

The consequences of urban sprawl: a case study of Wirral, Merseyside.

Chris Couch & Jay Karecha

Liverpool John Moores University

Introduction

This paper is one of a series being written by the authors as a contribution to the URBS PANDENS research project examining 'urban sprawl in Europe'. The first two parts of the paper were presented at the Ljubljana meeting. Part one examined definitions and theories of urban sprawl whilst part two considered methods of measuring urban sprawl and presented data on urban change and sprawl for England, the Merseyside conurbation and the Metropolitan Borough of Wirral. Part three, presented at the Liverpool meeting, explored the causes of urban sprawl and a more recent contrasting phenomenon: re-urbanisation. This paper is part four and is concerned with the consequences of urban sprawl. Again most of the findings are based upon empirical work undertaken in the Wirral, Merseyside case study area.

In our earlier work we distinguished urban sprawl from urban growth. It was argued that urban sprawl can be defined as a redistribution of population or economic activity away from the centre and towards the periphery of an urban area and is indicated by a reduction in the gradient of the rent-bid or density curve. Urban growth, on the other hand, can be defined in terms of either an expansion of population or economic activity within an urban area. All other things being equal urban growth will cause the rent-bid or density curve to shift to the right, whilst retaining the same gradient. Urban sprawl could be said to have occurred only if that gradient becomes less steep.

This analysis led to the identification of three facets of urban sprawl that could be tested empirically:

- i) **changes in urban density at different distances from the city centre;**
- ii)
- iii) **the amount or proportion of development that has occurred beyond the existing urban area** (Although this latter measure is not, of itself, an indicator of urban sprawl (as distinct from urban growth), it is difficult to envisage many circumstances where urban sprawl would occur without some development occurring outside the existing urban area);
- iv) consequent upon these two changes, because population and activities are further apart is a third change:
the volume and mode of transport demand.

Hence, at the Liverpool meeting, following an expert discussion, it was agreed that the approach to investigating the consequences of urban sprawl would be divided into three fields of study:

- the conversion of rural land to urban uses;
- changes in urban densities at different points within urban areas, and;
- the impact upon transport demand and mode.

It was also acknowledged that each of these fields of study could usefully be divided into social, economic and environmental dimensions.

Whilst accepting the theoretical argument that causes and consequences are inextricably intertwined and acknowledging the interplay between social, economic and environmental processes, it was nevertheless thought that for practical purposes a useful research framework would be provided by the matrix created by land conversion; density and transport changes on one axis and social, economic and environmental impacts on the other axis.

\ Impacts Changes \	Social impact	Economic impact	Environmental impact
Land conversion	X	X	X
Density changes	X	X	X
Transport changes	X	X	X

Our empirical work is mainly focused upon the process of land conversion for residential development. The methods used to explore the consequences of urban sprawl in Wirral were fivefold. Firstly the existing literature was reviewed to determine the extent of existing knowledge in the field and its applicability to our case study area. Secondly, published data sources were used to identify a number of impacts. The main sources of published and semi-published data used in this paper are indicated below.

Data type	Purpose
Census of Population, every 10 years to 2001, data available down to ward level.	Analysis of demographic and social change.
Land Use Change Statistics, annual since the mid 1980s, data available down to local authority level.	Analysis of rural to urban changes in land use.
Residential development and land use, annual since the mid 1970s, down to site level within Wirral MBC.	Spatial analysis of residential development in Wirral.
Dwelling prices, quarterly since mid 1990s, down to postcode area and sector.	Analysis of changes of dwelling values over time, space and type.
Environmental data, especially air pollution, since 1993.	Analysis of the relationship between urban change and the environment.

Thirdly a social survey of recently moving residents was undertaken in order to establish the consequences of their locational choice in relation to certain selected issues concerned with neighbourhood satisfaction. The survey covered the same stratified sample of the households in Wirral as the earlier survey on the causes of urban sprawl, comprising all households that had moved into newly constructed dwellings in selected wards over the last six years (1996-2001). All households included in the first survey were sent the second questionnaire together with a letter explaining its purpose and an information sheet setting out the main results from the first survey. Thus the second survey was sent to heads of household in 1195 new dwellings in Birkenhead, Cloughton, Hoylake, Moreton, Royden and Upton wards. In all 290 completed questionnaires were returned, an overall response rate of 24.3%. This is a reasonable response rate for a postal questionnaire, especially given that the guarantee of anonymity prohibited any follow up pursuit of non-responses, and sufficient to permit the fairly simple analysis that the research required. A copy of the questionnaire is attached at appendix 1.

The fourth source of data was fieldwork undertaken by the study team to assess such matters as the 'visual quality' of the urban fringe and to measure some of the physical characteristics of districts in inner and outer Wirral.

The final source was qualitative information obtained from expert interviews to assist the team in understanding and interpreting some of the socio-economic and environmental data derived from other sources.

The analysis is based upon a number of different spatial units. Census data, some land use change data and the social survey have been analysed on the basis of the 22 wards which comprise the borough. Dwelling price data has been analysed on the basis of the 13 Wirral postcode districts. In order to clearly and simply differentiate non-sprawling from sprawling areas, for much of the analysis these wards or postcode districts have been aggregated into two zones: inner and outer Wirral, with inner Wirral being the more mature, higher density and more 'compact' urban area and outer Wirral being the newer, lower density and more 'sprawling' suburban area.

Urban sprawl in Wirral

Over the last 100 years the outward spread of population in Wirral (bringing with it the looked-for decline in the density gradient) has had a number of major consequences. These can be contrasted with the more gentle (less pronounced) consequences of the last twenty years. Firstly there is a historical legacy of spatial social segregation brought about by urban sprawl, expressed most vividly in West Kirby & Hoylake (first developed as rail-based commuter settlements in the 19th century) and Heswall (which developed rather later as motor car ownership increased during the 20th century). It is impossible to be precise about when the origins of this social segregation began in Wirral, but we find segregation to be present today. Our own research shows that over the last twenty years, this trend towards segregation has continued.

The rapid post-war urbanisation of West Wirral resulted in major environmental losses - the loss of habitats and hence the loss of species. This urbanisation has slowed dramatically in recent years but the effects continue. There is also a growing disconnection between inner area residents and the countryside. Car-oriented lifestyles are now 'the norm', transforming self-contained outer Wirral villages into commuter settlements. Reductions in the density of local service provision have continued as suppliers of services seek internal economies of scale regardless of the external costs, and rising car ownership has increased the mobility of consumers who passively accept or even welcome these changes.

