**100**	**74%**
2	**23**	**17%**
3	**2**	**<1%**

The survey undertaken in 1996 (Survey B) showed that the car ownership of house managers at that time was 0.84 cars per apartment. This represents an increase of 33% in a period of some 5 years.

The vehicles owned by house managers are given in Appendix IX

5.3.7 Car Ownership in Relation to Age of Development

In Chapter 4 above, it is shown that the average age of residents tends to be higher in the older developments. As car ownership is likely to decrease with age, this suggests a relationship between the age of the development and car ownership. This relationship is further investigated below.

Figures 5.3 and 5.4 below show the car ownership levels by age of development. Figure 5.3 shows the data obtained from the 1994 data and this has been updated to give the 2002 data in figure 5.4.

Figure 5.3 Car ownership levels by age of development

(Source – Survey A 1994)

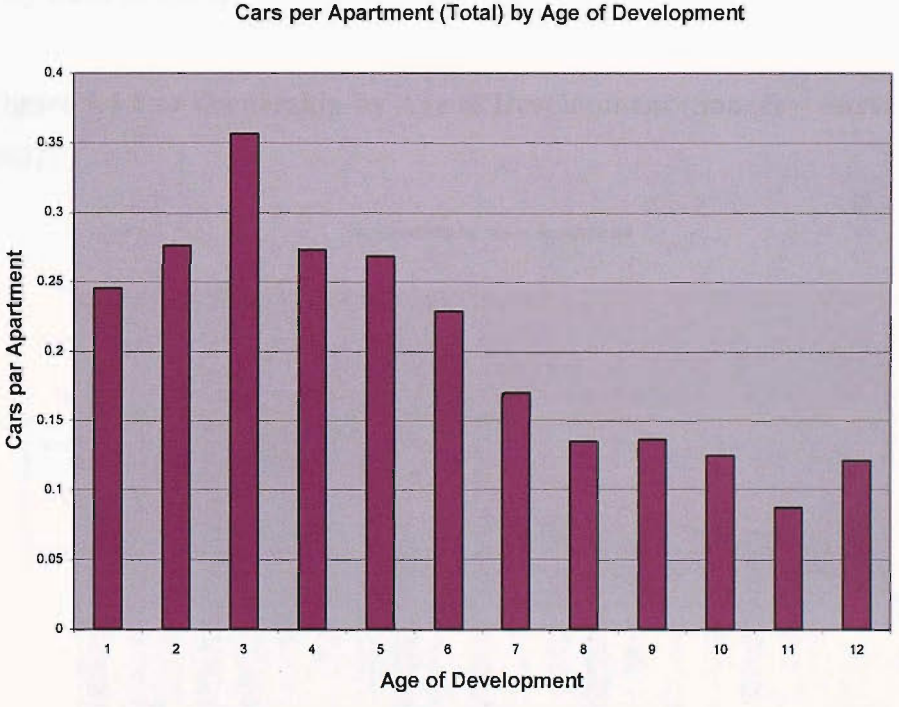
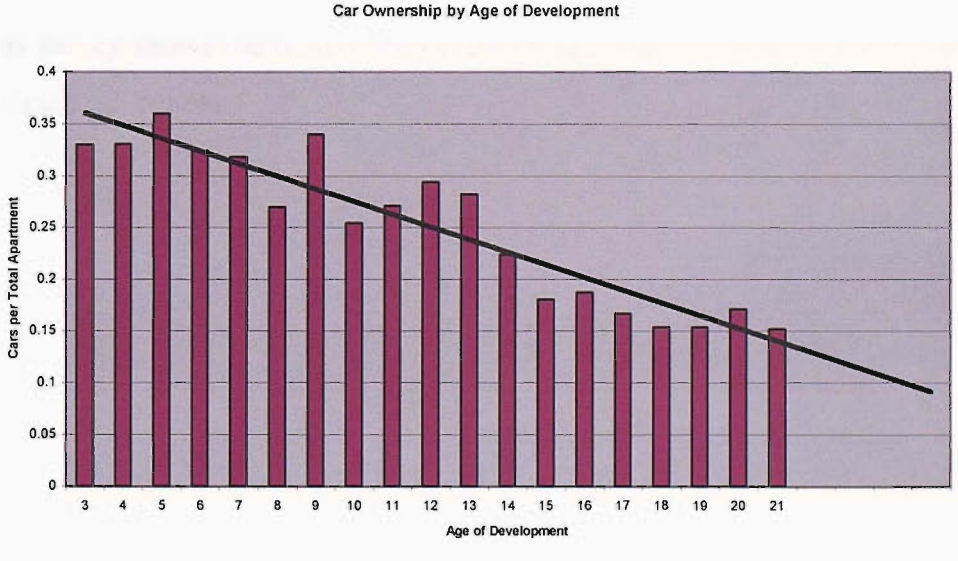


Figure 5.3 shows that car ownership levels appear to peak during year 3 of the development life. After this time, there appears to be a trend of reduced car ownership. The lower level of car ownership in the first two years of the life of the development reflects the fact that the sales period for most developments is some two to three years. Therefore, in these early years the lower level of occupancy of the apartments results in an overall lower level of car ownership per apartment. When the sales are likely to be completed, in year three, or thereabouts, the car ownership level is at its peak.

In preparing this analysis, data for developments more than 12 years old was not used, due to the very low sample levels. For example, only 2 developments were completed in each of the years 1977, 1978 and 1979 and only three in 1980.

Figure 5.4 Car Ownership by Age of Development (Source – Survey A 2002)



This more recent analysis shows a generally similar pattern to that based on the 1994 data, although there appears to be a somewhat greater degree of fluctuation. The peak car ownership level occurs in the third year of the life of the development, when all of the apartments are likely to be sold. After this time, the figure shows a decline in car ownership over a longer period, with a possible levelling out from about year 18 to year 21.

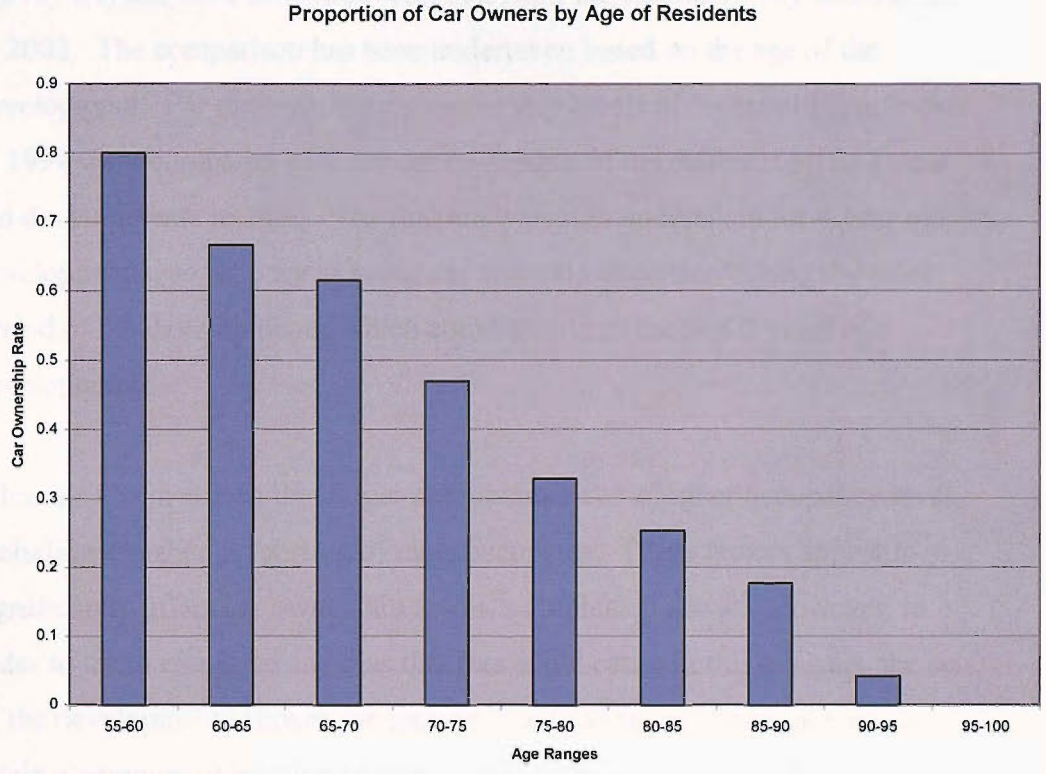
This figure includes the "trend line", which gives a general guide to the trend of the data. However, this line should not be taken as a predictive tool, but is purely illustrative. As indicated above, the relationship is unlikely to be linear and so linear regression analysis would not be appropriate here.

5.3.8 Car Ownership by Age of Residents

Reference is made above to the suggestion that car ownership levels fall as the elderly residents get older. This has been investigated using the data from the 2000/2001 survey *(Survey C)*.

This survey shows the relationship between age and car ownership indicated in figure 5.5 below.

Figure 5.5 Car Ownership Levels by Age of Residents (Oldest in Apartment)



In considering this data, it should be borne in mind that the sample levels in each age group will vary, as indicated in Figures 4.2 and 4.3 above. In particular, the number of residents under the age of 60 is very small, so limited reliance should be placed on the actual car ownership rate for this age group.

5.3.9 Car Ownership Trends

In undertaking any assessment of the possible growth in car ownership, it is necessary to try to eliminate any other factors that might distort the car ownership levels.

As it has been established that car ownership does vary with the age of the development, then any significant increase in the proportion of new developments could have the effect of increasing the recorded overall car ownership levels, without there being any significant change in the actual car ownership characteristics of residents.

In order to try to eliminate this variable, the data for the 1994 Telephone Survey (A) has been compared with that from the similar survey undertaken in 2002. The comparison has been undertaken based on the age of the development. For example the car ownership levels of 5 year old apartments in 1994 were compared with the car ownership of the different set of 5 year old developments in 2000. The first analysis was undertaken for 4 year old developments, so as to try to avoid any possible distortion during the sales period of the developments, which could extend to the first 3 years of a development.

It has also been shown that larger apartments have a higher occupancy level, including a higher proportion of male occupants. These factors appear to significantly affect car ownership levels, as indicated above. However, in order to try to eliminate any bias that this could cause in this analysis, the sets of the developments chosen for each year will, as far as is possible, try to retain a common proportion of larger "two-bedroom" apartments.

This process has involved assessing the proportion of two-bedroom apartments for both of the sets of developments for the years to be compared. Some of those developments for the year with the highest proportion of two-bedroom units are excluded from the year's data with the higher proportion. Similarly, some of the developments with the lowest proportion of two-bedroom units are excluded from the data for the year with the lower proportion. This process is repeated until the two proportions converge to within about 1%.

Table 5.4 below shows the results of these comparisons.

Table 5.4 Comparison of Car Ownership Levels – by age of development (Surveys A)

Survey Year	Opening Year	Age of Devt	%age 2 Bed Apart-ments	Total Apart-ments	% Occupied	Cars	Cars per Occupied Apartment
1994	1990	4	32.4	490	89.7	121	**0.275**
2000	1996	4	32.2	950	95.1	334	**0.370**
1994	1989	5	28.5	914	90.6	227	**0.274**
2000	1995	5	27.9	489	95.9	160	**0.341**
1994	1988	6	29.6	1322	91.9	293	**0.241**
2000	1994	6	30.3	370	93.5	97	**0.280**
1994	1987	7	27.9	1257	88.5	237	**0.213**
2000	1993	7	27.6	336	97.6	84	**0.256**
1994	1986	8	19.1	989	88.3	162	**0.185**
2000	1992	8	19.2	452	96.0	100	**0.230**

The comparison of the 4 year old developments suggests that there has been a significant increase in car ownership between 1994 and 2000, of some 34% in this 6 year period. The comparison of 5 year old developments shows a 24% increase in the same period. The 6 year old developments also show an increase, but this is somewhat lower, at 16%. The 7 year old developments show an increase over the 6 year period of some 20%. The increase for 8 year old developments is some 24%. The average increase is some 24% over 6 years, or about 3 to 4% per annum.

It was not possible to compare developments that were 9 years old in 1994 and 2000, as the proportion of two-bedroom units could not be made to match, whilst still retaining a reasonable sample for comparison purposes. The proportion of two-bedroom apartments opened in 1985 totalled some 3 to 4%, whereas the single development with the lowest proportion in 1991 had some 16.7%.

It should be noted that even a comparison of this nature is open to some error. Whilst the analysis removes, as far as possible, many of the factors that would be likely to interfere with a realistic comparison, the nature of the developments, in terms of locational characteristics, may vary considerably. The need to retain a car may be much greater in rural areas than in central urban ones. The breakdown of the samples used in the table could, therefore influence the car ownership levels. However, by using data from a number of developments, 20 for example in the case of the 1989 developments, it is hoped that such variations in overall samples can be minimised.

The fact that all of the comparisons consistently show a higher car ownership level in the later survey year provides a strong indication that car ownership levels have actually been increasing. Some variations in the rate of this increase may be expected and, as referred to above, other factors, including, possibly, the locational characteristics of the developments may have some influence.

However, even if these other factors are significant, it is unlikely that the developments chosen for the comparison would all be "biased" in the same way, i.e. with the developments in the older groups always displaying a higher level of the other characteristics that would tend to reduce car ownership. Consequently, if there were no significant trend in car ownership, it would be expected that in some instances the comparison would show a reduction in car ownership. It is concluded, therefore, that there is a strong presumption that car ownership levels have been increasing in the sheltered housing development.

5.4 Giving Up Car Ownership

Perhaps the final matter worthy of exploration in respect of car ownership is the reasoning behind residents giving up the use of the car, and the timing of this in relation to entry into sheltered housing.

5.4.1 Reasons for Giving Up Car Ownership

The reasons for giving up vehicles are given below. Unlike the analysis of reasons for giving up a driving licence, this data is not divided by sex. This is because car ownership is usually a family or apartment characteristic, not an individual one.

From the 1996 questionnaire survey, it was found that nationally over 50% of residents stated that they were once car owners. Whether this is fully reliable cannot readily be determined. There is a possibility that some female residents may have considered that any car owned was owned by a now deceased husband. Therefore, this proportion may be an underestimate.

However, of the 1209 who acknowledged previous ownership of a car, or other vehicle, some 620 had given up such ownership. This represents some 51%. The reasons for giving up are given, in order of importance, in table 5.5, below.

Table 5.5 Reasons for Giving Up Car Ownership (Survey B)

Reasons for Giving Up	Percentage
health reasons	31%
no further need	27%
death of spouse	15%
entering sheltered housing	11.5%
safety reasons	11%
financial reasons	10.5%
too much worry	8.5%
other reasons	5.5%
road accident	1%

It can be seen that these percentages add up to well in excess of 100%. This is due to many respondents giving a combination of reasons. Therefore, for example, of the 31% who mentioned health reasons, some will also have mentioned other reasons.

The 2000/2001 questionnaire (Survey C) also asked residents their reasons for giving up car ownership. The reasons given are shown in table 5.6, below. Again the percentages total more than 100%, as a significant number of residents gave more than one reason. In a small number of cases 5 or more reasons were given.

Table 5.6 Reasons for Giving Up Car Ownership (Survey C)

Reasons for Giving Up	Percentage
health reasons	35%
death of spouse	25%
no further need	23%
too much worry	13%
financial reasons	11%
age	9%
entering sheltered housing	9%
safety reasons	6%
other reasons	5.5%
parking problems	1%
car stolen	<1%

It is interesting to note that health reasons remain the major influence in this decision. However, death of a spouse is more prevalent as a reason in the latest set of data, at marginally higher than "no further need". "Too much worry" has also gained in importance, now being slightly more important than "entering sheltered housing". Safety reasons have dropped in importance. No explanation is available for the changes, although they may not be so significant as to change the overall theme of reasons.

It is of interest to compare some of these findings with that of the AA Foundation for Road Safety Research study on "When and Why Drivers Give Up Driving" (Rabbitt - 1996). The report's conclusions refer to the concern of drivers over the loss of mobility and independence upon giving up a car. The high level of residents who have indicated no further need for a car (27% and 23%) tends to suggest that the location of the developments near services and public transport facilities minimises any such concerns.

The AA study also looked at the elderly drivers who have given up driving. It states that 100 out of the sample of 339 (i.e. some 29.5%) did so because they felt that they no longer drove safely. However, it is noticeable that only 11% of the residents of sheltered housing referred specifically to safety. This may well be because those in sheltered housing tend to give up driving for other reasons, including general health etc., before safety becomes a major concern. Others may consider that they may not be safe driving, because of health concerns, which is given as the major reason in both tables 5.4 and 5.5 above.

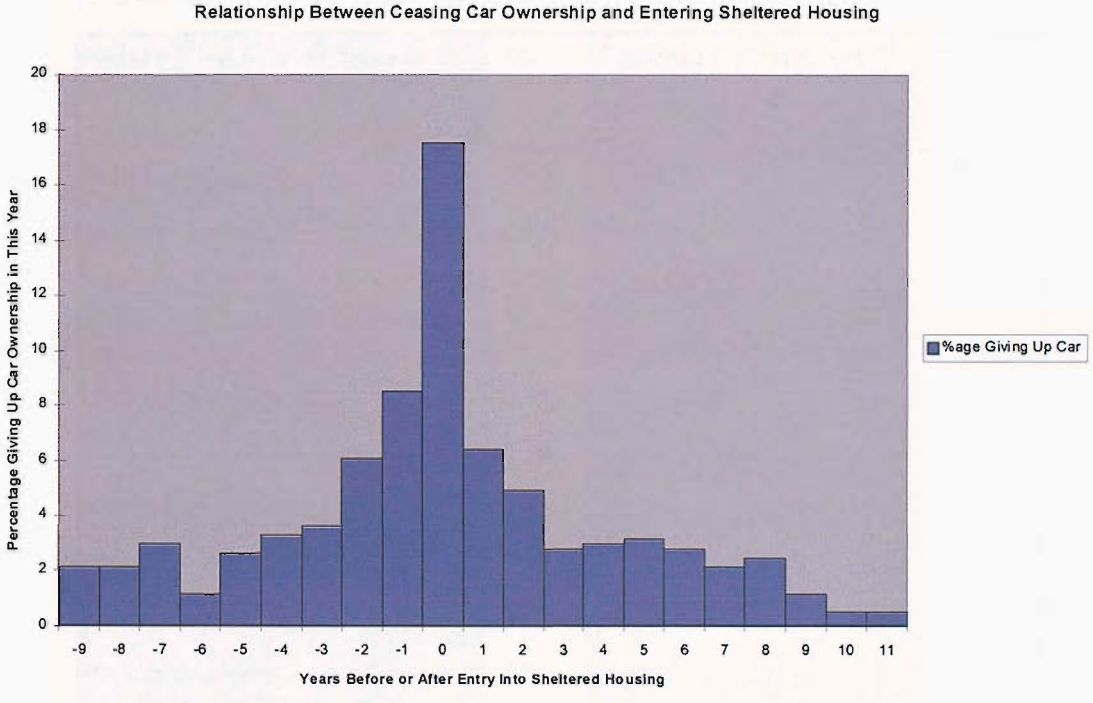
5.4.2 The Timing of Giving Up Car Ownership

The timing of residents giving up ownership of a car gives an interesting picture as illustrated in Figure 5.6. There appears to be a gradual increase in the abandonment of car ownership from some 5 or 6 years prior to entry to sheltered housing, reaching a peak in the year of entry. There is a subsequent fall-off after entry down to a steady level in years 3 to 8 after entry. The rate then further falls off to a relatively low level.

This relationship gives a clear indication that the move into sheltered housing is a significant factor influencing the abandonment of car ownership. Some 18% of residents who had given up car ownership did so in the same year as entering sheltered housing. It may also be that the decision to give up the car, and the reasons for doing so, may also influence the decision to enter sheltered housing. This would be supported by the fact that there is a build-up in numbers giving up the car in the 3 to 5 years prior to entry. The majority of residents would probably not have known of their future move at this stage and so these other factors could have been the major influence on both the decision to give up the car and the later decision to move to sheltered housing.

The higher than normal level of giving up the car experienced soon after the move is in line with other evidence from the study. It may well reflect the fact that the decision to give up the car is based on the same reasons as for those giving up earlier, but this decision is delayed until after entry. Also the benefits of the location of the development, for example, may not be realised until after entry and these can significantly influence the decision to give up car ownership.

Figure 5.6 Relationship Between the Timing of Giving Up Car Ownership and Entering Sheltered Housing



It should be noted that 16.7% of those giving up car ownership did so 10 or more years before entry, and 3.7% did so 12 or more years after entry. These are not shown in Figure 5.5.

5.4.3 Comparison of Reasons for Giving Up Car Ownership and Moving Into Sheltered Housing

The 2000/2001 survey also asked residents their reasons for entering sheltered housing. It is interesting to compare these with the reasons for giving up car ownership, in order to see if there are any common reasons.

Table 5.7 below gives the two sets of reasons, for comparison purposes.

Table 5.7 Comparison of Reasons for Giving Up Car and Entering Sheltered Housing

(Survey C)

Giving Up Car Ownership	%	Entering Sheltered Housing	%
Health reasons	35%	Security	53%
death of spouse	25%	previous house/garden unsuitable	43%
no further need	23%	nearer family	35%
too much worry	13%	death of spouse	27%
financial reasons	11%	Health	25%
entering sheltered housing	9%	Companionship	24%
age	9%	Location	4%
safety reasons	6%	Age	2%
parking problems	1%	Others	1%
car stolen	<1%		

The first three reasons for entering sheltered housing might be considered to only have a limited relationship to car ownership. However, if security is a major issue, trips out alone in a car might be an added concern and if looking after a house or garden presents difficulties, so might driving a car. Also, the proximity to one's relatives may reduce the need to travel and so reduce the need for a car.

However, a more direct relationship appears to come when looking at the next reason, i.e. the death of a spouse. In both sets of data, this reason was given by about 25% of the residents. Of the 119 residents who gave "death of a spouse" as the reason for entering sheltered housing and who also gave reasons for giving up car ownership, 55 (46.2%) also gave this as a reason for giving up car ownership. This does suggest a significant relationship for some (possibly about 12%) of the residents responding to this question. This might be added to by the residents who gave "entering sheltered housing" as a reason for giving up car ownership, where a direct relationship is clear.

The location of the development, as given as a reason for entering sheltered housing by 4% of the residents, would also influence the need for a car, and be factor in the 23% "no further need" reason for giving up a car.

Age is also a common factor.

The exact relationship between the reasons for entering sheltered housing and giving up car ownership cannot be clearly established, but there does appear to be a link for some residents.

5.5 Vehicles Owned

5.5.1 Vehicle sizes

Based on general anecdotal experience, it appears that the elderly may prefer smaller vehicles than the population at large. This may be due to them feeling that such vehicles are easier to control. They may feel that, with their families now being independent, they only require a limited amount of space within the vehicle.

It may also be due to financial considerations. These residents do not drive "company cars", and so the owners have to purchase and run the cars themselves. Most retired people have limited fixed incomes, which may restrict the level of spending on such matters.

The first consideration, therefore, is whether this impression, based on experience, is accurate. The questions to be answered is:

Do the residents of sheltered housing tend to drive vehicles smaller than those of the population at large?

Before considering the validity of this, it is prudent to ask why this is of any practical interest. When designing a car park, there are certain criteria that are normally adopted by local planning and highway authorities. These are based on national guidelines.

However, if the needs of the residents of this form of housing differ significantly from the norm, then more efficient car parking layouts may be feasible, taking up less of the limited resource, namely urban land.

5.5.2 The Standard Vehicle

Before looking at the vehicle sizes of the residents of this form of sheltered housing, it is necessary to establish the benchmark against which the size of vehicle has to be judged.

Appendix I of Design Bulletin 32 (Department of Transport - 1977) specifies the dimension of the 95%ile car in use at that time. The car used as the guide for design purposes was the British Leyland Motor Corporation (BLMC) 1800 Mk II. This car is no longer in production. It was some 4.23 metres in length and 1.715 metres in width.

This vehicle's size and turning data was the basis for establishing a standard car parking space, with dimensions of 4.8 metres in length and 2.4 metres in width. It may be worthy of note that some local authorities adopt a slightly higher standard, with the length being increased to 5 metres and in some cases the width to 2.5 metres. Spaces designed specifically for the disabled user have an increased width, usually totalling some 3.6 metres.

A further dimension that is commonly used in car park layout design is an aisle width of 6 metres. This applies to parking spaces at 90 degrees to the aisle.

It is open to question whether, for example, a car park in a private development should be designed so that all spaces cater for the 95%ile car. In a residential car park, it might be possible to provide a range of car parking space sizes, within realistic bounds, with those with smaller cars being guided to use the smaller spaces. This could allow a more efficient use of land in such a development.

However, it has to be recognised that visitors are likely to have larger cars and they may have difficulties using the smaller car parking spaces , if these are the only ones available. Furthermore, some residents with smaller cars may choose to use the larger spaces. Consequently, any use of smaller car parking spaces has to be carefully considered and limited to locations where significant benefits can be achieved, without causing unacceptable problems.

5.5.3 Cars Owned by Residents of Sheltered Housing

Each of the above factors will influence the layout design of a car park. If the "95%ile" car of the residents is significantly different from the "national" 95%ile car, some revisions to car parking layout may be appropriate. On one occasion in the past, a local authority tested a proposed car parking layout for a proposed new sheltered housing development of this nature using the turning characteristics of a Jaguar XJ6. The following analysis may assist in giving a guide to a more appropriate vehicle upon which to base such a test.

The residents surveyed in 2000/2001 (Survey C) were asked to indicate the make and model of the car(s) that they owned. In most cases the model was readily recognised and, using the Parkers Used Car Guide, the length and width of each vehicle could be established. In a small number of instances the vehicle size could not be ascertained and, in a number of others, the model was not given, so the size could not be ascertained for this reason.

The table given in Appendix IX gives a list of the vehicles specified by the residents, the length and width of these and also the number of residents owning the specified model. The ownership of the house managers is also included.

An analysis of this data indicates that the dimensions are known of some 260 residents vehicles. Consequently, the 95%ile is obtained by setting aside the highest 13 sets of dimensions and taking the next highest. On this basis, the "95%ile" vehicle of residents is some 4.47 metres in length and some 1.73 metres in width. The nearest current model to this set of measurements is the Vauxhall Vectra.

The most popular car is the Nissan Micra, with some 11.5% of residents owning this model. Almost as popular is the Ford Fiesta, with 10% of residents owning this model. These vehicles are less than 3.75 metres in length and 1.6 metres or less in width.

Table 5.8 below shows the comparison between the "standard 95 %ile car" from Design Bulletin 32 (Department of Transport – 1977), the 95%ile residents' car and the equivalent house managers' vehicle.

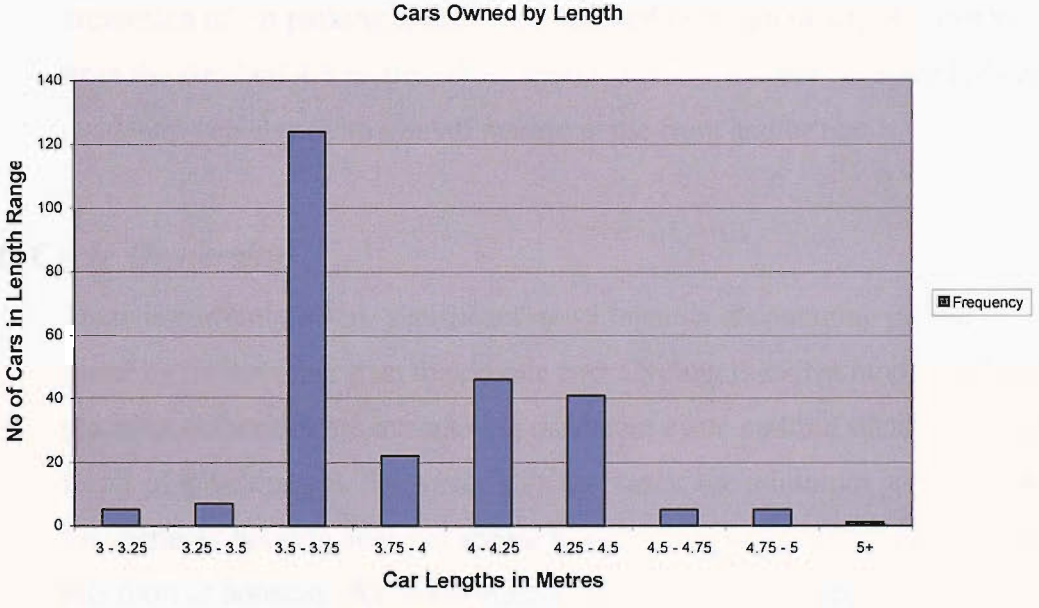
Table 5.8 Comparison of 95%ile vehicles

Vehicle (95%ile)	Length (metres)	Width (metres)
DB 32 Vehicle	4.23	1.715
Residents' Vehicle	4.47	1.73
House Managers' Vehicle	4.75	1.73

The table indicates that the 95%ile cars of both the residents and the house managers are larger than the Design Bulletin 32 specified vehicle. However, this does not necessarily imply that car parking spaces should be larger than the previous norm, or that all spaces need be this size. The uniform use of the 95%ile vehicle means that the car parking space design is unduly influenced by only the largest 5% of the cars.

Figure 5.7 below shows the split of vehicles by length.

Figure 5.7 Frequency of Vehicles Owned by Residents – By Length



It can be seen that some 124 (48.4%) of the 256 vehicles recorded were in the length range 3.5 to 3.75 metres, or to be more exact 3.5 to 3.74999 metres. Table 5.9 shows this data expressed in percentage terms.

Table 5.9 Percentage of Vehicles Below the Specified Length

Vehicle length	% of Residents' Vehicles Below this Length
3.25	2.0%
3.5	4.7%
3.75	53.1%
4	61.7%
4.25	79.7%
4.5	95.7%
4.75	97.7%
5	99.6%
5.25	100%

This indicates that there may be a possibility to reduce the land taken by car parking for the residents of this form of housing. For example, if a proportion of car parking spaces were reduced in length to, say, 4.3 metres from the standard 4.8 metres, these spaces would still cater for some 60% of residents' vehicles, with a small margin at the front and/or rear.

5.6 Cycle Ownership

There is currently a very significant move towards encouraging people to travel by modes other than the private car. Cycling is such a mode and local planning authorities are introducing minimum cycle parking standards for all forms of development. However, in some cases, the minimum requirement for sheltered housing does not appear to reflect the nature of the residents of this form of housing. As an example, one set of standards applied in Chichester, West Sussex, had the same overall requirements for sheltered housing for the elderly as for students, even though their age and fitness characteristics would normally be very different.

The appropriate cycle parking provision is addressed below, but the actual extent of ownership and the potential for cycle ownership is investigated in the following section.

5.6.1 Current Cycle Ownership

In order to address this issue, in the first instance a small survey of 30 of McCarthy and Stone's developments was undertaken in October 1999, which showed that the residents of those developments had a cycle ownership rate of 1 cycle per 115 apartments. This therefore indicated that less than 1% of apartments accommodated a cycle owner. The survey also showed the likely use of cycles by visitors to the sites. (Survey D) This survey involved the house managers providing the information, from their knowledge, and not the residents themselves.

