Transport and Land Use Planning in the New Towns

The Transport Crisis and the New Town Experience

The relationship between transport and urban design was a subject that attracted considerable attention in the planning of Britain's new towns. This was particularly so for the later new towns, which were designed when high car ownership and use had become a reality and further massive growth in traffic was forecast. Many innovative and contrasting land use/transport structure were used. But with the winding down of the new town programme, this experience of integrating land use and transport planning came to be seen of little more than historical interest. However, in the recent years, transport issues have developed in significantly new way such that the land use/transport planning experience of the new towns is now seen of increasing relevance to contemporary transport planning issues.

There are two factors that have resulted in the renaissance of interest in the role of urban design in transport planning.

The first factor is the gradual demise of traditional roadbuilding transport policies. Since the Second World War, the orthodox approach to transport planning has been essentially to adjusting supply to demand. Predominantly this has involved providing road capacity, together with the planned trimming of rail and bus services, with some exceptions due to 'social need'.

From the late 1980s, traditional "supply-led" transport planning has lost its credibility Although recently identified problems concerning the global environmental impacts of motor traffic are growing in importance, the initial reason for this re-evaluation was the incapability of the traditional roadbuilding response to reduce traffic congestion. In 1991, the pro-Conservative *Daily Telegraph* dismissed plans to enlarge the M25 London Orbital motorway as a waste of money that "will ultimately have little effect on congestion" and highlighted the experience of Los Angeles, where it concluded that only "revolutionary methods involving a change in lifestyle will really ease the problem" (Hiscock, 1991).

The widespread view that throwing money at congested roads will only create bigger, more congested roads is not simply media cynicism. In *Transport: The New Realism,* Goodwin et al (1991) provide rigourous proof that "all available road construction policies only differ at the speed at which congestion gets worse" (Goodwin et al, 1991 p.111) and the 1994 report by the Standing Advisory Committee on Trunk Road Assessment (SACTRA, 1994) confirmed the long-held suspicion that building new roads did result in inducing additional traffic, particularly on orbital roads such as the M25.

In his 1994 Linacre Lecture, *Traffic Growth and the Dynamics of Sustainable Transport Policies*, Dr Phil Goodwin argued that the "New Realism" leading to the acceptance of demand restraint transport policies is entering a second phase. The first phase was the gradual (if grudging) acceptance that for major towns and cities demand restraint has to be the core rationale for transport policy. The second phase involves the realisation that demand restraint is inevitable *for trunk roads and motorways also.* Quoting British Road Federation research, Goodwin shows that even a roadbuilding programme of an uncontemplated vastness would fail to stop congestion getting worse. As a policy response, roadbuilding will always fail; demand restraint is the only direction possible for transport policy at all levels.

Although much has been said about the environmental impacts of travel, it is actually the failure of supply-led roadbuilding policies to crack the congestion problem that has been crucial to its demise. This was first recognised in towns and cities, SACTRA has moved it to cover ring roads and hinterland motorways and the final battleground is now over inter-urban links.

If road congestion has led us towards a sea change in core transport planning philosophy, this is strongly reinforced by growing concerns about the environmental impacts of transport.

The impossibility of reconciling environmental imperatives and continued traffic growth is now becoming an accepted fact of life. Road traffic is responsible for over half of all nitrogen oxide pollution in the European Union and 85% of carbon monoxide emissions (CEC, 1992). Probably the most severe long-term environmental threat of all is *global warming* and climatic change. Carbon dioxide (CO_2), is the most abundant 'greenhouse gas',.responsible for around 50% of global warming. The Intergovernmental Panel on Climate Change (Houghton et al 1990) has estimated that emissions of CO_2 must be reduced worldwide by at least 60 per cent in order to halt the net growth of this gas in the atmosphere.