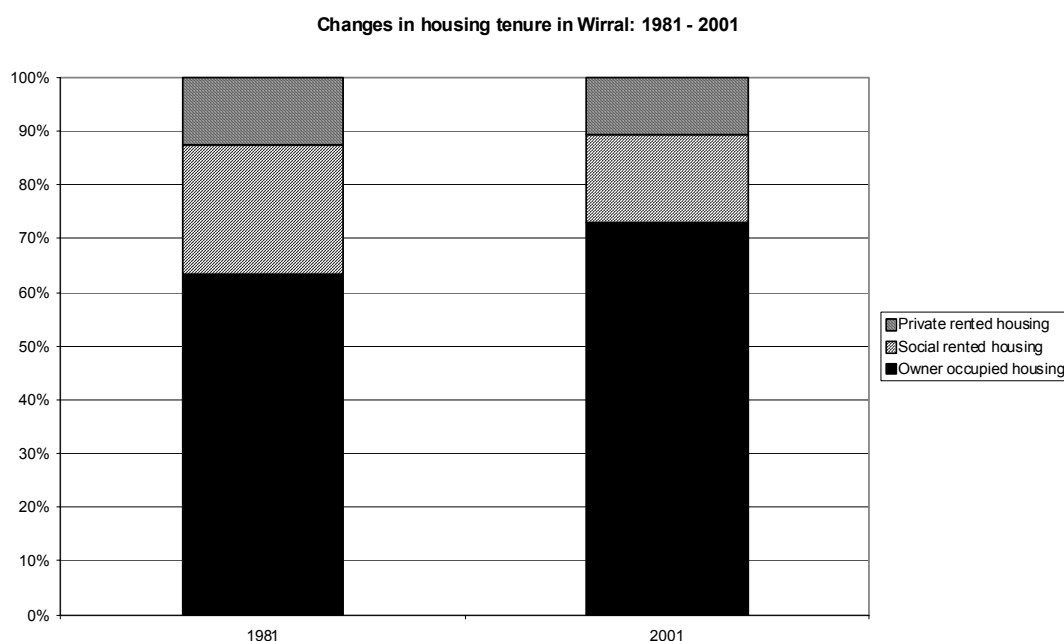
The dispersal of jobs away from the traditional port-related industries has diminished the formerly strong economic connection between the people of Wirral, the Mersey and Birkenhead docks. Economic activity and employment in outer Wirral has grown as the economy has diversified. Travels patterns are today not only increasingly dominated by the motor vehicle but destinations are more scattered.

Thus Wirral has a legacy of urban sprawl that is maintained today. But today the process of sprawl has been brought under better control. New residential development in the countryside is minimal, despite social and economic pressures to the contrary but the tendency for economic activity to move outwards and disperse continues. The legacy of urban sprawl is that Wirral has become a more polycentric urban area, where economic activity is widely dispersed and travel patterns diffuse. It is important that the discussion of the recent consequences of urban sprawl that follows below should be seen in the context of this historical legacy.

Social consequences of urban sprawl

Social segregation

There is clear evidence of spatial social segregation in Wirral. As the urban area of the Wirral sprawled through the 20thC, so the spatial segregation of social classes increased. Despite some counteracting policies this trend towards increased segregation seems to be continuing. This can be seen in the housing market. It is a feature of housing in Wirral (and in the UK generally) that the proportion of housing supply that is in the form of social housing (and allocated according to need) is in long term decline, whilst the proportion of housing allocated through the market, particularly for sale to owner occupiers has steadily increased.



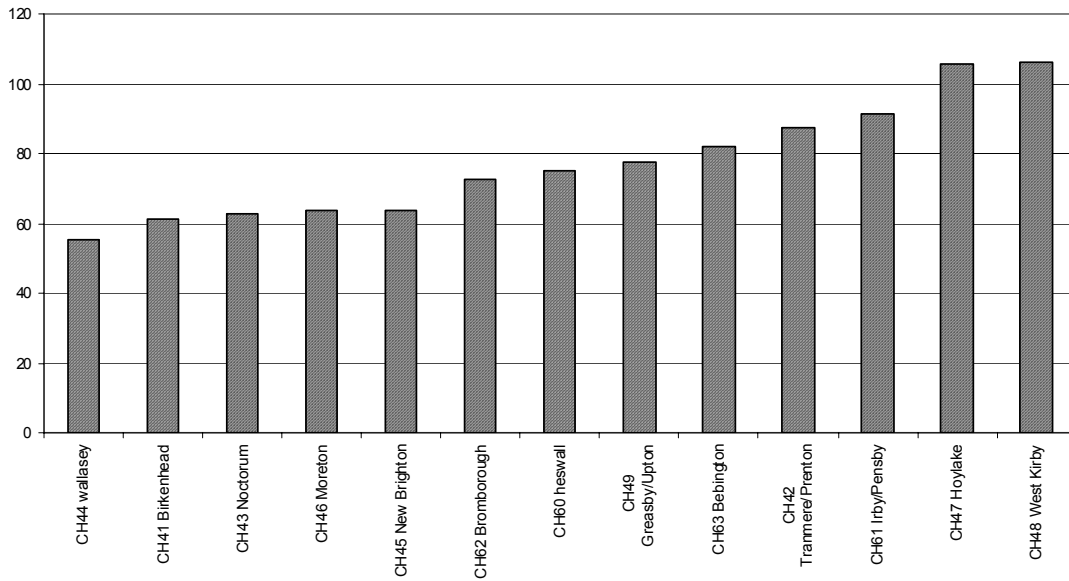
Source: Census of Population

Figure 1: Changes in housing tenure in Wirral

Furthermore, it is in the sprawling outer Wirral wards such as Thurstaston (87.3%), Royden (90.2%) and Heswall (90.4%) where owner occupation is at its highest, and in some of the inner wards such as Birkenhead (33.2%), Tranmere (44.9%), where owner occupation is at its lowest. In consequence, over the last thirty years, the ability to pay has gradually become a more important determinant of household location. If it can be shown that house prices have changed differentially between areas then it can be deduced that the access to housing for different income groups will have changed between these areas.

It is only since 1995 that reliable data on the price achieved on the sale of dwellings has been available from the Land Registry. Taking a standardised dwelling type (semi-detached houses), it can be seen that prices in inner Wirral increased by +64% between 1995 and 2002, whereas in outer Wirral the price increase was +81%, with the highest increases being recorded in West Kirby and Hoylake. Further details of variations in the increase in value of semi-detached houses between postcode districts is given below in figure 2.