However, in order to provide guidance based on a larger sample of apartments, this issue was also addressed in the 2000/2001 survey (Survey C). Each resident was asked whether they were the owner of a bicycle. Of the 1186 responding to this question, only 24 indicated that they owned a bicycle. This represents some 2% of residents. Given that the residents themselves are providing the information, and the sample was significantly greater, this cycle ownership level may be considered more reliable than that previously obtained.

This low level of cycle ownership is likely to be due to the age and fitness levels of the residents.

5.6.2 Potential Cycle Ownership

However, it has been suggested that the low level of ownership may reflect the failure to make provision for cycle parking in the developments concerned. In order to assess the merits of this suggestion, a further question was asked of residents in the 2000/2001 survey (Survey C). They were asked how many would take up cycling, if cycle parking provision were available. Of the 967 specifically responding to this question, only 21 (2.17%) answered in the positive. They indicated that 31 residents would take up cycling, if parking provision were made.

However, this figure of 31 does contain a significant bias. One resident, who lived alone, indicated that 6 residents of his/her apartment would take up cycling. This is obviously impossible for a resident living alone. This resident may have taken the term "your apartment" in the question as referring to the whole of that development and may have estimated a response on this basis. Assuming that this resident would take up cycling, but disregarding the other 5 indicated, the 31 should be reduced to 26.

Given the average occupancy of an apartment in this survey as being 1.19 persons per apartment, the 967 apartments would be occupied by some 1151 residents. The 26 potential cyclists represent 2.25% of the total residents.

If it is assumed that all of these residents would actually take up cycling, if parking provision were made, this figure can be added to the 2% who already cycle and this would result in an overall level of residents who do or would cycle being some 4.25%.

5.7 Travel Modes and Visitor Types

Residents, and their visitors, will not only travel by car. They will be expected to walk and use public transport, including taxis, and some may be able to cycle. This section of the thesis considers these other modes of travel. It will also give more details on the type of visitors to the developments.

5.7.1 Residents' Trips

The 2000/2001 survey (Survey C) sought information from residents on the trips from and to their apartments, as made by them and their visitors. However, as described below, the trip generation data from this source is not considered wholly reliable. Some residents appeared to give trip data for more than the one day they were asked to, as evidenced by some residents apparently claiming to be in more than one place at the same time. Consequently, an alternative approach to deriving trip generation data is described and followed.

However, the errors described in this data, which would have clearly resulted in an inaccurate trip generation rate, are less likely to apply to the modal split aspect of the data. For example, although the data for a single day may erroneously include data for other days, it is unlikely that a resident would wrongly assign a mode of travel to the generated trip. An analysis of the data obtained gives the modal split information shown in table 5.10, below.

The table shows that walking is the predominant made of travel, with some 45% of trips being on foot.

It can be seen that travel by the residents' own cars represents only about 21% of the trips made. A further 17% of trips were made in other persons' cars, approximately evenly split between visitors' cars, which would probably be mainly relatives' cars, or those of visiting friends, and those of other residents. The total of trips by private car/vehicle represents, therefore, some 38% of the total. This combined figure is still lower than the percentage of trips made on foot.

Table 5.10 Travel Modes Used by Residents

Travel Mode	No of Trips	Proportion of Total
walking/Foot	343	44.8%
car (incl light van)	158	20.6%
bus	82	10.7%
car passenger - visitor's car	70	9.1%
car passenger - resident's car	61	8.0%
taxi	24	3.1%
coach	9	1.2%
electric Scooter	4	0.5%
train	4	0.5%
dial a Ride	3	0.4%
cycling	2	0.3%
tube	2	0.3%
wheelchair	2	0.3%
tramway	1	0.1%
ambulance	1	0.1%
Total	**766**	**100%**

Public transport use totals some 16%, with the two main modes being the bus, which represents about two thirds of these public transport trips, and the taxi, which represents about one fifth.

This can be compared with the national modal split data for the "elderly", as given in Chapter 2 above (Noble – 2000). Because some 75% of residents in sheltered housing are females, the weighted average of the elderly residents has been calculated and used in Table 5.11 below.

Table 5.11 Comparison of Modes of Travel – Sheltered Housing against National Data

Mode	Sheltered Housing	National Data – by age group				
		60-64	65-69	70-74	75-79	80+
Walking	44.8%	26.8%	32.3%	34.3%	35.3%	36.2%
Car Driver	20.6%	36.3%	31.0%	25.6%	21.3%	15.0%
Car Passenger	17.1%	23.5%	23.7%	22.4%	23.3%	26.2%
Bus	10.7%	8.3%	8.8%	13.2%	15.0%	15.1%
Other	6.8%	5.2%	4.1%	4.5%	5.1%	7.4%
Total	100%	100.1%	99.9%	100%	100%	99.9%

It is evident that the residents in sheltered housing undertake a significantly greater proportion of their trips on foot than the general members of the elderly population. Although the elderly population do tend to undertake a higher proportion of walking trips, as they age, even the over 80 year olds do not walk as much as the residents of sheltered housing. This may reflect the favourable location of most sheltered housing developments, being within walking distance of many shops and other facilities.

The proportion of car driving trips by residents is in the same order as for those of the general population aged in their late 70s. Given that the average age of residents is also in the late 70s, this may not be unexpected. However, the proportion of trips as a car passenger is lower for the residents in sheltered housing. This also applies to the overall proportion of trips by car. The overall proportion of car trips by sheltered housing residents is some 37.7%, whereas the proportion for the population in general is 59.8% for 60-64 years olds, 54.7% for 65-69 year olds, 48% for year olds, 44.6% for 75 to 79 year olds and 41.2% for those over the age of 80.

There is a jump in the proportion of trips by bus, when the general population reached the 70-74 years age group. The proportion of bus trips by the residents of sheltered housing is higher than for those persons under 69 but less than those of older persons, who are generally in the same age range. This may reflect the ability to walk to more destinations and therefore a lower need to use public transport.

5.7.2 Visitors' Trips

The residents gave information concerning some 396 visitor trips. Although the timing of these may be of doubtful validity, as indicated above, there is no reason to doubt the information given on the type of visitor. As might be expected, the majority of visits were from relatives and friends.

The visitor types, expressed as a proportion of the total, are shown in Table 5.12 below.

Table 5.12 Type of Visitor

Visitor	Number (total 396)	Percentage
Relatives	232	59%
Friends	72	18%
Home Help/Carer	42 + 15	14%
Hairdresser	12	3%
Nurse	11	3%
Meals on Wheels	3	<1%
Doctor	1	<1%
Other	8	2%
Totals	**396**	**Approx 100%**

Residents were also asked by what mode their visitors travelled to and from the development. The modes used are much more restricted in number and are as shown in table 5.13 below.

Table 5.13 Travel Modes Used by Visitors

Travel Mode	No of Trips	Proportion of Total
Cars	305	77.2%
Walking/Foot	60	15.2%
Bus	19	4.8%
Cycle	6	1.5%
Train	3	0.8%
Taxi	2	0.5%
Totals	**395**	**100%**

The difference in the modal split, when compared to that of the residents, is highly significant, with the car being the major mode for visitors and walking falling back to a much less significant second position. Of course this is not surprising. Many of the visitors are likely to be significantly younger and will have a much higher level of car ownership. However, it should also be noted that, whereas the residents may walk to nearby shops and other facilities, or even just go for a stroll, the distance travelled by visitors are likely to be such that walking may not be a feasible option.

It is difficult to compare the mode of residents' trips with the modes of travel of the population in general, as the age and sex of the visitors are not known.

5.8 Car Parking Provision

The car parking provision that may be made for a sheltered housing development made up of three types of car parking and is influenced by a number of factors. The types of parking are:-

1. Resident parking
2. House manager parking
3. Visitor parking

The resident and house manager parking is influenced by their car ownership. The visitor parking additional requirements are influenced by the number of visitors and the availability of spaces. The car parking provision for all of these is also influenced by national planning policy and the approach adopted by the local planning authorities.

5.8.1 Car Ownership – Residents

As indicated above, there are two conflicting characteristics of the residents' car ownership, which may have to be taken into account. The first is the falling level of car ownership over the life of the development, or at least during the relatively early years, prior to a possible levelling out of this characteristic.

The reduction in car ownership is illustrated in figures 5.3 and 5.4 above. The 1994 data shows a car ownership level of 0.357 cars per apartment in year 3. In the 12^{th} year of the developments its was reduced to 0.121 cars per apartment. This represents a decrease in car ownership of 0.236 cars per apartment over 9 years, a decrease of some 66%. The annual decrease averages some 7.3%.

The trend line for the 2002 data, as indicated in figure 5.4 above, shows a reduction from about 0.35 cars per apartment in year 4 to 0.16 in year 20. This suggests a 55% reduction in some 16 years, or an average of approximately 3.5% per annum. This would suggest a significantly slower rate of decline in car ownership than observed in 1994. However, this may reflect the inclusion of a period from about year 15 when car ownership could be a levelling off, such that the overall reduction appears to be spread over a longer period than is perhaps the case. For this reason, it is considered that the rate of decline is likely to be nearer to that indicated by the 1994 data.

It may be argued, however, that the car ownership trend shows a general increase for comparable developments. This is referred to in the consideration of "car ownership trends" above. In the five comparisons made, it suggests increases in car ownership of 34%, 24%, 16%, 20% and 24%, in a six year period. These give an average of 23.6%, or some 3 to 4% per annum.

It may be suggested that these two trends would tend to cancel each other out. However, it has to be acknowledged that the trend towards higher car ownership levels was likely to have been current during the period when the reduction in car ownership, as the development aged, was observed. This suggests that this reduction already takes this trend into account and that the rate of reduction might have been somewhat greater had this not been the case.

This reduction in car ownership does raise the important question:-

> ***Should the car parking provision made reflect the peak demand during the very early years of the life of the development or the demand at some later stage?***

Perhaps in an ideal world, where resources were not limited, provision would be made to meet the maximum demand, thereby ensuring that residents, the house manager and their visitors could always find a convenient parking space within the development. However, this could be wasteful of valuable urban land, resulting in a significant number of the car parking spaces being unused for the majority of the life of the development. In the "real world", this is an important constraint on provision.

The "real world" situation is reflected by national policy in place at the time this matter is considered. This will also have an important and perhaps over-riding influence on the provision to be made, as discussed below.

5.8.2 Car Ownership – House Manager

The average car ownership of the house managers is given in section 5.3.6 above as being some 1.12 cars per apartment. This can be rounded to one space per house manager's apartment, which is appropriate as McCarthy and Stone normally restricts the house managers to one car parked on the site.

5.8.3 Visitor Parking

A survey was undertaken in 1997, in order to ascertain the parking requirements for visitors to sheltered housing schemes. The surveys were undertaken at six of McCarthy and Stone's developments (Survey D). In order to ascertain the peak visitor requirements, the surveys were undertaken over one long weekday, i.e. on a Friday, and on a Saturday and a Sunday.

The survey staff noted, where possible, the registration numbers of all the vehicles within the car park of the development at 8 a.m. They then noted the registration numbers and times of all the arrivals and departures of vehicles, up to 8 p.m. The registration numbers of the residents' cars (and the house manager) were obtained from the house managers, in order that the cars of the residents and their visitors could be separated.

The results of the survey are shown in the graphs in Appendix X. These show the parking spaces occupied by residents, the house manager and visitors at regular intervals throughout the day. The data shows that the peak visitor parking demand occurs on the weekday, i.e. the Friday. Adding the peak visitor parking numbers for each of the developments, gives a total of 34 visitor cars. At the time of the survey, the number of occupied apartments in the developments was 323. This represents an average of 1 visitor car for every 9.5 apartments, or 0.105 visitor cars per apartment during this peak.

As it is standard practice not to allocate car parking spaces to the residents, visitors can use the spaces vacated by residents. Therefore the demand for visitor parking spaces is limited to the number of spaces needed, over and above those provided for residents.

A realistic approach to determining the likely additional parking demand for visitors is to assess by how much the maximum number of parked cars observed exceeds the number of residents cars.

As an example, consider the first graph in Appendix X, for Homewest House, Bournemouth (Friday). Here the maximum number of residents cars observed was 5, and the maximum number of spaces occupied was 8. One might, therefore, assume a requirement for 3 visitor spaces.

For the example chosen here, it happens that all the residents' cars were present at some time during the survey. However, at the other Bournemouth development, Homewaye House, only two of the four residents cars were present at any time. It is likely that, particularly with the larger developments, some of the residents will always be absent at the peak visitor times.

Adopting this approach, the requirement for the six selected developments would be as follows:-

Homewest House	3 spaces
Homewaye House	6 spaces
Homesea House	6 spaces
Homelawn House	1 space
Homehill House	6 spaces
Homelinks House	5 spaces

It is interesting to note that the maximum requirement arises on a Friday for 5 out of the six developments. The exception is Homelinks House, where the peak was on the Sunday. This Sunday peak was, however, only marginally higher than the Friday peak.

Taking into account the size of the developments, the visitor parking requirements can be summarised as indicated in Table 5.14, below.

Table 5.14 Visitor Parking Demand

Development	Spaces/occupied apartment
Homewest House	**0.11**
Homewaye House	**0.09**
Homesea House	**0.08**
Homelawn House	**0.01**
Homehill House	**0.13**
Homelinks House	**0.15**
Overall Average	**0.08**

Expressed in another understandable way, if we effectively assume that not all of the apartments will be occupied, we would require approximately one additional space for visitors, for every 12.5 apartments.

5.8.4 National Policy - Car Parking

Guidance on the provision of car parking at developments has evolved over recent years. Up until the early 1990s, it was normal to assume that development should make full provision for all of its parking needs. The demands of the users, whether they be, for example, residents, employees or visitors, would be expected to be met. However, this approach has fundamentally changed.

In 1994, a new version of Planning Policy Guidance Note 13 "Transport" (Department of the Environment - 1994) was published by Central Government and applied to both England and Wales. This introduced the concept of limiting vehicle movements by constraining car parking provision. It promoted the use of maximum, as opposed to minimum, car parking standards, implying that full provision to meet the demand for spaces would no longer be appropriate.

This 1994 guidance has subsequently been updated and, indeed, strengthened. The latest guidance (Department of Transport, Local Government and the Regions – 2001) not only reflects the desire to discourage car usage, but also a need to make the best use of urban land, so as to avoid the need to develop rural land. The advice given in the various sets of guidance, including PPG 3 "Housing" (Department of the Environment, Transport and the Regions – 2000), are summarised below.

PPG 13 "Transport" (March 2001)

Paragraph 6 of PPG 13 advises local authorities that they should:-

> *"use parking policies, alongside other planning and transport measures, to promote sustainable transport choices and reduce reliance on the car for work and other journeys"*

PPG 13 promotes the optimum use of well-located sites. In paragraph 21 it starts by advising that:-

> *"local authorities should seek to make maximum use of the most accessible sites, such as those in town centres and others which are, or will be, close to major transport interchanges. These opportunities may be scarce. They should be pro-active in promoting intensive development in these areas and on such sites."*

Parking is specifically considered under the general heading of "*Managing Travel Demand*", and should be considered in that context. Paragraph 49 repeats some of the guidance from the previous version of PPG 13 on how controlling car parking can influence how people travel. It goes on to state that-

> *"Car parking also takes up a large amount of space in development, is costly to business and reduces density. Reducing the amount of parking in new development (and in the expansion and change of use in existing development) is essential, as part of a package of planning and transport measures, to promote sustainable travel choices."*

In paragraph 51, it advises that authorities should:-

> *"not require developers to provide more spaces than they themselves wish, other than in exceptional circumstances which might include for example where there are significant implications for road safety which cannot be resolved through the introduction or enforcement of on-street parking controls."*

This guidance is stronger than that in the previous version of PPG13, in that it removes the scope to argue that on-street parking will, as a matter of course, cause problems. If this is thought to be the case, an authority will need to show that the problems caused would be significant and that parking restrictions could not be used to overcome them. Furthermore, it appears that difficulties in enforcing on-street parking controls will not be accepted as justifying a higher level of off-street provision in developments.

Local authorities are advised, in paragraph 52, to set maximum levels of parking in their development plans. One of the reasons for this is to "*reduce the land-take of development*".

PPG 3 "Housing" (March 2000)

Given that the land use considered in this study is housing, guidance is also given in PPG3 .

In paragraph 59, it describes the local authority requirements for car parking in developments as being "*a significant determinant of the amount of land required for housing*".

In paragraph 60, it advises that:-

> *"Car parking standards for housing have become increasingly demanding and have been applied too rigidly, often as minimum standards. 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. Parking policies should be framed with good design in mind, recognising that car ownership varies with income, age, household type and type of housing and its location. They should not be expressed as minimum standards."*

Paragraph 61 includes the advice that:-

> *"Local authorities should revise their parking standards to allow for significantly lower levels of off-street parking provision, particularly for developments:*
> *in locations, such as town centres, where services are readily accessible by walking, cycling or public transport;*
> *which provide housing for elderly people, students and single people where the demand for car parking is likely to be less than for family housing".*

In paragraph 62, the advice states:-

> *"Car parking standards that result, on average, in development with more than 1.5 off-street car parking spaces per dwelling are unlikely to reflect the Government's emphasis on securing sustainable residential environments. Policies which would result in higher levels of off-street parking, especially in urban areas, should not be adopted."*

Given that the average demand for residential car parking in most housing areas would be expected to exceed this suggested maximum average level, this suggests constraint of parking provision in residential developments.

Now that Scotland has its own parliament and Wales its own assembly, separate guidance has been issued for these countries.

The Scottish Office guidance on "Transport and Planning" is given in National Planning Policy Guidance 17 (Scottish Office - 1999). It should be noted, however, that this guidance is currently being reviewed. Paragraph 21 refers to a *"a set of maximum parking standards for specific uses"*. This is reinforced in paragraph 22, which states that:-

> *"The methodology is intended to ensure that access to significant travel-generating developments by non-car modes becomes significantly greater than at present. The emergence of Transport Assessments and maximum parking standards will focus attention on the requirement to deliver an appropriate modal split in accessing new developments. It is no longer appropriate for minimum parking standards to be a requirement of development proposals....."*

Car Parking is addressed in more detail in paragraphs 57 and 58. These include the following:-

> *"Parking policies have an important role to play in reducing reliance on the private car. This will require a well-structured approach related to location, the non-car modes likely to be available and the journey purposes served by parking..... As paragraphs 21 and 22 indicate the setting of maximum parking standards will support policies for improved accessibility by public transport, foot and cycle and to ensure that targets consistent with the Road Traffic Reduction Act and any other national and local traffic and air pollution targets, can be met. Parking restraint policies should be supported by appropriate complementary measures to promote the availability of high quality public transport services and the effective management of traffic demand."*

In March 2003 the final version of an addendum was published to NPPG17, under the heading "Scottish Planning Policy - SPP 17 - Transport and Planning Maximum Car Parking Standards (Scottish Executive - 2003)". This confirms the use of maximum car parking standards, for all land uses, with the possible exception of residential development. It refers, in paragraph 11, to the possible need for "parking control zones", if the use of maximum standards for a development proposal would be likely to result in on-street parking that would result in "operational congestion and safety issues".

In addressing the issue of maximum car parking standards for residential development, SPP 17 states:-

> *"If constraining parking at trip destination has the desired effect of reducing numbers of car trips, while car ownership remains unconstrained, more cars will have to remain parked at home. Residential development should, therefore, be excluded from maximum car parking standards. Planning authorities, in the context of highly accessible sites, should however consider applying locally derived maximum car parking standards to such residential development, including in appropriate cases car-free housing".*

Whilst not suggesting the general use of maximum car parking standards for residential development, it does not rule this out in appropriate circumstances and it is noticeable that there is no indication that minimum car parking standards should apply. The guidance appears, therefore, to promote a degree of flexibility.

The current guidance for Wales is included in "Planning Policy " (Welsh Office - 1999) and in Technical Advice Note 18 (Welsh Office - 1998) . Chapter 2 of Planning Policy Wales addresses the issue of sustainability, and refers to the duty, under the Wales Act 1998, to promote sustainable development.

One of the key policy objectives is to "*promote resource efficient settlement patterns that minimise land take...*". The guidance advises that "*higher density development, including residential development, should be encouraged near public transport nodes, or near corridors well served by public transport (or with the potential to be so served).*" It also advises that *"the design process should also promote the efficient use of resources, including land".*

Chapter 8 of "Planning Policy Wales" deals with transport issues. Paragraph 8.4.2 indicates that:-

> *"Car parking provision is a major influence on the choice of means of transport and the pattern of development. Local authorities should ensure that new developments provide lower levels or parking than have generally been achieved in the past. Minimum parking standards are no longer appropriate. Local authorities should develop an integrated strategy on parking to support the overall transport and locational policies of the UDP".*

The following paragraph indicates that authorities should *"jointly establish maximum levels of parking for broad classes of development, together with a threshold size of development above which such levels will apply. These maximum standards should be set in collaboration with interested organisations."*

The Technical Advice Note (TAN 18) reinforces this guidance.

Local authorities are advised to "*reflect the differing needs of residential, retail and other commercial development".*

Paragraph 30 advises that:-

> *"Parking standards in UDPs should be set as a range of maximum and operational minimum amounts of parking for broad classes of development and location. In locations with good access to means of travel other than the private car, local authorities should consider reducing the maximum parking allowed."*

The following paragraph refers to how development proposals should be considered. It states that:-

> *"When seeking planning permission most developers will be required to provide parking provision to avoid causing traffic problems. Space for operational parking (e.g. service and delivery vehicles) will normally be provided on-site. Subject to environmental, highway access, or traffic management considerations, the applicant may also be required to provide appropriate non-operational parking on-site".*

5.8.5. Recommendations for Car Parking Provision

The car parking provision proposed for any new development will need to take into account both the demand for spaces and the policies applying at any the time.

House Manager Provision

Although there is no requirement for all house managers to own a car, there is an argument that possession of a vehicle could be beneficial for the house managers in the performance of their duties. They may be better equipped to assist residents, particularly in an emergency. On this basis, a parking space for the house manager could be considered to be "operational parking", that is necessary for the operation of the development. One space for the house manager would, therefore, be provided in each development.

Visitor Parking Provision

Given the policy guidance, the provision of parking spaces for visitors is clearly not a high priority. If provision is not made, visitors would have to park away from the site and consequently may be encouraged to use other modes of travel. This is wholly compatible with the policy guidance referred to above.

However, for social reasons, residents should not be isolated from their potential visitors.

It would appear appropriate, therefore, only to provide full provision for visitors in areas which are remote from public transport services and where there is no available off-site car parking. Conversely, no provision would be made where a development is well located for public transport services and/or where there is off-site car parking readily available, even if this involves the payment of a car parking charge. The provision should, therefore, range from no spaces in highly accessible areas to a minimum of 0.08 spaces per apartment in the least favourably located developments, well away from public transport services and where there is no alternative off site car parking available.

In exceptional circumstances, where parking might not be provided for residents, there can be no joint use of spaces. In such circumstances, the provision for visitors could be approximately 1 space for every 9.5 apartments, or 0.105 spaces per apartment.

The provision to be made is a matter of judgement.

Resident Parking Provision

The level of resident parking to be provided would also normally be influenced by policy considerations. However, as a guide to the likely "demand" for resident spaces, consideration has been given to the peak level of demand. The basis for this assessment is the January 2002 telephone survey (Survey A – 2002). As the sales period for new developments would be up to about three years, developments opened in 1999, 2000 and 2001 were not considered in this assessment. In addition, older developments, where car ownership would be likely to have fallen below its peak are also excluded. Consequently, the data used has been confined to the developments opened in the three years 1996, 1997 and 1998. These are the developments where the overall car ownership is likely to be at its peak.

In these developments, there were a total of 1905 one-bedroom apartments and 936 two-bedroom apartments occupied in the 2002 survey, when the total resident car ownership was 970 cars. This equates to some 0.34 cars per occupied apartment.

However, as indicated in section 5.2, the car ownership of two-bedroom apartments has been found to be higher than that of one-bedroom apartments. The ratio in 1996 was found to be 2.2 and in 2000/2001 was found to be 1.84. The average of these two ratios is 2.02. Applying this ratio to the two bedroom apartments, and then adding the number of one bedroom apartments, the total equivalent one-bedroom apartments would be 3796. The car ownership for one-bedroom apartments would then be 0.256 cars per apartment. For two-bedroom apartments, this would rise to 0.516 cars per apartment.

This is the average provision required to meet the demand for resident parking in the early years. For a typical development with 75% one-bedroom apartments and 25% two-bedroom apartments, this equates to approximately 0.32 cars per apartment.

In line with the policy guidance referred to above, this provision could be varied, depending on the accessibility of the development to shops and services. On the basis that the best-located sites should make the lowest provision and the least favourably located sites should make the highest provision, it is suggested that the provision for these should be approximately the equivalent to the 15%ile and 85%ile car ownership values, respectively.

For the purposes of this exercise, the locational characteristics will be considered in the following context:-

Most Favourable Location

Criteria:- In or immediately adjacent to the town or major district shopping centre, with a generally full range of shops and associated services.

With easy access on foot or by public transport to other services such as doctor's surgery, dentist etc.

Very conveniently located for a public transport node (e.g. a bus station, a railway/tube station or an interchange serving both forms of transport).

Available off-site car parking, in public car park(s) or on-street, where there are no significant capacity or safety implications.

Typical Locations

Criteria:- Within easy walking distance of a range of shops meeting the everyday needs of residents, such as a newsagent, general food/convenience store and ideally a pharmacy.

Reasonably convenient, by foot or public transport, for some or all other services such as a bank, doctor's surgery, dentist etc.

Located on, or close to, a good public transport corridor and its bus stops (or rail/tube station) with services to the main shopping centre and/or major supermarket, with a regular frequency of two or three services per hour during the main part of the day.

A typically located development should normally make provision for visitor parking. However, if there is readily available off-site car parking, in public car park(s) or on street, where there are no capacity or significant safety implications, some or all visitor parking can be omitted.

Least Favourable Locations

Criteria:- Relatively remote (although still normally within about 800 metres) from a range of shops meeting the everyday needs of residents, such as a newsagent, general food/convenience store and ideally a pharmacy.

Not conveniently located, either by foot or public transport, for other services such as a bank, doctor's surgery, dentist etc.

Some 400 metres or more from bus stops (or rail/tube station) with services to the main shopping centre and/or major supermarket, or where the frequency of service is limited to one or fewer services per hour during the main part of the day.

No, or very limited, available off-site car parking.

Taking the data from the 1996/1997/1998 sites, the 15%ile one-bedroom equivalent is 0.16 cars per apartment and the 85%ile one-bedroom equivalent is 0.34 cars per apartment.

In adopting this approach, the suggested provision of car parking spaces for residents would be as follows:-

	One-bedroom Apartments	Two-bedroom Apartments
Most Favourably Located	0.16	0.32
Typical Location	0.26	0.52
Least Favourably Located	0.34	0.68

As indicated above, given the policy guidelines, the actual provision is a matter of judgement. It will be influenced by local car parking standards, which are, or should, be set as maximum standards, and other local circumstances. As there appears to be some correlation between car ownership in these development and the car ownership of pensioner households in the area, this could be one local factor to be considered, with a slightly higher provision being considered in areas of higher than normal pensioner car ownership.

5.9 Cycle Parking

5.9.1 Recommendations for Cycle Parking Provision

The cycle ownership and potential cycle ownership is described above.

Policy guidance encourages the use of other modes of travel than the private car. The cycle is one such favoured mode of travel. In most instances, therefore, cycle parking standards are set as minimum levels of provision. However, they must clearly be appropriate to the nature of the development.

Cycle Parking for Residents

The data indicates that currently only 2% of residents own cycles and that there is potential for this to rise by a further 2.25%. The typical provision should, therefore, allow for 4.25% of residents to have cycles.

On average, the occupancy of an apartment is some 1.188 persons per apartment. Using this, the combined cycle ownership/potential cycle ownership, can be expressed as 1 cycle for every 5% of apartments. The requirement is, therefore, 0.05 cycle parking spaces per apartment.

Cycle Parking for House Managers

As indicated above, the average requirement is one space for each house manager's apartment.

Cycle Parking for Visitors

Visitors will tend to spend relatively short times at the developments, and therefore there is likelihood that cycle parking spaces can be used by more than one visitor per day. The provision should reflect this.

A survey was undertaken in late 1998/early 1999, which took the form of a brief questionnaire sent to the house managers of 30 existing McCarthy and Stone Category II sheltered housing developments. Responses were received from all of these house managers. These have been used as the basis for this assessment.

The developments surveyed were chosen because of their geographical spread, from Falmouth, Cornwall, to Cromer in Norfolk and Dundee in Scotland. A range of development ages was chosen, with the schemes ranging from one opened in 1980 to one opened in 1997.

The developments surveyed incorporated a total of some 1526 apartments, with an average of approximately 51 apartments per scheme.

The maximum number of visitors using bicycles observed on these sites, at any one time, averages out at approximately 1 per 29 apartments or 0.035 visits per apartment at any one time. The results of this part of the survey are given in Table 5.15, below. The maximum figure at any one development was 6. From comments made on some of the responses, this number often includes paperboys and/or the postman, who may not normally be expected to require secure cycle parking. For this reason the estimated requirements are sometimes lower than the maximum observed.

Table 5.15 Cycle Visitor Parking Survey

Development	Opening Year	Apartments	Max Visitors
Homemead House, Romsey,	1980	36	2
Homepoint House, Southampton,	1982	51	2
Homehill House, Bexhill on Sea,	1983	49	1
Homecombe, Torquay	1984	62	0
Homesands House, Southport	1984	57	5
Homedowne House, Gosforth, Newcastle	1985	40	2
Homepier, Worthing	1985	31	6
Homegower House, Swansea	1986	135	0
Hometay, Dundee	1987	44	3
Homecolne House. Cromer	1987	50	0
Homefirs House, Wembley	1987	48	1
Homebell House, Aldridge (W Midlands)	1988	70	5
Barum Court, Barnstaple	1988	50	3
Denehyrst Court, Guildford	1989	36	0
Tumbling Bay Court, Oxford	1990	60	4
Ashton Court, Gourock, (Scotland)	1991	24	0
Nailers Court, Bromsgrove	1991	60	2
Cedar Court, Tenterden (Kent)	1991	34	0
The Chines, Westbourne, (Dorset)	1992	53	1
Scholars Court, Stratford Upon Avon	1992	43	3
Fairview Court, Glasgow	1993	33	0
Livingstone Court, Barnet	1993	45	0
Dellers Court,Taunton	1994	43	3
Springbank Court, Altrincham	1994	43	3
Trinity Court, Rugby	1994	31	2
Amber Court, Hove	1995	49	0
Orchard Court, Leeds	1995	45	2
Bay Court, Falmouth	1996	60	0
Mayfield Court, Edinburgh	1996	96	2
Silvas Court, Morpeth	1997	48	1
TOTALS		1526	53

The house managers were given an opportunity to comment on the issue. Only some took this opportunity, but the comments made were as follows:-

> *"Paperboy just leaves bike at front door, while delivering. One visitor leaves her bike in the outer foyer, 2 other visitors leave bikes on the grass at the back. Nobody has ever asked for bike stands".*

"Often in bad weather expensive cycles are required to be kept indoors or covered, as carers who may be on site for some considerable time need to keep bikes dry. Family members visiting residents often have a "don't care" attitude and ride straight across the garden to a ground floor flat. If there were bike spaces, house managers could insist on "Leave bikes in car park". Provision is made for 3 wheeled electric trikes for disabled residents and it is possible to allocate a car park space for bikes."