Energy consumption for transport purposes is the fastest-growing source of CO_2 emissions in most developed countries. For example, according to UK Department of Energy figures, transport in Britain has grown from being a relatively moderate consumer of energy in 1960 to being today the largest and fastest growing. Within the EU as a whole, transport consumes just under 30% of total energy used (CEC, 1992 p12). A recent OECD report on the Carbon Dioxide (CO_2) emissions from private cars (IEA, 1993) noted that technology is available to to improve car fuel efficiency by a factor of three or more, but that in reality, using current commercial technology coupled with allowing for market acceptability, the economic potential improvement is nearer 20%. However, as noted by Hughes (1993) even vast improvements in fuel efficiency would only buy Britain about 15 years before traffic growth returned CO_2 emissions to their current, unsustainable, level and would then continue to grow. Once increased motorised mobility in developing countries is added to the equation, the task seems even more impossible.

Thus both in terms of the failure of traditional roadbuilding transport policies to reduce congestion and the need to address transport's environmental impacts, demand management and restraint for motorised travel is clearly on the policy agenda. However, most politicians would prefer it otherwise, seeing 'rationing' car use as a ticket for electoral defeat. Thus the search is on for politically acceptable ways to contain motorised travel demand. This is where the experience of the new towns is of such crucial relevance.

The 'Dream' Solution to the Transport Crisis?

One of the most attractive policy measures is the use of planning to influence the pattern of land uses and so reduce the need for travel by car while at the same time enhancing the attraction more environmentally-friendly means of travel, such as cycling, walking and public transport. Such an approach to reducing car dependence is seen as a 'dream' solution compared to more politically fraught methods of reducing car use.

However, many of the recent policy studies that have examined the potential for urban design to reduce car use have concentrated on the relationship between population density and amount of motorised travel (Newman and Kenworthy, 1989, and the CEC *Cities and Sustainability* report being probably the most well known). Population density clearly is an important factor, but if a planned approach to restraining car use is the purpose of such studies (and growing environmental concerns makes that more likely) then why should attention be restricted to only one factor restraining car use simply because, by accident and not design, it is sufficiently widespread to be particularly noticeable?

It is not surprising to find that, in a general policy context of roads being built as car use increases, that car use is lowest where that policy cannot be applied - in areas so built up there is insufficient room for roadspace and car parking. This suggests that the negative factor of congestion plays a more important role in reducing motorised travel than the positive effects upon alternative transport modes. Congestion is arguably the worst method to restrict car use; it is costly, distributional impacts are random, it intensifies energy use and the sort of urban structures that result tend towards social drawbacks of their own.

When an examination of planned communities is made to understand the transport effects of contrasting urban designs, somewhat different conclusions arise than from the studies that looked at unplanned settlements. This is where the experience of the new towns is so crucial. The first study to draw upon the new town experience in the modern context of the need for environmentally-focussed demand management transport planning was the 1991 TEST study comparing the effect of the land use/transport design of the Dutch new town of Almere and the UK new town of Milton Keynes.

Almere was designed to provide good pedestrian and cycle access with medium density (35-45 houses per hectare) urban development clusters separated by open space. By way of contrast, Milton Keynes was modelled on Los Angeles, using a dispersed land use pattern and low density housing at 20 dwellings per hectare.

Trips rates were virtually identical in the two communities, but in Almere, the mean trip length was a little shorter than in Milton Keynes with a higher proportion of local trips. However, modal split was very different, with 66% of trips in Milton Keynes being by car as opposed to only 43% in Almere

Table 1: Modal Split in Almere and Milton Keynes

	Milton Keynes	Almere
Walk	17.7	20.7
Bicycle	5.8	27.5
Car	65.7	43.1
Bus	6.3	6.0
Train	1.1	2.7
Other	3.4	0
	100	100

Source: TEST, 1991

One striking fact to emerge from this study is that the main difference is not in public transport use, but in the proportion of trips by walk and bicycle. This was of particular importance for children's trips. The liberating effect of Almere's pedestrian/bike-oriented urban form on children and teenager's travel was striking. In Milton Keynes a third of trips by 5-18 year olds was by car. In Almere it was only 5%.