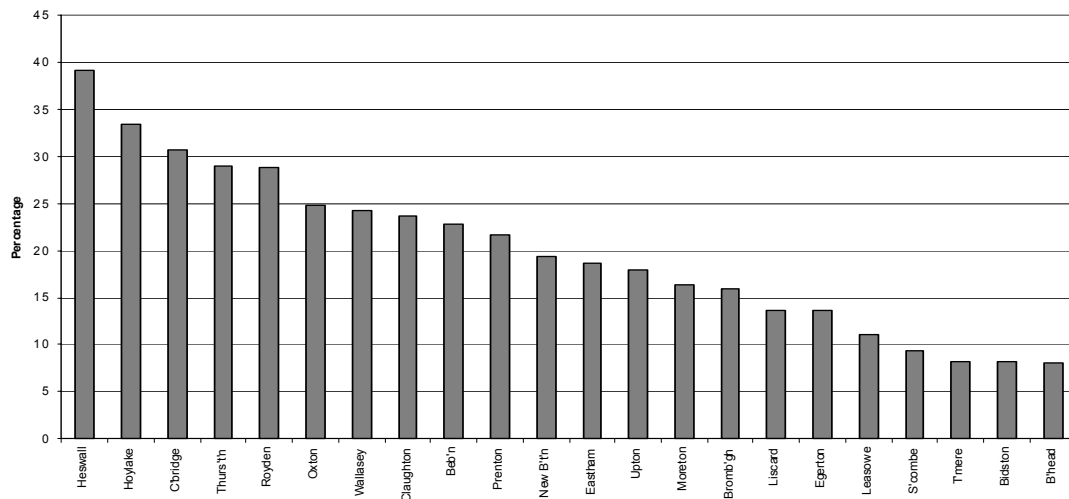
Dwelling price changes: semi-detached houses in Wirral wards, 1995-2002



Source: Land Registry Data.

Figure 2: House price changes in Wirral

Even at the beginning of the period the highest house prices were found in the peripheral postcode districts such as CH47 Hoylake, CH48 West Kirby and CH60 Heswall, placing private housing in these areas out of reach of those on lower incomes. The evidence from figure 2 suggests that over the period 1995-2002 those on lower incomes would gradually become even more excluded from postcode districts with high initial prices and higher than average price rises. Figure 3, below shows the present distribution of population of social grade AB (Higher and intermediate managerial, administrative and professional workers) in Wirral. If this disparity continues over time then it is reasonable to anticipate that this spatial social segregation will continue with urban sprawl increasingly dominated by higher income groups.



Source: Census of Population, 2001.

Figure 3. Social grade by ward in Wirral

Differences in living experiences

One of the most widely stated consequences of sprawl identified in the literature relates to differences in lifestyle and living experiences between residents of higher density, 'compact' inner urban areas and those in lower density, 'sprawling' peripheral areas. These issues were addressed by means of the second social survey of recent movers to new dwellings in selected areas of Wirral. The analysis divides the responses into inner Wirral residents (from Birkenhead and Claughton wards) and outer Wirral residents (from Hoylake, Moreton, Royden and Upton wards).

The first issue to be considered was the extent to which living in inner Wirral was less pleasant than outer Wirral. Respondents were asked to rate the extent to which certain matters were problematic. Table 1. gives the results.

Table 1. Local social and environmental problems in Wirral

Problem or intrusion	Inner Wirral	Outer Wirral
Noise from traffic	2.0	1.6
Noise from industry	1.3	1.1
Noise from neighbours	1.8	1.3
Car crime	1.9	1.4
Burglary	2.1	1.4
Vandalism	2.0	1.5
Personal safety	2.3	1.3
Drug abuse	2.7	1.4
Poor air quality	1.9	1.5
Light pollution	1.7	1.2
Neighbour disputes	1.5	1.2

NB: The data records the mean response for the area on a 5 – point scale. 1 = no problem, 2 = minor problem, 3 = moderate problem, 4 = serious problem, 5 = very serious problem.

Source: authors' survey.

The immediate impression is that none of these social or environmental problems appear to be serious problems for residents anywhere in the survey area. Nevertheless, residents in outer Wirral reported a lower level of problems than those in inner Wirral in every category. It is notable that the five most problematic features of living in inner Wirral are four of the 'crime' categories and traffic noise. This confirms the logic of households justifying their moves to outer Wirral on the basis that 'peace and quiet' and a 'low crime area' were important criteria.

The second issue was whether the lower density peripheral area would be 'less friendly' and more socially isolating than the higher density inner areas. Some commentators argue that areas of low density development (characteristic of urban sprawl) and areas of mono-functional land use (i.e. predominantly residential) do not foster a sense of community. This they argue, is because people live isolated lives (especially the elderly) with little opportunity for social contact or interaction. Dependence on car use increases the isolation. (A.Power p735 2001). Others suggest that the sense of community simply changes. No longer is it orientated around place. Instead it is orientated around activities (e.g. church, recreational activities, social clubs, work, etc.).

To test this issue respondents were asked whether they could name their neighbours, how many acquaintances they had in the neighbourhood and the extent to which their social life

was based upon their neighbourhood, work, personal interests or family. The findings are given in table 2.

Table 2. Social contact and social life in Wirral.

	Inner Wirral	Outer Wirral
Proportion of respondents who could name a next-door or same-floor neighbour	87.2%	94.8%
Respondents knowing less than 10 acquaintances within approximately 200 metres of their home	67.5%	49.7%
Respondents knowing between 11 and 20 acquaintances within approximately 200 metres of their home	26.5%	33.9%
Respondents knowing more than 20 acquaintances within approximately 200 metres of their home	6.0%	16.4%
Social life mainly based around the neighbourhood*	2.0	2.4
Social life mainly based around work*	2.1	1.9
Social life mainly based around personal interests*	2.9	3.0
Social life mainly based around the family*	3.8	3.6

* NB: Responses were on a 5 – point scale with 5 being the most positive response and 1 being the most negative. Hence the response of 3.8 is the strongest response shown here and 1.9 the weakest.

Source: authors' survey.

This shows that the great majority of respondents from all parts of the survey area knew at least one neighbour by name. We might speculate that the slightly higher positive response from outer Wirral results from the greater social stability of these areas. When it comes to the question of knowing people within the wider neighbourhood the difference between inner and outer Wirral is greater with significantly stronger evidence of community coming from the outer Wirral area. Again it might be surmised that length of residence and commonality of interests have a greater impact on the development of local communities than density or urban form. What is clear is that even in areas of sprawl the great majority of residents reported a high level of social contact. The data also shows that in both the inner and outer areas family and personal interests are more important bases for social life than are work or the neighbourhood. Thus it might be concluded that the neighbourhood, its location, density and form do not appear to be particularly important determinants of community or social life and, at least in Wirral, these do not seem to be greatly influenced by the process of sprawling. As a note of caution it should be pointed out that none of the areas of sprawl surveyed in Wirral exhibited the extreme mono functionality characterised by Power and others in their writing. Such areas do exist in Wirral, notably Caldy and Gayton, but there is no evidence that the affluent populations of these areas experience the severe isolation suggested by Power.

Residents were then asked to select from a menu of eighteen words three that, for them, best described their neighbourhood. Table 3. has the results.

Table 3. Neighbourhood descriptors in Wirral.