"I have had 1 lady on a bicycle in 12 months"

The house managers also gave an indication of the frequency of visitors, although some did not specify a period, and so this data is not included. This part of the survey data is given in table 5.16, below.

Table 5.16 Frequency of Visitors on Bicycle

Development	Apartments	Frequency of visitors on bicycles	Comments
Homemead House, Romsey,	36	2 per day	
Homepoint House, Southampton,	51	2 per day	Newspaper boys only
Homehill House, Bexhill on Sea,	49	1 per week	
Homecombe, Torquay	62	0	Never to HM's knowledge
Homesands House, Southport	57	1 per day	
Homedowne House, Gosforth, Newcastle	40	-	
Homepier, Worthing	31	-	
Homegower House, Swansea	135	0	
Hometay, Dundee	44	6 per day	Paper boys
Homecolne House. Cromer	50	0	
Homefirs House, Wembley	48	4 per month	
Homebell House, Aldridge (W Midlands)	70	5 per day	Paper boy twice daily, carers twice daily, visitor once daily
Barum Court, Barnstaple	50	Infrequently	
Denehyrst Court, Guildford	36	Paper boy only	
Tumbling Bay Court, Oxford	60	4 per day	
Ashton Court, Gourock, (Scotland)	24	0	
Nailers Court, Bromsgrove	60	1 per week	
Cedar Court, Tenterden (Kent)	34	0	
The Chines, Westbourne, (Dorset)	53	2 per day	Paper boy and postman
Scholars Court, Stratford Upon Avon	43	5 per week	
Fairview Court, Glasgow	33	0	
Livingstone Court, Barnet	45	0	
Trinity Court, Rugby	31	3 per day	
Dellers Court,Taunton	43	-	
Springbank Court, Altrincham	43	4 per day	
Amber Court, Hove	49	0	
Orchard Court, Leeds	45	1 per month	
Bay Court, Falmouth	60	0	1 lady on bicycle in 12 months
Mayfield Court, Edinburgh	96	3 per day	
Silvas Court, Morpeth	48	1 per week	
TOTALS	1526		

Whilst 0.035 spaces per apartment would be likely to cater for the average requirements of visitors, this may not be sufficient to meet all normal peak demands. A provision of twice this level, of 0.07 spaces per apartment should ensure that most peak demands are met.

5.9.2 Variation in Provision

As cycle use is to be encouraged, it is suggested that the provision should not be reduced below the levels indicated above.

However, in locations where there is additional encouragement to use the cycle, such as where cycle tracks link the site to the surrounding areas, such as the town centre, consideration should be given to boosting cycle parking provision to further encourage use. However, it is considered unlikely that an increase of more than 10% to 20% would be appropriate.

5.10 Traffic Generation

5.10.1 Definition of Traffic Generation

Traffic generation data is usually expressed in one of two ways. It may be related to the size of the development, expressed as vehicle movements per unit of floor area, or it may be related to numbers of units, e.g. bedrooms in a hotel, or houses in a residential development. As this is a residential use, the obvious method of expressing the trip generation is the number of vehicle movements per apartment. This is the basic approach adopted here. A vehicle movement is a one-way trip, either to or from the development.

5.10.2 Available Traffic Generation Data

Trip generation rate data has been derived by the operators of the TRICS (Trip Rate Information Computer System) database. This is a nationally recognised database, originally set up by a consortium of local authorities. Unfortunately, at the time of the preparation of this thesis, the TRICS analysis takes little or no account of the different forms of sheltered housing, which are likely to have different trip making characteristics. There may also be other aspects of the data that affects its reliability.

In this section of the thesis, the appropriate means of estimating traffic generation of this form of sheltered housing is derived. It only relates to genuine Category II Sheltered Housing developments and not Category I housing, where a lower level of services are provided, or to some hybrid form of development.

5.10.3 Historic Traffic Generation Data – 1985

Data was submitted by McCarthy and Stone at public inquiries in the late 1980s, based on a survey undertaken in 1985. The results of surveys at 16 developments are reproduced in table 5.17, below.

The data shows the average trip generation rate was 0.774 vehicle movements per 12 hour day, between 8 a.m. and 8 p.m. The maximum rate was 1.064 movements per day and the minimum was 0.463.

For comparison purposes, a "rule of thumb" traffic generation rate for a standard house was assumed, at that time, to be about 6 vehicle movements per day. Consequently, some 7 to 8 sheltered housing apartments would have had the same generation as a standard family dwelling.

Table 5.17 1985 Weekday Traffic Generation Data

County	Development	Units	Vehicle Move-ments	Trip Rate Vehicle movements /apartment
Hampshire	Waverley Crt, N Milton	32	23	0.719
	Homefield Hse, N Milton	32	17	0.531
	Homegrange Hse, Milford on Sea	36	24	0.666
	Homewood Hse, Lymington	46	29	0.630
	Homerise Hse, Winchester	51	41	0.804
	Homegrove Hse, Southsea	77	65	0.844
	Homepoint Hse, Southampton	52	45	0.865
Dorset	Homeleigh Hse, Bournemouth	44	23	0.522
	Homecliffe Hse, Highcliffe	50	32	0.640
	Homechester Hse, Dorchester	51	54	1.059
Surrey	Homebeech Hse, Woking	90	85	0.944
Wiltshire	Homesarum Hse, Salisbury	47	50	1.064
East Sussex	Homehill Hse, Bexhill	49	26	0.531
Gloucester	Homeberry Hse, Cirencester	60	53	0.883
Essex	Homebush Hse, Chingford	57	49	0.860
Cheshire	Homedee Hse, Chester	54	25	0.463
Totals		**828**	**641**	**0.774**

5.10.4 Historic Traffic Generation Data – 1997

A further survey was undertaken in March 1997, when the traffic generation for the period from 8 a.m. to 8 p.m. was also obtained for 8 developments. These surveys were undertaken on a Friday, Saturday and Sunday. The survey involved a manual count of all vehicles arriving and leaving the developments. Consequently, the data collected includes all vehicle movements, by residents, visitors and servicing traffic.

The results of the survey are indicated in table 5.18, below.

Table 5.18 (a) 1997 Traffic Generation Data - Friday

County	Development	Units	Friday		Trip Rate Vehicle movements /apartment
			In	Out	
Lancashire	Poplar Crt, Lytham St Annes *	74	59	61	1.62
	Homelinks Hse, Lytham St Annes	41	27	28	1.34
Sussex	Homehill Hse, Bexhill on Sea	50	28	28	1.12
	Homelawn Hse, Bexhill on Sea	79	43	43	1.09
Hampshire	Homesea Hse, Southsea	79	31	30	0.77
	Homerose Hse, Southsea **	52	6	8	0.27
Dorset	Homewaye Hse, Bournemouth	69	19	17	0.52
	Homewell Hse, Bournemouth	32	24	23	1.46
Totals		**476**	**237**	**238**	
			475		**1.00**

Table 5.18 (b) 1997 Traffic Generation Data - Saturday

County	Development	Units	Friday		Trip Rate Vehicle movements /apartment
			In	Out	
Lancashire	Poplar Crt, Lytham St Annes *	74	35	35	0.94
	Homelinks Hse, Lytham St Annes	41	20	18	0.93
Sussex	Homehill Hse, Bexhill on Sea	50	28	30	1.16
	Homelawn Hse, Bexhill on Sea	79	29	29	0.73
Hampshire	Homesea Hse, Southsea	79	35	36	0.77
	Homerose Hse, Southsea **	52	7	9	0.31
Dorset	Homewaye Hse, Bournemouth	69	9	11	0.29
	Homewell Hse, Bournemouth	32	12	13	0.78
Totals		**476**	**175**	**181**	
			356		**0.75**

Table 5.18 (c) 1997 Traffic Generation Data - Sunday

County	Development	Units	Friday		Trip Rate Vehicle movements /apartment
			In	Out	
Lancashire	Poplar Crt, Lytham St Annes *	74	27	26	0.72
	Homelinks Hse, Lytham St Annes	41	21	21	1.02
Sussex	Homehill Hse, Bexhill on Sea	50	11	12	0.46
	Homelawn Hse, Bexhill on Sea	79	32	30	0.78
Hampshire	Homesea Hse, Southsea	79	28	28	0.71
	Homerose Hse, Southsea **	52	4	4	0.15
Dorset	Homewaye Hse, Bournemouth	69	12	11	0.33
	Homewell Hse, Bournemouth	32	13	10	0.72
Totals		**476**	**148**	**142**	
			290		**0.61**

* Residents' parking spaces were allocated in Poplar Court
** The car park to Homerose House was gated.

It should be noted that the trip generation rates at two of the developments may be influenced by unusual characteristics at the site. The Poplar Court development was one of the relatively few in the country where car parking spaces have been allocated to residents. It is understood that some other spaces were also allocated to visitors. Anecdotal evidence suggests that the car ownership of residents is higher than might otherwise be expected in such developments, as residents are more reluctant to give up a car, as this will also involve giving up the car space. Some residents feel that their parking space is rightly theirs and would not wish to lose it. Higher car ownership levels can affect the use of vehicles and consequently the traffic generation.

Homerose House is located close to the Southsea shopping centre. It is understood that some unauthorised parking was being experienced on this site and so a barrier was erected. Such a barrier might prevent or discourage visitors from entering the site. Visitors might, therefore, park elsewhere and walk to the site, thereby reducing the apparent traffic generation.

If it were assumed that the impact of these two developments tend to balance each other, the traffic generation rates are as indicated in table 5.19, below. The table also includes the generation rates if the two "unusual" developments are omitted.

Table 5.19 - Traffic Generation Rates – Friday, Saturday and Sunday

	Friday	Saturday	Sunday
All Surveyed Developments	1	0.75	0.61
Excluding "Unusual" Developments	0.97	0.77	0.65

It can be seen that the traffic generation is at its highest on the weekday surveyed, i.e. the Friday. The Saturday generation was some three quarters of the Friday generation with the Sunday generation being even lower, at about three fifths to two thirds of the Friday figure.

Again, for comparison purposes, the "rule of thumb" traffic generation rate, based on the TRICS data (TRICS), for a standard dwelling was in the order of 7 vehicle movements per day, at the time of this survey. It appears, therefore, that the general relationship between the traffic generation of sheltered housing and standard housing remained approximately the same between 1985 and 1997. In 1985, the weekday traffic generation of a sheltered housing scheme was about 13% of that of an average standard dwelling and in 1997 it was some 14%.

In line with the traffic generation of standard housing, there was a growth in the generation rate of sheltered housing during this 12 year period.

5.10.5 Current Traffic Generation

Whereas the survey undertaken in 2000/2001 sought information concerning the trips made by residents and visitors, by all modes, the analysis undertaken suggests that the responses are unreliable. The survey requested that the residents of the sample apartments keep a diary of the trips made to and from their apartment for a particular day of the week. Although the responses to the small pilot study were generally satisfactory, the analysis carried out of the main survey results shows that a number of residents included trips made on a number of days.

Whilst not indicating that this was what they had done, it was evident that the responses were not accurate, because, for example, some residents were apparently in two or more places at the same time. This data was not, therefore, considered sufficiently reliable for use in estimating trip generation rates. It has, however, been used for other purposes.

Instead, the traffic generation rate is derived from actual traffic count data collected during the period 1998 to 2003, with the majority being collected in 2000. In order to ensure that the derivation is valid and does not show any avoidable bias, well-established and accepted statistical methods have been used.

The TRICS database (TRICS) specifies that general trip rate data is not given in the TRICS datacard where data is available for fewer than 6 sets of survey results. This appears to reflect a concern to ensure an adequate sample rate. The analysis described below is based on the results of some three times this number of surveys, undertaken during the past few years. Nine of the sample sites were selected for their varying years of opening, ranging from 1984 to 1999, for their range of proportion of two-bedroom apartments and also their varied locations. Data from an additional three sites was also already available. Subsequently, data from a number of other developments has become available.

The sites are listed in table 5.20, below, which includes an indication of the dates of each survey. The layouts of the accesses to most developments are not suitable for surveys by means of automatic traffic counters. Consequently, all surveys involved manual counts, undertaken by an independent survey company, and involved the taking of the registration numbers of the vehicles entering and leaving the development between the hours of 0700 and 1900, except where indicated.

Table 5.20 (a) – Selected Developments for Traffic Generation Survey

Development	Town/City	Year of Opening	1 bedroom apartments	2 bedroom apartments	Parking Spaces	Date of Survey
Fairview Court	Kingston Upon Thames	1988	38	0	12	Mon 6 Nov 2000
Diamond Court	Somerton – N Oxon	1988	27	30	16	Fri 10 Nov 2000
Grayrigge Court	Grange Over Sands – Cumbria	1990	17	48	35	Wed 15 Nov 2000
Homedee House	Chester	1984	54	0	10	Thurs 23 Nov 2000
Albion Court	Northampton	1997	42	17	15	Mon 27 Nov 2000
Elphinstone Court	Kilmacolm – Scotland	1989	37	12	28	Wed 22 Nov 2000
Bourne Court	Caterham	1994	26	8	17	Wed 8 Nov 2000
Glendower Court	Cardiff	1994/96[1]	63	50	38	Mon 13 Nov 2000
Ailsa Craig View	Prestwick- Scotland	1999	40	13	18	Thurs 23 Nov 2000
Totals			**344**	**178**	**189**	

Note :- 1. This development was undertaken in two phases.

Table 5.20 (b) – Developments where Traffic Generation Data Was or Became Available

Development	Town/City	Year of Opening	1 bedroom apartments	2 bedroom apartments	Parking Spaces	Date of Survey
Homegower House	Swansea	1986	109	26	30	Fri 28 Jul 2000
Mumbles Bay Court	Swansea	1993	9	47	45	Fri 28 Jul 2000
Haldenby Court	Swanland – Hull	1992	25	15	28	6 – 12 Aug 1998 [2]
Hometide House	Gosport	1983	54	0	14	17 – 19 May 2002
Homeryde House	Gosport	1988	31	3	12	17 – 19 May 2002
Homefort House	Gosport	1986	70	3	28	17 – 19 May 2002
Forest Dene Court	Sutton, Surrey	1987	96	1	32	7 February 2001
Redwood Court	Ewell, Surrey	2000	22	8	13	8 February 2001
Crosfield Court	Watford	1996	53	21	26	4-6 March 2003
		Totals	**469**	**103**	**202**	

2. This survey was by means of an automatic traffic counter in August 1998.

5.10.6 House Managers' Generation

One factor that needs to be taken into account is that each development will normally have a house manager. This will be a younger person, possibly with a family, whose apartment may have a different trip generation rate than the others in the development. The trip rate of the house manager's apartment is probably unrelated to the number of apartments in the development as a whole.

In order to try to eliminate any distortion due to the house manager's movements (one survey site had two house managers – one for each development phase) the registration numbers of the house managers cars were obtained, where possible, and the trips of these vehicles deducted from the observed totals. This could only be done for the nine specially selected sites where a registration number survey was undertaken. However, this allowed an average number of trips to be obtained for the house managers, and this correction was applied to the other sets of data.

Table 5.21 below gives the trip data for the surveyed sites.

Table 5.21 House Manager, Residents' and Visitor Trips

Development	Town/City	House Manager Trips	Resident/Visitor Trips
Fairview Court	Kingston Upon Thames	4	78
Diamond Court	Somerton – N Oxon	0	53
Grayrigge Court	Grange Over Sands – Cumbria	0	24
Homedee House	Chester	0	36
Albion Court	Northampton	0	56
Elphinstone Court	Kilmacolm – Scotland	2	96
Bourne Court	Caterham	0	24
Glendower Court [1]	Cardiff	6	195
Ailsa Craig View	Prestwick- Scotland	2	51
		Mean =1.55	
		Say 2	
Homegower House	Swansea	2[2]	142
Mumbles Bay Court	Swansea	2[2]	104
Haldenby Court	Swanland – Hull	2[2]	51[3]
Hometide House	Gosport	2[2]	38[4]
Homeryde House	Gosport	2[2]	23[4]
Homefort House	Gosport	2[2]	42[4]
Forest Dene Court	Sutton	2[2]	137
Redwood Court	Ewell	2[2]	18
Crosfield Court	Watford	2[2]	89[5]
	Totals	**32**	**1257**

Notes:-

1. Two House Managers
2. Estimated
3. Based on average of 5 weekday flows
4. Friday Count (survey included weekend)
5. Average of 3 weekdays

5.10.7 Residents' Traffic Generation

The standard means of obtaining an average trip rate would be to divide the number of vehicle movements by the number of apartments. From the above data, this would give 1257 vehicle movements from 1115 apartments, or a trip rate of 1.13 vehicle movements per apartment per day.

Whilst this may be a very useful figure, it may reflect an over-simplistic approach, if a full understanding of the factors that influence trip generation is to be achieved. In order to investigate this further, linear regression techniques, including multiple linear regression, have been used to test the following hypotheses:-

Null Hypothesis 1:- The vehicle trip generation of a development is independent of the overall number of apartments within the development.

Alternative Hypothesis 1:- The vehicle trip generation of a development is dependent on the overall number of apartments within the development.

Logic would suggest that there is a clear relationship here, in that if there were no apartments there would be no residents to make any vehicle movements and the more apartments there are the greater the likelihood of vehicles movements taking place. It is expected, therefore, that the statistical analysis of the data will result in the null hypothesis being rejected.

Null Hypothesis 2:- The vehicle trip generation of a development is independent of the number of one-bedroom and two-bedroom apartments in the development.

Alternative Hypothesis 2:- The vehicle trip generation of a development is differentially dependent on the number of one-bedroom and two-bedroom apartments in the development.

It is necessary to assess whether the difference in the number of trips made to and from developments is dependent on the proportion of apartments that are one-bedroom units and those that are two-bedroom units. Car ownership is higher in two-bedroom apartments and so it might be expected that developments with a higher proportion of such apartments would have a higher trip generation rate than those with a lower proportion.

However, this possible effect could be offset by the lower car-owning households undertaking more trips by taxi or receiving more visits from friends and relatives, who may be more likely to use the car as a mode of travel. This would tend to offset any differences in trip generation rates.

Null Hypothesis 3:- The vehicle trip generation of a development is independent of the age of the development.

Alternative Hypothesis 3:- The vehicle trip generation of a development is dependent on the age of the development.

Given that, as shown earlier, the car ownership levels tend to decline as the development, and most of its residents, age, it might be assumed that trip rates will also decline. The trip generation may, therefore, be inversely proportionate to the age of the development. However, these residents may attract more visits from those who would have a greater likelihood to use a car.

Null Hypothesis 4:- The vehicle trip generation of the development is independent of the car ownership levels of the local area:-
(a) for all households, or
(b) for households including one or more persons of pensionable age.

Alternative Hypothesis 4:- The vehicle trip generation of the development is dependent on the car ownership levels of the local area:-
(a) for all households, or
(b) for households including one or more persons of pensionable age.

One further factor that could influence the generation rate of this form of development is the car ownership levels in the area, possibly reflecting the affluence of the area. It has been suggested that the generation rate is likely to be higher in areas with high car ownership.

The car ownership of the postcode areas for each of the surveyed developments has been obtained from the 1991 National Census data. The first set of data used in this analysis is the general car ownership levels of all households and the second used is the car ownership levels in households with one or more residents of pensionable age. In light of the age similarities, the second car ownership rate used would be expected to be of greater relevance. This proved to be the case when car ownership itself was considered. However, if the trips of visitors are of importance, the general car ownership level may prove of equal or greater relevance.

The data has been obtained for the postcode area of the developments surveyed. Unfortunately, the precise car ownership per household cannot be obtained, as the census data only gives households with no cars, one car and two or more cars. The two or more cars could be two, three, four or even more. It would be possible to simply take the percentage of households owning at least one car as the basis for the assessment. However, this would not differentiate between areas with varying levels of the higher car ownership.

It is considered better to assume that all households indicated as having two or more cars do have two. The total notional number of cars is then divided by the total number of households. As the number of households with three cars would be expected to be very limited, this measure is likely to be a relatively good measure of car ownership. The data obtained from the Office of National Statistics (ONS) and the Scottish equivalent is shown in table 5.22, below.

Table 5.22 – Car Ownership for Selected Postcode Areas – All Households

Development	Postcode Area	Notional cars per household (all)
Fairview Court	KT2 7	1.31
Diamond Court	OX2 7	1.00
Grayrigge Court	LA11 7	1.31
Homedee House	CH1 4	1.05
Albion Court	NN1 1	0.67
Elphinstone Court	PA13 4	1.28
Bourne Court	CR3 6	1.45
Glendower Court	CF4 7	1.31
Ailsa Craig View	KA9 1	0.83
Homegower House	SA1 4	0.96
Mumbles Bay Court	SA3 5	1.36
Haldenby Court	HU14 3	1.60
Hometide House	PO13 9	1.12
Homeryde House	PO13 9	1.12
Homefort House	PO12 1	0.93
Forest Dene Crt	SM2 5	1.23
Redwood Court	KT17 1	1.27
Crosfield Court	WD1 2	0.97

The data for households with at least one resident of pensionable age is not available in the same form. It does give total households and the number with no cars. Therefore, in this case it is necessary to use the percentage of car owning households, as opposed to cars per household. However, if the level of two car owning pensioner households is low, as is likely, again using this data may not result in a significant error. This data is given in table 5.23, below.

Table 5.23 Car Ownership for Selected Postcode Areas– Pensioner Households

Development	Postcode Area	Notional cars per pensioner household expressed as a percentage (%)
Fairview Court	KT2 7	67.4
Diamond Court	OX2 7	51.5
Grayrigge Court	LA11 7	64.4
Homedee House	CH1 4	38.9
Albion Court	NN1 1	16.4
Elphinstone Court	PA13 4	63.9
Bourne Court	CR3 6	56.3
Glendower Court	CF4 7	48.6
Ailsa Craig View	KA9 1	44.6
Homegower House	SA1 4	32.3
Mumbles Bay Court	SA3 5	55.9
Haldenby Court	HU14 3	72.0
Hometide House	PO13 9	62.4
Homeryde House	PO13 9	62.4
Homefort House	PO12 1	30.9
Forest Dene Crt	SM2 5	50.2
Redwood Court	KT17 1	53.3
Crosfield Court	WD1 2	25.8

Null Hypothesis 5:- The vehicle trip generation of the development is independent of the location of the development, in relation to facilities likely to be used by residents (as assessed by the residents of the development).

Alternative Hypothesis 5:- The vehicle trip generation of the development is dependent on the location of the development, in relation to facilities likely to be used by residents (as assessed by the residents of the development).

The variables considered so far in this assessment have been readily measured in numerical terms. However, the locational characteristics of a development are not so easily expressed in this way.

Logic indicates that, if there is a relationship between location and trip generation by vehicle, the more convenient the development is for these facilities, the fewer the number of vehicle trips are likely to be. Residents will walk and not need to rely on the car.

The 2000/2001 survey, (Survey C) asked residents for their comments on the convenience of their developments for access to these facilities, specifically local shops, a major supermarket, a town centre and public transport. It is reasonable to assume that the residents of the developments would be best qualified to assess the merits of the development, from a locational viewpoint. Consequently, this data will be used to assess the influence of location on trip generation rates.

The residents were asked to grade these locational factors as being very poor, poor, adequate, good or very good. If a score is given to the responses, ranging from 1 for "very poor" to 5 for "very good", the locational merits of the developments can be assessed in numerical form. The resulting average values of the responses are shown in the following table. This data was collected by means of a questionnaire survey, which relied upon the availability and co-operation of the house manager to issue, collect and return the forms, and on the residents to complete and return the forms to the house manager. Consequently, the convenience scores for some of the developments are not available. Furthermore, Redwood Court is a new development that was not included in the survey.

Table 5.24. Residents' Convenience Scores (Averages)

(Source – Survey C)

Development	Sample	Local Shops	Major Supermarket	Town Centre	Public Transport	Total
Fairview Court	6	4	3.66	4.17	4.75	16.58
Diamond Court	8	4.75	4.14	4.5	4.625	18.01
Grayrigge Crt	4	4	1.75	3.75	3.5	13
Homedee Hse						
Albion Court	9	4.55	4.55	4.55	4	17.65
Elphinstone Crt	5	4.8	2.8	4	3.6	15.2
Bourne Court	3	4.33	4.33	4.33	4.33	17.33
Glendower Court	13	2.92	2.54	2.54	2.54	10.54
Ailsa Craig View	2	3.5	2	4	4	13.5
Homegower Hse	19	4.42	3.72	4.16	4.26	16.56
Mumbles Bay Crt	6	4.4	2.83	3	4	14.23
Haldenby Court	4	4	2	1.67	3	10.67
Hometide House	8	4.75	3	3.75	4.25	15.75
Homeryde House	4	4.25	3	4	3.5	14.75
Homefort House						
Forest Dene Crt	8	4	3.83	4	4	15.83
Redwood Court						
Crosfield Court	10	4.1	4.5	4.5	4.3	17.4

In this case, given the logical situation that the more convenient the development the fewer car trips that are likely to be made, the number of vehicle trips is therefore likely to be inversely proportional to the convenience score.

It is, of course, possible to argue that the measures of convenience used are inappropriate or unreliable. However, such a criticism is only justified if a better independent measure of convenience is found that would allow a higher correlation coefficient to be achieved. In the absence of any better way of assessing this factor, there is no way in which it can be realistically utilised.

An analysis of the above data, with the trips made being the dependant variable and the other factors being the independent variables, has been carried out by means of linear and multiple linear regression.

However, before undertaking this analysis, it is necessary to consider whether the "independent" variables are independent of each other. In some cases, logic would suggest that it would be inappropriate to use certain variables together. For example, one would not use both total apartments and the numbers of one and two bedroom apartments in the same analysis. Also there is likely to be a significant correlation between general car ownership levels and those of pensioner households. Similarly as the total convenience score, which will be referred to as "general convenience" is made up of a total of the other convenience factors and, consequently, will not be wholly independent.

There may, however, be other less obvious relationships. For example, as public transport is generally highly accessible in town centres, the convenience of these may well not be independent. In order to test the independence of the "independent" variables, each variable was tested against each other variable. The following table shows the coefficient R^2 for each of these comparisons in the top right section of the table, which is shaded blue.

Table 5.25 Test of Independence of Variables. (R^2 Values)

Variable	Aps	One B	Two B	Gen Conv	LS	SM	TC	PT	Age	Gen CO	Pens CO
Aps	-	0.65	0.16	0.01	0.12	0.01	0.00	0.05	0.07	0.07	0.21
One B		-	0.05	0.02	0.02	0.12	0.04	0.00	0.06	0.14	0.23
Two B			-	0.18	0.13	0.12	0.05	0.18	0.00	0.02	0.00
Gen Conv				-	0.49	0.60	0.70	0.81	0.03	0.25	0.16
LS					-	0.16	0.13	0.46	0.16	0.02	0.00
SM						-	0.29	0.30	0.13	0.11	0.24
TC							-	0.48	0.00	0.37	0.17
PT								-	0.00	0.15	0.04
Age									-	0.03	0.01
Gen CO										-	0.65
Pens CO											-

The following abbreviations are used in the table:-

Aps = total apartments One B = One Bedroom Apartments

Two B = Two Bedroom Apartments

Gen Conv = General Convenience Factor

LS = Convenience for local shops SM = Convenience for supermarket

TC = Convenience for town centre PT = Convenience for public transport

Age = Development Age

Gen CO = General car ownership Pen CO = Pensioner Car Ownership

It is clear from the above that there is a significant relationship between the total number of apartments and the number of one bedroom apartments. However, both would not be used in any logical analysis of the traffic generation, which would either use the total number of apartments or the number of one bedroom apartments, along with the number of two bedroom apartments.

The other significant correlation levels are between the "general convenience" factor and the individual "convenience" factors and between the individual convenience factors. Again logic would indicate that one should not use the "general convenience" measure with any other similar factors, as the former is made up, at least in part, by the latter.

As an alternative to using the "general convenience factor", one might wish to use one or more of the individual convenience factors. The above analysis indicates that this has to be approached with care. Public transport is likely to be better in a town centre than elsewhere and so a measure of convenience in terms of access to a town centre would be likely to also be some measure of the convenience of access to pubic transport. It would, therefore appear to be inappropriate to use both of these factors in any multiple linear regression analysis.

The above analysis also indicates a similar relationship between convenience of access to local shops and to public transport. This may indicate that the roads on which local shops are likely to be located are also likely to be the roads where buses would operate, with bus stops being located close to the these shops. It would, therefore, also appear to be inappropriate to use both of these factors in any multiple linear regression analysis.

A similar comment can be made concerning the convenience of access to supermarkets and to public transport services, although the relationship is less significant. This may reflect the fact that many supermarkets cater for car-based shoppers and public transport links are less important in determining their location. This may be changing, with current planning policies, but appears to reflect the situation when many supermarkets were established.

Finally, as might be expected, there appears to be a relationship between general car ownership levels in an area and the car ownership of pensioner households. The use of only one of these "independent" variables would be appropriate.

The possibility that trip generation is related to the level of car parking provided has been considered. However, the car parking provision is normally related to the number of apartments, with any variation normally being based on the proportion of two bedroom apartments or the locational characteristics of the development. As these factors are being assessed here, there is no need to consider the car parking provision. It will not be independent of these other factors.

In the remaining analysis, relationships will only be considered significant if a level of at least 95% confidence is achieved. This is equivalent to a "p" value of 0.05. Ideally a confidence level of 99%, equivalent to a "p" value of 0.01 will be achieved.

Finding 1. The vehicle trip generation of a development is dependent on the overall number of apartments.

By using simple linear regression, a relationship with a Pearson Coefficient (r) of 0.79 was found. This shows a significant correlation at the 99% confidence level. As $r^2 = 0.62$, it indicates that over 62% of the vehicle movements can be explained in this way. The adjusted $r^2 = 0.60$ and p= 0.0001. Based on the analysis of this data, the null hypothesis is not considered to be valid. This finding is in line with a logical assessment.

Finding 2. The use of the numbers of one and two bedroom apartments in the trip generation analysis does not improve the correlation achieved.

The use of multiple linear regression shows a marginally improved Pearson Coefficient (r) if the number of one and two bedroom apartments are used, in place of the total number of apartments. The coefficient r becomes 0.8, so that it is again significant at the 99% confidence level, and $r^2 = 0.64$, suggesting that some 64% of vehicle movements are explained in this way.

However, the adjusted $r^2 = 0.59$, which is marginally worse than for the relationship involving the total number of apartments. The value of p is also less favourable, changing from 0.0001 to 0.0005, whilst still meeting the criterion specified above. This suggests that the correlation is not improved, and is marginally worse, when the type of bedrooms provided is taken into account.

The analysis shows an intercept of –15.7 and the coefficients for the one and two bedroom apartment numbers are 1.279 and 1.655. This might suggest a 30% higher generation from two bedroom apartments, however, the fact that the overall correlation is not improved has to be recognised.