The substitution of walk and bike for short car trips has particular environmental benefits. Firstly, cars are at their least efficient undertaking short trips, resulting in high fuel consumption and emission of pollutants (this is compounded by the fact that, even when fitted, catalytic converters do not work until a car's engine has warmed up). Secondly, a very high proportion of travel in Britain remains very local - according to the 1991-93 National Travel Survey, over 70% of trips are under 5 miles, with nearly a third under 1 mile. Enabling a high proportion of these trips to be by foot and bike is both environmentally and socially beneficial.

Overall, the Almere/Milton Keynes study suggests that a reduction of about a third in motorised journeys can be achieved by shifting from low density dispersed layouts to clustered settlements at only medium densities. This is the same amount as is suggested by national data for the more extreme move from low to high density settlements (for example, a comparable modal split change would require a shift from a density of around 25-30 persons per hectare to over 75 ppha based upon British National Travel Survey information).

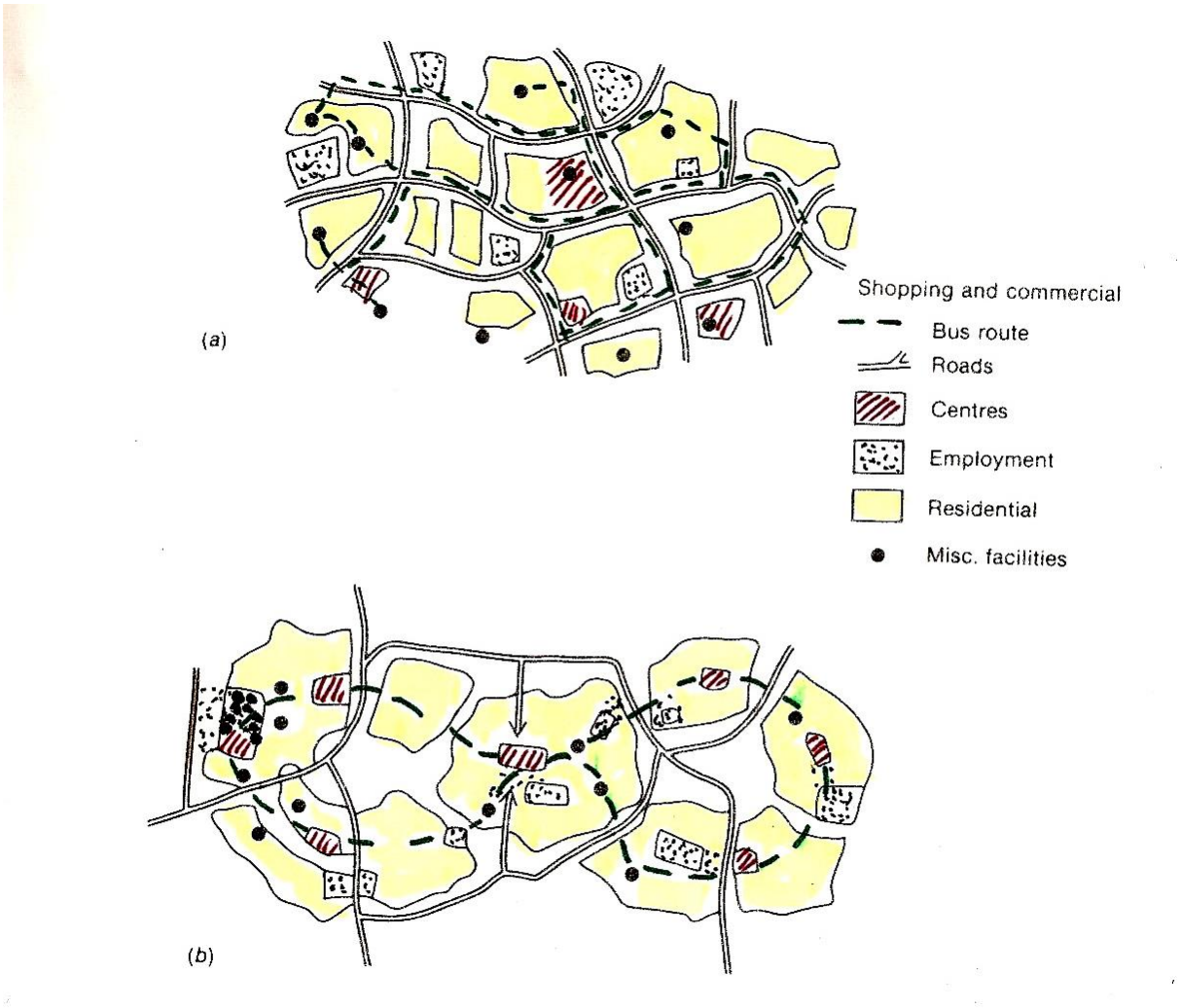
The British new towns experimented with a wide range of transport/ land use designs. A return to examine this experience (much of which is documented in this CD ROM archive) contains valuable lessons for transport planning today, through to the 21st century and beyond towards a more sustainable future.