Descriptor	Inner Wirral	Descriptor	Outer Wirral
well-located	64	Pleasant	113
Quiet	48	well-located	108
Pleasant	41	safe	96
Friendly	31	quiet	66
Safe	30	friendly	51
Noisy	24	clean	29
Busy	23	suburban	15
Clean	23	busy	7
Urban	11	noisy	4
Unsafe	9	dull	3
Dull	9	isolated	2
suburban	7	urban	2
unfriendly	6	dirty	2
Dirty	5	unfriendly	2
Isolated	3	run-down	1
run-down	3	unsafe	1
unpleasant	2	exciting	1
Exciting	2	unpleasant	0
	341		503

NB: Figures show the actual numbers of responses selecting the descriptor.

Source: authors' survey

The top five descriptors selected by inner and outer Wirral residents are the same but the order and frequency of citing are significantly different.

<i>Inner Wirral</i>		<i>Outer Wirral</i>	
Well-located	56.1%	Pleasant	67.3%
Quiet	42.1%	Well-located	64.3%
Pleasant	36.0%	Safe	57.1%
Friendly	27.2%	Quiet	39.3%
Safe	26.3%	Friendly	30.4%

There is a greater mix of responses from inner Wirral, possibly reflecting a more heterogeneous community and a more varied local environment than that found in outer Wirral.

Finally residents were asked if they thought that their neighbourhood was improving, staying the same or getting worse. The answers are given in table 4.

Table 4. Perceptions of future prospects for neighbourhoods in Wirral.

The neighbourhood is:	Inner Wirral	Outer Wirral
Improving	28.2%	17.2%
Staying the same	53.0%	74.6%
Getting worse	18.8%	8.3%

Source: authors' survey

Residents in inner Wirral were more likely than residents in outer Wirral to say that their neighbourhood was changing. There was a much stronger sense of stability from outer Wirral residents. However, inner Wirral residents were quite divided as to whether the area was improving or getting worse. This may have been influenced by the precise locality in which they lived. Inner Wirral is a heterogeneous area containing a large number of neighbourhoods and communities, each with distinct and different characteristics. It may be that whilst regeneration policies and investments are having a positive effect on some neighbourhoods, other are feeling negative consequences or are simply being by-passed by improvements.

Economic consequences of urban sprawl

Employment opportunities

Over the last two decades or so there has been a significant sprawling of employment in Wirral. Between 1984 and 1998 total employment increased by 4.7%, but showed a decline of -7.4% in inner Wirral and an increase of +19.9% in Outer Wirral.

Table 5. The sprawling of employment in Wirral.

	Employees 1984	Employees 1998	% change 1984-98
Inner Wirral	49,147	45,520	-7.4%
Outer Wirral	38,961	46,729	+19.9%
Total	88,108	92,249	+4.7%

Source: Annual Census of Employment

This means that employment would tend to become more accessible to the population of the outer areas and less accessible to those in the inner areas. Data from the Census of Population can be combined with data from the Annual Census of Employment to show changes in the number of jobs in each ward in Wirral as a ratio of the ward population. This data confirms that over the study period the ratio of jobs per head of population increased in outer Wirral by 25.6% compared with an increase of only 5.2% in inner Wirral.

Retailing and services

Recent years have seen significant changes in the retail sector as changes in consumer demand, economies of scale, centralisation of ownership, the growing importance of accessibility by car have all had an impact. In the convenience sector consumer demand has moved away from multiple lower-spending pedestrian trips to local shops towards fewer but higher-spending trips, frequently car-borne, often to more distant supermarkets or shopping centre. The causes are to be found in rising car-ownership, a rise in the number of working

women and a decline in traditional family roles. The consequence is a decline in the number of local convenience shops. In many areas, particularly the less affluent, the traditional parade of local shops (butcher, baker, grocer, greengrocer, ironmonger, newsagent) has all but gone, to be replaced by a single unit convenience store. This trend can be seen in a number of parts of Wirral including Rock Ferry, Seacombe and Birkenhead North.

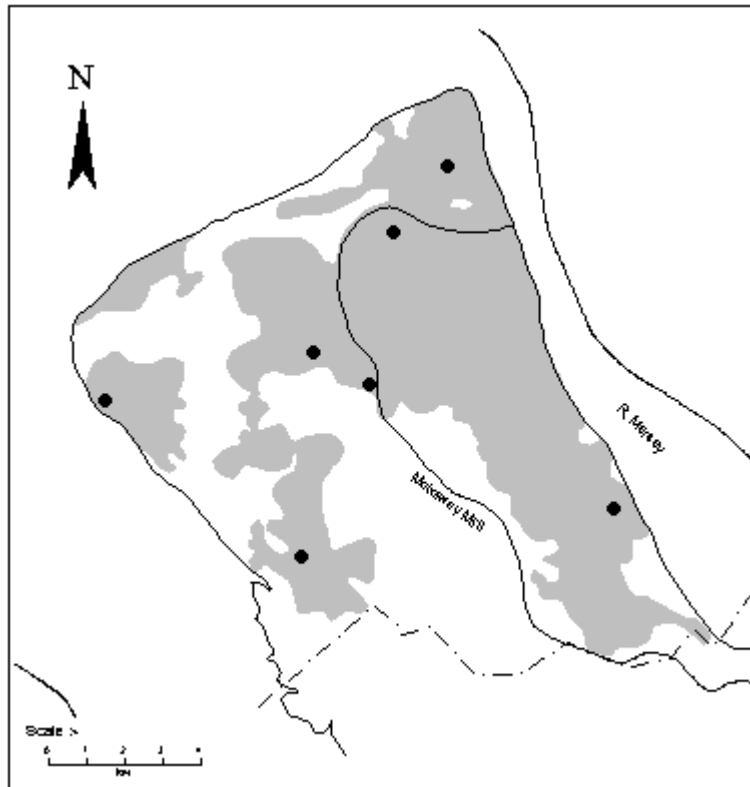


Figure 4. The location of major superstores in Wirral.

Economies of scale have encouraged the growth of large supermarkets (over 25,000m²). Centralisation of ownership means that only four firms account for more than 50% of food retailing in England (Lewis, 2002, p34). Within the last 15 years in Wirral, 7 such superstores have been developed on sites strategically located across the area (5 are in outer Wirral and 2 in the inner area) as shown in figure 4. Although only one was built on previously rural land (the planning system forced such developments onto brownfield sites) few are well served by public transport and all are provided with large, free, car-parks. Such edge-of-town development have been seen by many authors to have negative effects on the vitality and viability of existing town and district centres. For example Bromley & Thomas, (2002) found that they did impact on town centres but that the measurement of impact was problematic and likely to vary depending upon the success of local revitalisation strategies. Whitebloom & Laurance (1993) believe that superstores encourage greater use of car travel (both sources quoted in Lewis 2002, p35).