Whilst the null hypothesis, that there is no relationship, cannot be supported, the benefits of using the probable relationship do not appear to be of sufficient value to adopt this approach. This may be considered an unexpected conclusion, given that the car ownership level of residents does appear to be significantly influenced by the number of two bedroom units. However, one might conclude that the trip generation rate is not highly dependent on car ownership. Instead, the residents are likely to generate a relatively steady level of vehicle trips and, those that are not undertaken by residents, in their cars, are replaced by those undertaken by their friends, relatives or even taxis. If the resident owns a car, he or she may visit relatives or friends, using that car. However, if they do not own a car, their relatives and friends may visit them.

Given that the use of the total number of apartments is the simplest measure of the size of any development, and there is no apparent benefit in using the split of one and two bedroom apartments, the remainder of the analysis will be confined to using the total number of apartments.

The approach adopted during the next stage of the analysis, is similar to stepwise multiple linear regression. Individual additional variables were brought into the analysis, one at a time. Any additional variable that was found to improve the correlation achieved was retained, but those that failed to do so were rejected, before any further variables were introduced. The results of this analysis are indicated in table 5.26, below.

Table 5.26 Statistical Significance of Additional Individual Variables.

New Variable	R^2	Adjusted R^2	P Total Aps	P New Variable	P Overall
Total Apartments Only	**0.62**	**0.60**	**0.0001**		**0.0001**
General Convenience	**0.67**	**0.62**	**0.0005**	**0.3220**	**0.0013**
Convenience – Local Shops	**0.69**	**0.64**	**0.0012**	**0.1888**	**0.0009**
Convenience – Supermarket	**0.65**	**0.59**	**0.0006**	**0.6700**	**0.0019**
Convenience – Town Centre	**0.67**	**0.62**	**0.0004**	**0.3071**	**0.0012**
Convenience – Public Transport	**0.68**	**0.63**	**0.0007**	**0.2357**	**0.0010**
Development Age	**0.62**	**0.57**	**0.0003**	**0.9012**	**0.0007**
General Car Ownership	**0.69**	**0.65**	**0.0001**	**0.0773**	**0.0001**
Pensioner Car Ownership	**0.67**	**0.62**	**0.0001**	**0.1767**	**0.0003**

Whilst in each case the overall values for "p" are acceptable, i.e. they meet the 99% confidence limit, the values for individual variables all fail in this respect.

This analysis suggests that, after the total number of apartments, the second most significant influence on trip generation, considered in this table, is the general car ownership of the immediate area. With a p value of 0.0773, it appears that there can be some 92% confidence that this is a significant influence on trip generation. Whilst this is close to the 95% confidence limit, it does clearly fail to meet this criterion.

It is interesting to note that this measure of car ownership is more significant than the pensioner car ownership in the same area. This may suggest that the car ownership of potential visitors is relatively important. As the general car ownership measure includes both the younger members of society and the pensioners, it could be a better guide to future car movements.

Finding 3. Whilst the general car ownership for the postcode area of the development may improve the correlation, the confidence level obtained fails to meet the 95% confidence test.

Finding 4. Using the pensioner car ownership for the postcode area of the development in the analysis, in place of the general car ownership data, does not improve the overall correlation. This too fails the 95% confidence criterion.

None of the other variables appear to be significant at or even close to the 95% confidence level. On this basis, there is no sound justification for rejecting the null hypothesis.

It also appears that the least significant factor in influencing trip generation is the age of the development. It may have been assumed that, as the development ages and car ownership is likely to decrease, significantly fewer trips would be made. This may be the case for the residents, but it appears that any such decrease would be offset by a corresponding increase in trips by visitors, or possibly by taxis.

Based on the analysis of this data, again there is no sound basis on which to reject the null hypothesis. Consequently, this results in the following finding:-

Finding 5. The vehicle trip generation of a development is not dependent on the age of the development.

Although such factors as convenience to local shops may have some influence on the number of trips generated, the level of confidence that this is the case is well below the 95% level required and indeed it is well below the 90% level of confidence. Consequently, there is no sound justification, based on the analysis of this data, to reject the null hypothesis.

Finding 6. The inclusion of one or more of the convenience factors does not significantly improve the ability to accurately predict trip generation.

Given that, prior to a development taking place, the satisfaction level of residents cannot be ascertained, the levels of convenience can only be subjectively judged, probably by someone who would not qualify for residency. Such a person might, therefore, not fully understand the likely attitude of future residents and so the level of accuracy may well be limited. This adds to the conclusion that this factor should not be used in predicting trip generation.

The analysis described above results in the following formula for the prediction of traffic generation of the residents and their visitors from this form of housing:-

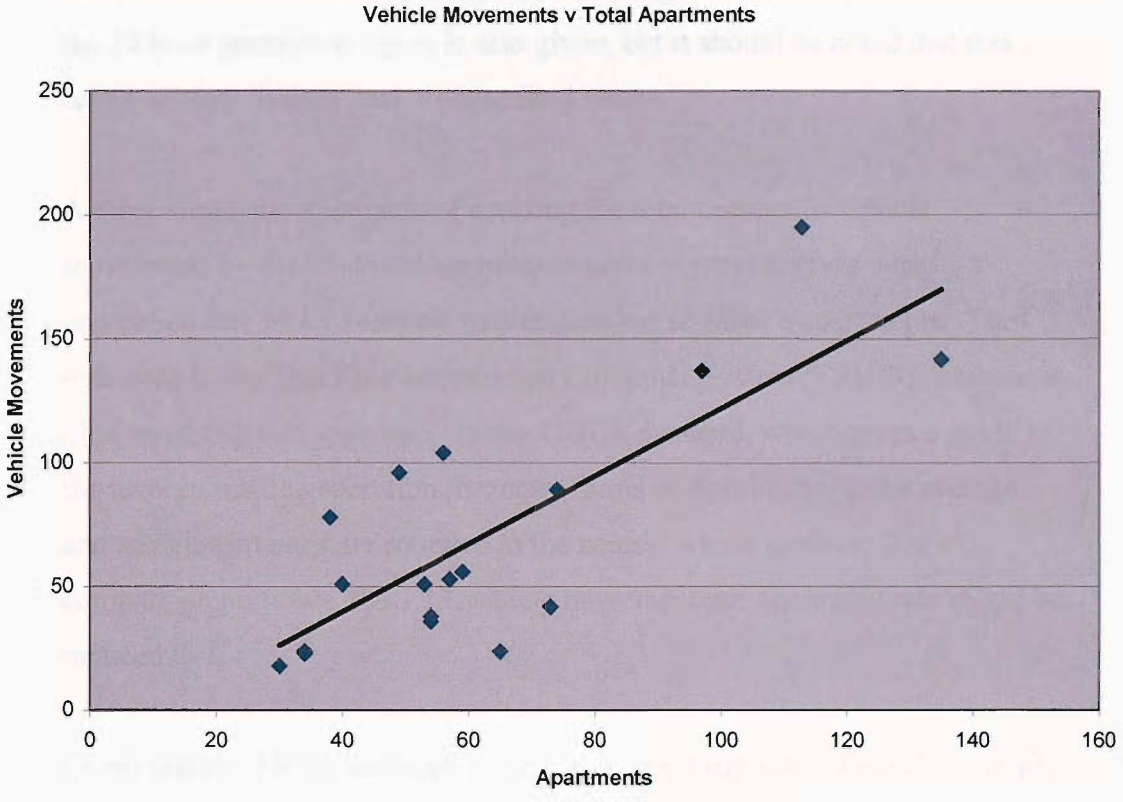
$$T = 1.37\,A - 15.04$$

where **T = Vehicle trips generated per12 hour day (08700-1900)**
A = Total residents apartments

It should be noted that the resulting figure should be increased to allow for additional trips generated by the house manager's apartment.

Figure 5.8 below shows the relationship between vehicles movements and total apartments. The trend line is added, to indicate the relationship.

Figure 5.8 Relationship of Vehicle Movements to Total Apartments



The formula derived will clearly only be valid within a limited range of numbers of apartments. For example, a development of, for example, 5 apartments would be predicted as having a generation of – 8.19 vehicle movements and clearly a negative generation would not be possible. However, the range of numbers of apartments used in this study is from 30 to 135 apartments. Rarely does a development include fewer than about 30 apartments, as the service charge costs can become excessive at much lower levels of development, and developments of in excess of 135 units are equally unusual. Therefore, the formula obtained is likely to be valid for almost all future development proposals. Should the numbers of units be significantly outside this range, the use of the formula should be reconsidered.

In order simplify the use of this formula, Appendix XI includes a table of the results for the number of apartments in the range 30 to 135. An estimate of the 24 hour generation figure is also given, but it should be noted that this is based on very limited data, as described below.

A more simplistic approach, of dividing the total number of vehicle movements by the total number of apartments surveyed, gives a trip generation rate of 1.13 vehicle movements per resident's apartments. The data used in the Trip Rate Information Computer System (TRICS) database is obtained using this approach. In the TRICS datacard, which gives a guide to the level of traffic generation for many forms of development, the average and 85%ile trip rates are rounded to the nearest whole number. For comparison purposes, the 1.13 vehicle movement per apartment rate might be reduced to 1.

Given that the TRICS datacard currently shows a trip rate for standard family dwellings as being 8 vehicle movements per day, it is clear that some 7 to 8 sheltered housing apartments would have a similar traffic generation to that of a standard dwelling. This relationship is generally in line with the findings in earlier surveys.

This relationship can be useful as some highway design criteria used dwellings as a factor. If the regression analysis for the relationship between vehicle movements and total apartments is constrained to pass through the origin, i.e. zero apartments equates to zero trips, the R^2 value becomes 0.61 and the adjusted R^2 becomes 0.55. This relationship remains significant at the 99% confidence level. It gives a gradient, which is effectively a trip rate, of 1.17.

These R^2 and adjusted R^2 can be compared with those established with the formula derived above, which were 0.62 and 0.60 respectively. It can be seen, therefore, that, although significant at the 99% level, the constrained relationship is not as good as that where the constraint is not applied.

5.10.8 Traffic Distribution Through the Day

Based on the data from 15 of the survey sites referred to above, the distribution of trips, by hour of the 12 hour day is as given in table 5.27 below.

Table 5.27 – Distribution of Trips Throughout 12 Hour Day

Time	% of Arrivals	% of Departures	Combined %
0700-0800	3.5	3.1	3.3
0800-0900	5.2	6.3	5.7
0900-1000	10.4	10.4	10.5
1000-1100	12.5	10.4	11.5
1100-1200	12.0	10.4	11.2
1200-1300	12.3	11.5	11.9
1300-1400	9.0	13.2	11.1
1400-1500	6.4	7.8	7.1
1500-1600	10.1	6.8	8.4
1600-1700	8.2	7.0	7.6
1700-1800	5.9	7.5	6.7
1800-1900	4.5	5.6	5.0
Totals	**100**	**100**	**100**

It can be seen that the peak traffic generation occurs in the late morning to early afternoon period, with relatively low generation in the normal traffic peaks of 0800-0900 and 1700-1800.

There will, inevitably, be some trips occurring outside the 12 hour period 0700 to 1900. The survey at the site in Swanland, near Hull, was undertaken using an automatic counter for a full week. Taking the average readings for 5 weekdays, it showed that, in overall terms, some 88% of vehicle movements occurred between 0700 and 1900.

Expressed as a percentage of the 12 hour flow, the following table gives the generation, in terms of arrivals and departures, for the remainder of the day.

Table 5.28 – Distribution of Trips Throughout other 12 Hours (1900-0700)

Time	% of Arrivals	% of Departures	Combined %
1900-2000	3.85	4.00	3.92
2000-2100	3.85	4.00	3.92
2100-2200	0	4.00	1.96
2200-0700	0	0	0
Totals	**7.7**	**12.00**	**9.8**

If the trip generation data outside the 12 hour period from 0700-1900 is required, the likely level of movements can be obtained by calculating the predicted 12 hour movements and then applying the percentages from table 5.24 above. For example, the 12 hour trip rate can be converted to a 24 hour trip rate by multiplying the 12 hour trip rate by a factor of 1.098. A trip rate of 1.13 vehicle movements per 12 hour day would therefore become 1.24.

It must be accepted, however, that this can only be a general guide. The conversion is based on the data from a single development and this may not be wholly typical of all such developments.

5.10.9 Heavy Goods Vehicle Generation

Based on 17 out of the 18 sets of traffic generation data, for which the type of vehicle undertaking a vehicle movement could be ascertained, it has been found that only 2.21% of the vehicle movements were undertaken by heavy goods vehicles. A number of these would be likely to be made by the refuse vehicle. In many developments, and probably a significant majority, however, the refuse vehicle does not enter the car parking area of the development, but services the development from the adjoining road. The location of the refuse room, where the refuse bins are stored, is normally such as to facilitate this form of servicing.

It may also be worthy of note that the refuse vehicles, and indeed some other servicing vehicles may well already be passing or servicing the site, prior to its development for sheltered housing and so is not newly generated by the development.

For 9 out of the 17 developments surveyed, no heavy goods vehicle trips occurred on the day of the survey. At one development, Forest Dene Court, Sutton, there was a particularly high level of movements by these vehicles. There were 10, out of a total of 137 movements, which equates to some 7.3%. This is over three times the average generation by these vehicles. It is understood that some maintenance works were being undertaken at this time.

5.11 Summary

Male residents generally tended to obtain their driving licences earlier than their female counterparts did. They also tend to be more reluctant to give them up. When they do so, health reasons are the most frequently given, whereas for the female residents this reason was second to "no further need".

Car ownership levels tend to be very low, but be steadily increasing for comparable developments. However, any increase is offset by a reduction in car ownership levels as the development ages. The peak car ownership levels normally occur in the early years of the life of the development, once the sales period is complete.

The house manager car ownership level has also been increasing to a level of just over 1 car per apartment.

Residents who have given up car ownership quote health reasons as the major reason, with "death of spouse" and "no further need" also being important reasons. The timing of giving up the car appears, in many cases, to be related to the timing of entering sheltered housing. This suggests a lifestyle change at this time.

Although the 95%ile residents' car may be relatively large, it is clear that residents do tend to favour smaller cars, with some 80% of their cars being less than 4.25 metres long.

Cycle ownership is relatively low, as might be expected, given the age and associated characteristics of the residents. There appears to be the potential for more residents to take up cycling, if better cycle parking facilities were to be provided, although the overall numbers would remain low.

The residents of sheltered housing appear to be more inclined to walk than the elderly population in general. This may reflect the favourable location of most of the development, in relation to shops and other facilities required for everyday life.

Car parking provision will be influenced by car ownership levels and current government policy. It is also recommended that, given that car ownership tends to be higher for the larger, "two-bedroom", apartments, this factor is taken onto account. In line with government guidance, the location of the development, in relation to shops and other services, should also influence the level of provision.

Cycle parking provision should be provided for the residents, the house manager, and their visitors. However, this provision would remain relatively low.

The traffic generation of this form of sheltered housing is very low. It requires some 7 or 8 of these apartments to generate the equivalent volume of traffic as a normal family dwelling. In simple terms, the generation is between 1.1 and 1.2 vehicle movements per apartment per 12 hour day. This is based on either a simple trip rate obtained by diving the total number of vehicle movements by the total number of apartments or by undertaking a simple linear regression analysis, constrained to ensure that the line of best fit passes through the origin.

On balance, the best means of predicting traffic generation is to use the total number of apartments, which gives the formula:-

$$T = 1.37\ A - 15.04$$

where T = Vehicle trips generated per12 hour day (08700-1900)

A = Total residents apartments

The use of the one and two bedroom numbers does not appear to give any significant benefit. Other factors, such as the convenience of the location, or age of the development do not appear to significantly influence the traffic generation. The overall car ownership of the immediate area is the most significant other factor, but is not highly significant.

The level of vehicle movements is low in the normal morning and evening peak periods. The peak for this form of housing is around the lunchtime period, with the overall peak being between noon and 1 p.m.

The traffic generated by these developments includes only a very low level of heavy goods vehicles.

6. Conclusions

With the increase in life expectancy and the "baby boom" after the Second World War, the number and indeed the proportion of persons who can be classed as "elderly" is increasing. Their housing needs will consequently also become a more significant factor in future planning decisions. This study has provided and analysed an extensive set of data that will allow the transport characteristics and needs of the residents of one specialised form of housing, Category II Sheltered Housing, to be better defined and understood.

6.1 Key Findings

Chapters 4 and 5 of this thesis end with a summary of all of the quantitative results of this research. From these results, the key findings are considered to be the following:-

1. The average age of entry to this form of housing appears to be increasing and is currently into the late 70s, at nearly 78 years of age. Consequently, the effects of the increase in life expectancy are unlikely to be of great importance here. The length of the residents' stay in sheltered housing would be unlikely to increase significantly. Even if the elderly do, in the future, retain their cars until an older age, any such effects will be offset by this trend in entry ages.

2. When moving in to this form of housing, residents often do so in order to enhance their security, to move away from unsuitable accommodation, to be nearer their families and for companionship reasons. The death of their spouse also often prompts such a move.

3. The average occupancy of apartments is just under 1.2 persons per apartment. Three quarters of these are females. The occupancy of larger apartments, sold as having an extra bedroom, is at a level higher than this overall average.

4. The move into sheltered housing appears to represent a significant lifestyle change, which, for many residents includes the giving up of car ownership. Almost one fifth of those who have given up their cars did so in the same year as they entered this form of housing.

5. After eliminating, as far as possible, other factors that appear to affect the car ownership of residents, car ownership levels appear to have been increasing steadily over recent years. However, notwithstanding this, the car ownership levels in individual developments declines over the early years of the life of the development and there is no evidence to suggest any subsequent rise.

6. In line with what might be expected, the analysis indicates that the traffic generation of this form of housing is related to the number of apartments provided in a development. Although the traffic generation of the larger "two-bedroom" apartments appears to be some 30% higher than that of the smaller "one-bedroom" apartments, the differentiation between these two types of apartments does not give a statistically significant improvement in the estimation of traffic generation. Other factors, such as the general or "pensioner" household car ownership levels in the immediate area, the age of the development or the convenience of the location of the development were found to have no significant effect on the traffic generation levels.

7. Traffic generation levels are very low, currently at between 1.1 and 1.2 vehicle movements per apartment per day. This generation has been increasing over the years from the mid 1980s, but this increase has been approximately in line with the traffic generation growth of "standard" or "non-specialised" housing.

6.2 Comments on Methods Used

The use of questionnaire surveys, whilst perhaps being the only practical means of obtaining data from a realistic sample of the residents, does have some limitations. These may be a little more pronounced, given that the respondents to the surveys were the elderly.

Reference has been made to the possible problems of some of the less able residents in responding to the survey and how this might have some influence on the results achieved.

may have been confused by the question and some may have considered that they were being helpful in providing more information than actually being sought. A more comprehensive pilot study may have given an early warning of this problem and allowed the question to be reworded in a manner that could have improved the quality of the responses.

Such problems could perhaps be overcome if residents were to be interviewed, in person, with the questionnaire being completed by a trained researcher. This approach would, of course be relatively expensive and this may limit the sample level that could be realistically achieved. Given the residents' established requirement for security, it would also be necessary to investigate whether visits by "strangers" would be acceptable to residents. It is recommended that this approach be considered, particularly where any further studies might be undertaken to elaborate on any of the findings of this study. Such studies may not require a high sample rate.

6.3 General Conclusions

The study has been successful in:-

1. Deriving a robust and practical means of estimating traffic generation for Category II sheltered housing,

2. Giving a sound basis on which to derive policies for car parking provision at such developments, albeit that the relevant guidance from central government, and possibly local authorities, will also influence the provision made,

3. Providing a sound basis for a better understanding of the characteristics of this form of housing, in order that misconceptions can be clearly countered.

7. Future Research

Whilst it is considered that this research addresses the most relevant issues, further research in specific areas is recommended. In particular, where this research has indicated that characteristics are changing over the years, such as the age of entry to sheltered housing, the initial car ownership levels and traffic generation, a monitoring of these characteristics should be undertaken on a relatively regular basis. One particular topic appears worthy of some detailed further research, which will be of direct relevance to sheltered housing, but will also be of more general interest. This is the comparison of car retention characteristics of men and women.

Others have discovered that the earlier in life one acquires a car, the later in life one gives up car ownership. However, the reasons for this do not appear to have been established. One possible reason is that there is a significant difference between the way men and women behave, in that women tend to have acquired their cars later in life but that, whenever they acquired their cars, they have been more inclined to give up their cars earlier than men. However, if there are no such differences between the sexes, then the current trends may have significant effects in the future.

As women are now reported to be acquiring cars at an earlier age, this might indicate that they will hold on to these for longer, bringing their characteristics closer to, or in line with, those of men. Given that women represent the majority amongst the retired population and in particular amongst those in sheltered housing, this could result in significant changes in future years, with much higher car ownership levels amongst the elderly. However, it has also been suggested that women are not as confident as men and tend to be worried about night driving and travelling on motorways. This thesis shows a difference between the sexes in their reasons for giving up their driving licences whilst other studies have identified significant differences between the sexes in relation to journeys made, distances

travelled, modes used and journey purposes. These differences are not confined to the older members of society.

Given these differences, it is far from certain that there will be a significant convergence of the car ownership characteristics of the sexes. Further research into the car retention characteristics of men and women may establish the extent to which convergence is likely to take place. This could include the comparison between the car retention levels of those men and women who first acquired their cars at the same age, in order to eliminate this potential influence.

REFERENCES

Age Concern (www.ageconcern.org.uk)

Baylliss D, O.B.E., Director of Planning London Transport, 1993, The Role of Bus Planner. *AA Foundation for Road Safety Research Conference – Older Road Users – The Role of Government and the Profession.*

Bebbington and Darton, 1996, Fit for the 21st Century. *A report from the Office for National Statistics.*
(www.archive.official-documents.co.uk/document/doh/ohnation)

Bevan, J., Senior Medical Consultant The Automobile Association, 1993, The Role of the Doctor. *AA Foundation for Road Safety Research Conference – Older Road Users – The Role of Government and the Profession.*

Bly P. H., Research Director at Transport Research Laboratory, 1993, Growing Older, Wish to Travel. *AA Foundation for Road Safety Research Conference – Older Road Users – The Role of Government and the Profession.*

Department of the Environment/Department of Transport, 1994, Planning Policy Guidance: Transport.

Department of the Environment, Transport and the Regions, 2000, Planning Policy Guidance Note No.3: Housing.

Department of Transport, 1977, Design Bulletin 32 - Residential Roads and Footpaths – Layout Considerations, First Edition.

Department of Transport, Local Government and the Regions, 2001, Planning Policy Guidance Note 13: Transport.

Greengross, Lady S., Director of Age Concern, 1993, Older People, Their Independence and Mobility. *AA Foundation for Road Safety Research Conference – Older Road Users – The Role of Government and the Profession.*

Government Actuary's Department
(www.gad.gov.uk)

Harris Research Centre, 1989, A Survey on Sheltered Housing for the Elderly – The Facts and the Future *(sponsored by McCarthy and Stone).*

Headicar P. G., Reader in Transport Planning, Oxford Brookes University, 1993, The Role of Town and Country Planning. *AA Foundation for Road Safety Research Conference – Older Road Users – The Role of Government and the Profession.*

Help the Aged
(www.helptheaged.org.uk)

Help the Aged Transport Council, 1998. Safe Accessible Reliable Affordable (SARA: The Top Four Issues)

Heumann L. and Boldy D., 1982, Housing for the Elderly.

Hinton P.R. 1995, Statistics Explained – A guide For Social Science Students.

House Builders Federation, 1988, Sheltered Housing for Sale – An Advice Note, 2nd Edition.

Lyons G., Chatterjee K., Marsden G., and Beecroft M., 2002, Society and Lifestyles. Transportation Research Group, University of Southampton.

Maitland Sir D., Chairman Health Education Authority, 1993, The Role of Health Education. *AA Foundation for Road Safety Research Conference – Older Road Users – The Role of Government and the Profession.*

McLaren J. and Hankin M., 2003, A Better Life: Private Sheltered Housing and Independent Living for Older People *(sponsored by McCarthy and Stone).*

Ministry of Housing and Local Government and Welsh Office, 1969, Circular 82/69 (84/69 in Wales) Housing Standards and Costs Accommodation Specially Designed for Old People.

Noble B., 2000, Travel Characteristics of Older People. Transport Statistics Personal Travel Division: DETR
(www.dft.gov.uk/stellent/groups/dft_transstats/documents/page/dft_transstats_

Office for National Statistics
(www.statistics.gov.uk)

Rabbitt P., Carmichael A., Jones S., and Holland C., of the Age and Cognitive Performance Research Centre of the University of Manchester, 1996, When and why older drivers give up driving. AA Foundation for Road Safety Research

Roberts T, 1999, The Ageing Population is a Critical Long Term Issue for Planners. *Planning Magazine - 9 July 1999.*

Schlackman W., Curtis P., Wood E. M. and Carr J. T. , 1988, Motoring and the Older Driver. The AA Foundation for Road Safety Research

Scottish Executive, 2003, Scottish Planning Policy – Transport and Planning Maximum Car Parking Standards (SPP17).

Scottish Office, 1999, National Planning Policy Guideline, NPPG 17, Transport and Planning.

T.R.I.C.S., (Continuing source), Trip Rate Information Computer System operated by JMP Consultants Ltd (London).

Welsh Office, 1998, Planning Guidance (Wales) Technical Advice Note (Wales) 18 Transport.

Welsh Office, 1999, Planning Guidance (Wales) Planning Policy First Revision.

APPENDICES

Appendix I

Circular 82/69 - Housing Standards and Costs, Accommodation Specially Designed for Old People (Extract)

Extract from Circular 82/69

Housing Standards and Costs – Accommodation specially Designed for Old People

Sections A to I (as referred to in definition of both Category I and II sheltered housing)

Section A

Plan Arrangement

1. All access stairs shall be enclosed

2. Where access to dwellings would involve a climb of more than one storey from the point of pedestrian or vehicular access (whichever is the lower) a lift shall be provided.

   All access above four storeys high shall be enclosed and two lifts shall be provided. In blocks of 5 or 6 storeys a minimum of 12 old people's dwellings on the 5th and 6th floors is considered necessary to justify a second lift. Old people should not, therefore, be accommodated on the 5th and 6th floors of such blocks unless this condition is met.

3. The dustbin or refuse disposal point and the fuel store where one is provided shall be conveniently accessible from every dwelling and shall be under cover and shall be capable of being lit at night.

4. All dwellings shall have an entrance lobby or hall with space for hanging out-door clothes.

5. Kitchen working surfaces shall be provided on both sides of the sink and on both sides of the cooker position. Kitchen working surfaces shall be provided and arranged in the following sequence:- work top/cooker/work top/sink/draining board (or the same in reverse order).

6. In two and three person dwellings sufficient space shall be provided in the kitchen to enable casual meals to be taken by two people.

Section B

Furniture

1. All dwellings plans must show the furniture drawn on and shall be designed to accommodate furniture set out below:-

(a)	Kitchen –	in Category I cases a small table unless one is built in
(b)	Living Space –	a small dining table and chairs 2 easy chairs or 1 settee and 1 chair a TV set small table a reasonable quantity of other possessions such as a bookcase

(c) Bedrooms (single)

1 single bed
1 bedside table
a small dressing table and chair
a built-in cupboard 600 mm (2 ft) wide or a space for a single wardrobe

Bedrooms (double)

2 single beds (a double bed should be shown dotted)
2 bedside tables
a small chest of drawers
a small dressing table and chair
a built-in cupboard 1200 mm (4 ft) wide, or
a space for a double wardrobe

Bed recess

As for a single room

Section C

Kitchen Fitments

1. Kitchen fitments shall comprise a minimum storage capacity of 1.7 m^3 (60 ft^3) in connection with:-

(a) Preparation and serving of food and washing up
(b) Materials for cleaning and laundry operations
(c) The storage of food, including refrigerator with a minimum capacity of .07 m^3 (2.5 ft^3) or a ventilated "cool" cupboard and space for a refrigerator

Note

(i) Part of this provision shall comprise a broom cupboard, which may be provided elsewhere than in the kitchen
(ii) The cubic capacity of kitchen fitments shall be measured overall for the depth and width and from the underside of working to the top of the plinth for height
(iii) The maximum height for kitchen working surfaces shall be 850 mm (34 inches).
The maximum height for shelves shall be 1520 mm (5 ft).

2. In grouped flatlet schemes (Category 2)
Gas or electric cookers large enough to cook a full meal for 3 people, shall be provided. They shall be to a design specially adapted for safety in use by old people.

Section D

Linen Cupboard

1. A cupboard shall be provided with a minimum of two shelves neither lower than 300 mm (1 ft nor higher than 1520 mm (5ft). The capacity of the storage area shall not be less than 0.4 m^3 (15 ft^3).

Section E

Electric Socket Outlets

1 The minimum provision shall be as follows:-

Kitchen	4
Living Area	3
Bedroom	2
Hall or lobby	1
Bedsitting room	5

Section F

Space Heating

1. The minimum standard shall be an installation with appliances capable of maintaining:-

The living area, bathroom, hall or lobby, bedroom*, kitchen, communal rooms (if any) at 21 degrees C (70 degrees F)
Circulation areas in grouped flatlet schemes at 15.6 degrees C (60 degrees F) when the outside temperature is –1 degree C (30 degrees F)

The temperature shall be controllable by the tenant.

(* Except the second bedroom in a three person dwelling)

Section G

Space Standards

1 Self-Contained Dwellings (Category I)

Standards: Flats or bungalows for one or two old people which are self-contained (Category I) shall be designed to provide areas of Net Space and General Storage Space not less than those set out in the following table.

Table G(i)

N = Net Space. S= General Storage Space. O= Overall Area

[For rules of measurement see Notes 1 and 2 of Appendix I to Circular 36/67 (Welsh Office Circular(28/67)]		Number of Persons (i.e. Bed Spaces) Per Dwelling			
		1		2	
		Sq Metres	Sq Feet	Sq Metres	Sq Feet
FLATS		Flat with bedsitting room		Flat with one bedroom	
	N	30	320	44.5	480
	S	2.6	28	3	30
	O	32.6	348	47.5	510
BUNGALOWS		Bungalow with bedsitting room		Bungalow with one bedroom	
	N	30	320		
	S	3	30	44.5	480
	O	33	350	4	40
				44.5	520

Notes

(a) For bungalows, not more than 1.5 sq metres (16 sq ft) of the general storage space shown above may be provided outside the dwelling.
(b) Where in special cases the need for three person self-contained dwellings provided with special facilities for 2 old people as detailed in Category 1 is shown to be necessary, they shall be designed to Parker Morris standards as given in Circular 36/76 (Welsh Office Circular 28/67). Although for density and yardstick purposes these will \count as three person dwellings, they will only qualify for the same addition to the normal yardstick as the two person dwellings in Category 1.

2 Grouped Flatlets (Category 2)

Flatlet for 1 or 2 or two old people shall be designed to provide areas of Net Space and General Storage Space not less than those set out in the following Table.