Transport/Land Use Planning in the British New Towns

For long it has been realised that there is an interrelationship between the shape, size and density of urban settlements and transport technologies and availability. Suburbanisation only became possible on a large scale with the development of the railways, trams and buses in the late nineteenth and early twentieth centuries. However, the question as to whether there is a major conflict in the land-use pattern and operational requirements of different transport modes was not seriously addressed before a series of theoretical urban form studies were made in the mid 1960s. One of the earliest of these was made by the planning consultants Jamieson and Mackay in connection with the Northampton, Buckinghamshire and Bedford study in 1967. This was closely associated with the subsequent designation of Milton Keynes and Northampton as new towns in 1967 and 1968 respectively.

Jamieson and Mackay considered the urban design operational requirements of public and private transport to be 'diametrically opposed'. For, in order to minimise congestion, it is best to disperse facilities and traffic flow. By contrast, public transport works best along 'corridors' of movement, with the main journey origin and destinations located along such corridors. Such a design also increases pedestrian accessibility compared to car-oriented designs. Fig 1 expresses this design conflict diagrammatically.

Fig 1: Optimal Urban Structure for Private and Public Transport



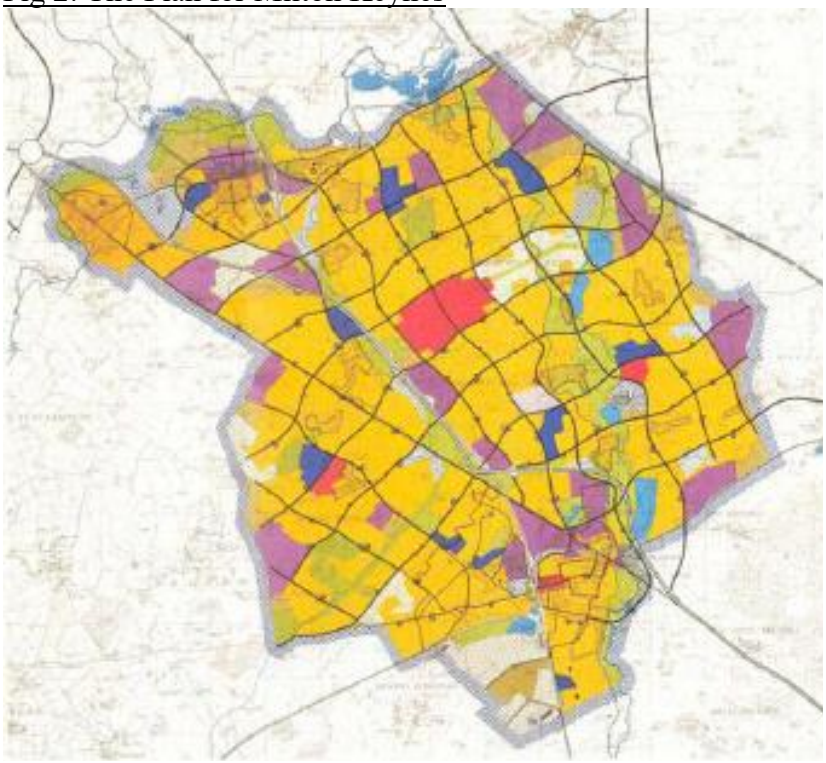
In practical new town planning terms, these alternative approaches broadly represent the view that you can either give the operational conditions for the private car priority, and then fit public transport, pedestrian and cyclist needs in as best can be accommodated, or that the operational needs of public transport and pedestrian access determine the urban design of a town, with car travel accommodated within this structure.

