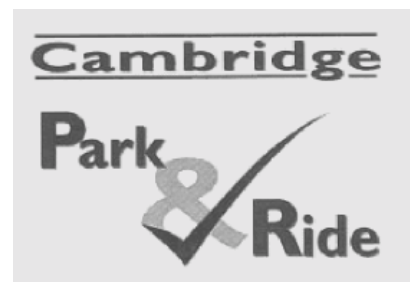


*'Park and ride' -  
sustainable transport or  
expensive white elephant?*



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**AMENDED, NON-PRESENTED VERSION**  
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# ***Approved dissertation proposal***

Park and ride is becoming an increasingly popular form of 'integrated transport' provision across the country, with millions of pounds being spent to set up such schemes. Park and ride is often promoted as an environmentally-friendly form of transport.

Particularly in the light of the Government's recently-published White Paper on the future of transport, and with its promises of new revenue streams, councils across the UK are considering park and ride as one of a number of options to address their areas' transport problems. However, concern is being expressed in some quarters that park and ride is not as environmentally sound as it perhaps claims to be. In particular, its supposed role as a method of reducing traffic is unproven.

Focussing primarily on Cambridge, but also considering other examples in the UK, such as Oxford's, the study will look at a variety of issues regarding park and ride's place in integrated sustainable transport. As an introduction, it will consider the general purpose of park and ride, who uses it, and its ability to be an effective and efficient form of transport. The study will question whether it really is a sustainable form of transport or merely a politically acceptable way to persuade people to use their cars less, but which, in reality, rather than reducing traffic, simply moves it elsewhere. It will consider whether park and ride is good value for money compared to other potential transport schemes. And the study will look into the effects of park and ride on the use of other forms of transport and also on car dependency.

The study will include collection and analysis of data from users of the system and from a variety of institutions, both local and national, including transport providers, transport campaign groups, Cambridge's councils, and other interested parties.

## ***Important note***

### **About this presentation**

The version of my dissertation presented here is not exactly that which was submitted for examination on Monday 1<sup>st</sup> May 2000.

It contains amendments, mainly presentational, which represent what would have been handed in had an additional day or so been available. Some areas of the original submission, such as the appendices and the addition of photographs were not as complete as had initially been hoped for.

This version has been produced for posterity's sake and to produce a more complete representation of the research undertaken.

The same rules, for example number of words, have been adhered to, with the single exception of the requirement for double-spaced lines, which is unnecessary in this instance.

Martin Lucas-Smith, Wednesday 3<sup>rd</sup> May 2000.

**This dissertation is mine own unaided work  
and does not exceed 10,000 words in length**

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I should like to thank the Cambridge park and ride manager for permission to take photographs of the park and ride sites.

Thanks are also due to members of the Cambridge Cycling Campaign with whom useful discussions were held.

# ***Overview of the investigation***

## **Overview**

This study looks at aspects of bus-based park and ride schemes in the context of their effect upon environmental sustainability. It looks at the issue in firstly the national context and then applies understanding gained from this to the local implementation of park and ride in Cambridge. Related issues, principally those relating to economic development are also considered as part of the context of the study.

## **Description of the parts of the study**

The first chapter of the study forms an introduction to park and ride.

After a description of the characteristics of park and ride, a series of short introductory briefings describing the background to policy development in the field.

The study continues with an introduction to the park and ride debate, and a critical review of relevant literature.

This is followed by short explanations of themes in transport policy which have relevance to park and ride, in order to assist understanding by the reader, who may be unfamiliar with some of these concepts.

The second chapter deals with analysis of park and ride policy in the national context. This deals with some of the more theoretical aspects to park and ride policy and practice. The chapter concludes with a summary.

The final chapter deals specifically with the Cambridge park and ride system. Linkages are made to explanations present in previous sections in order to draw the theory into the local context of the Cambridge park and ride system. Once again, it concludes with a summary of this chapter and hence a final evaluation of the park and ride system as implemented in Cambridge.

Material studied for the investigation included a variety of pieces pertaining to debate over policy, published data collected from previous investigations into park and ride, reading for the background and theoretical approaches, and a wide range of information and data specific to the Cambridge Park and Ride

system. The reading material was supplemented by discussions with and questions put to key figures implementing park and ride policy in the Cambridge area.

## **Issues of particular note**

Little difficulty was in general encountered during the study. The large number of sources of data and comment meant a broad spread of available research on which to draw.

Some difficulty was encountered in obtaining data from Cambridgeshire County Council in that required data was often spread over a number of departments, particularly in relation to data based on parking availability. Staff at the offices were, however, helpful and responded quickly to requests for information.

Although the proposal for the study initially included suggested collection of data from users of the system, this proved to be unnecessary for the simple reason that literature reviews lead to the obtaining of more than enough relevant material already in published form.

# ***Chapter one: Background***

## **A description of park and ride**

Bus-based park and ride refers to the provision of a dedicated regular bus service running to and from a city centre and a number of car park sites in areas close to the edge of the area along radial routes. These sites are positioned so as to intercept motorists coming into the town from further afield rather than go all the way into town.

Car parks used for park and ride are often purpose-built, often in the green belt – an area of land surrounding a city centre in which planning permission for building development is granted under special circumstances only.

The car park area often involves the use of a special waiting building with various facilities; this may be staffed in order both to assist patrons and, in conjunction with CCTV, to provide reassurance for the safety of their vehicles.

The buses using park and ride are usually dedicated bus services, and thus not well integrated with conventional bus services. They are likely to be high-quality, more modern buses in order to attract car users from the comfort of their vehicles. Buses run throughout the day. Bus priority lanes are often provided, enabling them to avoid congestion.



*Bus priority measures also benefit other modes such as cycling, increasing safety and convenience (photograph from CambsCC 1999c)*

Park and ride is often used in conjunction with complementary traffic restraint measures or parking management in the town centre, or where severe congestion is present. Together with any bus priority measures, such restraint is often used in order to form a complete ‘carrot and stick’ approach to encouraging motorists to switch mode of transport for the town-area part of their journey by moving to park and ride.