Table G(ii)

N = Net Space. S= General Storage Space. O= Overall Area

[For rules of measurement see Notes 1 and 2 of Appendix I to Circular 36/67 (Welsh Office Circular(28/67)]		Number of Persons (i.e. Bed Spaces) Per Dwelling			
		1		2	
		Sq Metres	Sq Feet	Sq Metres	Sq Feet
FLATLETS		Flat with bedsitting room		Flat with one bedroom	
	N	27	290	39	420
	S	1.9	20	2.5	27
	O	28.9	310	41.5	447

Notes

(a) For one person flatlets 0.8 sq metres (9 sq feet) of the above general storage may be provided in internal communal stores.
(b) For two person flatlets 1.2 sq metes (13 sq feet) of the above general storage may be provided in internal communal stores.
(c) There is a possible hazard in providing a bath in a 1 person flatlet. A short bath 1350 mm (4.5 ft) will, however, reduce the risk. Where a bath is desired in such a flatlet, the minimum net floor area shall be 28.5 sq metres (303 sq feet) storage 1.9 sq metres (20 sq feet) and the minimum total area 30 sq metres (323 sq feet). No special cost allowance will be made and the total cost of the scheme must be kept within yardstick plus 10%.

Tolerance: Where dwellings are designed on a planning grid and not otherwise, a maximum minus tolerance of 1.5% shall be permitted on the Net Space.

Section H

The W.C and washbasins

1 (a) All W.C.s shall be provided with at least one hand-hold conveniently set at the side of the pedestal. (Example: inclined grip handle as illustrated in M.O.H.L.G. Design Bulletin No 1 page 11).
(b) Doors to W.C. compartments shall open outwards and shall be fitted with special locks openable from the outside.

(c) *In grouped flatlet schemes* (Category 2) in one person flatlets, a W.C. compartment with handbasin shall be provided.
(Note: In all other dwellings for old people the W.C. may be in the bathroom).

Section I

The Bathroom

1. (a) All baths shall be flat bottomed and of such a length that an old person cannot become completely immersed (a maximum standard length of 1550 mm (5 ft 1 inch).

(b) At least one hand-hold to assist an old person into and out of the bath shall be provided. (Examples: grip handles incorporated in the design of the bath, or other aids as described in M.O.H.L.G Design Bulletin No. 1 page 10).

(c) Doors to bathrooms, shall open outwards and shall be fitted with special locks openable from the outside.

(d) *In grouped flatlet schemes* (Category 2) bathrooms for single person flatlets shall be provided on a shared basis of not less than one bathroom to four flatlets – some of the baths in these bathrroms may be Sitz baths.

(e) *In grouped flatlet schemes* (Category 2) each two person flatlet shall be provided with a private bathroom within the dwelling.

Note

Showers: In any proposed group of not less than four bathrooms one shower compartment may be provided in lieu of one of the proposed bathrooms. Where a shower compartment is provided the following shall apply:-

(a) The floor of the shower compartment shall be non-slip and safe from hazards
(b) The hot water output to feed a shower shall be thermostatically controllable to give a maximum output temperature of 49 degrees C (120 degrees F).
(c) The shower compartment shall contain a secure hand-hold and wall mounted seat. Spray outlets shall be adjustable to varying heights.

Section J

Communal Facilities

1. Where *self contained dwellings to Parker Morris standards* (Category 1) are provided with common rooms i.e. lounge, T.V. room, workshop or hobbies room, the following shall apply :-

(a) the common rooms shall have a minimum floor space allowance of 0.95 sq metres (10 sq feet) per person. The route from the dwellings need not be covered but shall be kept as short as possible.
(b) at least 1 W.C. and hand basin shall be provided, located conveniently for the common room.
(c) A small pantry or tea kitchen with a sink and a means of heating water shall be provided adjacent to the common room.
(d) A space for hats and coats shall be provided.
(e) A small cupboard for cleaning materials shall be provided.
(f) A store adjacent to the common room with an area not less than 2 sq metres (22 sq feet)

2. Where *self contained dwellings to Parker Morris standards* (Category 1) are provided with emergency alarm systems, the systems shall communicate with a nominated person or be easily noticeable by those passing the dwelling.
Note: For self-contained dwellings (Category 1) the cost yardstick for any scheme which includes either or both of the facilities mentioned in Sections J1 and 2 above will be adjusted in accordance with Appendix II to this Circular.

3. *Group Flatlet schemes* (Category 2) planned to areas set out in Section G2 shall have the following provisions :-

(a) A warden's dwelling, self-contained to the standards set out in Appendix I to Circular 36/67 (Welsh Office Circular 28/67) (except that where a scheme of fewer than 15 flatlets is associated with a residential home provided by the welfare authority, this requirement is waived if warden service is to be provided by the matron of the home and her staff).

(b) An emergency alarm system connecting each dwelling with the warden's quarters whereby tenants can communicate with the warden in cases of emergency. (In the case of the "linked schemes" referred to in (a) above the alarm system will communicate with the residential home).

(c) (i) A common room or rooms with a minimum floor space allowance of 1.9 sq metres (20 sq feet) per person.
(ii) A W.C. and hand basis as in 1(b).
(iii) A small pantry or tea kitchen as in 1(c).
(iv) A space for hats and coats as in 1 (d).
(v) A store adjacent to the common room with an area of not less than 2 sq metres (22 sq feet) as in 1 (f).

(d) A laundry room with not less than 1 sink, 1 automatic washing machine, 1 tumble drier and a table or bench for folding clothes.

(e) A cupboard with a minimum capacity of 1 cubic metre (36 cubic feet) to hol cleaning materials for the communal areas.

(f) A telephone with seat adjacent for use by tenants.

(g) All accommodation shall be accessible by enclosed and heated circulation areas.

(h) Goods delivery shall be made possible from door to door preferably direct by means of delivery hatches or alternatively, to grouped lockers.

4. Guest Accommodation and Warden's Office

In schemes of self-contained dwellings (Category 1) a guestroom may be provided, and in grouped flatlet schemes (Category 2) a guestroom and a warden's office may be provided. The guestroom should be situated near a communal toilet. The cost yardstick for any scheme which includes either or both of these facilities will be adjusted in accordance with Appendix II to this Circular.

Appendix II

Description of Sheltered Housing

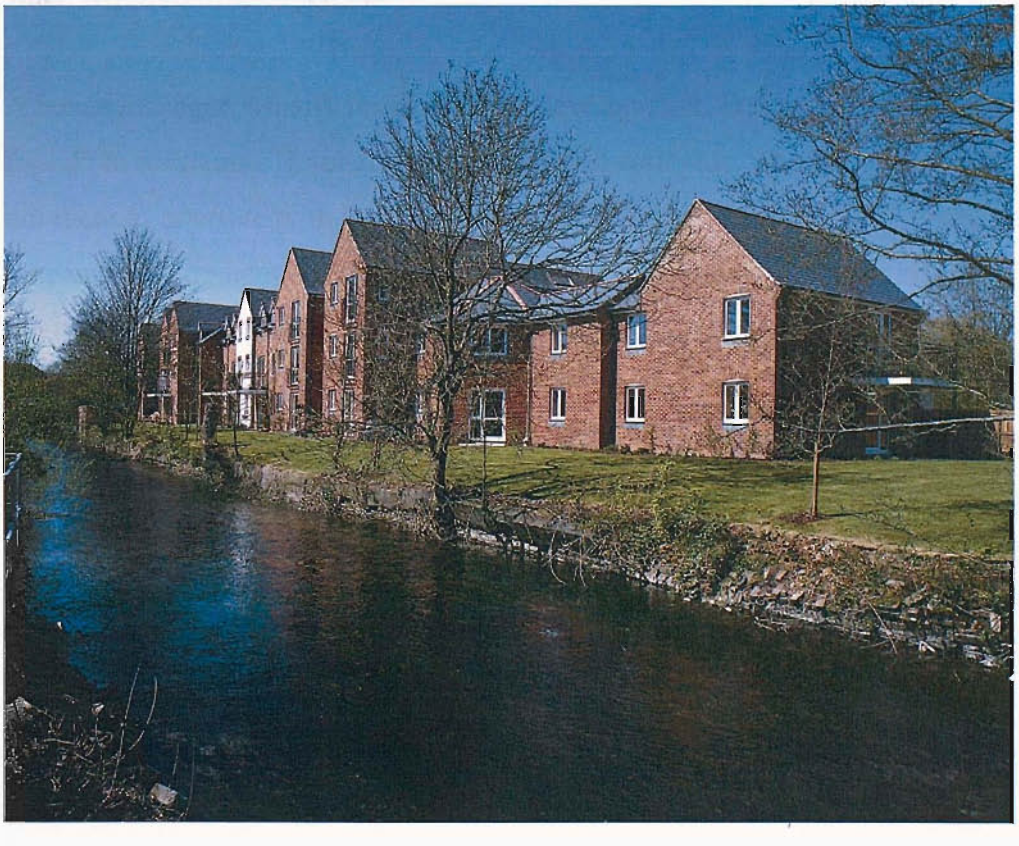
Category I Sheltered Housing

Category II sheltered housing is provided in apartment blocks, as illustrated in photographs 1 to 3 below. For reasons of economy of scale, the minimum size of the development is normally close to 30 apartments. As indicated below, residents have to share the cost of the provision of facilities and for developments significantly below this number, the share of the charges imposed on an individual household is likely to be prohibitive.

Photograph No. 1

Photograph No. 2

Photograph No. 3



This form of housing is designed to meet the needs of the "less active" elderly.

One of the key features that attracts such residents to this form of housing is security. Modern Category II sheltered housing developments provide a TV entry controlled system. The aim is to ensure that no unauthorised person gains entry to the building itself. As a result, residents, who may well be potentially vulnerable, feel confident to move about between their own apartments and the residents' communal facilities, such as the lounge. Residents feel confident that they can open the door of their apartment without any risk to their security. The success of such systems depends on the way the residents and the house manager operate the controls.

In addition to the controlled entry system, a 24-hour emergency "Careline" system is provided, along with sophisticated fire detection equipment and intruder alarms in all the apartments. The "Careline" system links call points in the residents bedrooms, bathrooms, lounges and hallways to the house manager, when on duty and available, or a central switchboard, when not. Consequently, assistance is readily available when required in an emergency.

A house manager, usually resident in the development, acts as a "good neighbour and friend" to residents. He or she is there to assist residents, when they seek help, but is not there to interfere with the residents' independence. In category II sheltered housing development, the house manager is not a medically trained person and so is not intended to provide any such care for residents.

Developments have a number of communal facilities. The main point of contact with other residents, on a social basis, is likely to be the resident's lounge. Residents can visit this lounge whenever they wish. The lounge often has a small kitchen facility to allow tea or coffee to be made, for example. Some lounges have a small library of books that residents can share. The lounge will be used for residents' meeting and social events, such as bingo, card playing, parties etc. A typical lounge is shown in photograph no. 4 below.

Photograph no.4

Residents will also normally have use of a communal laundry, with washing machines, driers and ironing facilities. Where a laundry is provided, no clothes washing facilities are provided in each of the residents' apartments. A typical laundry is illustrated in photograph no 5, below.

All developments have a lift system, to assist residents to gain access to the higher floors. The lifts have corner seating, for the convenience of residents and are fitted with an emergency alarm button.

Guest suites are provided, which allow residents to have friends and relatives to visit them and stay overnight, without accommodating them within their apartment. The use of an apartment could be considered in contravention of the lease, and the requirements of the planning controls, if the visitors do not comply with the age restrictions in force. A typical guest suite is shown in photograph no. 6, below.

Photograph no 5

Photograph no 6

The buildings are set in their own grounds. Most have on-site car parking and amenity space, although some developments have very limited or no car parking provision and the levels of amenity space varies, depending on the location and nature of the development. The grounds, the exteriors and the communal areas are cared for and routinely maintained by the handy man and the gardener, with other specialists being brought in as and when required.

The salary of the house manager and the maintenance of all of the communal facilities are funded from a service charge paid by every resident.

In addition to these communal facilities, each apartment is designed with the elderly in mind. For example, the doors to apartments are wider than the norm, to provide ease of access and electricity sockets, switches etc are planned to be located at convenient heights for residents.

The hallway leads to the lounge/diner, with its small kitchen. (See photographs 7 below). Here the oven is set at a suitable height to save bending and the taps are of the lever type, for easier use.

Photograph no. 7

The apartment has a bathroom. There are grab rails above the bath and lever taps are also provided. A typical bathroom is shown in photograph 8, below.

Photograph no. 8

Apartments have either one or two bedrooms, although the second bedroom is frequently not used for this purpose. One such bedroom is shown in photograph 9, below.

.

Photograph no. 9

Appendix III

Description of Surveys

Surveys Used in Study

Survey Type A – Telephone Survey

Surveys of this form have been undertaken by The Planning Bureau, the town planning arm of McCarthy and Stone for a number of years. The aim of the surveys was to establish data on the car ownership/car parking situation at the developments. Where appropriate, and where resources permitted, they were undertaken on an annual basis.

The house managers of each of the company's developments were telephoned and asked to provide specific data. Over the years the data sought changed slightly.

The data is stored by county, for ease of access, and has been used to provide a guide as to the car ownership levels of residents for the developments in the vicinity of newly proposed developments. A typical example of the data collected is given in the following table.

The name of the development is, of course known, when the telephone call is made. The house manager is then asked to provide the following data:-

Total number of apartments
Number of occupied apartments (one bedroom and two bedroom apartments)
Household sizes (one or two person)
Car ownership levels for one and two person households (and total)
Car parking provision on the site

It has to be borne in mind that the survey data collected in this way is open to human error on the part of the house manager and/or the person making the telephone call. Where possible it has to be checked to ensure consistency. For example, the number of apartments or car parking spaces provided is very unlikely to change from year to year.

OCCUPANCY & CAR OWNERSHIP FOR EXISTING McCARTHY & STONE (DEVELOPMENTS) IN Worcester
Date:
January 2002

Name of Development	No. of Apartments	No.of Apartments Occupied	1 Bed Apartments Occupied	2 Bed Apartments Occupied	1 Person Households	2 Person Households	Car Ownership for 1 Person Households		Car Ownership for 2 Person Households		Total Cars		On-Site Parking Spaces Provided	
								Ratio		Ratio		(Cars To Households Ratio)		(Ratio to No. of Apts)
Gheluvelt Court	52	52	40	12	44	8	9	1:4.9	3	1:2.7	12	1:4.3333	19	1:2.7368
Homenash House	65	64	55	9	62	2	7	1:8.9	2	1:1	9	1:7.1111	15	1:4.3333
Homesmith House	75	71	71	0	57	14	15	1:3.8	8	1:1.8	23	1:3.087	25	1:3
Morgan Court	61	56	40	16	49	7	19	1:2.6	5	1:1.4	24	1:2.3333	24	1:2.5417
Nailers Court	61	61	54	7	46	15	12	1:3.8	14	1:1.1	26	1:2.3462	33	1:1.8485

Survey B – First Questionnaire Survey (1996)

This survey was derived and organised (in part) by the author. The aim was to obtain information from an appropriate proportion of the residents of McCarthy and Stone Category II Sheltered Housing Developments. The survey forms were sent to some 10% of the residents of one development, as a pilot for the main survey, and the results assessed to determine whether the residents clearly understood the questions being asked. The house manager was also contacted to see whether the residents had commented on the questionnaire.

When there was a satisfactory level of confidence that the survey would be likely to provide the data being sought, the full survey was than undertaken. Forms were sent to approximately 20% of the apartments in the 354 occupied developments. The apartments chosen were selected on a numerical basis. Apartments 1, 6, 11, 16, 21 etc. were chosen. Depending on the number of the apartments in the development, the sample chosen was either a little above 20%, 20% or a little below. This was not considered critical, as a response rate of 10% of all residents was considered more than sufficient. It was accepted that some residents may not wish to participate in the survey and the choice of 20% for surveying allowed for a refusal rate of up to 50%.

The survey shows that responses were received from some 320 developments and the overall sample rate achieved was 12.75% of apartments.

A significantly lower sample may well have been acceptable in most cases, but the higher level allowed for possible further analysis of the data by area and the higher level would make this a more reliable basis for analysis.

A copy of the survey forms used, along with the covering letters, follows.

It can be seen that the house manager was requested to provide some limited data, some of which referred to the development as a whole and also one question on the car ownership of the residents of the house manager's apartment.

The questionnaire to be completed by residents was divided into two parts. The first part sought data related to the apartment itself, such as the number of rooms, the occupancy, car ownership etc. The second part of the survey sought data about the residents, such as their age and driving licence possession.

1996 Survey Questionnaires

McCARTHY
& STONE
(Developments) Limited

Homelife House, 26-32 Oxford Road
Bournemouth, Dorset BH8 8EZ.
Telephone: (01202) 292480
Fax No: (01202) 557261

Dear House Manager

McCARTHY & STONE (DEVELOPMENTS) RETIREMENT HOUSING SURVEY ON CAR OWNERSHIP

The above survey is being undertaken by McCarthy & Stone (Developments) Limited, with the full co-operation of Peverel Management Services. The intention is to survey approximately 20% of the apartments in each development. Your co-operation is requested.

1. Enclosed you will find a number of sets of survey forms, fronted by a letter to the residents. On each letter you will find the number of the apartment that the set of forms should be delivered to.

2. The survey is in two parts, with Part One dealing with the apartment. Part Two forms are aimed at each individual resident of that apartment, so if there are two residents in any one apartment, they should receive two sets of the Part Two forms. You will find three sets of these Part Two forms, already labelled for each apartment. Please ensure that you remove any spare copies, so that each apartment receives the correct number of these forms.

3. Having done this, could you please distribute the sets of survey forms to the apartment numbers indicated (i.e. one Part One form and the appropriate number of Part Two forms).

4. Could you please request the residents to return the completed forms to you within one week of distribution. If any resident needs assistance in completing the forms, I would be grateful if you could provide this. Also, if, at an appropriate time, you could gently remind residents to return their forms, this would assist greatly.

5. Should an apartment be vacant, or the occupants away, please indicate this on the front of the survey form and return it with the rest. Similarly, if your apartment is one of those selected, please write "House Manager" on the first sheet, do not fill in anything else, and return it. However, I would be grateful if you would complete and return the attached slip, headed "House Manager Survey".

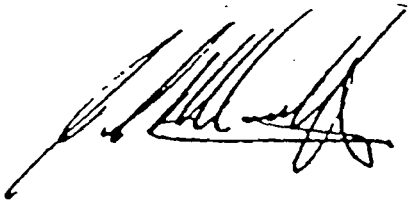
6. When returned to you, please put all of the completed forms in the enclosed large envelope and post it as soon as possible. You will notice that the envelope does not have a stamp on it. This is owing to the fact that postage costs are unknown, however, Peverels have agreed to the postage costs being paid from your petty cash. Even if all the forms are not returned, please send the completed forms back within two weeks of the receipt of this letter.

As an incentive for the residents to participate in this survey, all the apartments returning duly completed questionnaires will be entered into a prize draw for a colour television.

If you are unclear about any aspect of the survey or procedure, please contact Miss Jane Crass (McCarthy & Stone) on 01202 292480, extension 2650 or Mr Allan Burns (Traffic Consultant) on 01794 516125.

Thank you for your co-operation.

Yours Sincerely



John McCarthy MBE
Chairman

HOUSE MANAGER SURVEY

Name of Development.....

Town.....

County.....

House Manager's apartment No. .....

Number of 1 bedroom apartments in the development.....

Number of 2 bedroom apartments in the development.....

Number of car parking spaces provided for the development (including visitor spaces and your space or garage).....

19.Do any of the residents of your apartment currently own a vehicle?

Yes..... No..... (please tick)

If yes, please indicate type (e.g. car/motorbike), and the number owned.

.....

McCARTHY
& STONE
(Developments) Limited

Homelife House, 26-32 Oxford Road
Bournemouth, Dorset BH8 8EZ.
Telephone: (01202) 292480
Fax No: (01202) 557261

Dear Resident(s)

McCARTHY & STONE RESIDENTS SURVEY

McCarthy & Stone are undertaking a survey of a random sample of the residents of their retirement housing developments. The purpose of this survey is mainly to collect data on the car parking and associated characteristics of residents of these apartments, so that future developments can best meet the needs of the residents.

You have been selected, at random, to receive one of these questionnaires and I would be grateful if you could take a few minutes to complete it. It is in two main parts. The first (Part One) relates to your particular apartment and can be filled in jointly with your spouse or another person who lives with you in the apartment. The second (Part Two) is intended to be specifically for you, the resident. There is a separate form for each person living in your apartment.

I have endeavoured not to request any information that you might find too personal, with the possible exception of the important question of your age.

The completed questionnaire will be treated in strict confidence and any published results will not include any individual personal information or any related to an individual apartment.

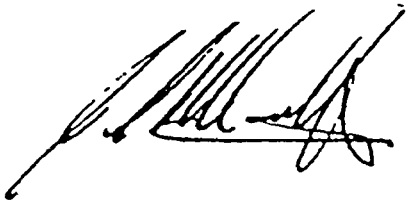
When you have completed the questionnaire, please seal it in the attached envelope and return it to the House Manager. He or she will then send it sealed, with the others from your development, back to McCarthy & Stone for analysis. **I should be grateful if you could complete the questionnaire within one week of receiving it.**

If you require any assistance, your House Manager has been asked to help you. Alternatively, you can telephone Miss Jane Crass (McCarthy & Stone) on 01202 292480, extension 2650 or Mr Allan Burns (Traffic Consultant) on 01794 516125.

If you return your completed forms, your apartment will be entered into a prize draw, with the lucky winner receiving a colour television.

Thank you for your co-operation and best of luck in the draw.

Yours Faithfully



John McCarthy MBE
Chairman

McCARTHY & STONE PLANNING SURVEY 1996

QUESTIONNAIRE

PART ONE - THE APARTMENT

1. Today's date.....

2. Excluding the kitchen and bathroom/toilet, how many rooms are there in your apartment?.....(e.g. bedrooms, lounge or dining room)

3. How many rooms do you use as bedrooms?.....

4. How many people occupy your apartment? female.....
   male.....

5. Have any of the residents of your apartment EVER owned a vehicle?
   yes..... no..... (please tick).

If the answer to question 5 is NO, then please go straight to Part Two of the Questionnaire, otherwise proceed to question 6.

6. Do any of the residents of your apartment CURRENTLY own a vehicle?
   yes..... no..... (please tick)

If yes, please inidicate type (e.g. car, motorbike), and the number owned.
.....

If the answer to question 6 is NO, please answer questions 7 and 8.
Otherwise please proceed to Part Two of the questionnaire.

0	3	9	0	2	1

7. When did the most recent ownership of a vehicle cease?

   approximate date: month..... year.....

8. What was the reason for giving up the ownership of this vehicle? (Please tick)

   no further need.....
   for health reasons.....
   for financial reasons.....
   concern over safety.....
   too much of a worry.....
   death of spouse.....
   road accident.....
   move to retirement housing.....
   other (please specify)
   .....

McCARTHY & STONE PLANNING SURVEY 1996

QUESTIONNAIRE

PART TWO - RESIDENT SURVEY

Would each resident of the apartment please individually complete their own Part Two of the questionnaire.

If there are insufficient forms for each occupant, please see your house manager.

9. Today's date .....

10. Are you?:-
    Male..... Female..... (Please tick)

11. What is your age? ..... (Years)

12. When did you move into this apartment?

    approximate date:- month.....year.....

13. When did you first enter this type of retirement housing?

    approximate date:- month.....year.....

Note:- The anwers to questions 12 and 13 may be the same if this is your first experience of this type of retirement housing.

0	3	9	0	2	1

14. Have you ever had a driving licence?

yes..... no..... (Please tick)

If the answer to question 14 is NO, please skip the remaining questions.

Otherwise please proceed to question 15.

15. Do you have a CURRENT driving licence?

yes..... no..... (Please tick)

16. When did you first obtain a driving licence?

approximate year.....

If you still retain a current driving licence, please skip the remaining questions.

17. If you have given up your driving licence, when did you do so?

approximate date:- month.....year.....

18. What was the reason for giving it up?

(Please tick)

no further need.....
for health reasons.....
for financial reasons.....
concern over safety.....
too much of a worry.....
death of spouse.....
road accident.....
move to retirement housing.....
other (please specify)
.....

McCARTHY & STONE PLANNING SURVEY 1996

QUESTIONNAIRE

PART TWO - RESIDENT SURVEY

Would each resident of the apartment please individually complete their own Part Two of the questionnaire.

If there are insufficient forms for each occupant, please see your house manager.

9. Today's date .....

10. Are you?:-
    Male..... Female..... (Please tick)

11. What is your age? ..... (Years)

12. When did you move into this apartment?

    approximate date:- month.....year.....

13. When did you first enter this type of retirement housing?

    approximate date:- month.....year.....

Note:- The anwers to questions 12 and 13 may be the same if this is your first experience of this type of retirement housing.

0	3	9	0	2	1

14. Have you ever had a driving licence?

yes..... no..... (Please tick)

If the answer to question 14 is NO, please skip the remaining questions.

Otherwise please proceed to question 15.

15. Do you have a CURRENT driving licence?

yes..... no..... (Please tick)

16. When did you first obtain a driving licence?

approximate year.....

If you still retain a current driving licence, please skip the remaining questions.

17. If you have given up your driving licence, when did you do so?

approximate date:- month.....year.....

18. What was the reason for giving it up?

(Please tick)

no further need.....
for health reasons.....
for financial reasons.....
concern over safety.....
too much of a worry.....
death of spouse.....
road accident.....
move to retirement housing.....
other (please specify)
.....

McCARTHY & STONE PLANNING SURVEY 1996

QUESTIONNAIRE

PART TWO - RESIDENT SURVEY

Would each resident of the apartment please individually complete their own Part Two of the questionnaire.

If there are insufficient forms for each occupant, please see your house manager.

9. Today's date .....

10. Are you?:-
    Male..... Female..... (Please tick)

11. What is your age? ..... (Years)

12. When did you move into this apartment?

    approximate date:- month.....year.....

13. When did you first enter this type of retirement housing?

    approximate date:- month.....year.....

Note:- The anwers to questions 12 and 13 may be the same if this is your first experience of this type of retirement housing.

0	3	9	0	2	1

14. Have you ever had a driving licence?

yes..... no..... (Please tick)

If the answer to question 14 is NO, please skip the remaining questions.

Otherwise please proceed to question 15.

15. Do you have a CURRENT driving licence?

yes..... no..... (Please tick)

16. When did you first obtain a driving licence?

approximate year.....

If you still retain a current driving licence, please skip the remaining questions.

17. If you have given up your driving licence, when did you do so?

approximate date:- month.....year.....

18. What was the reason for giving it up?

(Please tick)

no further need.....
for health reasons.....
for financial reasons.....
concern over safety.....
too much of a worry.....
death of spouse.....
road accident.....
move to retirement housing.....
other (please specify)
.....

Survey C – Second Questionnaire Survey (2000/2001)

This survey was undertaken in a similar manner to Survey B. It was also derived and organised (in part) by the author. The same procedure, in terms of a pilot survey and sampling procedure was adopted, although for this survey the apartment numbers surveyed were number 2, 7, 12 etc. However, in this case, approximately 450 developments were surveyed. Furthermore, the survey was spread over a 12 month period, with about one twelfth being randomly surveyed each month. This allowed for the responses on residents visits to the garden area etc. to be analysed on a seasonal basis.

A significant proportion of the responses have been analysed, although a significant proportion remains in raw data form. The responses from 152 developments (approximately one third of the developments surveyed) have been processed. This totals responses from over 1030 apartments and over 1160 residents. This represents a sample rate of over 4.56% of apartments. The acceptability of this sample rate was assessed by considering some of the results from lower sample levels and assessing whether the inclusion of additional responses made any significant change to the findings. Any changes were found to be of a minor nature.

A copy of the survey forms used, again including the letters to the house manager and residents, follows.

The house managers were asked to provide data related to their own apartment and to the development as a whole. They were also asked to distribute the questionnaires to the residents and to collect and forward the responses.

The first part of the residents' survey sought details about the residents at both the apartment and individual level, such as number of "bedrooms, number of residents, car ownership details, along with the sex, age etc of residents, any disabilities and interests. The second part of the questionnaire sought data on the comments of the residents. The final part sought data on the activities of individual residents, such as visits to the facilities within the development and also trips made outside the development.

2000/2001 Survey Questionnaires

McCARTHY
& STONE
(Developments) Limited

Homelife House, 26-32 Oxford Road
Bournemouth, Dorset BH8 8EZ.
Telephone: (01202) 292480
Fax No: (01202) 557261

169

169

Dear House Manager

McCARTHY & STONE (DEVELOPMENTS) - RETIREMENT HOUSING SURVEY

We are undertaking a survey to collect information about the residents of McCarthy & Stone developments and how our developments operate. The results of the survey will assist the Company in planning our future schemes. The survey is being undertaken with the full co-operation of Peverel Management Services.

The survey is intended to add to the information collected in a similar survey undertaken in 1996, which has proved very useful over the last few years.

Your co-operation would be greatly appreciated.

You are asked to:-

1. Distribute the enclosed survey forms to the appropriate residents (the apartment numbers are indicated on each envelope);
2. Complete your own questionnaire, attached (please note that the questions I would like you to answer will vary, depending on whether you are a resident house manager, or live off the site);
3. Some 10 days after distribution, please collect the completed forms that have not already been returned to you and return them all in the enclosed envelope. It has been agreed that you are to pay the postage for the return of the envelope at present, and Peverel will be re-imbursed by us at the finish of the entire survey.

Should an apartment be vacant, or the occupants away, please indicate this on the front of the survey form and return it with the rest. Similarly, if your apartment is one of those selected, please write "house manager" on the first sheet and return it.

If you require any assistance in completing the questionnaires or in assisting any of the residents, please call Miss Jane Crass (McCarthy & Stone) on 01202 508035, or Mr Allan Burns (Survey co-ordinator) on 01794 516125.

Thank you very much for your assistance.

Yours Sincerely

Keith Lovelock

Keith Lovelock
Chief Executive

SURVEY OF HOUSE MANAGERS

1. Do you live in the development (Yes or no)? .....

If the answer to question 1 is "No", please go to question 7.

2. How many people live in your private apartment .....

3. Total number of cars owned by you and your family .....

4. Make and specific model of cars (e.g. Ford Fiesta, Peugeot 205)
.....

5. Number of bicycles owned by you and your family .....

6. If you had storage for bicycles, how many of your family would take up cycling .....

7. In the past 12 months, have you had any complaints from neighbouring properties:-
(yes or no, or unknown) .....

8. If yes, what were the nature of the complaints

.....

.....

.....

.....

9. In the past year, have you had complaints from residents over the services provided
(yes or no) .....

10. If yes, what was the nature of the complaints

.....

.....

.....

.....

11. Is the guest suite occupied (yes or no) .....
(if yes, please ask the guests to complete the attached "guest movement form")

House Manager / visitor diary

If you are a resident house manager:-

On the Monday following receipt of this form, could you please complete the following diary of trips made by you and your family.

Trips out (Please give purpose of trip, e.g. business, shopping, visit friends, church, theatre etc. Also please state the main means by which you travelled e.g. walk, cycle, bus, taxi, as driver or passenger in your car, lift with resident, lift with relative/friend, train etc)

1. Depart time ..... return time ..... Purpose ..... How did you travel .....
2. Depart time ..... return time ..... Purpose ..... How did you travel .....
3. Depart time ..... return time ..... Purpose ..... How did you travel .....
4. Depart time ..... return time ..... Purpose ..... How did you travel .....
5. Depart time ..... return time ..... Purpose ..... How did you travel .....
6. Depart time ..... return time ..... Purpose ..... How did you travel .....

(please go on to visitor diary)

If you are a non-resident house manager:-

On the Monday following receipt of this form, could you please complete the following diary of trips made by you to and from this apartment block.