Within Britain's new towns, the clearest examples of the these two contrasting approaches are Runcorn and Redditch, representing the public transport-oriented design and Milton Keynes, Washington and Telford representing extreme private transport-oriented structures.

Milton Keynes - a private transport dominated design

As noted above, the plan for Milton Keynes (Fig 2) involved and extremely dispersed land use pattern and low density housing.

Fig 2: The Plan for Milton Keynes



Even though the published plan stated that "The Corporation regards the provision of a good public transport system as a public responsibility of the highest priority' (The Plan for Milton Keynes, Vol 1 para 133), this desire was not reflected in the selected land use structure. Despite the published plan containing much emphasised goals to achieve freedom of choice to the town's residents, which to be achieved required high quality public transport and safe pedestrian movement, the Plan's Transport Technical Supplement admitted that:

> "in the light of the selected land use plan, the provision of a competitive form of public transport does not make practical sense. This consideration of maximisation of freedom of choice has therefore been discounted. .... The appropriateness of providing a public transport service beyond the minimum level necessary to transport those not in a position to travel by car is solely a matter of policy."
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> The Plan for Milton Keynes, Technical Supplement No 7, Vol 2, p.34

The belief held by the planners of Milton Keynes that its urban structure was incapable of supporting more than a minimal public transport service has, sadly, been totally confirmed in practice. Initially, even basic services required a large subsidy (over 40% of costs) and, in 1975, an attempt at a high-tech solution, using Dial-a-Bus made even greater losses. The scheme, which only covered a small part of the town, was scaled down and finally abandoned in 1980. Following the deregulation of buses in 1986, conventional services were replaced by minibuses. Fares rose considerably and, resulting in some routes ceasing to require subsidy. A 'bus war' took place in the early 1990s, when a rival company tried to establish itself, but the incumbent operator won and retains its local monopoly. However, by 1995, despite record fare rises and cost-cutting, bus operations in Milton Keynes were losing money and the future of even "the minimum level necessary to transport those not in a position to travel by car" was looking uncertain.

Additionally, the low density of development in Milton Keynes means that the catchment area for local facilities are small and as such only very basic services like a shop or two, a school for children up to 12, playing fields and a community hall are within walking distance. A system of segregated cycleways has been built in most areas (although, strangely, not in Central Milton Keynes), but many journeys remain beyond even cycling distance. Milton Keynes has only average cycle use for a town of its population and a lower than average number of trips by foot.

A somewhat poignant postscript to the transport design of Milton Keynes is that this new town, which above all others was designed to freely accommodate mass car use, has failed even to achieve this aim. In 1994 a Buckinghamshire County Council transport study showed that car use in Milton Keynes would exceed the capacity of its road system within the first few years of the 21st century. Unless something is done to restrain car use, at about the same time the building of Milton Keynes is completed, its road system will be reaching gridlock.

In virtually every other respect, Milton Keynes represents what is right about Britain's new towns. The town's energy conservation work in domestic, commercial and industrial buildings has set an example for the rest of the country to follow, and the effective incorporation of environmental factors into planning new areas is of international renown. But the1960s concept of transport planning looks increasingly inappropriate for a town looking forward to the 21st century. This is a legacy that will be extremely difficult to remedy.

Conflict-Resolving Designs

In the new towns, the stimuli to develop urban designs to truly resolve the conflict between the requirements for private and public transport came from social considerations. Today the economic futility and environmental consequences of mass car use are well known, but these original social arguments remain as valid as ever.

In Milton Keynes, Telford and most other UK new towns, the belief in a massive rise in car use led to that factor dominating the design of these settlements. In a few other towns, the same trend was seen as a factor which required a design emphasis on public transport. What produced this seemingly opposite reaction to the same situation?