A complementary trend has been the growth of retail parks within which ‘big box’ warehouses accommodate DIY, furniture, electrical, sports and other retail sectors that have moved out of their traditional town centre locations. Again these development are dependent upon car-borne trade and rely on good road access and large, free, car-parks. There are three such developments in Wirral, 1 in outer Wirral and 2 in the inner area, all on former brownfield sites).

Thus it can be seen that scarcely any of these retail developments have had any impact on the urbanisation of rural land and in many cases have had a beneficial effect on the re-use of brownfield sites, they have nevertheless caused a rise in use of the motor car and an increase in journey length for retail purposes.

The social survey explored the question of convenient pedestrian access (on foot) to local facilities and amenities. The findings are given in table 6. below.

Table 6. The convenience of access to local facilities in Wirral.

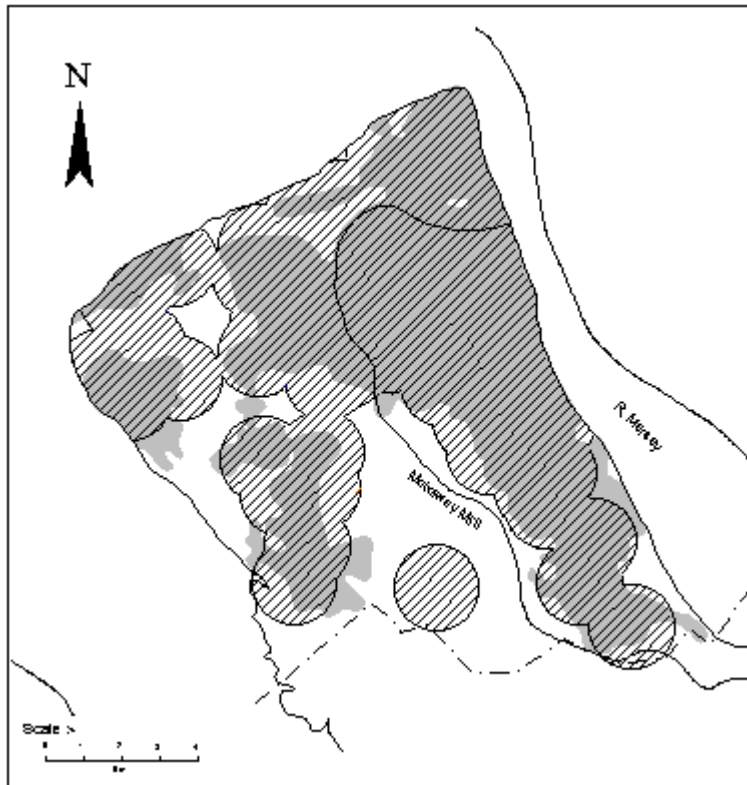
Facility or amenity	Inner Wirral	Outer Wirral
Local food store	2.3	1.8
Newsagent	1.9	1.5
Doctor's Surgery	2.5	2.3
Pharmacy	2.0	2.1
Post Office	2.1	1.6
Public House	2.0	1.5
Park/Green Space	2.1	1.6
Bust Stop	1.5	1.3

NB: The data records the mean response for the area on a 5 – point scale. 1 = very convenient, 2 = convenient, 3 = neither convenient nor inconvenient, 4 = inconvenient, 5 = very inconvenient.

Source: authors' survey.

The data appears to dispel the idea that living in the lower density suburbs of Wirral is significantly less convenient for the pedestrian than the higher density inner areas. Residents from outer Wirral reported more convenient access than residents from inner Wirral in relation to local food stores, newsagents, doctor's surgeries, post offices, public houses, parks/green spaces, and bus stops. Thus there is no evidence from this survey to support the notion that sprawl in Wirral has led to less convenient pedestrian access to local facilities. In interpreting this data it is worth noting certain salient points. Firstly, on the 5 – point scale no facility scored worse than 2.5 anywhere in the survey area, suggesting that nowhere was particularly poorly served. Secondly, given that in recent years peripheral housing developments have been strictly controlled by the planning system in Wirral many new housing developments (home to the social survey respondents) have been conveniently sited in relation to existing urban areas, often taking the form of infilling. Thirdly, in relation to some of the other European cities being studied in this project the differences in urban form and density between inner and outer Wirral are slight. The average urban density of inner Wirral is around 3,700 persons per Km² and in outer Wirral 1,500 ppkm², whereas Karl and Inger note a much greater difference between Stockholm (3,971ppkm²) and Värmdö (71ppkm²)

However, the social survey only covered selected wards in areas that were in the view of the research team, probably quite well served with local amenities. As a further check, fieldwork was carried out to examine the location and distribution of one amenity: post offices, in relation to population distribution. There is a higher density of provision of post offices in inner Wirral compared with the outer areas. Figure 5. shows how some of the most affluent parts of the sprawling residential areas of outer Wirral, with some of the most expensive housing are particularly poorly served, notably Caldly, Gayton and Brimstage,.



Note - areas not covered by the hatching lie beyond 1km of a post office.

Figure 5. The accessibility of post offices in Wirral.

Infrastructure and transport

It is argued that sprawling development is expensive in terms of public expenditure. This is because government (and ultimately tax payers) have to pay the cost of additional infrastructure, utilities and services at the periphery whilst at the same time having to maintain underused utilities and services in the inner urban areas. Higher density, more compact development would be less expensive in this respect. (A.Power p736 2001, R.Peiser p278 2001, SCATTER p17 WP1 2002 (quoting Ewing), The Barlow Report 1940).

There is evidence that as urban areas sprawl so the traditional dominance of suburb-to-centre journeys has been displaced by more tangential, suburb-to-suburb movements. In Wirral such a trend can be observed as employment, retail locations, health and education services and leisure destinations have become increasingly dispersed away from the traditional urban core. Traffic flows on tangential routes in Wirral, such as the A5137 (Heswall-Bromborough) and B5151 (Bidston, Oxtun, Clatterbridge) and A551 (Wallasey, Moreton, Upton, Heswall) have increased substantially. New tangential bus routes have been developed, for example, between Bromborough, Heswall and West Kirby, and between Clatterbridge, Arrowe Park and Leasowe.

Investment in transport infrastructure seems to have had a very limited impact on the location of urban development in Wirral in recent years. Despite the building of the mid-Wirral motorway (M53) in the 1970s little development has accrued to the potentially attractive locations around the motorway junctions. Surrounding rural land has been well protected from development. There has been no development permitted at junction 4 (Clatterbridge) other than the redevelopment of parts of the nearby Clatterbridge Hospital. At junction 3

(Woodchurch) there is a small industrial estate (the North Cheshire Trading Estate), although nearby a derelict factory has been converted, and subsequently redeveloped, as a superstore. A motorway spur at junction 2 facilitated the building of the 'Upton-bypass' which took traffic out of Upton village but did open up surrounding land for housing development and the building of another superstore. Junction 1 lies within the deprived Bidston ward and nearby brownfield sites have been developed for a retail park, superstore and sports centre.