## **National policy context**

Two principal issues in transport planning are ‘sustainability’ and by the notion of ‘integrated transport’. These are now introduced.

## **Sustainability**

The concept of sustainability gained widespread acceptance from the late 1980s, following decades of concern about the environment. The standard United Nations definition is that “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development, 1987, p. 43).

Recent UK government views on sustainability (DETR 1999b) agree that there are two fundamental aspects to it. The first is the environmental aspect, which is that environmental damage caused by development is acceptable up to the point where it might be detrimental to future generations to meet their needs. The second is the social aspect, namely that such development must be done in ways which produce socially-just outcomes.

These two themes are particularly relevant in the transport field. There are both environmental and social problems associated with excessive car use. The case for the former is well established; an example of the latter is that poorer members of society without the ability to pay for the use of a car are left with declining public<sup>1</sup> transport as car use increases, a trend demonstrable in most countries.

With such issues in mind, developments in UK transport policy over the last decade have been concerned to balance these against other requirements for transport such as its economic role.

## **Integrated transport**

The term ‘integrated transport’ refers to the ‘new realism’ in transport, a phrase coined at the start of the decade by Goodwin (1991), which seeks to ensure that transport policy and practice should be made more sustainable, both environmentally and socially.

In particular, it is a phrase which gained widespread acceptance in the UK through the publishing of the 1998 Integrated Transport White Paper (DETR 1998), the contents of which are now being passed into law. The White Paper forms the first overarching policy on transport for a generation. Although there has been much other transport policy in the last few decades, this has only been concerned with individual modes of transport (e.g. bus privatisation in

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<sup>1</sup> Throughout this study the term ‘private’ as used throughout this work refers to usage of transport (for example the availability of cars rather than ‘public’ transport), as opposed to ‘private’ vs. public in the sense of ownership, e.g. ‘public’ transport being owned by private firms.

1985-6) without consideration for other modes of transport or for wider policy such as that on the environment.

This change of direction or 'new realism', in rhetoric at least, developed after the publication of the national road traffic forecasts of 1989. These forecasts, which predicted huge increases in traffic with widespread consequences, led to the 'universal recognition amongst transport professionals that you can't provide at the rate of growth' (Goodwin, lecture on 26/1/99). The logic of this was thus simple – the amount of traffic per mile of new road increases, hence the problem gets worse. More traffic on main roads leads to more congestion, both there and in towns, and thus alternatives to the private car need to be developed, if the economy is not to suffer through the costs of congestion.

Another major factor leading to policy change has been pressure, both nationally and globally, for reductions in air pollution and climate change gases, much of which come from the transport sector.

Commentators such as Goodwin assert (ibid.) that the White Paper represents a real breakthrough in UK transport policy, particularly in its advocacy of new revenue streams such as congestion charging to raise money for transport improvements, and new institutional structures. This is supported by an interesting discourse coalition between the environmentalists such as the group Friends of the Earth, and the likes of Confederation of British Industry.

Principal themes in UK transport policy now emphasise the need for viable alternatives to the car in order to achieve modal shift<sup>2</sup> on a wide scale and for better land-use planning – to reduce the need to travel. These themes, put together, form the overarching principles of reducing pollution, congestion and social exclusion, without harming economic growth.

Park and ride is included in the White Paper as one element that can help achieve these aims.

## **Background to park and ride policy**

### **History**

Parkhurst (1995; 1996; 1999c) provides a history of bus-based park and ride in the UK. There have been two phases of interest. The first was in the 1970s, although some schemes started in the 1960s. The Oxford park and ride system, the town for which this mode of transport is arguably best known,

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<sup>2</sup> The term 'modal shift' refers to changes in patterns of use from one mode of transport to another e.g. from car to bicycle.

originated from this time and was the only full-time scheme to last through the 1980s.

The second phase of interest has been a resurgence in the latter half of the 1990s in park and ride provision. As of 1997, there are some 48 sites across 23 towns and cities (TAS Partnership 1997, p. 5). This resurgence of interest may partly explained by the fact that “the UK government has only recently provided funding for park and ride schemes” (Parkhurst 1996, p. 6).

## **The purpose of park and ride**

Parkhurst (1996, p. 2) notes that “a distinction has to be drawn between park and ride implemented on environmental grounds and on economic grounds”. There are two possible primary objectives of park and ride – an economic one where the desire is to ensure the continued viability of the city centre, and an environmental one, where the aim is to improve the environment of the city centre without increasing pollution outside it also.

Many schemes take elements of both. Such is particularly the case in historic centres such as Cambridge, whose intention is apparently to strengthen the economic performance of the city centre while attempting to achieve environmental benefits.

This economic/environment split is of crucial importance to analysis of the effectiveness of park and ride implementation. Only through comparison with the original objectives of a scheme can it be judged for effectiveness once implemented.

## **The park and ride debate, with a review of relevant literature**

Park and ride has only relatively recently become the subject of debate and detailed study in terms of policy analysis in a wider sense, looking at park and ride implementation nationally and its consequences.

Parkhurst (1999b, p. iii) discusses how a ‘park and ride debate’ concerned with the environmental credentials of park and ride started in 1994. This is likely to have been a result both of increasing concern for sustainability and of the substantial shifts in transport thinking from the end of the 1980s, as described above.

The majority of studies on park and ride prior to 1994 have been by Local Authorities in order to appraise their own schemes, in terms of use, cost, and so forth. While providing useful data, these are of limited use for the wider analysis of park and ride, as they tend not to look at schemes in the context of wider travel effects either locally or (even less so) in the national context.

Since 1994 a great deal of detailed research on general park and ride policy has been carried out, to the extent that, as one commentator has asserted, “over-study has been a problem in some places” (Parkhurst 1999b, p. 39). This refers to the large amount of data now available from various sources (in particular, WS Atkins 1998; TAS Partnership 1997; and various Local Authority studies, for instance CambsCC 1999a). Data from these studies covers a variety of areas of interest both in terms of site specifications and also, more importantly, data relating to users of park and ride. User data includes information on aspects such as user profiles, purpose of use, travel distance to park and ride sites, alternative modes of transport, effects on private mileage, trip generation, and so on.