Trips

Please give your time of first arrival at the apartments, and mode of travel (Question 1), and the time of departure after work, and mode of travel (Question 2)

In addition, please list the other trips you make during the day, giving the purpose of trip. Also please state the main means by which you travelled e.g. walk, cycle, bus, taxi, as driver or passenger in your car, lift with resident, lift with relative/friend, train etc)

1. Arrival time (for work) ..... Mode of travel .. .... 2. Depart time (after work) ..... Mode of travel .....

Other trips during working hours:-

3. Depart time ..... return time ..... Purpose ..... How did you travel .....
4. Depart time ..... return time ..... Purpose ..... How did you travel .....
5. Depart time ..... return time ..... Purpose ..... How did you travel .....
6. Depart time ..... return time ..... Purpose ..... How did you travel .....
7. Depart time ..... return time ..... Purpose ..... How did you travel .....

(please go on to visitor diary)

Visitor Diary

1. VISITS TO YOU OR YOUR APARTMENT BY NON-RESIDENTS

(PLEASE DO NOT INCLUDE ANY VISITORS TO INDIVIDUAL RESIDENTS)

(To be completed by all house managers on the Monday following receipt of this form)

Visits to you or the apartment building by non-residents
(Please indicate who the visitor(s) was (visitor type) e.g. relative/friend, doctor, nurse, gardener, cleaner etc., and also please state the main means by which the visitor(s) travelled (please ask them if necessary) e.g. walk, cycle, bus, taxi, car, train)

1. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
2. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
3. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
4. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
5. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
6. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
7. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
8. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
9. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....

Visitor Diary

1. VISITS TO THE APARTMENT BUILDING BY NON-RESIDENTS. E.G GARDENER, POSTMAN ETC.

(PLEASE DO NOT INCLUDE ANY VISITORS TO INDIVIDUAL RESIDENTS)

(To be completed by all house managers on the Monday following receipt of this form)

Visits to you or the apartment building by non-residents
(Please indicate who the visitor(s) was (visitor type) e.g. relative/friend, doctor, nurse, gardener, cleaner etc., and also please state the main means by which the visitor(s) travelled (please ask them if necessary) e.g. walk, cycle, bus, taxi, car, train)

1. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
2. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
3. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
4. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
5. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
6. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
7. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
8. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
9. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....

GUEST SUITE – DIARY OF MOVEMENTS

Please indicate the date of your arrival as a guest ..... Please indicate expected departure date .....

On the Monday following receipt of this form, if you are still a guest in this suite, could you please complete the following diary of trips made by you and your family.

Trips out (Please give purpose of trip, e.g. business, shopping, visit friends, church, theatre etc. Also please state the main means by which you travelled, e.g. walk, cycle, bus, taxi, as a driver or passenger in your car, lift with resident, lift with relative/friend, train etc.)

1. Depart time ..... Return time ..... Visitor type ..... How did you travel .....
2. Depart time ..... Return time ..... Visitor type ..... How did they travel .....
3. Depart time ..... Return time ..... Visitor type ..... How did they travel .....
4. Depart time ..... Return time ..... Visitor type ..... How did they travel .....
5. Depart time ..... Return time ..... Visitor type ..... How did they travel .....
6. Depart time ..... Return time ..... Visitor type ..... How did they travel .....

McCARTHY
& STONE
(Developments) Limited

Homelife House, 26-32 Oxford Road
Bournemouth, Dorset BH8 8EZ.
Telephone: (01202) 292480
Fax No: (01202) 557261

16932

Dear Resident(s)

McCARTHY & STONE RESIDENTS SURVEY

McCarthy & Stone are undertaking a survey of a random sample of the residents in order to collect additional information about those who live in McCarthy & Stone developments, and how the developments operate. The results of the survey will assist the company in planning our future developments. This survey is being undertaken with the full agreement of Peverel Management Services.

The survey is intended to add to the information collected in a similar survey undertaken in 1996, which has proved very useful over the last few years.

You have been selected, at random, to receive one of these questionnaires and I would be grateful if you could spare the time to complete all of the questions. I have endeavoured to minimise the amount of information requested that might be considered of a personal nature. However, I can assure you that your completed questionnaire will be treated in the strictest confidence, and any published results will not include and individual personal information. Your co-operation would be greatly appreciated.

When you have completed the questionnaire, please seal it in the attached envelope and return it to the House Manager. He or she will then send it sealed, with the others from your development, back to McCarthy & Stone for my analysis. **I should be grateful if you could complete the questionnaire within one week of receiving it.**

If you require any assistance, please ask your House Manager or call Miss Jane Crass (McCarthy & Stone) on 01202 508035 or Mr Allan Burns (Survey co-ordinator) on 01794 516125.

Thank you for your co-operation.

Yours Faithfully

Keith Lovelock

Keith Lovelock
Chief Executive

MCCARTHY AND STONE LIFESTYLE SURVEY - 1999-2001

Survey of Residents of Sheltered Housing

Part 1 Details of Residents:-

1. Excluding the kitchen and bathroom/toilet, how many rooms are there in your apartment (e.g. bedrooms, lounge, dining room etc.)? .....

2. How many people live in your apartment .....

3. Total number of cars owned by residents of your apartment .....

4. Make and specific model of cars owned, (e.g. Ford Fiesta, Peugeot 205)
.....

Please complete the following question 5 to 13, to give a description of each of the residents:-

		Resident No 1.	Resident No. 2.	Resident No 3
5.	Sex (Enter Male/Female)	.....	.....	.....
6.	Age (Years and months)	.....	.....	.....
7.	Current car driver (yes or no)	.....	.....	.....
8.	Owner of a bicycle (yes or no)	.....	.....	.....

Any disabilities (if none, please proceed to question 13) :-

9.	Registered disabled (yes or no)	……..	……..	……
10.	Nature of disability (e.g. blind)	……..	……..	……
11.	Enter "P" if confined to a wheelchair, "O" if an occasional wheelchair user, or "X" if not a user	……...	…….....	……
12.	Is it <u>essential</u> that the disabled resident can use a wider than normal car parking space, because of their disability (yes or no)	……	……..	……..

13. What are the main leisure activities of the residents of your apartment

e.g. bowls, bridge, bingo, cinema, watching TV, crosswords etc. Please list below:-

Resident No 1.	Resident No. 2	Resident No 3
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……

Part 2. Comments on your Apartment

Please tick the description you think best describes your opinion of the apartment you live in:-

14. Amount of garden space/landscaping (including paving etc.)	Very Poor	Poor	Adequate	Good	Very Good
15. Quality of garden space/landscaping (including paving etc.)	Very Poor	Poor	Adequate	Good	Very Good

Comments on other facilities:-

16. Residents lounge	Very Poor	Poor	Adequate	Good	Very Good
17. Laundry facilities (if provided)	Very Poor	Poor	Adequate	Good	Very Good
18. Security provision	Very Poor	Poor	Adequate	Good	Very Good
19. Guest suite (if provided)	Very Poor	Poor	Adequate	Good	Very Good

169	32

20. Convenient location for local shops	Very Poor	Poor	Adequate	Good	Very Good
21. Convenience for major supermarket	Very Poor	Poor	Adequate	Good	Very Good
22. Convenient location for town centre	Very Poor	Poor	Adequate	Good	Very Good
23. Convenience for public transport (e.g. buses or possibly trains, taxis etc.)	Very Poor	Poor	Adequate	Good	Very Good
24. Adequacy of car parking	Very Poor	Poor	Adequate	Good	Very Good

25. If provision were made for the parking of bicycles (e.g. cycle racks or store), would any resident in your apartment be likely to take up cycling (yes or no) .....
If yes, please indicate how many .....

26. Does your apartment face mainly a) south .... b) east .... c) north ... d) west ... (please tick)

27. Are you happy with this aspect (yes or no) .....

28 If you had had the choice of the following views from your apartment, which would you have preferred – please indicate order of preference (1 for first choice, 2 for second etc.)

	Preference (1,2 or 3)
a) activity, such as a busy street, public place, shopping area	.....
b) the quiet garden area	.....
c) the main entrance/car park	.....

29. Could you sit out in the grounds, if you wished to (yes or no) .....

30. When do you sit out in the grounds

a) spring .... b) summer .... c) autumn .... d) winter .... e) never .... (please tick)

31. If you do sit outside, do you seek a

a) sunny spot ..... b) shaded spot ..... c) no preference ..... (please tick preference)

32. How do you normally carry out your shopping for food/groceries etc.

(Please tick the one description that best describes your shopping behaviour)

a) undertake a major shop **no more than once a week**.....
or b) undertake smaller, **more frequent shopping trips** .....
or c) have your main food/groceries **delivered** .....
or d) varies from week to week .....

33. Why did the resident(s) of your apartment enter sheltered housing - please tick reason(s)

health reasons ..... security ..... nearer family .....
previous house/garden unsuitable ..... death of spouse .....
companionship .....
Other (please specify) .....

34. If the resident(s) of your apartment have given up owning a car, please indicate reason(s)

health reasons .....no further need .....death of spouse .....
financial reason ..... safety/security reasons .....
too much worry ..... entered sheltered housing .....
Other (please specify) .....

35. Was the level of service provided by McCarthy & Stone when you bought your apartment

Very Poor Poor Adequate Good Very Good (please tick)

36. Has living in your apartment lived up to your expectations Yes ..... No .....

37. Would you recommend McCarthy & Stone to a friend/relative Yes ..... No .....

Diary Questionnaire (Resident 1)

Please complete this form to give your activities on the one specified day only.
On the first Wednesday following receipt of this questionnaire, please complete the attached diary for the day. If you do not undertake any particular activity, please tick "none".

A. Visits to residents lounge (None)

1. Time ..... Length of stay ..... Purpose .....
2. Time ..... Length of stay ..... Purpose .....
3. Time ..... Length of stay ..... Purpose .....
4. Time ..... Length of stay ..... Purpose .....
5. Time ..... Length of stay ..... Purpose .....

B. Visits to laundry (if provided) (None)

1. Time ..... Length of stay ..... 2. Time ..... Length of stay .....
3. Time ..... Length of stay ..... 4. Time ..... Length of stay .....

C. Visit to the grounds (None)

Please enter times and please tick what you were doing.

1. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
2. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
3. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
4. Time ..... Length of stay ..... Walking..... Sitting..... Other .....

169	32

D. Trips out (None)

(Please give purpose of trip, e.g. shopping, visit friends, church, theatre etc. Also please state the main means by which you travelled e.g. walk, cycle, bus, taxi, as driver or passenger in your car, lift with other resident, lift with relative/friend, train etc.)

1. Depart time ..... return time ..... Purpose ..... How did you travel .....
2. Depart time ..... return time ..... Purpose ..... How did you travel .....
3. Depart time ..... return time ..... Purpose ..... How did you travel .....
4. Depart time ..... return time ..... Purpose ..... How did you travel .....
5. Depart time ..... return time ..... Purpose ..... How did you travel .....
6. Depart time ..... return time ..... Purpose ..... How did you travel .....

C. Visits to you from non-residents (None)

(Please indicate who the visitor(s) was, e.g. relative/friend, doctor, nurse, home-help etc., and also please state the main means by which the visitor(s) travelled (please ask them) e.g. walk, cycle, bus, taxi, car, train)

1. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
2. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
3. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
4. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
5. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
6. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....

Diary Questionnaire (Resident 2)

Please complete this form to give your activities on the one specified day only.
On the first Wednesday following receipt of this questionnaire, please complete the attached diary for the day. If you do not undertake any particular activity, please tick "none".

A. Visits to residents lounge (None)

1. Time ..... Length of stay ..... Purpose .....
2. Time ..... Length of stay ..... Purpose .....
3. Time ..... Length of stay ..... Purpose .....
4. Time ..... Length of stay ..... Purpose .....
5. Time ..... Length of stay ..... Purpose .....

B. Visits to laundry (if provided) (None)

1. Time ..... Length of stay ..... 2. Time ..... Length of stay .....
3. Time ..... Length of stay ..... 4. Time ..... Length of stay .....

C. Visit to the grounds (None)

Please enter times and please tick what you were doing.

1. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
2. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
3. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
4. Time ..... Length of stay ..... Walking..... Sitting..... Other .....

169	32

D. Trips out (None)

(Please give purpose of trip, e.g. shopping, visit friends, church, theatre etc. Also please state the main means by which you travelled e.g. walk, cycle, bus, taxi, as driver or passenger in your car, lift with other resident, lift with relative/friend, train etc.)

1. Depart time ..... return time ..... Purpose ..... How did you travel .....
2. Depart time ..... return time ..... Purpose ..... How did you travel .....
3. Depart time ..... return time ..... Purpose ..... How did you travel .....
4. Depart time ..... return time ..... Purpose ..... How did you travel .....
5. Depart time ..... return time ..... Purpose ..... How did you travel .....
6. Depart time ..... return time ..... Purpose ..... How did you travel .....

C. Visits to you from non-residents (None)

(Please indicate who the visitor(s) was, e.g. relative/friend, doctor, nurse, home-help etc., and also please state the main means by which the visitor(s) travelled (please ask them) e.g. walk, cycle, bus, taxi, car, train)

1. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
2. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
3. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
4. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
5. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
6. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....

Diary Questionnaire (Resident 3)

Please complete this form to give your activities on the one specified day only.
On the first Wednesday following receipt of this questionnaire, please complete the attached diary for the day. If you do not undertake any particular activity, please tick "none".

A. Visits to residents lounge (None)

1. Time ..... Length of stay ..... Purpose .....
2. Time ..... Length of stay ..... Purpose .....
3. Time ..... Length of stay ..... Purpose .....
4. Time ..... Length of stay ..... Purpose .....
5. Time ..... Length of stay ..... Purpose .....

B. Visits to laundry (if provided) (None)

1. Time ..... Length of stay ..... 2. Time ..... Length of stay .....
3. Time ..... Length of stay ..... 4. Time ..... Length of stay .....

C. Visit to the grounds (None)

Please enter times and please tick what you were doing.

1. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
2. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
3. Time ..... Length of stay ..... Walking..... Sitting..... Other .....
4. Time ..... Length of stay ..... Walking..... Sitting..... Other .....

169	32

D. Trips out (None)

(Please give purpose of trip, e.g. shopping, visit friends, church, theatre etc. Also please state the main means by which you travelled e.g. walk, cycle, bus, taxi, as driver or passenger in your car, lift with other resident, lift with relative/friend, train etc.)

1. Depart time ..... return time ..... Purpose ..... How did you travel .....
2. Depart time ..... return time ..... Purpose ..... How did you travel .....
3. Depart time ..... return time ..... Purpose ..... How did you travel .....
4. Depart time ..... return time ..... Purpose ..... How did you travel .....
5. Depart time ..... return time ..... Purpose ..... How did you travel .....
6. Depart time ..... return time ..... Purpose ..... How did you travel .....

C. Visits to you from non-residents (None)

(Please indicate who the visitor(s) was, e.g. relative/friend, doctor, nurse, home-help etc., and also please state the main means by which the visitor(s) travelled (please ask them) e.g. walk, cycle, bus, taxi, car, train)

1. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
2. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
3. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
4. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
5. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....
6. Arrival time ..... depart time ..... Visitor type ..... How did they travel .....

Surveys D – Traffic Counts Etc (Various Dates)

Survey of Company Records (see Table 4.4)

The company keeps records of all of the reservation forms of persons purchasing a lease of an apartment. These records include the ages of the potential residents. Although some of the reservations might not result in an eventual purchase, this provides the best available data of the age of residents at about the time of entering this form of housing.

A random set of developments, for various years of opening, was selected from the available data to allow Table 4.4 to be derived.

Cycle Ownership Survey (see paragraph 5.5.1)

The house managers at a sample of 30 developments were surveyed to ascertain the cycle ownership of residents and the use of cycles by visitors. The 30 developments incorporated a total of 1526 apartments, at an average of 51 per development. A range of developments was chosen, from Falmouth, in Cornwall, to Dundee in Scotland. In addition, the age of developments also varied, from one which opened in 1980 to one opened in 1997.

The survey took place in December 1998/January 1999. A copy of the survey form follows. This form was sent to the house managers and all 30 responded within 3 to 4 weeks. The survey was undertaken by the author of this overall study.

Visitor Parking Survey (see paragraph 5.7.3) and 1997 Traffic Generation Survey

Again this survey was organised and analysed by the author. A survey company was employed to undertake the surveys between 8 a.m. and 8 p.m. on a Friday, Saturday and Sunday at 8 developments. The surveys were undertaken in March 1997. The survey staff noted the registration numbers of all the vehicles in the car park of the development at the start of the survey period. They then noted the registration numbers of all vehicles entering or leaving the development, noting the time of the vehicle movement.

Whilst it was assumed that the cars in the car park at the start of the survey were residents' cars, this was checked by obtaining the registration numbers of the residents' cars from the house manager. It was then possible to determine how many visitors' cars were present within the car park at any time during the day.

It was also possible to determine the number of vehicle movements generated by the developments, as each such movements was noted as part of the survey.

Traffic Generation Surveys (see paragraph 5.9.5)

There were two basic survey procedures used in this study. The main procedure used is identical to that described above, with the vehicle registration number of the vehicle and the time of the movement being noted.

The second procedure involved the use of an automatic traffic counter on the access to the development. This procedure gives data for the full 24 hour period, usually over a full week.

Appendix IV

Residents' Interests

Residents' Interests

In the table below, only those residents' interests where 12 or more references have been made have been included. This limit represents reference by some 1% of the total residents responding to this question.

Table A - Residents' Interests

Interest	No of references (from 1167 residents)	Percentage of residents with this interest – to nearest 1%
Television	983	84%
Crosswords	525	45%
Reading	494	42%
Bingo	218	19%
Walking	192	16%
Card Games	184	16%
Handicrafts (e.g. knitting)	156	13%
Music	108	9%
Bowls	92	8%
Board games (incl dominoes)	81	7%
Cinema	79	7%
Theatre	77	7%
Radio	76	7%
Holidays	70	6%
Day Trips	42	4%
Eating Out	40	3%
Church	38	3%
Gardening	33	3%
Dancing	31	3%
Swimming	31	3%

Interest	No of references (from 1167 residents)	Percentage of residents with this interest – to nearest 1%
Computer	30	3%
Visiting family	28	2%
Keep Fit	28	2%
Shopping	26	2%
Cooking	25	2%
Writing	25	2%
Voluntary Work	21	2%
Visiting Friends	19	2%
Jigsaws	19	2%
Painting (Art)	18	2%
Education (Classes)	15	1%
Puzzles	14	1%
Singing	13	1%
Quiz Nights	13	1%

Appendix V

Residents' Comments

Residents' Comments

In the 2000/2001 survey, residents were asked to comment on some of the facilities provided at the development. Some of the responses could have some relationship to the transport needs of the residents, and are considered in detail in the main body of the thesis. The full set of responses of residents is given below.

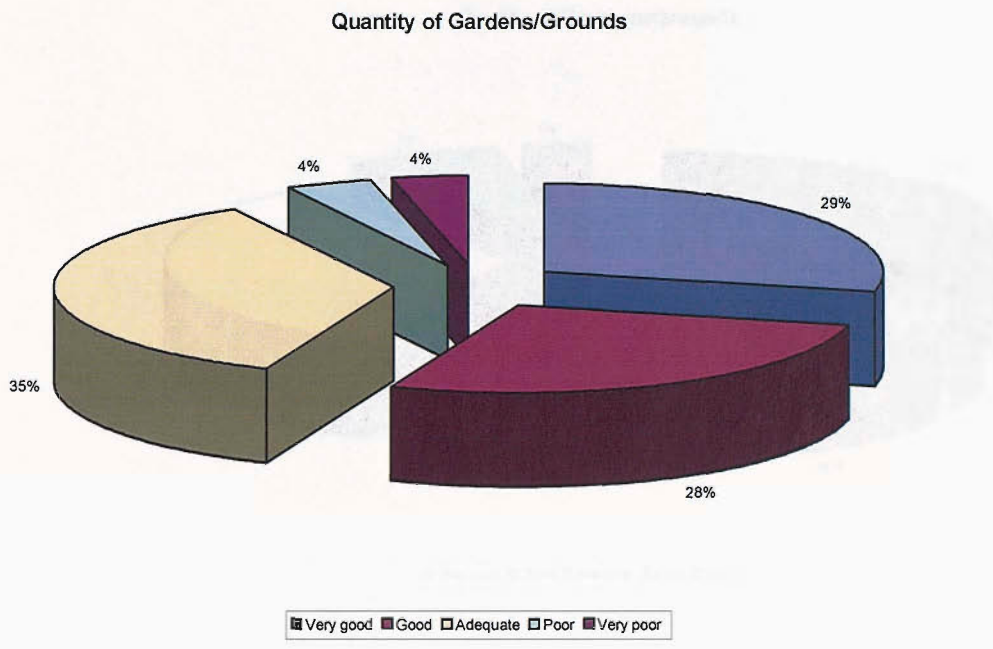
Amenity Space

This is initially considered in two of the questions asked. The first relates to the quantity of the amenity space provided and the second to the quality.

When the quantity of the amenity areas of the developments are considered, the results show only 8% of residents thought the provision was less than adequate, 35% considered the provision adequate, 28% good and 29% very good. This appears to show a 92% level of satisfaction.

This can only represent a general guide, as the level of provision will vary significantly between developments.

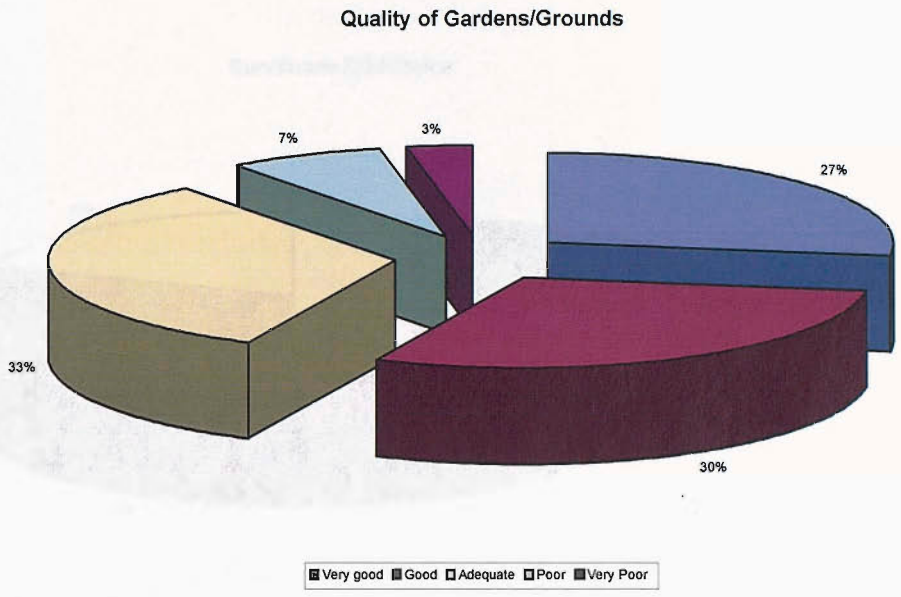
Comments on Quantity of Garden Space Provided



The comments on the quality of the provision are a little less favourable. Here some 10% indicate that the quality is less than adequate. From occasional comments made by residents, this appears to result from a level of dissatisfaction with some of the gardeners employed. It may reflect an interest in gardening by many residents, and a frustration that they cannot do the work and that it is not done to their standards.

However, a 90% satisfaction rating, including a 57% good/very good rating, is still generally favourable.

Comments on Quality of Landscaping etc

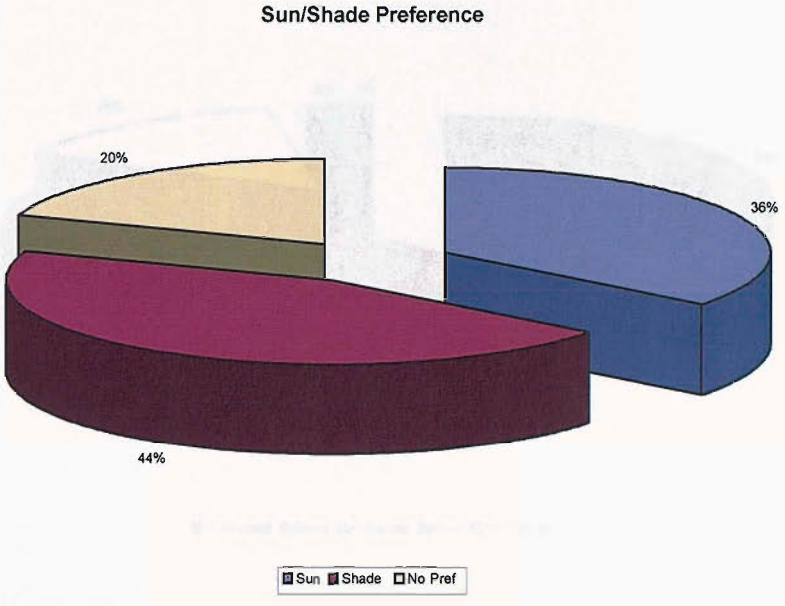


Further questions sought information of the use of the grounds. Only 3.4% of residents did not feel that they could sit out in the gardens, if they wished. Such comments may be worthy of further consideration, as some of these responses came from developments where other residents indicated that they could, and indeed did, sit out. This could indicate that, at these developments, the access to the gardens was not ideally suited to someone with limited mobility.

Some 25% of residents indicated that they never sat out in the grounds. Of those that did, and 696 indicated when they did so, the summer was, not surprisingly, the most popular time. It was found that 681 of the 696 sat out in the summer, with only 15 avoiding doing so in this season. Summer was between 2 and 3 times as popular as spring, when 267 of the 696 sat out, and was about 4 times more popular than autumn, when 173 did so. Very few, only 16, indicated that they sat out in the winter months.

When the residents did sit out, their preferences for the location (sun or shade) were as shown below.

Preferred Location for Sitting Out

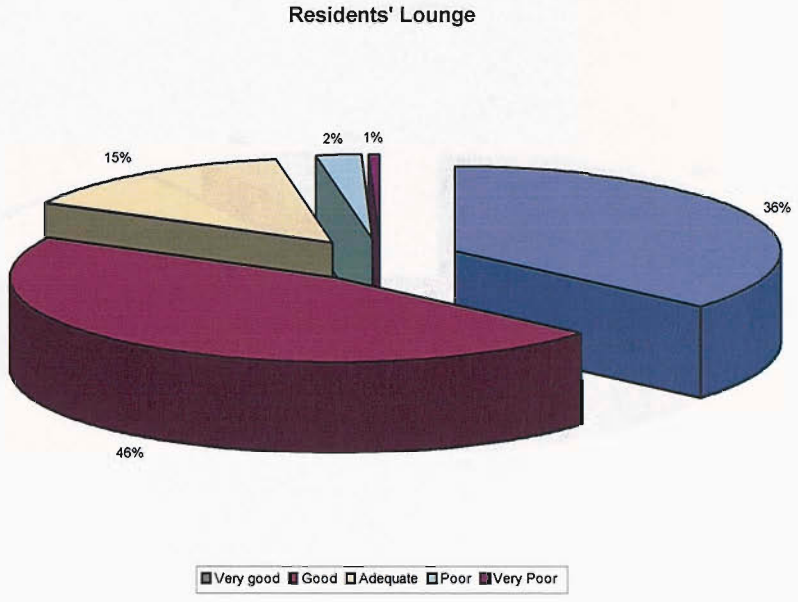


This does show a slightly higher preference for a shaded sitting out area, although sunny areas are also popular. Ideally, therefore, a development should allow for both.

Residents' Lounge

Some comments were made about the inability of some lounges to accommodate all residents, and the related lack of adequate seating. It is unclear how frequently there would be a need or desire for all residents to visit the lounge at the same time. The size or nature of the associated "kitchen" area also generated some limited comments. However, the level of satisfaction was generally high.

Comments of Residents' Communal Lounge

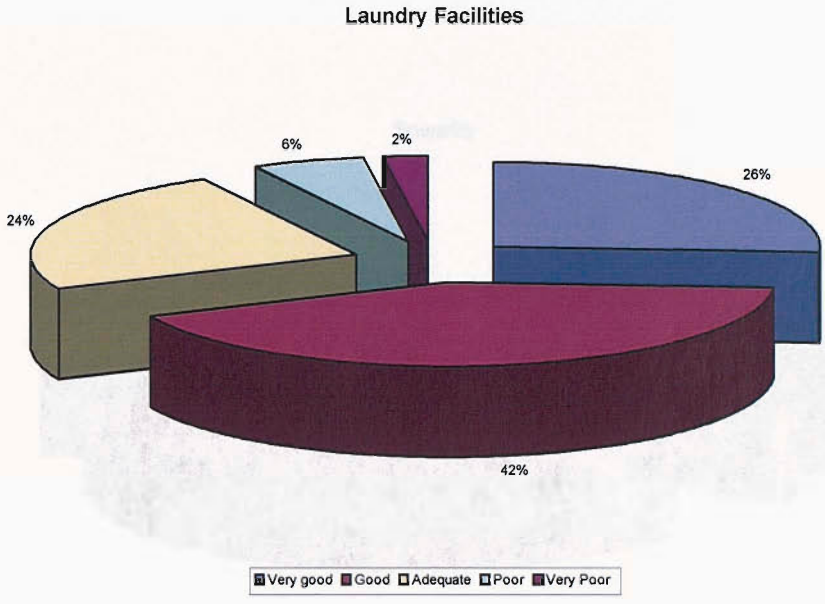


Only some 3% show dissatisfaction at the provision, giving a 97% satisfaction rating, with 46% describing the provision as good and 36% as very good.

Laundry

There were some limited criticisms over the number of washing and/or drying machines provided, when compared with the number of apartments. In some developments, this problem may have been overcome by the use of the laundry being "rationed" on a rota basis. When asked about visits to the laundry on specific days, a number of residents reported that this was not their "allocated day". Such an arrangement is one that is made at the development itself, presumably at the suggestion of residents.

Comments on Communal Laundry Facilities



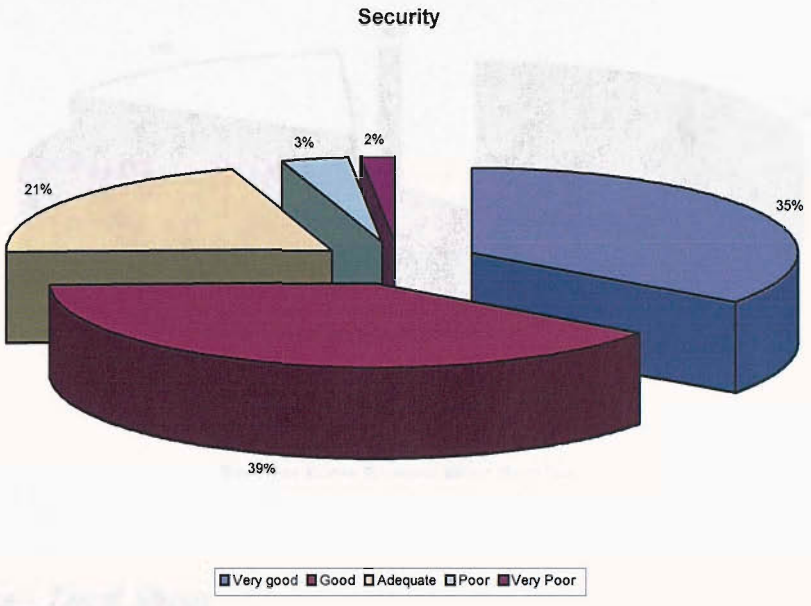
The dissatisfaction level (poor or very poor) is low, at 8%, and the good or very good rating is in excess of two thirds.