Although Arthur Ling, the designer of Runcorn, accepted the rise in car ownership, he realised that this would continue to be distributed very unevenly:

> "To design the town dominantly for the motor car would require the maximum expenditure on highways to cater for peak period traffic and a more extensive provision f car parking spaces at the Town Centre and in the industrial areas. In addition public transport..... would be little used and therefore it would be uneconomic to operate a frequent service. This would cause a sense of social isolation for those without the use of a car, such as children and old people and also members of the family to whom the car is not available at a particular time"

Arthur Ling: *Runcorn New Town,* 1967

The Runcorn plan and that of some other new towns (particularly Redditch, 1966, and also Peterborough, 1970, Irvine, 1967 and the unbuilt Stonehouse, 1974), are the major British attempt at addressing the land use/transport social and economic externalities of mass car use via urban design. These plans share the same basic principals:

- segregation of networks for private and public transport making it possible to concentrate flows for public transport while dispersing car traffic;

- the size of residential areas is determined by the population needed to maintain a frequent public transport service;

- residential densities increase towards public transport routes;

- low density land uses (e.g. large parks, warehousing, major roads etc.) are kept towards the edge of catchment areas so as not to increase walking distances to public transport routes and local facilities;

- the arrangement of residential areas, employment centres, shopping and other major travel generating land uses provides 'corridors' for public transport services. In some new town designs (e.g. Redditch) land uses along these corridors were considerably more mixed than was usual in new town plans.

Figure 3 shows how the above urban design principles were applied to expand the existing town of Runcorn from a population of 30,000 to 100,000. The existing town is to the west (left), with the expansion occuring along corridors served by a segregated Busway. The design of Redditch (Fig 4) was based upon very similar principles. Note in the Redditch plan the way the provision of a large park along the flood valley of the River Arrow does not break up the bus catchment.