The principal issue around which concern is centred in the debate is whether park and ride is responsible for an increase or decrease in car use. This was in the context of park and ride being implemented, as it often is today, under the guise of being a ‘green’ form of transport. The debate has also looked into the wider issues relating to park and ride policy, such as those to do with social equity and costs of provision.

Some commentators assert that the environmental credentials of park and ride are highly questionable. The principal commentator on park and ride practice in the UK is Graham Parkhurst of University College, London who has written a number of studies on the issue (Parkhurst 1995; 1996; 1998; 1999a; 1999b; 1999c; 2000), focussing on different topics. The only other commentator on park and ride of note is Phil Goodwin, who has tended to deal with transport issues more generally.

While however, ‘there is little dissent to the view that P&R is a positive economic measure’ (Parkhurst 2000, section 1), the debate over whether park and ride is environmentally or socially sustainable continues to this day. This issue will be discussed in chapter 2.

In 1998, the Council for the Protection of Rural England (CPRE), a national campaign group, issued a campaign briefing (CPRE 1998) on park and ride. Such a briefing was in response to the apparently insatiable desire from Local Authorities for new park and ride schemes, which were increasingly in green belt land and hence of concern to CPRE, and to the increasing opposition by local groups to the schemes. CPRE’s mood was decidedly one of caution, agreeing with dissenters of park and ride policy that “as a way of keeping vulnerable town centres alive, such schemes may have a role”, but that “if they are to deliver real environmental benefits, schemes will need to be matched by measures to reduce parking in town centres”. (ibid., p. 16) This policy element of parking removal, as will be discussed shortly, was not and, with very few exceptions, is even now not being implemented.

In an attempt arguably to silence its critics and thereby diffuse the issue, the Department of the Environment, Transport and the Regions (DETR) of the UK

Government commissioned a study (WSAtkins 1998) into 'The Travel Effects of Park and Ride' from consultants WSAtkins in 1998 "in response to concerns that P&R was leading to an increase in private car mileage not a reduction" (ibid., p. I-ix). However, the aim of the study, despite its broad-sounding title, was quite specific; namely, to "identify the elements of park and ride that contribute to reducing car use" and to "provide information on the extent to which park and ride schemes result in a net increase or decrease in private car mileage" (ibid., p. I-1-1).

The study surveyed users in eight towns to examine in detail their travel habits pertaining to their use of park and ride. Cambridge was one of these towns, and thus a considerable amount of data relating to this centre is now available.

WSAtkins' study found an average reduction in car mileage of around 2km per user for each direction to/from the site (WSAtkins 1998, p. I-8-7). However, critics such as Parkhurst and Goodwin (see, for instance, *Local Transport Today* 29/7/99, p. 8) were quick to seize upon biases in the interpretation of the data. Parkhurst found that three critical areas of analysis had been omitted, as will be discussed shortly. Hence far from diffusing the issue, the WSAtkins study added ammunition to the claims of critics of park and ride. Parkhurst was now able (1999b, p. i) to claim that "following the WSAtkins research, the conclusion 'park and ride results in an increase in traffic' is much more robust". The present study agrees with this analysis for reasons which will be discussed.

It is possible to see revisions of policy in the light of the debate. Recent government guidance (DETR 2000, p. 51) now instructs Local Authorities to consider more carefully the proposed schemes and suggests necessary safeguards.

A few other studies are of particular note. The first is that consultant the TAS partnership (1997) which serves as an overview of the schemes across the country and gives data pertaining to them but refrains from policy comment. The other main studies are those by the English Historic Towns Forum in 1993 which includes best practice on park and ride, and that for the Transport Research Laboratory (Pickett et al. 1996).

It is interesting to note why it has taken thirty years for the effects of park and ride to be properly appraised. Parkhurst asserts (1996, p. 6) that, with increasing constraints on funding, public bodies have needed to be increasingly vigilant in using such resources.

## **Transport themes relevant to discussions on park and ride**

Before discussing national park and ride policy, it is informative to look at certain key themes in order to assist understanding of the theoretical background.

## **Subsidy**

In the transport context, subsidy is where money is used to lower the price to the consumer of certain forms of transport, usually in order to increase use of these modes at the expense of others. The classical free-market economics approach to subsidy is that it causes market distortions and should thus be avoided. However, it is generally accepted that there is a legitimate need for subsidy in certain instances. As Goodwin describes (1987, p. 121), political authorities justify subsidy by considering a wide range of political, social and economic objectives. In the transport field this is most commonly subsidy applied to service buses (particularly rural buses) and to trains, in both cases to enable social transport with a minimum-access function (Parkhurst 1995, p. 20).

Subsidy for park and ride is present in two respects: the cost of purchasing the land and of developing the car park site and the cost of running the buses. These are usually nowhere near covered by user charges (CPRE 1998, p. 12). Both such types of subsidy are present in the Cambridge system, as will be discussed later. Such subsidy is generally paid for by city centre parking revenue from across the city.

One justification by Local Authorities for the use of large amounts of money from parking revenue to fund park and ride is that the law demands it. Minutes of the Cambridge Environment and Transport Area Joint committee for 24/1/00 (CambsCC 2000a, p. 5) explain to councillors that “the uses of any surplus funds are limited by law to investment for parking purposes”. However, this has recently been challenged. An article in *Local Transport Today* (“Oxfordshire’s right to spend parking revenue on public transport upheld”, 3/2/00) reports that “Oxfordshire County Council has retained its right to use surplus revenue from on-street parking charges for public transport improvements, after an objection [that it should be used firstly for parking] was quashed by the district inspector”. This ruling appears to suggest that future revenue from parking may be able to be used for other purposes, though in cases such as Cambridge, there is substantial reliance on this income to assist in paying for the park and ride sites and the running of the service, as will be demonstrated later. It should also be borne in mind that spending on alternatives such as cycling and buses rather than facilities for cars, could benefit motorists more, because the potential for modal shift, and hence freeing up of road space, is arguably greater.