Security

Security is seen by residents as the most important reason why they entered sheltered housing. There were a very limited number of comments about the level of security in some developments. One comment was that too many people had keys that could bypass the normal entry system, e.g. paper delivery boys/girls.

The dissatisfaction level is again very low, at about 5%. Given the importance placed on this feature, this appears to be a very good satisfaction rating. It will be noted that this is an important selling point of this form of housing.

Comments on the Security at the Developments



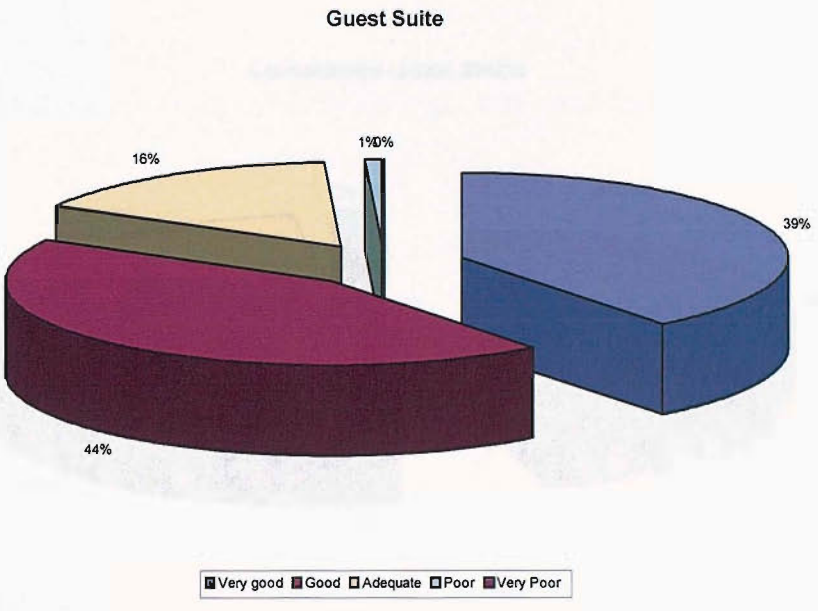
Guest Suite

In most developments, a small apartment is provided which can be used by residents' guests. Friends and relatives are not expected to stay in the residents' individual apartments. This could lead to problems in relation to the standard lease if persons below the qualifying age stayed in a resident's apartment, even for a relatively short period.

The satisfaction with the guest suite facility is very high, although many residents did not comment, but noted that they had not had cause to use or even enter the suite.

None described the facility as "very poor", and less than 1%, described it as poor. Well over 80% of residents described it as a good or very good facility.

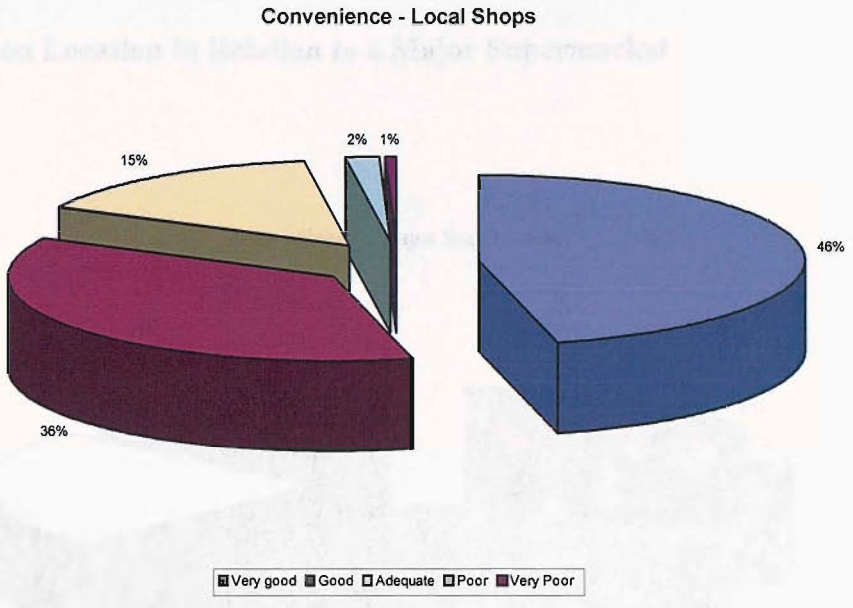
Comments on Guest Suite Provision



Convenience – Local Shops

Most residents are satisfied with the location of their developments, with respect to local shops. Only some 3% rate the location in relation to these local shops as being poor or very poor. Some 82% consider the location to be good or very good. This is one of the important factors in the siting of such developments.

Comments on Location of Development in Relation to Local Shops

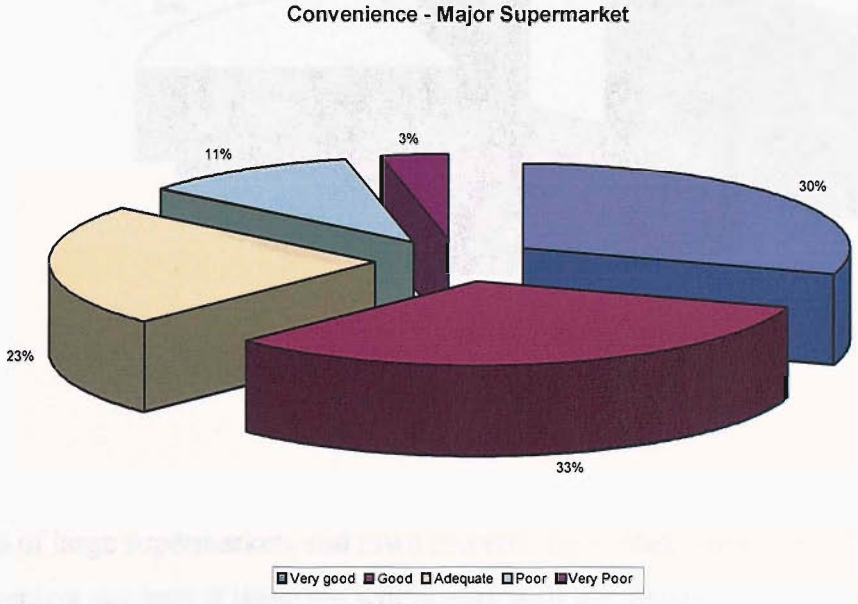


Convenience – Supermarket

Not all developments are likely to be very well located in this respect. Major supermarkets tend to be large units addressing the needs of large catchment areas. They can, therefore, only be in close proximity to a small proportion of dwellings. They are likely to be much less accessible to most residential areas than the smaller local shops.

The survey shows, nevertheless, that over 60% of residents consider that their development is well located for one, or more, major supermarkets, with 14% considering the location to be unsatisfactory, i.e. poor (11%) or very poor (3%). On balance, this appears to be a very satisfactory result.

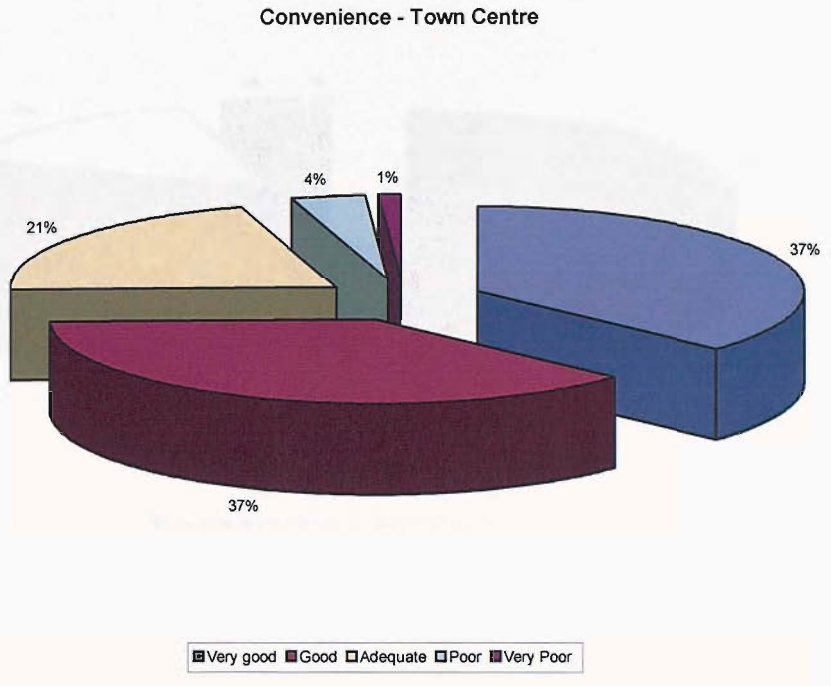
Comments on Location in Relation to a Major Supermarket



Convenience – Town Centre

Again, not all developments can be close to town centres, although appropriate sites are sought within reasonable proximity to general shops, services and facilities. The residents appear generally satisfied with convenience for town centre services. Only 5% considered the location of their development to be poor or very poor and almost 75% of residents considered it good or very good.

Comments on Location in Relation to Town Centre

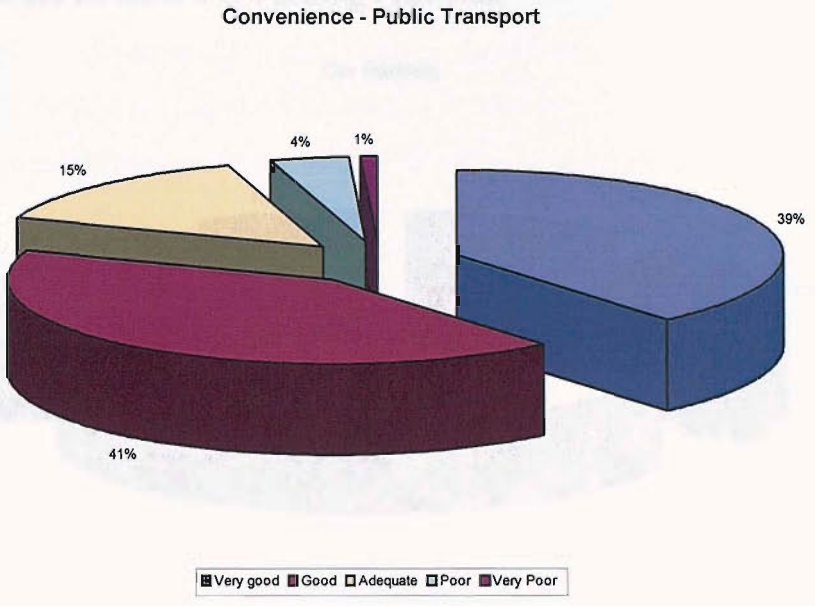


In terms of large supermarkets and town centres, the residents may consider access to be convenient not only if these are within easy walking distance, but also if suitable public transport is available.

Convenience for Public Transport

Some 80% of residents consider access to public transport to be good or very good and a further 15% considers this to be adequate. Only 5% are not satisfied with the provision.

Comments on Location in Relation to Public Transport Services



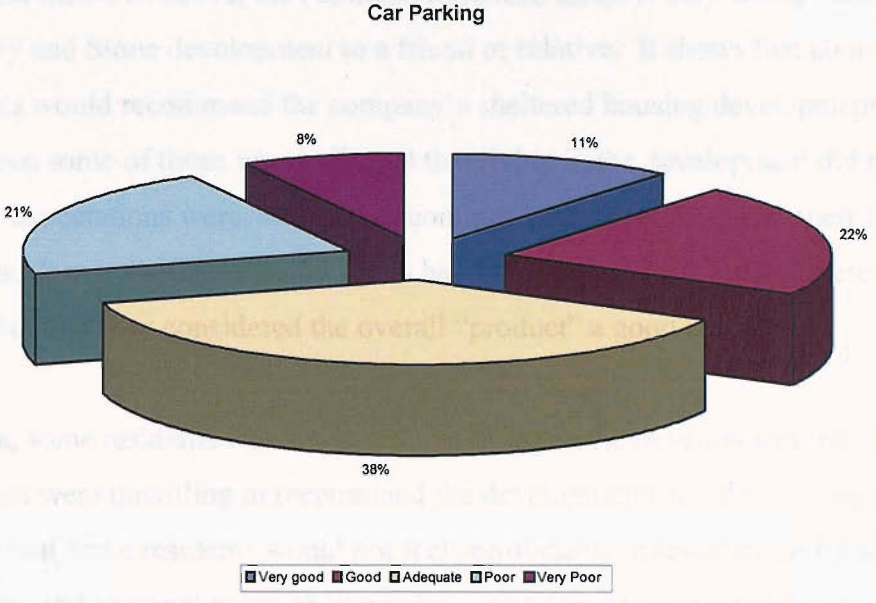
Car Parking

In light of Government policies on car parking and on maximising the use made of "brown field" sites, along with the company's commercial requirement to make maximum use of sites, some degree of discontent in this matter would be expected. Any such discontent would be increased if, as suggested above, car ownership levels are increasing and the level of parking spaces provided are not correspondingly increasing.

The responses show that although 8% describe the provision as "very poor", and 21% as "poor", some 38% considered it "adequate", 22% "good" and 11% "very good". This is obviously the issue that raises most discontent amongst residents and yet still over two thirds consider the provision adequate or better.

In line with the results indicated above, car parking problems are most likely to be experienced in the early years of life of the development. As car ownership declines, the problems would lessen.

Comments on the Level of Car Parking Provision



Residents' Expectations

Considering a more general guide to the satisfaction of residents, they were asked if living in their development lived up to their expectations. The response shows an overwhelming level of satisfaction. Some 88% of residents stated that their living in these apartments lived up to their expectations, with 12% indicating that it did not.

Residents' Recommendations

On the same theme as above, the residents were also asked if they would recommend a McCarthy and Stone development to a friend or relative. It shows that about 89% of respondents would recommend the company's sheltered housing developments to others. Even some of those who indicated that living in the development did not live up to their expectations were willing to recommend the development to their friends or relatives. It may be that these residents had specific expectations that were not satisfied, but that they considered the overall "product" a good one.

In addition, some residents who indicated that living in the development did live up to expectations were unwilling to recommend the developments to others. It may, of course, be that some residents would not feel comfortable in recommending anything as important and personal as the sheltered housing lifestyle to anyone else, no matter how satisfied they personally were.

Appendix VI

Sheltered Housing Car Ownership by County

1994 Telephone Survey (Survey A)

The table below gives the results of the 1994 telephone survey. It shows that the overall car ownership in 1994 was one car for every 4.616 occupied apartments, i.e. 0.217 cars per apartment. However, if all the apartments are taken into account, not just those occupied at the time of the survey, the ownership rates fall to one car for every 5.292 apartments, or 0.189 cars per apartment. This data is based on information for 14,823 apartments.

National and County Car Ownership in McCarthy and Stone Developments (1994 Telephone Survey - A)

County	Total Apartments	Cars per Occ. Apart	Occ. Apart per Car	Cars per Total Apart	Total Apart per Car
National	14823	0.217	4.616	0.189	5.292
Borders	36	0.235	4.250	0.222	4.500
Strathclyde	647	0.211	4.730	0.189	5.303
Lothian	372	0.162	6.179	0.151	6.643
Tayside	90	0.319	3.130	0.256	3.913
Northumberland	48	0.243	4.111	0.188	5.333
Cumbria	180	0.273	3.667	0.250	4.000
Tyne and Wear	156	0.091	11.000	0.083	12.000
Cleveland	40	0.294	3.400	0.250	4.000
North Yorkshire	229	0.219	4.574	0.205	4.872
Lancashire	311	0.362	2.764	0.286	3.494
West Yorkshire	65	0.385	2.600	0.308	3.250
Humberside	40	0.370	2.700	0.250	4.000
Merseyside	186	0.272	3.683	0.220	4.537
Greater Manchester	314	0.245	4.074	0.217	4.618

County	Total Apartments	Cars per Occ. Apart	Occ. Apart per Car	Cars per Total Apart	Total Apart per Car
Clwyd	56	0.380	2.632	0.339	2.947
Cheshire	382	0.213	4.696	0.181	5.536
Derbyshire	37	0.250	4.000	0.243	4.111
Staffordshire	82	0.136	7.333	0.110	9.111
West Midlands	420	0.227	4.400	0.202	4.941
Dyfed	47	0.419	2.389	0.383	2.611
Herefore & Worcester	303	0.367	2.722	0.320	3.124
Nottinghamshire	50	0.114	8.800	0.100	10.000
Lincolnshire	62	0.414	2.417	0.387	2.583
Leicestershire	44	0.162	6.200	0.114	8.800
Warwickshire	114	0.442	2.267	0.395	2.533
Cambridgeshire	47	0.162	6.167	0.128	7.833
Norfolk	161	0.331	3.020	0.311	3.220
Suffolk	95	0.217	4.611	0.189	5.278
Buckinghamshire	91	0.197	5.077	0.143	7.000
Bedfordshire	58	0.143	7.000	0.121	8.286
Hertfordshire	435	0.235	4.259	0.195	5.118
Essex	759	0.170	5.897	0.153	6.543
East Berkshire	162	0.241	4.156	0.198	5.063
Greater London	625	0.160	6.253	0.139	7.184
Surrey	1026	0.227	4.412	0.194	5.156
Kent	969	0.218	4.581	0.185	5.413
West Sussex (excluding Chichester)	522	0.193	5.172	0.167	6.000
East Sussex	879	0.141	7.103	0.122	8.215
Cornwall	74	0.303	3.300	0.270	3.700
Devon	677	0.186	5.381	0.167	5.991

County	Total Apartments		Occ. Apart per Car	Cars per Total Apart	Total Apart per Car
Somerset	268	0.181	5.526	0.142	7.053
Dorset	1181	0.202	4.953	0.181	5.519
Avon	191	0.246	4.071	0.220	4.548
Wiltshire	160	0.252	3.972	0.225	4.444
Hampshire	1125	0.164	6.087	0.143	6.988
Isle of Wight	204	0.449	2.225	0.392	2.550
West Glamorgan	135	0.196	9.461	0.096	10.385
South Glamorgan	80	0.183	5.462	0.163	6.154
Gwent	112	0.268	3.731	0.232	4.308
Gloucestershire	181	0.235	4.263	0.210	4.763
Oxfordshire	295	0.272	3.680	0.254	3.933

Appendix VII

County Car Ownership Data for Sheltered Housing

and from National Census

County Car Ownership in McCarthy and Stone Developments – in Relation to National Car ownership data (All Households and Pensioner Households

(1994 Telephone Survey – A and 1991 Census Data)

County	Occupied Sheltered Apartment per Car	Total Households per car – All Households	Total Pensioner Households/ Pensioner Households With Cars
Northumberland *	4.111	1.120	2.913
Cumbria	3.667	1.058	2.443
Tyne and Wear	11.000	1.622	5.085
Cleveland *	3.400	1.294	3.704
North Yorkshire	4.574	0.984	2.288
Lancashire	2.764	1.088	2.701
West Yorkshire *	2.600	1.221	3.637
Humberside *	2.700	1.167	2.927
Merseyside	3.683	1.373	3.576
Greater Manchester	4.074	1.231	3.822
Clwyd *	2.632	0.978	2.314
Cheshire	4.696	0.935	2.438
Derbyshire *	4.000	1.038	2.975
Staffordshire *	7.333	0.965	2.810
West Midlands	4.400	1.211	3.467
Dyfed *	2.389	0.974	2.137
Hereford & Worcester	2.722	0.859	1.957
Nottinghamshire *	8.800	1.109	3.008
Lincolnshire *	2.417	0.956	2.141
Leicestershire *	6.200	0.983	2.682
Warwickshire	2.267	0.887	1.754

County	Occupied Sheltered Apartment per Car	Total Households per car – All Households	Total Pensioner Households/ Pensioner Households With Cars
Cambridgeshire *	6.167	0.908	2.302
Norfolk	3.020	0.952	2.117
Suffolk *	4.611	0.930	2.240
Buckinghamshire	5.077	0.787	2.188
Bedfordshire *	7.000	0.900	2.652
Hertfordshire	4.259	0.838	2.377
Essex	5.897	0.895	2.461
East Berkshire	4.156	0.819	2.343
Surrey	4.412	0.760	1.932
Kent	4.581	0.933	2.477
West Sussex (excluding Chichester)	5.172	0.889	2.002
East Sussex	7.103	1.066	2.372
Cornwall *	3.300	0.957	1.999
Devon	5.381	0.991	2.094
Somerset	5.526	0.883	1.935
Dorset	4.953	0.915	1.888
Avon	4.071	0.951	2.424
Wiltshire	3.972	0.890	2.206
Hampshire	6.087	0.884	2.233
Isle of Wight	2.225	1.040	2.177
West Glamorgan	9.461	1.153	3.007
South Glamorgan *	5.462	1.113	2.633
Gwent *	3.731	1.366	3.018
Gloucestershire	4.263	0.896	2.094
Oxfordshire	3.680	0.856	2.134

* Sheltered housing sample – less than 100 occupied apartments

Appendix VIII

Car Ownership

Results of Telephone Survey of Car Ownership – January 2002

County	Apartments	Occupied Apartments	Cars	Cars per occupied apartment
Berks	163	157	29	0.184713376
E Sussex	1080	1030	201	0.195145631
Kent	1277	1197	260	0.217209691
Surrey	1365	1267	299	0.235990529
W Sussex	558	519	99	0.190751445
Cheshire	686	566	181	0.319787986
Cumbria	180	169	44	0.26035503
Derbyshire	37	35	10	0.285714286
Lancashire	469	439	155	0.353075171
Gt Manchester	563	523	161	0.307839388
Merseyside	264	256	63	0.24609375
Shropshire	34	34	15	0.441176471
Staffordshire	82	82	13	0.158536585
Tyne and Wear	252	230	41	0.17826087
Cambridgeshire	101	83	23	0.277108434
Herefordshire	58	53	23	0.433962264
Lincolnshire	122	119	43	0.361344538
Northumberland	96	95	28	0.294736842
Nottinghamshire	150	127	38	0.299212598
Norfolk	228	216	72	0.333333333
Warwickshire	289	234	75	0.320512821
Worcestershire	373	355	114	0.321126761
W Midlands	321	312	56	0.179487179
Clwyd	55	50	19	0.38
Dyfed	46	40	15	0.375
Gloucestershire	305	259	75	0.28957529
Gwent	113	96	20	0.208333333
Oxfordshire	518	480	145	0.302083333
S Glamorgan	261	240	70	0.291666667
W Glamorgan	194	184	54	0.293478261
Avon	336	320	91	0.284375
Cornwall	202	143	49	0.342657343
Devon	1011	960	239	0.248958333
Dorset	1646	1577	446	0.282815472
Hants	1569	1481	356	0.240378123
IOW	203	199	75	0.376884422
Somerset	350	328	80	0.243902439
Wilts	305	264	52	0.196969697
Borders	40	35	10	0.285714286
Lothian	591	445	86	0.193258427
Prestwick	53	46	19	0.413043478
Strathclyde	183	176	38	0.215909091

County	Apartments	Occupied Apartments	Cars	Cars per occupied apartment
Tayside	300	285	95	0.333333333
Bedfordshire	165	157	42	0.267515924
Buckinghamshire	161	156	35	0.224358974
Essex	1101	1062	258	0.242937853
Herts	600	564	125	0.221631206
London	1229	1092	214	0.195970696
Cleveland	87	81	34	0.419753086
Humberside	40	35	12	0.342857143
N Yorks	483	464	144	0.310344828
S Yorks	45	45	15	0.333333333
Suffolk	202	184	57	0.309782609
W Yorks	206	174	77	0.442528736
Totals	**21348**	**19720**	**5090**	**0.25811359**

Appendix IX

Residents' and House Manager Vehicles

Table E – Vehicles owned by residents and house managers

Vehicle Code	Vehicle	Length	Width	Frequency (Residents)	Frequency (House Managers)
1	volvo (unspecified)			2	2
2	mgb gt	3.87	1.52		1
3	rover mini	3.05	1.42	4	
5	nissan micra	3.71	1.57	30	7
6	peugeot 106	3.55	1.6	4	1
7	rover 200	4.22	1.68	5	
8	peugeot 405	4.42	1.73		2
9	citreon ax	3.53	1.57	2	3
10	renault 5	3.66	1.57	2	
11	ford fiesta	3.73	1.6	26	9
12	nissan sunny	4.24	1.68	5	1
13	rover maestro	4.01	1.68	6	1
14	proton 1.5	4.31	1.62	2	1
15	vauxhall astra	3.97	1.71	13	6
16	ford mondeo	4.46	1.75	3	4
17	ford escort	4.22	1.67	8	8
18	vw polo	4.14	1.65	4	6
19	vauxhall astra	3.97	1.71	2	2
20	vauxhall corsa	3.73	1.6	6	4
21	ford sierra	4.42	1.73		2
22	mazda 121	3.81	1.65	2	
23	fiat punto	3.73	1.6	3	2
24	volvo 460	4.39	1.68	1	
25	seat marbella	3.45	1.47	5	
26	renault clio	3.71	1.62	9	2
27	peugeot 406	4.55	1.78		2
28	rover montego	4.46	1.7	2	3
29	daewoo lanos	4.24	1.68	2	
30	ford vitesse			1	
31	peugeot unspecified				2

Vehicle Code	Vehicle	Length	Width	Frequency (Residents)	Frequency (House Managers)
32	rover knightsbridge	3.4	1.55	1	
33	suzuki vitara	4.04	1.63		2
34	nissan unspecified			4	1
35	fiat panda	3.38	1.47	1	
36	toyota unspecified				1
37	renault megane	4.39	1.7	1	1
38	citreon saxo	3.73	1.62		1
39	honda civic	4.47	1.7	8	2
40	citreon zx	4.06	1.7	1	
41	kia pride	3.61	1.6	1	
42	fiat uno	3.68	1.57	1	
43	coda hatchback			1	
44	toyota carolla	4.3	1.68	3	2
45	peugeot 205	3.7	1.57	7	3
46	bmw 318 compact	4.22	1.7	1	
48	rover metro	3.53	1.57	12	2
49	vauxhall vectra estate	4.55	1.73	2	
50	rover kensington	3.53	1.57	1	
51	peugeot 206	3.71	1.58	3	1
52	rover (unspecified)			2	1
53	volvo 440	4.32	1.68	2	
54	volkswagen transporter camper			1	1
55	toyota camry	4.72	1.78	1	
56	vauxhall nova	3.63	1.52	3	2
57	vw unspecified			1	2
58	renault 21	4.47	1.7	1	
59	ford ka	3.63	1.62	2	4
60	mazda 323	4.24	1.7	1	
61	rover 600	4.65	1.73	1	2

Vehicle Code	Vehicle	Length	Width	Frequency (Residents)	Frequency (House Managers)
62	volkswagen golf	3.99	1.68	2	
63	rover 214	3.96	1.68	1	3
64	rover 1.4	3.53	1.57	3	1
65	volvo 740 estate	4.8	1.78		3
66	volvo 240	4.8	1.73	1	1
67	seat ibiza	3.6	1.6	2	
68	seat arosa	3.53	1.65	1	
69	rover 414	4.49	1.7	3	1
70	peugeot 405 estate	4.42	1.73	1	
71	renault laguna	4.5	1.75	1	2
72	toyota unspecified			1	
73	vauxhall unspecified			1	3
74	honda unspecified			1	
75	romahome hitop motorhome			1	
76	nissan primera	4.4	1.7	1	1
77	rover 216	4.22	1.68	5	2
78	citreon unspecified			1	1
79	ford galaxy zetec	4.62	1.8		1
80	citreon saxo	3.73	1.62		
81	ford granada scorpio	4.75	1.75		2
82	rover 213	4.16	1.62	1	1
83	ford unspecified				4
84	peugeot 309	4.03	1.62	1	1
85	rover 100	3.53	1.58	2	1
86	rover 820	4.88	1.73		2
87	ford orion	4.22	1.68	1	2
88	vauxhall cavalier	4.44	1.7	4	2
89	hyundai unspecified			3	
90	renault kango van				1
91	renalt megane	4.39	1.7		2
92	peugeot 806	4.44	1.8	1	

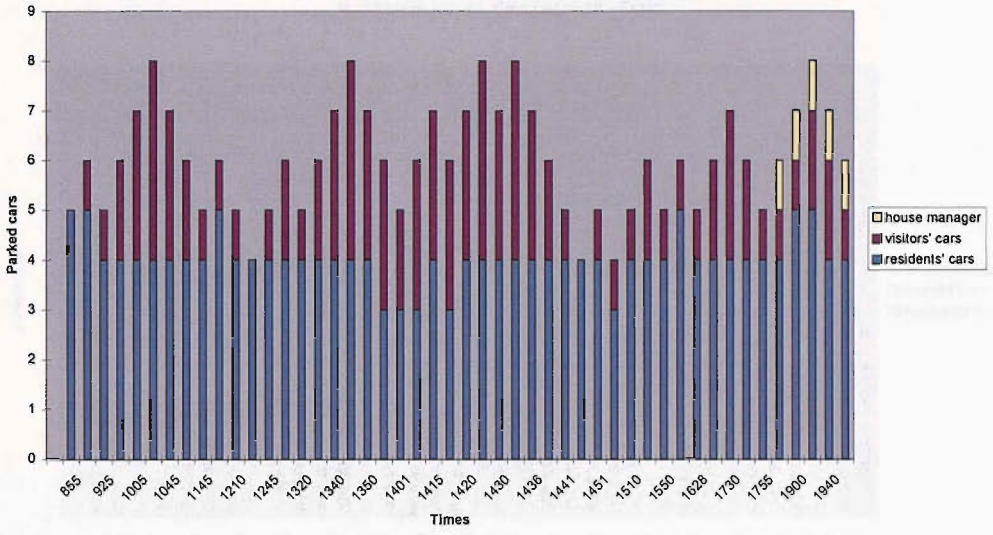
Vehicle Code	Vehicle	Length	Width	Frequency (Residents)	Frequency (House Managers)
93	vauxhall carlton	4.67	1.78		1
94	vauxhal senator	4.85	1.75	1	
95	ford sierra	4.47	1.52	1	1
96	renault scenic	4.14	1.7		1
97	nissan bluebird	4.42	1.7	2	
98	seat cordoba	4.14	1.65	1	
99	hyundai coupe	4.34	1.73		1
100	misubishi shogun	4.14	1.78		1
101	subaru impreza	4.34	1.7	1	
102	saab 900	4.75	1.7	1	
103	volvo 340	4.32	1.68	1	1
104	toyota starlet	3.73	1.62	1	
105	vw golf	4.01	1.68	2	
106	ford saphire	4.47	1.7		1
107	suzuki jimmy	3.63	1.7		1
108	bmw 540i	4.78	1.8		1
109	jaguar xj6	5.05	1.91	1	
110	skoda felicia	3.86	1.62	1	
111	fiat brava	4.19	1.75		1
112	vauxhall vectra	4.47	1.73	1	1
113	daewoo nexia	4.44	1.65		1
114	vauxhall omega	4.8	1.8		1
115	vauxhall corsa club	3.73	1.6		1
116	vauxhall montana			1	
117	fiat cinquecento	3.22	1.45	1	
118	ford sierra estate	4.52	1.73		1
119	toyota carina	4.44	1.7		1
120	ford puma	3.99	1.71		2
121	toyota rav	3.81	1.73		2
122	honda ballade			1	
123	jaguar sovereign	4.98	2.0	1	
124	kia mentor	4.29	1.7		1
125	citreon bx	4.22	1.65	1	