There has been a limited amount of investment in local rail infrastructure. The electrification of the Liverpool-Rock Ferry- Chester/Ellesmere Port railway (S-Bahn!) was extended beyond Rock Ferry to Chester and Ellesmere Port in the late 1980s. Three new railway stations have been built, two in outer Wirral (Bromborough Rake and Eastham) and one (Conway Park) in the inner area. It could be concluded that these investments (except Conway Park station) were a consequence of previous rounds of urban sprawl since they have improved rail services to existing suburban areas rather than opening up new areas for development.

Environmental consequences of urban sprawl

Land conversion

The amount of rural land lost is significant but its distribution is uneven. Firstly in terms of category it can be seen that almost twice as much land has been lost from a natural or semi-natural state than from agriculture. Thus the conversion process has had a greater impact through the loss of a recreational amenity than through loss of rural economic activity or 'way of life'. The loss of sports places is also significant, being equivalent to around 40 football pitches in scale over the 24-year period. The amount of land conversion from rural to residential use in Wirral is shown below in table 8..

Table 7. The conversion of rural land to residential use in Wirral

Category of land conversion	Amount of land converted (hectares) 1977 – 2000
Former agricultural land	101.8 (32.0%)
Former 'unused land in a natural or semi-natural state'	187.2 (58.8%)
Former 'land sport places'	29.3 (9.2%)
Total	318.3 ha.*

* 318.3 ha. is 2.04% of the total land area of Wirral.

Source: Wirral Metropolitan Borough Council

The loss of recreational amenity is also uneven in terms of location. Over the period around 60% of the loss of 'natural or semi-natural' land was from just four wards: Clatterbridge, Moreton, Royden and Thurstaston (i.e. from approximately 34% of the land area of Wirral). The loss of sports places was even more concentrated with 74% of the losses occurring in Bromborough, Clatterbridge, Moreton and Oxton wards (i.e. from approximately 26% of the land area of Wirral). The inclusion of Bromborough and Oxton, essentially urban wards, within the second group suggests that there has been a certain amount of subsequent infilling of land which had been leapfrogged over in previous waves of development.

Development in rural areas causes a loss of land for agricultural production as well as the loss of natural habitats. Much of the lost agricultural land in Wirral would have been classified as 'grade III', mainly used for pasture. Over the period the effects of EU subsidies and regulations and changing farming practices have led to a surplus of lower grade agricultural

land in the UK. Thus, although urbanisation has caused the loss of over 100 hectares of agricultural land in Wirral over the last 25 years, the impact on agricultural production is likely to have been negligible.

The effect of urban sprawl upon natural habitats is more varied. Whilst 'species-rich grassland' has all-but disappeared from the Wirral (and UK) countryside, the causes lie in changes in agricultural methods as much as with urbanisation. Lowland heathland is an important habitat type in rural Wirral, significant amounts of which have been lost, especially around Wirral's eastern ridge near Birkenhead, where development pressures have consumed this land. There has only ever been a small quantity of woodland in Wirral in recent history, however over the last 30 years significant areas of remaining woodland have been lost, for example, in building the Ford estate. It is ironic that when this social housing estate later fell into disrepair, part of the regeneration process included renaming the estate 'Beechwood' after the woods that had been destroyed in the original construction process! The Wirral coast has experienced changes during the last thirty years. Some of these changes, such as the extension of salt-marshes in the Dee estuary, are natural processes. However, the building of the sea wall and flood defences along the north-Wirral shore are man-made and have been provided to protect areas of urbanisation from flooding. If the urban area had not been allowed to sprawl into areas at risk from sea-flooding these sea-defence works would not have been so necessary. Ponds, another important habitat in Wirral, have been lost through agricultural practices but little affected by urbanisation.

A further problem is that whilst large areas of natural habitat survive in Wirral, many have become separated and fragmented. This adversely affects the mobility of species and their ability to survive or adapt to environmental change. Of particular concern are Bidston Hill and Eastham Woods, cut off from the open countryside by urbanisation, and the very narrow 'green-belt' corridors between the urban areas of Heswall/Pensby, Greasby, Upton and Woodchurch. The M53 motorway is also a major barrier to wildlife mobility, although some accommodation works such as badger tunnels were provided.

Whilst the effects of regeneration and re-urbanisation are generally positive, the loss of mature gardens to infill development (especially in West Wirral), is environmentally damaging with effects upon tree cover and bird numbers.

There has been little significant non-residential urban sprawl into rural Wirral in recent years although a major exception (outside Wirral, in Ellesmere Port & Neston Borough) was the Cheshire Oaks retail and leisure development. The development adversely affected a number of habitats. A number of 200-year old oak trees were cut down and the loss of ponds adversely affected the numbers of Great Crested Newts. The extensive ground level car parks consumed a large amount of former agricultural land and sealed large areas of previously unsealed surface.

Noise and light pollution

Increased noise pollution, mainly from traffic growth has had intrusive impacts. Whilst many species will tolerate noise, others such as some singing birds, will not. Light pollution is not a major issue although it can affect the nesting patterns for species such as owls.

Surface sealing

The increase in surface sealing brought about by urban sprawl results in significant environmental impacts. After rainfall, water is channelled directly into Wirral's main 'rainwater drainage' rivers, notably the Dibbin, Birket and Fender. What results is a huge surge in water volumes that wash away everything in their path, with damaging consequences

for riverside habitats. In other places a high level of surface sealing can reduce the level of the water table. In Wirral however, it is actually rising due to other factors.

Air pollution

The urban sprawl of population within an area increases the amount of car travel it is argued. When petrol or diesel combust within an engine, carbon dioxide, carbon monoxide, nitrogen oxides, particulate matter, ozone emissions, and volatile organic compounds (including hydrocarbons) are released into the atmosphere. These emissions have negative impacts on the environment and on human health, for example some of these emissions (e.g. carbon dioxide) contribute to the 'greenhouse' effect, others, for example nitrogen oxides, lead to respiratory problems. (There are some small beneficial outcomes, e.g. nitrogen oxides, at low levels, can have a positive effect on plant life, acting in the same way as a fertiliser). The argument that the urban sprawl of population leads to increases in the amount of car travel is not universally accepted. Gordon & Richardson (quoted in SCATTER, 2002) argue that the assumption of a single-centre urban area is outmoded – rather a polycentric urban area is the reality. In the polycentric urban area, industry, retail and leisure have also all spread out (in our study this would be partially captured by a reduction in the employee density gradient of an area). The outcome of this, in their view, is that car travel is not increased. Furthermore they argue that the preference for car travel is not the consequence of (so-called) 'urban sprawl', rather it is a preference that is independent of 'urban sprawl'.