Parkhurst (2000, section 7) shows that subsidy is almost always needed in order to enable the park and ride systems to function, although he cites Brighton as a rare case of running an attractive service without it.

Park and ride particularly suffers from inefficiency during the middle of the day. This is because although commuters may leave their vehicles there during the whole day, the buses must keep running. Park and ride is thus especially

susceptible to peaking (Parkhurst 1999c). This problem might become particularly acute in the event of a private non-residential parking charge being implemented in Cambridge, a strong possibility.

The same commentator states (Parkhurst 1999b, p. i) that the existence of subsidy is relevant “since subsidy is one of the underlying causes of unintended effects”. This is principally because it reduces the generalised cost of travel (ibid., p. vi), hence making a service more attractive and thus attracting extra trips. CPRE (1998, p. 8) echoes these concerns, citing that P&R represents a further subsidy to car owners, whom, the organisation claims, do not pay their full costs as it is. Such wider costs include costs associated with pollution, noise, climate change, health costs, death from traffic accidents, and so forth.

### **Abstraction**

Abstraction from public transport is the commonly-observed (for example, WSAtkins I-1-3) phenomenon that a significant minority of park and ride users formerly used ‘normal’ public transport before they switched their transport choice to park and ride. Such users are not ‘target users’ i.e. are not users for whom park and ride is intended, and represent increases in car use and hence mileage if they have driven to the park and ride site (as opposed to walking there).

Abstraction is additionally a concern because loss of passengers from vulnerable bus services, particularly those in rural areas, may result in a marginal service being withdrawn or made less frequent, to balance costs. This leads to concerns over social equity, as those who without cars are then left with public transport of even lower quality than previously.

### **Suppressed demand**

Suppressed demand relates to demand for travel (e.g. through car use) which is not fulfilled because there is not the physical space for cars to use it (i.e. there is ‘congested equilibrium’). This was a key factor in the abandonment of the early-1990s roads programme, when it was realised that there was often no point building new roads because this would release the suppressed demand, causing them simply to fill up with new traffic, resulting in the same amount of congestion.

This issue is of particular relevance to park and ride, because road space freed from users diverting to park and ride is thus likely to be used up by other vehicles, limiting park and ride’s potential for traffic reduction. This also applies to city



*Roads consistently clogged with traffic, such as this one on an orbital route in Cambridge, are a classic indicator of suppressed demand*

centre parking use. As Topp (1995, p. 35) states, “parking spaces attract cars, so they generate car traffic”.

The generally accepted solution is to replace the freed road space with bus priority and other measures. This also helps prevent buses getting stuck in the traffic, which would render them useless in attracting users. A principle is that non-users should not derive the benefits, which would otherwise reduce effectiveness of the scheme (Parkhurst 1999b, p. vii). The corollary of all this is that schemes whose purpose is to provide environmental benefits, must include removal of parking spaces in the city to prevent new car travel as part of the implementation package.

Bus priority measures and parking removal are additionally of benefit to cyclists, who are then better protected from traffic, and other groups such as pedestrians or local residents who will enjoy less traffic on nearby roads. Such forms of integration are now a key theme in UK transport policy.

### **Local Transport Plans**

Local Transport Plans are the new mechanism by which local authorities bid for money from central government in order to provide a range of transport improvements in a county-wide area over the duration of the plan, which is five years. Local Transport Plans replace the yearly Transport Policies and Programme submissions, widely acknowledged as leading to short-termist transport planning.

## ***Chapter two: National policy on park and ride***

### **Official policy on park and ride**

Government guidance favours park and ride schemes in the context of a package of measures. This is highlighted in the government's Integrated Transport White Paper (DETR 1998, p. 43) which states it is "encouraging park and ride facilities to help beat congestion". Nowhere in the document is park and ride specifically quoted as being 'environmentally-friendly', although statements such as the above infer this sentiment due to the context in which they are placed.

Recent guidance to local authorities from the UK Government on full Local Transport Plans (DETR 2000, p. 51) states that 'park and ride in appropriate circumstances can help promote sustainable travel patterns'. Notably, again, this does not say that park and ride is an environmentally-beneficial policy, only that it can help *promote* sustainability.

The most important official guidance to Local Authorities on planning policy comes in the form of Planning Policy Guidance Notes, or PPGs; in the case of transport this is provisional PPG 13 (DETR 1999a). The emphasis here is similar to that of the White Paper, promoting park and ride's role in terms of accessibility to city centres – its economic rather than environmental justification alluded to earlier.

However, it is here that the government makes clear its intentions as regards the intersection of policy on park and ride and on parking: "schemes should not be designed to increase the total parking stock available in a town" (DETR 1999a, p. 18). Furthermore, the same document states (*ibid.*) that 'park and ride schemes are inappropriate development in green belts'. Both of these policies are of direct interest in comparison to the Cambridge park and ride system, as will be discussed in chapter 3.

### **Discussion and critiques of national park and ride policy**

There are thus essentially two differing, but not necessarily mutually exclusive, broad policy objectives to park and ride: economic and environmental.

## **‘Environmental’ park and ride**

Let us first consider the role of park and ride implemented under the guise of an environmental role. As noted earlier, this is the public’s perceived role of park and ride (CPRE 1998, p. 3), and on the face of it, park and ride clearly would indicate the possibility of traffic reductions: cars of visitors to a city centre use the park and ride site instead of going all the way to the town centre, hence a reduction in mileage.

In purely environmental terms, the cost-benefits of park and ride are based around a balance of two issues: whether there is a net reduction in vehicle mileage and, if so, whether the level of reduction is worthwhile compared to the loss of green belt. The question of whether other ways of achieving this reduction using the same financial resources also need to be considered.

### **Reasons for an increase in traffic**

The research by WSAtkins (1998), which uses information collected from users of eight park and ride systems, claims as its ‘headline’ figure a mean car-use reduction of 2.09km (ibid., p. I-8-7) due to park and ride provision. The average distance travelled by these users had they not used park and ride is 11.76km (ibid., p. I-8-6). In the same chart, for Cambridge specifically, a reduction of 0.75km on an average trip distance of 9.61km is given.