Vehicle Code	Vehicle	Length	Width	Frequency (Residents)	Frequency (House Managers)
126	ford focus	4.17	1.7	1	
127	chrysler neon	4.37	1.7	1	
128	skoda 1300 gl			1	
129	rover 420	4.31	1.7		2
130	suzuki unspecified				2
131	citreon bx estate	4.39	1.61		1
132	skoda unspecified			1	
133	diahatsu sirion	3.68	1.6	1	
134	mercedes e190	4.75	1.88	1	
135	mitsubishi colt	3.96	1.68	1	
136	misubishi carisma	4.44	1.7	1	
137	citreon xantia	4.52	1.75		1
138	daewoo matiz	3.5	1.5	2	
139	ford transit				1

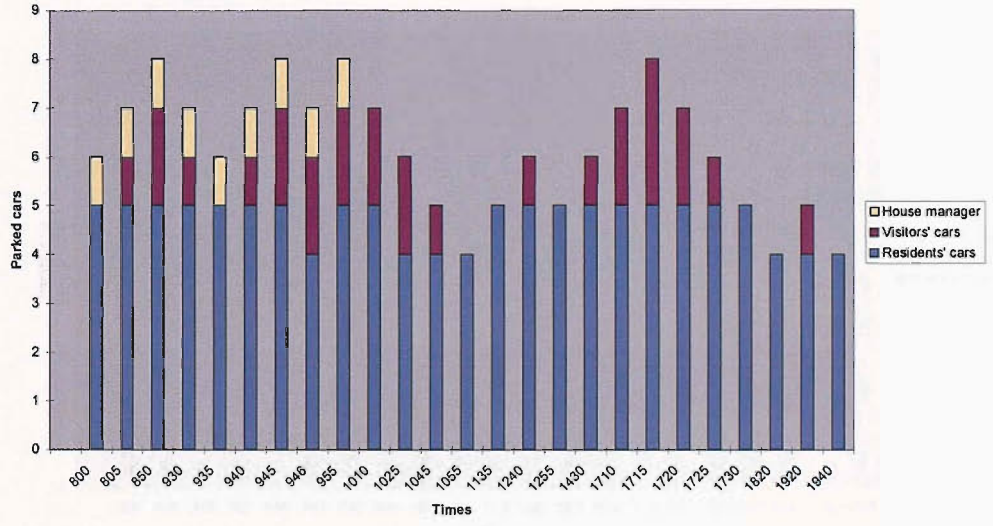
Appendix X

Visitor Parking Graphs

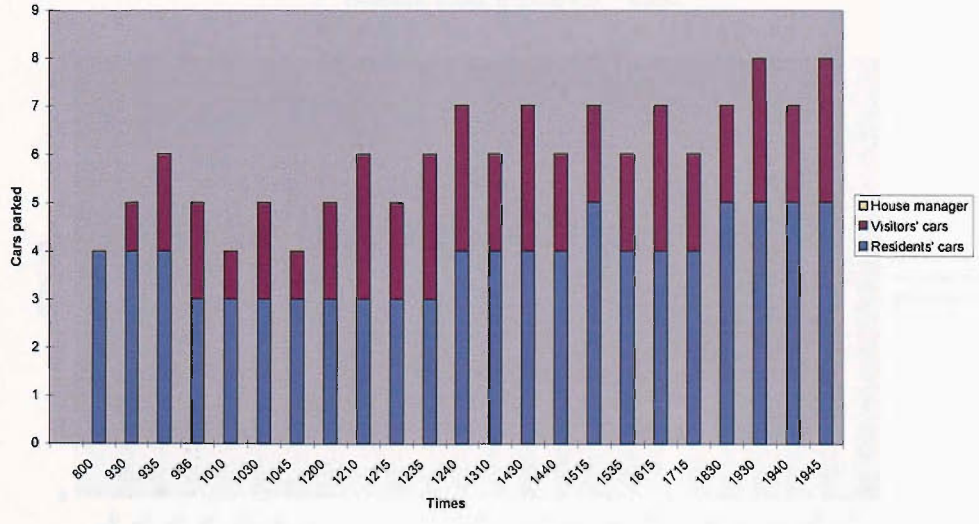
Homewest House, Bournemouth - Friday



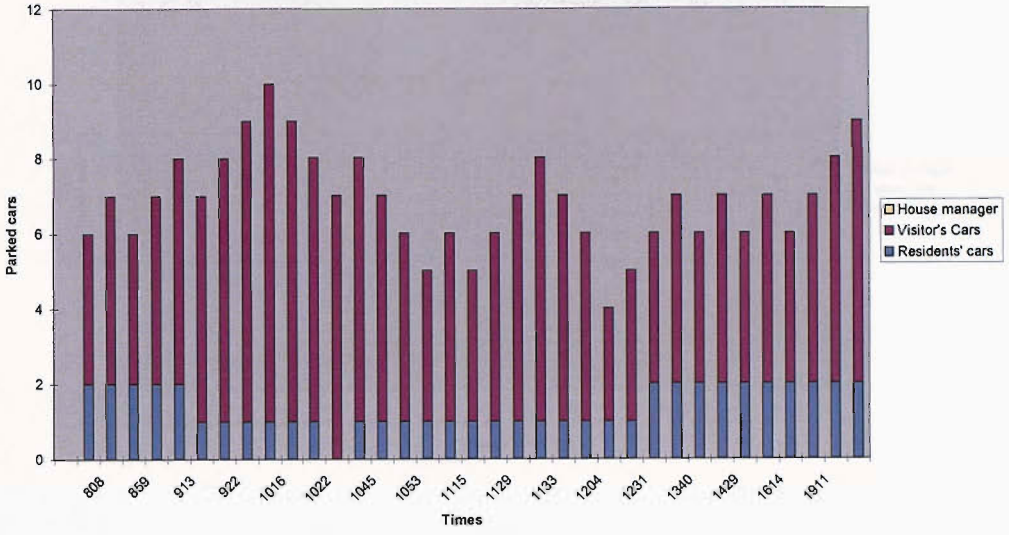
Homewest House, Bournemouth - Saturday



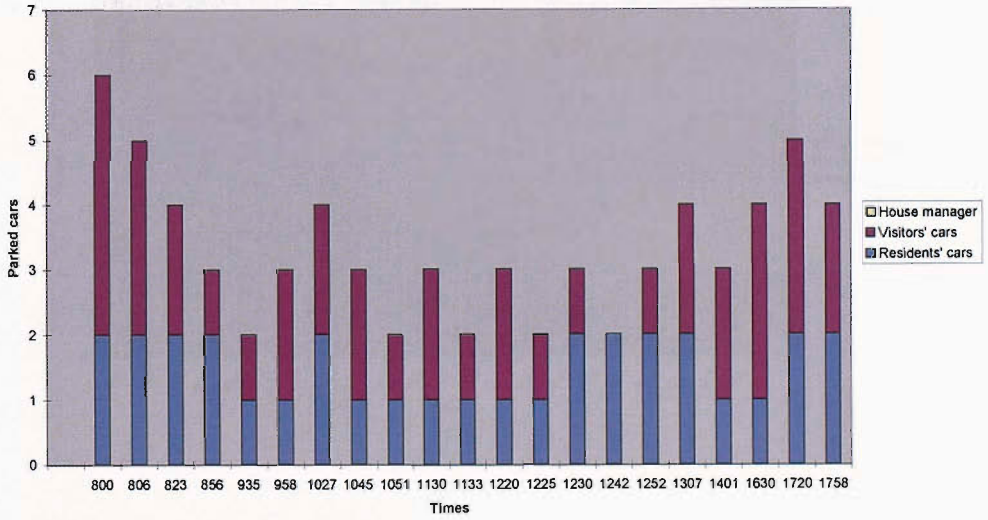
Homewest House, Bournemouth - Sunday



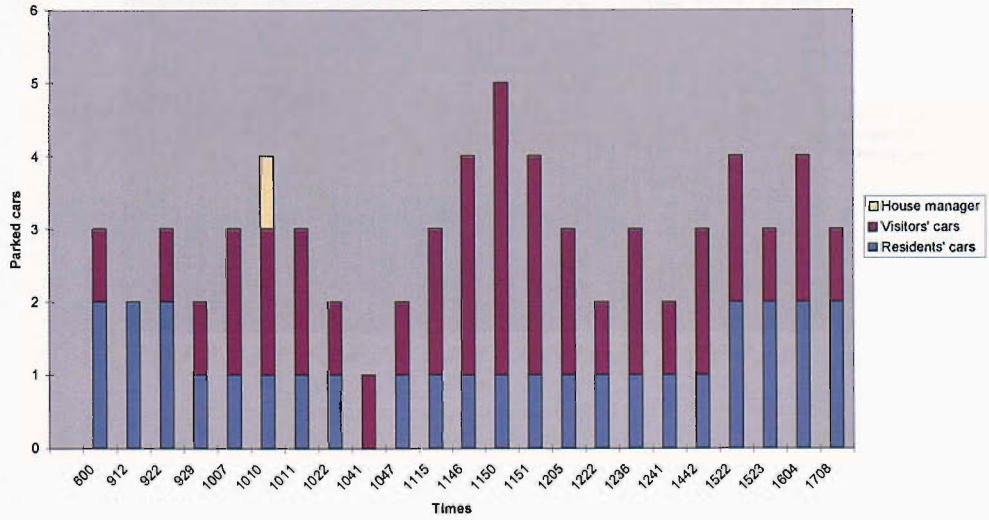
Homewaye House, Bournemouth - Friday



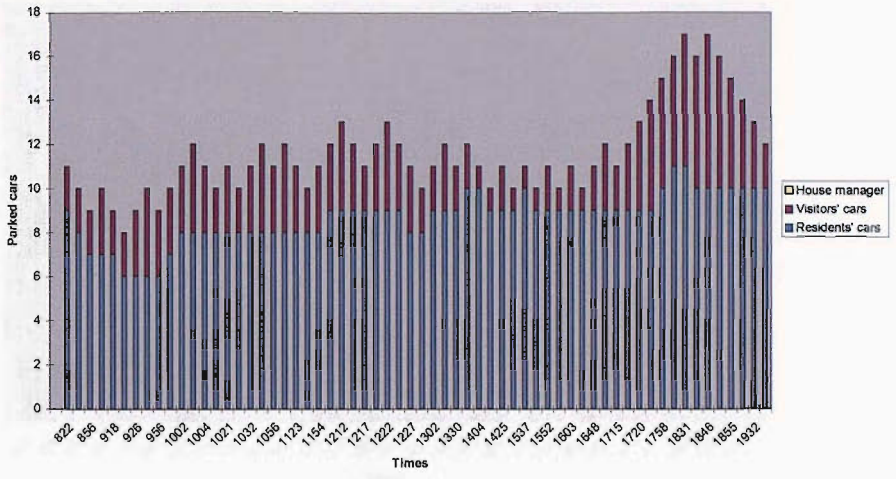
Homewaye House, Bournemouth - Saturday



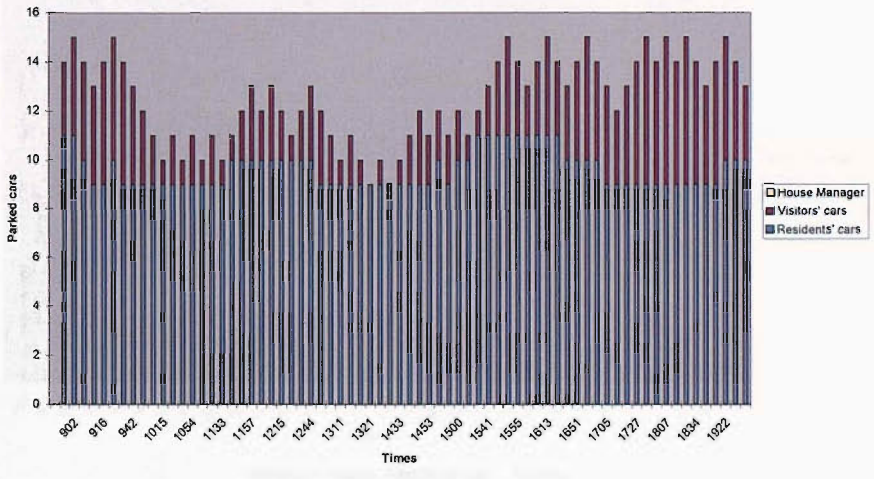
Homewaye House, Bournemouth - Sunday



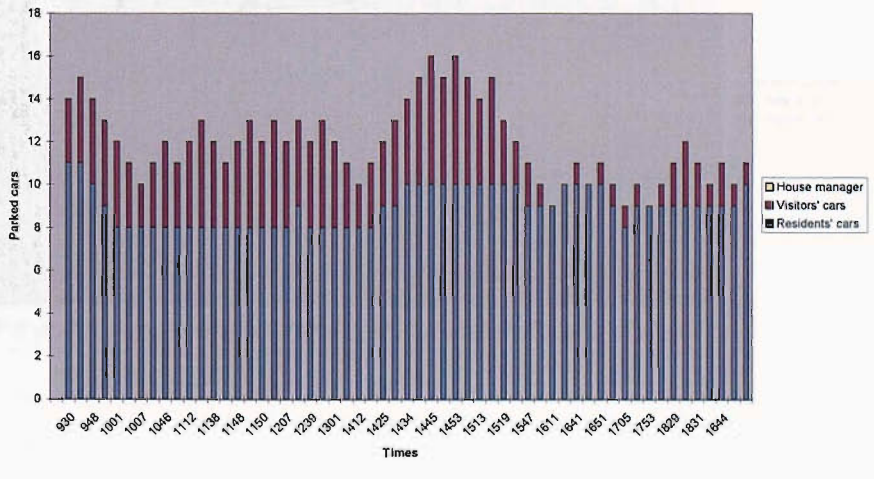
Homesea House, Southsea - Friday



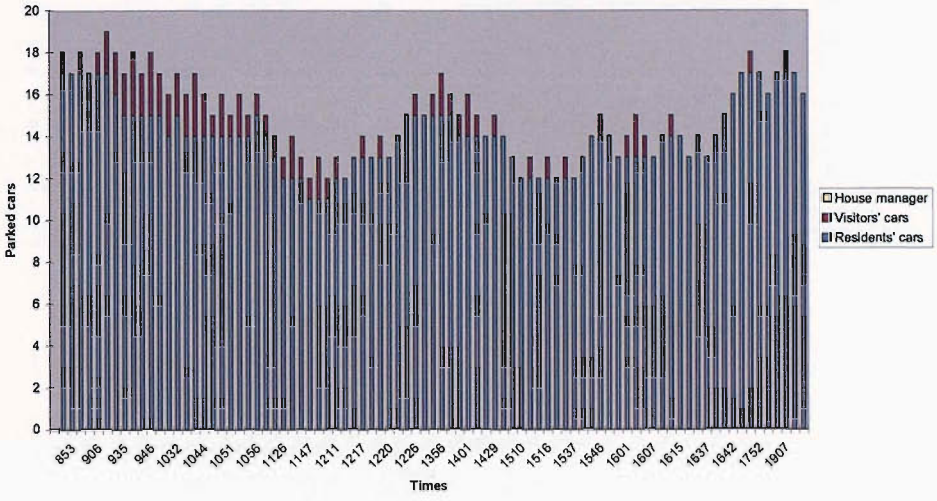
Homesea House, Southsea - Saturday



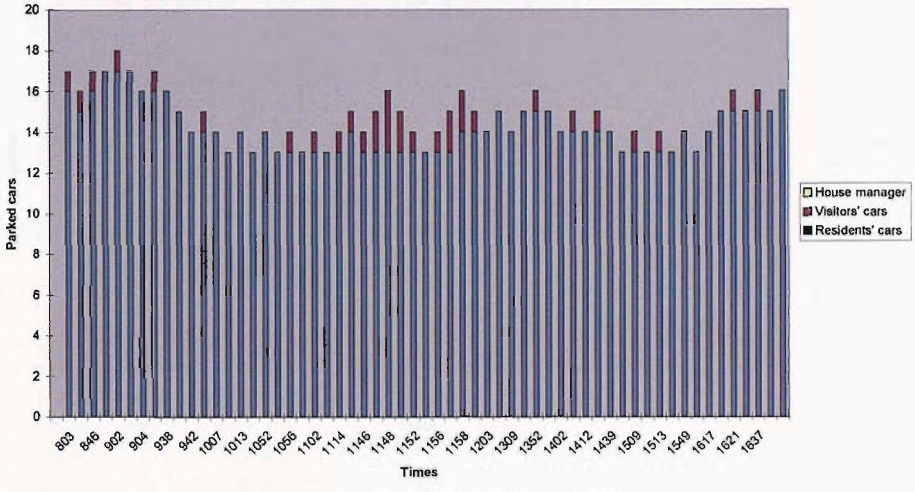
Homesea House, Southsea - Sunday



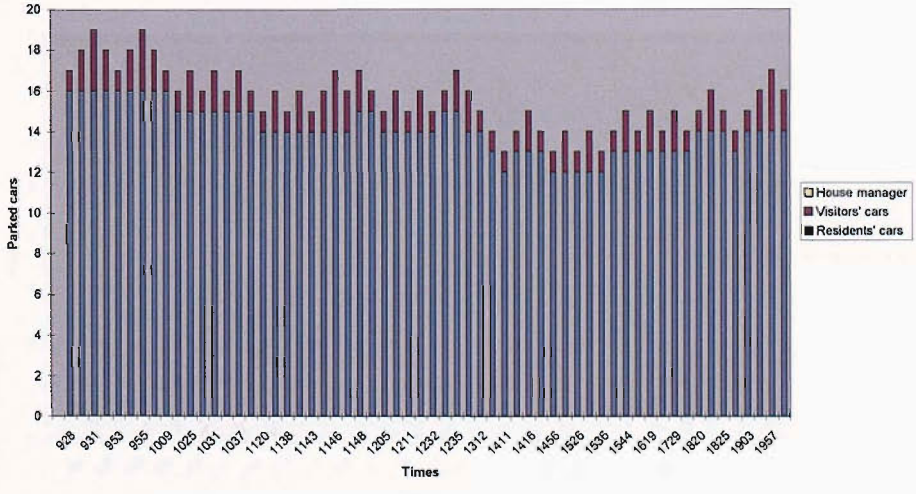
Homelawn House, Bexhill on Sea - Friday



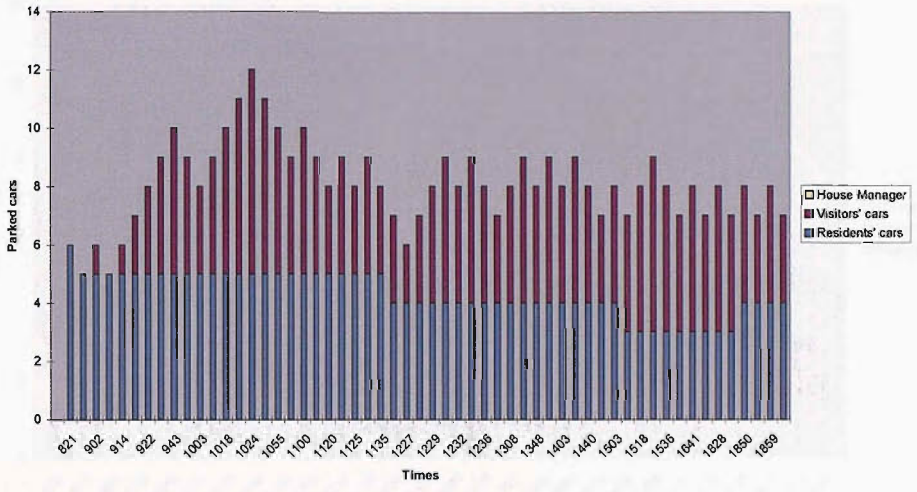
Homelawn House, Bexhill on Sea - Saturday



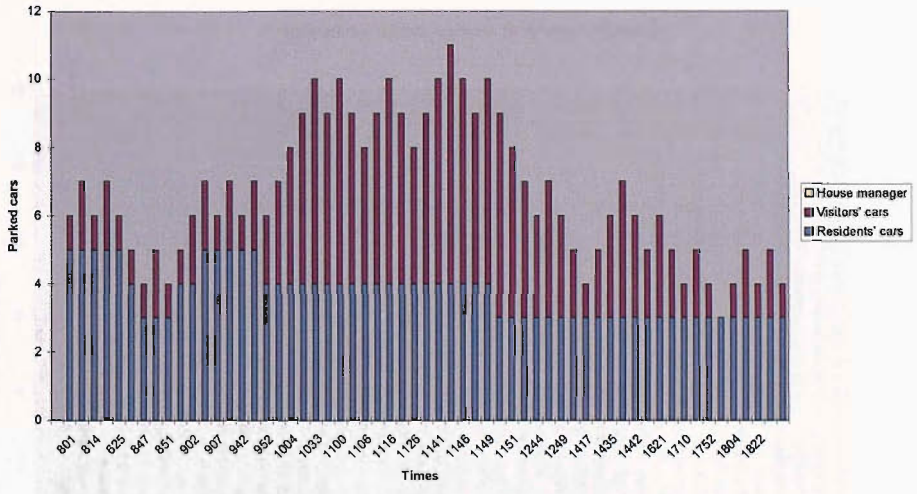
Homelawn House, Bexhill on Sea - Sunday



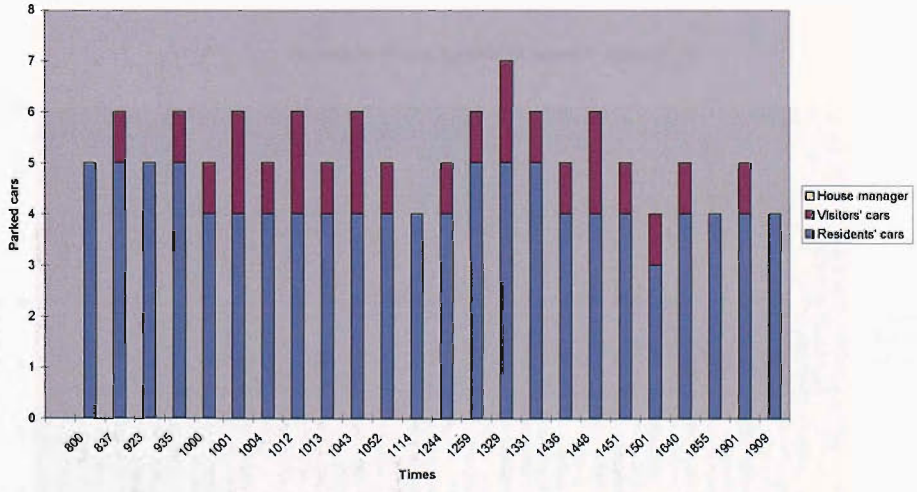
Homehill House, Bexhill on Sea - Friday



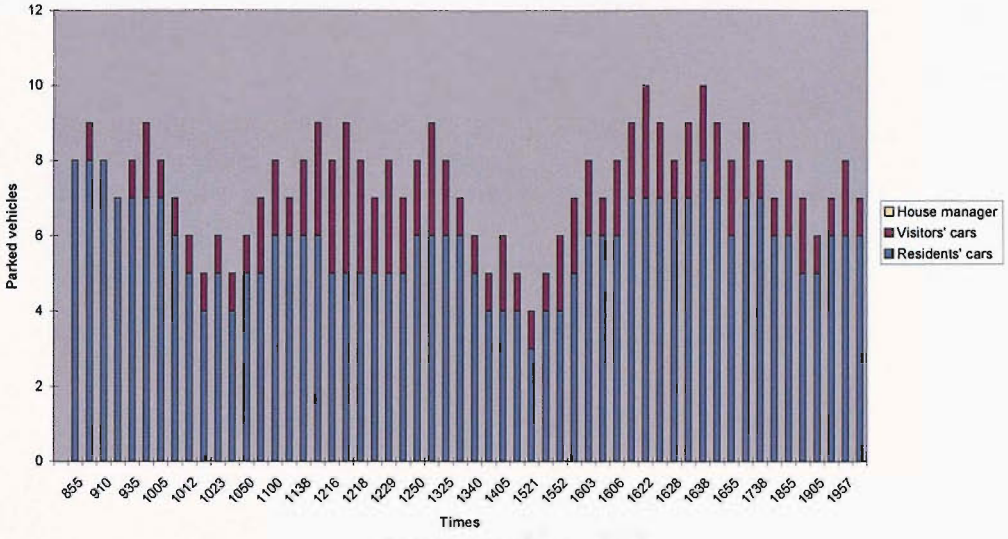
Homehill House, Bexhill on Sea - Saturday



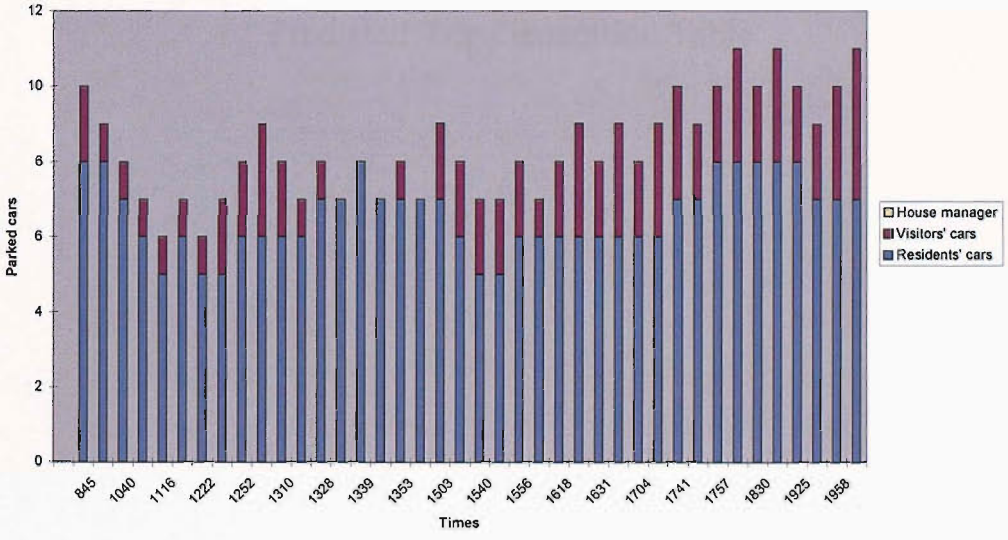
Homehill House, Bexhill on Sea - Sunday



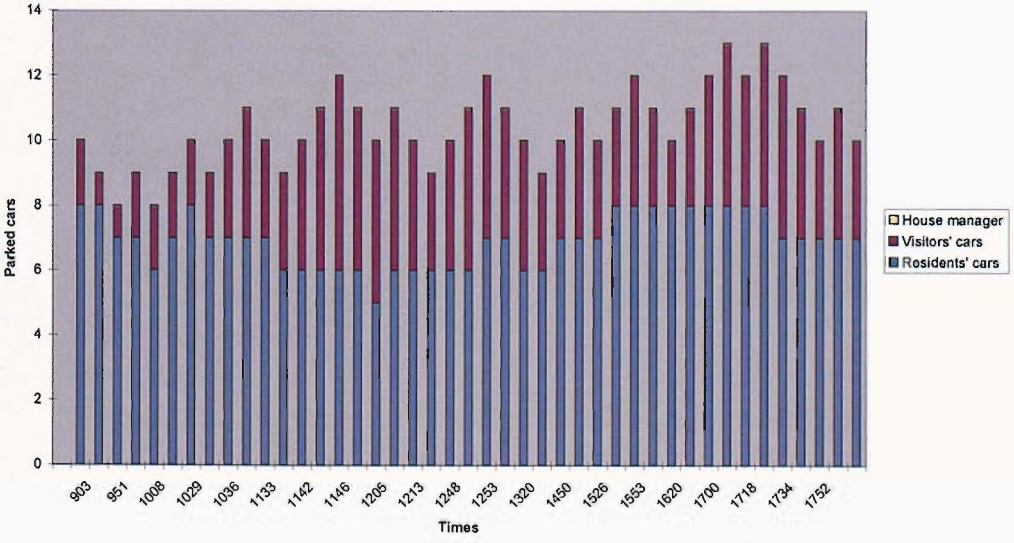
Homelinks House, Lytham St Annes --- Friday



Homelinks House, Lytham St Annes - Saturday



Homelinks House, Lytham St Annes - Sunday



Appendix XI

Predicted Trip Generation Table

Number of Apartments	Predicted 12 Hour Trip Generation (0700-1900)	Predicted 24 Hour Trip Generation *
30	**26**	**29**
31	**27**	**30**
32	**29**	**32**
33	**30**	**33**
34	**32**	**35**
35	**33**	**36**
36	**34**	**38**
37	**36**	**39**
38	**37**	**41**
39	**38**	**42**
40	**40**	**44**
41	**41**	**45**
42	**43**	**47**
43	**44**	**48**
44	**45**	**50**
45	**47**	**51**
46	**48**	**53**
47	**49**	**54**
48	**51**	**56**
49	**52**	**57**
50	**53**	**59**
51	**55**	**60**
52	**56**	**62**
53	**58**	**63**
54	**59**	**65**
55	**60**	**66**
56	**62**	**68**
57	**63**	**69**
58	**64**	**71**
59	**66**	**72**
60	**67**	**74**
61	**69**	**75**
62	**70**	**77**
63	**71**	**78**
64	**73**	**80**
65	**74**	**81**
66	**75**	**83**
67	**77**	**84**
68	**78**	**86**
69	**79**	**87**
70	**81**	**89**
71	**82**	**90**
72	**84**	**92**
73	**85**	**93**
74	**86**	**95**

Number of Apartments	Predicted 12 Hour Trip Generation (0700-1900)	Predicted 24 Hour Trip Generation *
75	88	96
76	89	98
77	90	99
78	92	101
79	93	102
80	95	104
81	96	105
82	97	107
83	99	108
84	100	110
85	101	111
86	103	113
87	104	114
88	106	116
89	107	117
90	108	119
91	110	120
92	111	122
93	112	123
94	114	125
95	115	126
96	116	128
97	118	129
98	119	131
99	121	132
100	122	134
101	123	135
102	125	137
103	126	138
104	127	140
105	129	141
106	130	143
107	132	144
108	133	146
109	134	147
110	136	149
111	137	150
112	138	152
113	140	153
114	141	155
115	143	156
116	144	158
117	145	159
118	147	161
119	148	162
120	149	164

Number of Apartments	**Predicted 12 Hour Trip Generation (0700-1900)**	**Predicted 24 Hour Trip Generation ***
121	**151**	**165**
122	**152**	**167**
123	**153**	**168**
124	**155**	**170**
125	**156**	**171**
126	**158**	**173**
127	**159**	**174**
128	**160**	**176**
129	**162**	**177**
130	**163**	**179**
131	**164**	**180**
132	**166**	**182**
133	**167**	**183**
134	**169**	**185**
135	**170**	**186**