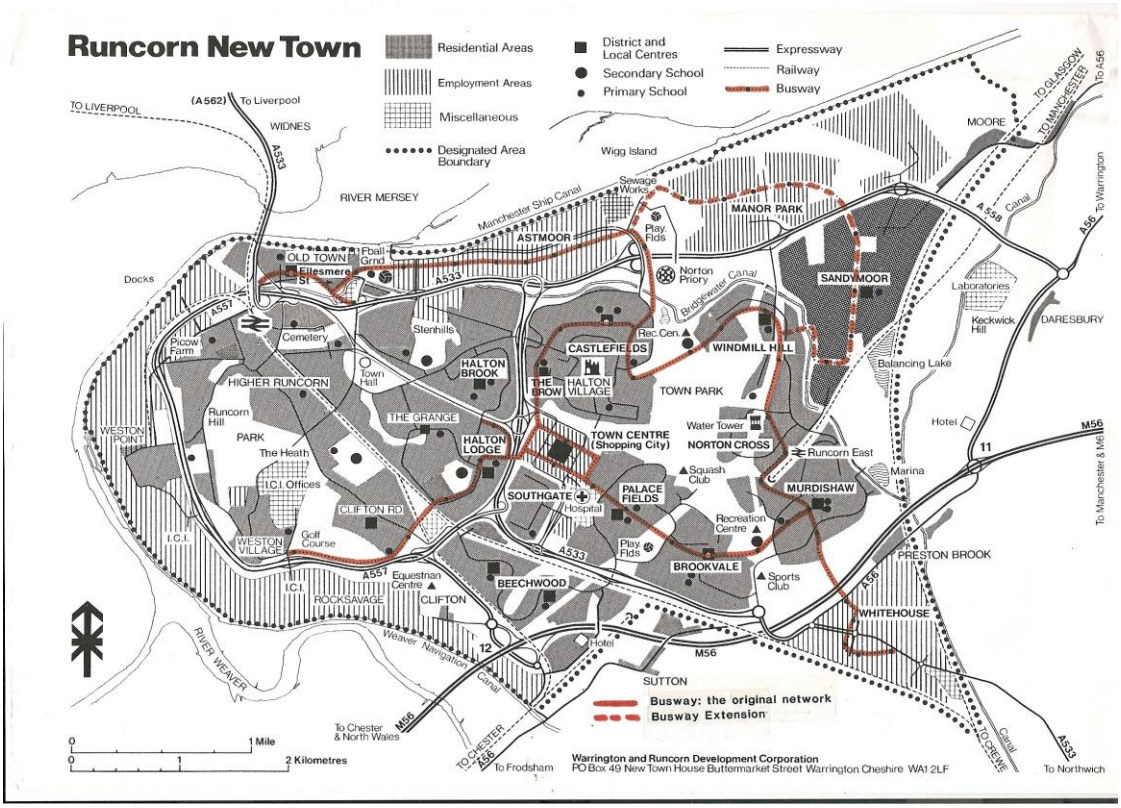

Fig 3 (above): Runcorn Land Use/Transport Plan; Fig 4 (below) Redditch Land Use/Transport Plan

Within ten years, these towns had developed successful bus systems with a frequency of service usually associated only with large cities. Runcorn achieved as service frequency of 5 minutes and Redditch 10 minutes. It should be noted, this was using large buses, seating 50 or more passengers, before the shift to more frequent minibuses became common after bus deregulation in 1986. Both these systems also moved into profit after 10 years and, in Redditch, even fares reductions were known (a 12% cut in fares was introduced in 1976). Unfortunately, since bus deregulation in 1986 it has not been possible to monitor the performance of bus services in these towns as passenger and commercial information is now confidential.

Both these towns also provided a road network intended to disperse car flows. Generally, these have proved to have functioned as well as the road networks in more car-oriented new town designs. As in all towns and cities in Britain, congestion emerged as a key problem in the late 1980s and, coupled with growing environmental concerns, further car restraint measures seem inevitable. On its own, the public transport-oriented designs of these towns does not produce a significant shift in demand to the bus services. But unlike Milton Keynes, Runcorn and Redditch at least have the core of a viable alternative to the car upon which to base their transport policies for the 21st century.

As well as the benefits to public transport, the designs of Runcron and Redditch have major benefits to non motorised travel. As was noted in the Milton Keynes - Almere study, moving trips to within walking and cycling distance represents the most important car use reducing effect of such designs. To a considerable extent, urban structures that are conducive to a good quality public transport service enhance pedestrian and cycle access as well. However, this also requires local physical conflicts between pedestrians, cyclists and traffic to be recognised, which in the cases of Redditch and Runcorn have not been particularly successful. Well designed pedestrian and cycles facilities are a rarity in the UK.

Applying the Lessons of the New Towns

It is important to realise that even the new town urban designs that were intended to resolve transport conflicts were not particularly intended to effect a modal shift away from car to bus. The main aim was to provide conditions in which, despite high car ownership, good quality bus services could still be provided. In this, they have been broadly successful, but they have not affected car use very much. The greatest effect,bordering upon the unintended, was that the public transport emphasis in these designs made walking a more viable option and this has been the greatest modal effect change.

The new town experience in land use/transport design contains valuable lessons for the use of planning measures to reduce car dependence. To a large extent they represent ‘advanced warning indicators’ - showing the eventual implications of trends towards different types of land use/transport systems. They suggest that more than land use planning measures alone are needed to reduce traffic; the urban structures of places like Redditch and Runcorn have the potential to have a very environmentally-benign transport system (which Milton Keynes does not), but at the moment only a small part of this potential is being realised. As Hughes (1993) noted, land use planning needs to be combined with other carefully-developed measures (such as price incentives, infrastructure investment and development of new technologies) to be fully effective. But without an urban structure conducive to public transport operations and access by non-motorised modes, trying to manage travel demands to within socially, economic and environmental limits could well prove an impossible task.

Is the 'dream' policy scenario possible of using urban design to cut congestion, pollution and CO_2 emissions without reducing personal accessibility? The answer to this is that, alone, urban design would not work, but that, in combination with other measures, long term structural policies such as land use planning could contribute significantly towards the "dream solution" to transport's environmental crisis. And our greatest experience of this is in the ‘advanced warning indicators’, of the new towns.

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