Crucially, however, this is based only upon the 47% (ibid. p. I-8-6) who would have driven to the city centre. While in itself this reduction is environmentally beneficial, it is almost certain to be outweighed by other considerations. Parkhurst exposes a number of crucial weaknesses in WSAtkins’ conclusion that park and ride results in traffic reduction.

First among these is that WSAtkins ignores the mileage from the buses used for park and ride. This is significant because buses have an environmental impact several times that of cars. Ascribing a figure of 2.5 to this, Parkhurst (1999b, p. 13) shows (ibid.w, p. i) that this reduces the WSAtkins headline figure from 2.09km reduction to 0.8km on average, and, in the case of three of the schemes studied, including the Cambridge one, creates a negative figure, i.e. an increase in the environmental effects of traffic.

The second weakness exposed by Parkhurst is that, given that an average of 47% of P&R users are ‘target’ users, in other words, those who would otherwise have driven to the city centre, the remainder – more than half – are users who were not intended for the service. This 53% would therefore otherwise have either used service buses (i.e. abstraction), used modes such as cycling or walking which are more sustainable, or not have made the trip at all.

In the latter case, park and ride has, by virtue of its quality, attracted new trips to the city centre. Possibly this may account for a third of all users (Picket et al. 1996). Although a positive economic benefit, and therefore to some degree an indication of success when measured as an 'economic' scheme, this is a clear net environmental loss due to the extra vehicle mileage.

Parkhurst asserts (1999b, p. i) that these new trips outweigh any small traffic reductions, thus resulting in overall mileage increase. Both of this and the construction of car parks in sensitive green belt areas are net environmental disbenefits.

Another reason for increased traffic is that resulting from suppressed demand for car parking in the city centre. This is a more simple way to provide an indication of whether traffic has decreased, yet little discussed in any great depth by any of the commentators. The presence of suppressed demand in city centres is likely, because it is an indication of high demand; there would otherwise be no need for the park and ride provision, as cars driving inwards need to park somewhere. Common sense dictates that an area known by motorists not to contain sufficient parking will result in their avoidance of that area while searching.

Hence unless parking spaces are removed from the city centre at the rate that new park and ride spaces are put in, traffic is almost certain to increase.

### **'Side effects' of park and ride provision**

Factored into the WSAtkins analysis is one particular side effect of park and ride, namely, where users from inside the city boundary have driven to the park and ride site. In some cases – some 10-15% according to Parkhurst (1998, section 4a response) - these users may have driven a longer distance than if they had gone directly into the city centre. This may be construed as an attempt by motorists to avoid the stress of driving in city centres.

Parkhurst (1999b, p. vi) suggests that the principal reason for the side effects is the existence of subsidy, because subsidy reduces the “generalised cost of travel” for this mode of transport. This creates an uneven playing field against other modes. It is thus unsurprising that abstraction effects occur because it pulls users away from a bus service of lower quality that is less subsidised or not subsidised at all. By law, except in certain circumstances, where a conventional service bus is subsidised this must be for a social minimum requirement, rather than an attempt actively to 'promote' them in competition with other modes. Park and ride suffers from no such requirement.

Parkhurst (1999a, section on “lessons for planning integrated local transport”) suggests that that there is a need to change user-charge, taxation and subsidy levers to address these cost relationships so as to reward travellers prepared to switch to energy and space-efficient modes early in their journeys. The other

policy proposal made by Parkhurst (ibid., final section) and others (see, for instance, CPRE 1998, p. 14 or Goodwin in *Local Transport Today* 29/7/99, p. 8) is that park and ride should be combined more effectively with conventional bus services. This would mitigate creation of car dependency and would provide a genuine alternative to the car.

### **‘Economic’ park and ride**

This role is less explicitly stated as the reason for new park and ride schemes or capacity. That park and ride schemes generally appear to be implemented according to this role has been shown by an analysis of schemes across the country (Parkhurst 1999b). Whatever the intention, for these reasons, poor environmental credentials reduce their legitimacy claims of environmental or ‘hybrid’ park and ride to economic park and ride.

As mentioned previously, economic park and ride is almost universally judged to be successful in terms of use. This can be determined by the level of patronage and the maintenance of city centre parking patronage levels. Such schemes enable city centres which suffer from congestion to attract a greater number of visitors in to the centre.

### **Social sustainability for either type of P&R**

The issue of social sustainability is pertinent in both cases because transport policy, like any other type of public policy, needs to be aware of social issues. Data from WSAtkins (1998, p. I-7-7) suggests that there is some evidence that abstraction from bus services may endanger socially-necessary public service buses, although this is not quantified. Additionally, park and ride may result in increasing car dependence because other non-car modes of transport receive proportionally less funding due to the costs of providing park and ride. This issue will be discussed later as part of analysis of the Cambridge park and ride system.

### **Possible positive attributes common to either type of P&R**

It is possible that P&R can lead to more positive attitudes by car drivers towards public transport, thus possibly increasing levels of public transport among car users (Parkhurst 1995, p. 17). However, any possible benefits are likely to be negated by the increased car mileage (as discussed above) caused by park and ride.

Secondly, a number of studies note (e.g. CPRE 1998, p.9) that the presence of a park and ride system can act as an enabler for wider transport schemes. This appears to be reflected in national guidance which suggests that park and ride is not a panacea in itself but needs to form part of a more balanced package (DETR, p. 18). An example of this is a park and ride scheme being proposed for

Salisbury (Local Transport Today 27/4/00 p. 3) as part of package of measures to replace the now-cancelled proposal for a Salisbury bypass. Here, park and ride is helping prevent an arguably more damaging proposal being enacted.

Assuming measures are taken to mitigate the possibility of suppressed demand (such measures are necessary for the operational effectiveness of schemes), park and ride may lead to decreases in pollution in the city centre. Less congestion will result in less stationary traffic (a particular cause of pollution). Although park and ride will often mean an increase in car use 'outside' the sites, which is not environmentally beneficial overall, dispersal is arguably a legitimate strategy for reducing the health impacts of traffic.