There is only limited historic data available on air pollution in Wirral. The longest time-span of recording is in inner Wirral where the presence of nitrogen dioxide has been measured at four sites since 1993 and a further five sites since 1998. Four outer suburban sites have also been monitored since the mid-1990s. There have also been sporadic measurements taken at rural and semi-rural locations in outer Wirral. The data for the inner and suburban locations shows a similar and consistent pattern of NO₂ levels around 40 – 45 micrograms per cubic metre (mpcm) with most sites recording a modest rise up to 1999, then dropping to around 35 mpcm and remaining at that level thereafter. The reason for this drop is not known. The level of NO₂ recorded at the rural and semi-rural sites was around 15 – 19 mpcm, less than half that of the urban and suburban sites. All that can be concluded is that urbanisation and more specifically, traffic, does lead to an increase in NO₂ in the atmosphere.

Energy consumption

Increased air pollution can also result from a more energy intensive lifestyle. Lower density development may be more energy-intensive than higher density development in terms of the energy used during the building's life-span (e.g. energy requirements for heating). The higher energy consumption increases emissions-to-air (these are generated during the power generation process). A. Power (p736 2001) notes the energy issue. Detached or semi-detached dwellings are higher energy users, compared to flats or terrace housing, although it is acknowledged that other factors, such as building form, orientation, type of heating system and amount of insulation, probably have a greater impact on energy usage than density alone.

Nevertheless, it has been suggested that (all other things being equal) detached houses typically consume 185% more energy than flats or terraced houses and semi-detached houses consume 150% more (Edwards B & Hyett, 2002, p100). Figure 6. shows how the composition of the Wirral dwelling stock has changed over the period and the effect this has had on energy domestic energy consumption. Although the calculation is crude, it suggests that the 'sprawling' of the dwelling stock away from higher density flats and terraced houses towards detached houses has led to a 3% increase in domestic energy consumption.

Dwelling types and energy consumption

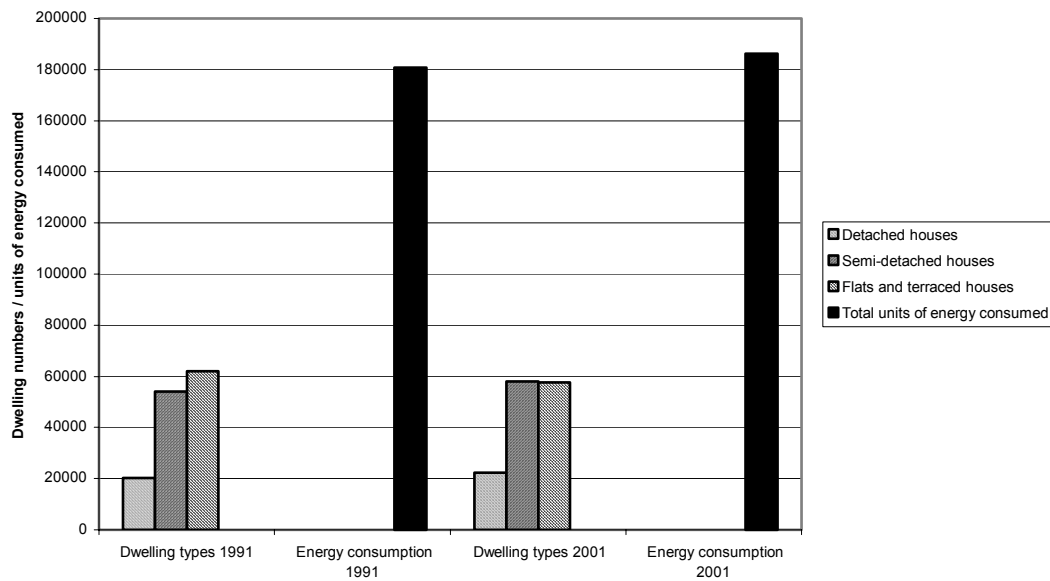


Figure 6. Changes in dwelling types and domestic energy consumption.

Land consumption is also dependent upon dwelling form and residential density. According to the Ministry of Housing and Local Government, moving from a ‘typical’ suburban neighbourhood of 25,000 people comprising mainly semi-detached and detached houses to a development of ‘terraced’ houses would achieve a land saving in the order of 15%. The incorporation of 20-40% of flats in the development would save a further 5-10% in the land used (MHLG, 1952). Using the same approach it has been calculated by the authors that if the mix of dwelling types in Wirral in 2001 had been the same as the mix existing in 1991 (i.e. if the average density of new development has not been allowed to fall below that of the existing dwelling mix) then around 1/3rd of the land used could have been saved from development.

Conclusions

Social consequences

It had already been established in our earlier work that although urban sprawl is continuing in Wirral, the rate of sprawl has slowed to low levels in recent years, particularly the last decade. A combination of restrictions on development on rural land, in the ‘green belt’, coupled with the sustained application of policies for the regeneration of the older urban area, have proved effective in this regard. It is also the case that the differences between the urban core of inner Wirral and the sprawling area of outer Wirral in terms of urban form, density, environment, economic structure and social composition, are not great when contrasted with some of the other case study cities.

Nevertheless, it has been possible to identify a number of consequences of urban sprawl in Wirral. Firstly housing tenure has changed differentially between areas. As a consequence outer Wirral, and especially some of the most sought after areas of sprawl have become more dominated by private housing allocated through market mechanisms rather than housing need. It has also been found that house prices have risen faster in outer Wirral (and especially Hoylake and West Kirby). The logical consequence of these trends, if they continue, is the

conclusion that urban sprawl in Wirral has led to circumstances in which increased spatial social segregation is likely to have occurred. This conforms with the views of Power (2001).

There do not appear to be great differences in 'living experiences' between residents in the inner core of Wirral and those living in the sprawling outer areas. No social or environmental problems were identified as more than moderately serious by residents in any location. However, of these, the most problematic features of living in inner Wirral were concerned with traffic noise and certain types of crime. This confirms the logic of households justifying their moves to outer Wirral on the basis that 'peace and quiet' and a 'low crime area' were important criteria.

There was little difference between residents of the inner core and sprawling outer areas in terms of social contact or social life. There is no evidence from Wirral to suggest that urban sprawl or the location, density or form of the neighbourhood are particularly important determinants of community or social life. In this our findings are somewhat different from those of Power (2001) and Burton (2000), although they may have been considering more extreme neighbourhoods.

Residents from all areas selected the same five characteristics to describe their neighbourhood (friendly, pleasant, quiet, safe, well-located) although the order differed with inner area residents putting more emphasis on location and quietness and those from the outer sprawling area mentioning pleasantness, well-located and safety above anything mentioned by inner area residents.