## **Summary of park and ride policy background**

We have seen how there are two 'types' of park and ride: environmental and economic. The former is intended to achieve overall traffic reduction, whereas the latter aims specifically to improve the accessibility and viability of the city, which may or may not mean traffic reductions, either inside the city centre or in total. Although environmental park and ride is most likely to be the perceived reason for schemes, implementation and usage data show that the economic role is more likely to be achieved in practice (Parkhurst 1996, p. 2).

Park and ride can achieve sustainability when it reduces traffic levels in total, not just in the city centre. This is unlikely to happen unless restrictions in parking capacity in the urban centre are made, in order to prevent an overall increase in parking availability.

Park and ride needs to be set in the context of an overarching transport policy, which may include complementary measures to reduce traffic in the city centre. Additionally, for park and ride to be well used, user charges need to be set as part of a general parking policy that considers these in tandem with city centre parking.

Unintended effects such as abstraction from public service buses can be minimised by considering both appropriate levels of subsidy (by creating a hierarchy of costs, favouring service buses over park and ride), and by the careful positioning of sites a sufficient distance from the city centre so as to dissuade trips originating from inside the city. Better integration with conventional bus services can also reduce the side effect of non-target use. Side effects need to be considered as part of the overall sustainability of the system in cases where the environmental role is that intended.

# ***Chapter three: The Cambridge park and ride system***

## **Background to Cambridge**

### **Cambridge's transport pressures**

Cambridgeshire, and especially Cambridge City, is an area of both immense housing and economic growth (discussed in, for example, Martin Centre 1999). This is due in particular to the presence of high-tech industry in the area and of Cambridge University, for both of which the area is internationally renowned.



*The Core Scheme aims to keep through-traffic out of the centre using a defined inner ring*

Like many other historic centres such as Oxford and York, the City Centre suffers from a centre with a medieval street pattern, incompatible with large numbers of cars wishing to use it.

These pressures of high growth and inadequate infrastructure produce a situation where severe congestion often results, creating challenges to the implementation of sustainable transport policies.

The city has for some time been the

subject of a number of policies to restrict cars from the central core area. These include pedestrianisation of the city centre in the 1980s, cycle-friendlier infrastructure to increase the 'cycling culture' already present, and more recent developments such as the Core Scheme to reduce through traffic in the city centre, and park and ride.

Cambridgeshire County Council considers itself at the vanguard of sustainable transport policy implementation, in particular through park and ride provision, for which it states "Park and ride is at the forefront of sustainable transport development in the



*The Core Scheme uses sets of rising bollards to restrict car use in the city centre and to give priority to buses*



Cambridge area” (CambsCC 1999b, p. 136). Such a view is not universally shared by transport and environmental campaign groups in the area, such as the Cambridge Cycling Campaign, although certain elements such as the Core Scheme are generally recognised as being more forward-looking than other Local Authority areas.

One reason for the high level of commuting into the area is the imbalance of employment to housing in the city, with around twice as many jobs as residents, according to data in the Local Transport Plan (CambsCC 1999b, fig. 4.4) and elsewhere. This creates particular pressures on roads such as the nearby A14 which are unsuitable for large volumes of traffic. The rationale for such housing growth in surrounding market towns was to maintain the attractiveness of Cambridge but the paradox is that the necessary inward commuting caused by this is instead causing detrimental effects.

## **Cambridge park and ride**

### **A note regarding data collection**

No attempt was made for the present study to obtain primary data first-hand from users of the Cambridge park and ride system simply because a more than sufficient amount of it already exists (for example, WSAtkins 1998; and TAS Partnership 1997).

### **Early history**

As early as 1983, solid proposals for a Cambridge park and ride were made. The report by the consultant Colin Buchanan and Partners in that year took as its lead the then Ministry of Transport study ‘Traffic in towns’ of 1963. The 1983 study advocates a park and ride system for Cambridge which bears remarkable resemblance to that being implemented over a decade later, the principal difference being a proposed reduction of around 1,500 city centre parking spaces, a policy not carried out.

Parking space removal is of special significance to the analysis of the Cambridge scheme, for reasons to be discussed shortly.

### **Description of the present Cambridge park and ride system**

There are four park and ride sites, with these located on the main radial roads entering the city from the North, South, East and West of the city centre, thus covering most directions of entry. Each is several miles out from the city centre.

The first park and ride sites to be provided in Cambridge were Clifton Road (essentially a car park which had a bus service that stopped at that location, but which has now closed), and Cowley Road, which will shortly be upgraded.

The three main Cambridge park and ride sites are all high-quality purpose-built sites which have all opened in the last five



*The Cowley Road site, effectively a car park on a bus route, is often referred to as the 'poor relation'*



*Like all three of the newer sites, the Babraham Road site is extensively landscaped with good facilities*

that waiting areas are highly regarded and that buses are of high quality and reliable.

The four sites currently operation contain a total of some 2540 car parking spaces (WS Atkins 2000, p. 1), with expansion ongoing, both in terms of number and size of locations. Data on the cost and extensiveness of the sites is given in

years, and are served with dedicated bus services. A further site of similarly high quality, to be built at Trumpington, a village to the south of Cambridge is currently planned, and is likely to get planning permission. It will be paid for substantially via developer contributions.

Informal discussions with patrons of the service, and first-hand experience of the service suggest



*Secure cycle parking – both stands and architect-designed lockers – is provided at the newer sites*

summary as appendix 1.

Buses leave from the sites at 10-12 minute intervals, travelling either north-south or east-west, stopping at the city centre and then travelling on to its 'complementary' site at the opposite end of the city. Services run from around 7am until 8.30pm, Monday to Saturday. Bus priority measures are used.

Although the bus services are dedicated to the park and ride sites, there are a total of eleven bus stops in total along the routes, so non-car users are able to use the services to a small



*The service is arranged as two routes, N/S and E/W, stopping in the city centre and on the way (diagram from user leaflet)*

extent.

Parking is free and so payment for the use of the service is by bus ticket purchase.

The service is very customer-orientated, and surveys (such as CambsCC 1999a) have been done to help indicate possible improvements to the service.