A higher proportion of inner area residents than those from outer areas felt their neighbourhood was improving but a higher proportion also felt it was getting worse. This divergence may reflect the more heterogeneous nature of the inner areas.

Economic consequences

Employment has grown faster in outer Wirral than in the inner areas. As a consequence of this sprawl, that ratio of jobs per head of population increased by over 25% in the outer areas compared with only around 5% in the inner core.

There has been a growth in large superstores and retail parks in recent years. The majority of these are located in outer Wirral although almost all are sited on existing urban land (brownfield sites). The consequences of these changes have been more and longer car-borne journeys for retail purposes. It is also well established that such developments have led to the closure of smaller, local shops and reduced provision elsewhere, particularly in the inner areas.

Although few residents from any area reported any significant inconvenience in walking to various local amenities (post offices, local shops, etc), our own field work on the location of post offices does suggest that provision and accessibility is worse in the sprawling outer areas of Wirral. This is especially true of some of the most expensive residential areas in Caldy and Gayton.

There is some evidence to suggest that previous rounds of urban sprawl have led to subsequent infrastructure investments in Wirral. This can be seen in rail and road investment and possibly also in flood defence works.

Environment

Urban growth and sprawl have led to over 300 hectares (just over 2% of the total land area) in Wirral being converted from rural to urban residential use between 1977 and 2000. There

has, in addition, been some further conversion of land to industrial, commercial and other uses. The loss of rural land to residential development has been uneven both in terms of location and type. There is some evidence of infilling in pockets that had been leapfrogged in earlier rounds of sprawl. Our own (rather dodgy) calculations suggest that over the last decade the use of higher density housing might have saved around 1/3rd of the land that has been used for residential development.

Urbanisation appears to have had little impact on agricultural employment or output in Wirral in recent years.

The effect of urbanisation upon natural habitats has been varied. Urban sprawl can lead to habitats becoming degraded, fragmented and separated. In Wirral a major concern has been the fragmentation and separation of areas of countryside causing difficulties for species mobility. However, the general view is that Wirral's remaining countryside is ecologically interesting and 'quite well-managed'.

There is limited evidence that urban sprawl has led to increased noise pollution, surface sealing and air pollution in Wirral.

Wirral has an historical legacy of urban sprawl that has led to an increasingly polycentric urban form and fragmented countryside. In recent years, urban sprawl has become a reducing problem in Wirral but even over the last decade it has led to the urbanisation of around 1/3rd more land than would have been the case if urban growth had occurred at existing urban densities. Sprawl does appear to have decreased job opportunities in the inner area and increased the probability of spatial social segregation. However, there is little evidence to suggest that urban sprawl itself has other significant consequences for community and social life. Sprawl has also reduced the accessibility of various local amenities and facilities. Sprawl has increased the necessity of longer journeys to work and for other purposes and encouraged greater use of the motor vehicle. The urbanisation process has reduced and fragmented natural habitats, although in recent years strong policies for their protection and management have been put in place. It seems likely that these trends will continue for the foreseeable future.

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Appendix 1.
SURVEY OF LIVING EXPERIENCES IN WIRRAL NEIGHBOURHOODS

This questionnaire should be completed by the head of household

1. In which year did you move to your current address? _____

2. Which of the following categories best describes your home?

- Flat _____
- Terraced house _____
- Semi-detached house _____
- Detached house _____
- Other (please specify)..... _____

3. From the home where you live, how convenient would you find it to reach the following places, by walking on foot?

NB: 1= very convenient, 2= convenient, 3= neither convenient nor inconvenient,
 4= inconvenient, 5= very inconvenient

Please circle one number for EACH place listed below:

Nearest local food store.....	1	2	3	4	5
Nearest newsagents.....	1	2	3	4	5
Nearest GP surgery.....	1	2	3	4	5
Nearest pharmacy.....	1	2	3	4	5
Nearest post office.....	1	2	3	4	5
Nearest public house (i.e. pub or bar).....	1	2	3	4	5
Nearest park or green space.....	1	2	3	4	5
Nearest bus stop.....	1	2	3	4	5

4. At the home where you live, to what extent do you consider the following matters to be problematic?

NB: 1= this is not a problem, 2= this is a minor problem, 3= this is a moderate problem,
 4= this is a serious problem, 5= this is a very serious problem

Please circle one number for EACH issue listed below:

Noise disturbance from traffic.....	1	2	3	4	5
Noise disturbance from industry.....	1	2	3	4	5
Noise disturbance from neighbours.....	1	2	3	4	5
Car crime (i.e. theft of or from cars).....	1	2	3	4	5
Burglary (of homes).....	1	2	3	4	5
Vandalism, graffiti.....	1	2	3	4	5
Personal safety on the street.....	1	2	3	4	5
Drug abuse.....	1	2	3	4	5
Poor air quality (smells, odours, pollution)..	1	2	3	4	5
Light 'pollution' (e.g. from street lighting).....	1	2	3	4	5
Neighbour disputes.....	1	2	3	4	5

5. At the home where you live, if you live in a house do you know the names (first name or surname) of either of your next-door neighbours, or if you live in a flat do you know the names (first name or surname) of anyone living on your floor?

Yes / No

6. In your neighbourhood (i.e. within approximately 200 metres of your home), how many people do you know by name? (first name or surname) (Please circle one answer)

Less than 10 11-20 More than 20

7. Of the time that you spend socialising, how much of your time is spent with the following groups of people?

Please circle one number for EACH statement listed below:

	All of the time	A lot of the time	Some of the time	A little of the time	None of the time
I socialise with people living in my neighbourhood	1	2	3	4	5
I socialise with people from my place of work.....	1	2	3	4	5
I socialise with people who I know through my interests and hobbies.....	1	2	3	4	5
I socialise with people from my family.....	1	2	3	4	5

8. Please circle the THREE words that, for you, best describe the neighbourhood in which you live?

safe noisy isolated pleasant busy
 quiet well-located urban suburban run-down
 friendly clean unsafe unpleasant
 exciting dirty unfriendly dull

9. Do you consider the neighbourhood in which you live, to be improving, staying the same, or getting worse? Please circle ONE of the following:

Improving Staying the same Getting worse

10. Which of the following categories best describes your household? (Please tick only one answer)

- Single adult living alone —
- Elderly person living alone —
- Adult couple —
- Adult couple with child / children —
- Single adult with child / children —
- 2 or more adults sharing (with no children) —
- Other (specify)..... —
- —

11. Into which age group do you belong? (Please circle one answer)

18-34 35-59 60 or above

12. What is the postcode of your current address? _/_/_/_/_/_/_/_

Thank you for completing this questionnaire.

To enter the prize draw, please write your name and address here.....
 Please could you return the completed questionnaire in the envelope provided, to Steve Bennett, School of the Built Environment, Liverpool John Moores University, Clarence Street, Liverpool, L3 5UG