## **Usage of Cambridge park and ride in the context of other transport modes**

Appendix 2 shows gives data on the use of different modes of transport in Cambridge, taken from data produced by Cambridgeshire County Council, for both 1998 (CambsCC 1999e) and 1999 (CambsCC 2000b).

Latest usage data (CambsCC 2000b, p. 18) show that there were 810,000 circular trips on the system per year. This equates to a daily average of around 2,600 users entering and leaving Cambridge, based on a 6-day operating week. Usage of park and ride in comparison to other transport modes is a few percentage points at most. A figure of 2.3% vehicles travelling on the radials using park and ride is also given in the Council's data (ibid., p. 20).

It is pertinent to note that Cambridge park and ride is often conceptually linked with the Core Scheme (which reduces car access to parts of the city centre) as a package. However, it must be pointed out that the purposes of the scheme are different. In the case of the latter, this is to reduce traffic passing through the city centre. The purpose of park and ride, however, is to enable access to the city centre, a different objective.

## **Purpose**

The Cambridgeshire Local Transport Plan, contains mixed messages about the purpose of the Cambridge park and ride system, for instance:

“Park and ride is at the forefront of sustainable transport development in the Cambridge area” (CambsCC 1999b, p. 136)

and

“Combined with policies that discourage car use, park and ride is expected to contribute significantly to the economic and environmental well-being of the City and its surrounding area” (ibid., p. 137).

The first of the statements implies that park and ride is sustainable. For reasons to be discussed in the next section, the present study disagrees. The second suggests that park and ride in Cambridge is provided for both environmental and economic reasons. Economically, the increasing demand in

the city centre economy and the housing growth in the surrounding area of Cambridge means that travel into the city is likely to continue to expand, while the environmental role refers to the wish to keep cars out of the city centre. These two roles will now be evaluated.

## **Cambridge park and ride as environmental park and ride**

There is a certain amount of evidence suggesting that Cambridge park and ride is not leading to overall traffic reduction. Two sets of data are sufficient to demonstrate this.

### **Traffic growth**

According to the 1999 Traffic Monitoring Report (CambsCC 2000, p. 16) “the volume of traffic entering Cambridge along its radial routes has been fairly constant over the past five years”. Park and ride may have assisted in this, but widespread congested equilibrium may be more relevant.

The Local Transport Plan (CambsCC 1999b, p. 303) states that there was 2% less traffic entering the city in 1999 than in 1997. However, this does not mean that there was 2% less traffic within the city, as there may have been suppressed demand by vehicles originating from in the city released by this radial decrease. For instance, the Local Transport Plan itself states (*ibid.*, p. 328) that ‘the ability of the city to take more traffic is very limited’, indicating the presence of suppressed demand.

On the other hand, Parkhurst's analysis (Parkhurst 1999b, p. v) of the WSAtkins data specific to Cambridge gives an increase of traffic as a result of park and ride, even before the effects of abstraction are taken into account. This is not compatible with the statement that the Cambridge park and ride system is “environmentally-friendly” (CambsCC 1999b, p. 209).

### **Parking demand**

It is additionally informative to study parking demand in the city centre, since traffic growth figures are not totally conclusive.

Appendix 3 shows the total public parking provision for the city centre and appendix 4 shows the revenue contributions from on-street parking.

As regards parking, the Local Transport Plan (CambsCC 1999b, p. 303) also states that “decrease in use of city centre car parks is more than offset by increased use of park and ride”. In other words, park and ride is effective in capturing vehicles entering the city but is assisting in a growth in traffic *overall*, since parking use has increased. It is impossible to say for certain what level of parking use there is because the data is sketchy. However, what is certain is that there have been increases in the amount of provision, solely due to new

park and ride sites, as shown in appendix 3. Anecdotal evidence suggests no detectable decrease in use of city centre parking while increases in park and ride space supply are made, i.e. parking use has increased. This is also backed up by theoretical work discussed earlier on suppressed demand in the context of congestion.



*Even at sites of international heritage importance, such as here outside King's College, parking spaces are not being removed by the City Council*

Additionally, the Cambridgeshire Local Transport Plan itself admits this issue elsewhere, in the context of parking in market towns (CambsCC 1999b, p. 208).

The balance of probability suggests that the level of use of parking has not decreased and that this would also suggest, inconclusively at present, that levels of car use have been maintained. The fact that parking is not being removed suggests that the demand for parking space is still present.

The lack of publicly-available data available from Cambridgeshire County Council on parking use shows that it is not possible accurately to judge whether park and ride is leading to traffic reduction on the basis of this data. However, for reasons suggested above, both theoretical and in practical terms, it does not appear that traffic reduction is taking place in line with park and ride provision.

At the very least, there is a lack of sufficient evidence to justify the high costs of the provision of the scheme, which is necessary if park and ride is claimed to be sustainable, as the County Council infers. This lack of data is a shortcoming of policy.

The fact remains, also, that the size of the sites in comparison to the number of parking spaces in the city (see appendix 3), particularly those of a private, non-residential nature, means that any potential for large interceptions of traffic is limited. Such scale must be compared to the resource implications of park and ride provision on Cambridgeshire's transport budget.

Additionally, the data on Cambridge presented in WSAtkins (1998) in the form of analysis by Parkhurst (1999b) adds weight to claims that Cambridge's park and ride system results in net environmental costs.

### **Cambridge park and ride as economic park and ride**

This is much more plausible. This is most simply demonstrated by lack of city centre parking reduction, which indicated both in data (CambsCC 1999b, p.307) and in discussions with council officers. As discussed earlier, this factor is relevant because suppressed demand for parking is likely to be present.

In a discussion with the Director of Environment and Transport for Cambridgeshire County Council (on 28/9/99), park and ride was described as a way to 'manage' growth. The system is primarily economic park and ride because it is accepting the desirability of growth in car use towards the city centre.

## Which role or both?

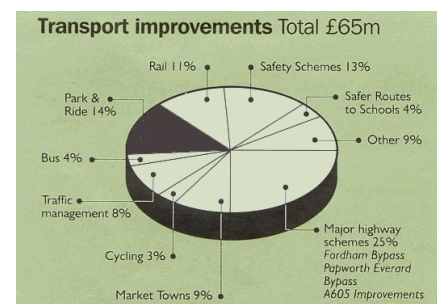
In reality, the *intended* role of Cambridge's park and ride system will be somewhere between the two, judging from statements such as those mentioned above from Cambridgeshire County Council. In practice, Cambridge park and ride has limited, if any, genuine environmental benefits, and must therefore be viewed primarily as an economic park and ride system, which is, nonetheless, a valid application.

## The subsidy issue

As discussed earlier, the issue of subsidy in park and ride is a principal reason for unintended effects. While traffic generation is not necessarily an undesirable effect of the scheme given its ambiguous purpose, it is instructive to investigate the use of public funds of the system. This is worthwhile because this it may highlight an opportunity cost at the expense of alternative schemes whose benefits, particularly to the environment and possibly also the Cambridge economy, might be greater.

The opportunity was therefore taken to discover the amount of subsidy being applied to the park and ride system for its predominantly car-using patrons.

The cost of park and ride provision is described in appendix 5. Excluding the 'future sites' shown in the table, some 4740 spaces will be provided by the park and ride system by 2003/4 at a total cost of £14.01m. This equates to a cost of £2,955 per space. The cost may in actuality be higher because of the possibility that city centre parking revenue (details in appendix 4) is not included in the site provision figures. Such a figure also does not include the cost of running the bus service, only some of the revenue for which is covered by user payments.



*The cost of providing the park and ride sites takes up a large proportion of the transport budget for Cambridgeshire (red highlight added to diagram) (diagram from CambsCC 1999d)*

Appendix 6 describes the method used to calculate the level of subsidy. The calculation results in a subsidy to the passenger of £1.06 per return journey made. The existence of such subsidy is rarely, if ever, openly quoted in materials issued by Cambridgeshire County Council.

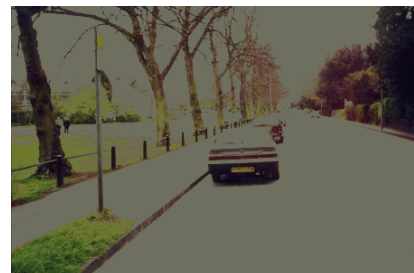
It must be borne in mind that this subsidy may need to rise steeply in forthcoming years because the cost of new sites and site expansions. Evidence for this is that the predictions for usage levels (CambsCC 1998b, figure 7.1) indicate that the rate of new provision will be faster than the rise in uptake of the service. What economy of scale may be present in future years is already likely to exist, so the scope for efficiency savings is perhaps limited, except for the extension of existing sites to take more car parking spaces.

Part of park and ride policy is that city centre parking costs should help subsidise the park and ride system. However, this creates a paradox. Part of the intention of park and ride is to reduce usage of parking in the city centre by having higher costs than the park and ride sites. As park and ride use and hence subsidy requirement increases, higher revenue from parking will be required. Resultingly, to fund this, either more city centre parking usage will be needed (thus reducing the effectiveness of park and ride and running counter to the general policy aim), or money raised from the parking will need to increase (hence discouraging it further and increasing probable modal shift to park and ride without providing the necessary subsidy).

This indicative analysis leads to the question of where the increased required park and ride subsidy will in the future come from. Possible options are that:

- A greater proportion of the parking revenue will be used than hitherto. This would be at the expense of other schemes funded by it, such as traffic policing, which benefit other more sustainable modes such as cycling and buses. This may result in less use of these modes, hence decreasing sustainability;
- Subsidy could come from other transport funds, again having a detrimental effect on sustainability for the same reasons;
- The costs of using park and ride to the user would need to increase faster than the rate that parking charges increase. However, this once again is contradictory to policy promoting use of park and ride, as increased prices will deter customers.

However, what is most apparent is the fact that because park and ride is so dependent on parking revenue, there is little scope for reducing the amount of parking present. This in itself severely limits the possibility of sustainability of the system. The parking data given in appendix 4 shows that around three-quarters of surplus parking revenue goes towards the running costs or capital costs of park and ride. Such reliance on parking revenue perhaps explains why



*Removal of parking spaces could free up space for alternatives, such as high-quality, safe cycle routes*

there is apparent reluctance to reduce city centre parking levels. Furthermore, opportunities to reduce on-street parking to the benefit of cyclists and other road users are lost.

The subsidy issue presented here shows that the economics of the system are unsustainable and that the resulting effects on parking are environmentally unsustainable. This issue is a key weakness in the Cambridge park and ride system. On the one hand, parking in the city centre is being discouraged by park and ride provision, while on the other, it is necessary for the existence of the system.

The present study takes the view that, given the dispersed nature of data on parking, especially in relation to its linkage with park and ride policies or otherwise, this indicates the lack of an properly integrated approach to parking demand policy. Such a view is reinforced by the statement on a covering letter (dated 20/4/2000) in reply from the County Council to a request for data on parking that “I have been trying to gather information on parking restraint, with only minor success”.

It is worth recalling at this point the governments guidance that “schemes should not be designed to increase the total parking stock available in a town” (DETR 1999a, p. 18), as discussed at the start of chapter 2. Such a policy is not being put into practice in Cambridge.

The only apparent parking demand policy present is the linkage between the relative costs of types of parking, such that “the cost of parking for more than two hours off-street should be greater than the cost of two adults using park and ride” (CambsCC 1999b, p. 211). However, there is still nothing to *prevent* usage being made of the spaces; the likely result is that merely more revenue is raised while traffic increases. Additionally, ‘conversion’ of longer-term parking to short-term parking will enable a greater number of journeys in total, as it increases the ‘overall parking opportunity’ (Parkhurst 1996, p. 12), a theme also echoed in Topp (1995, p. 35).

## **Suitability for Cambridge**

Cambridge, as an area of high housing and population growth is a popular urban centre. This demand shows no sign of relenting. It is therefore essential to analyse the Cambridge park and ride system in this context.

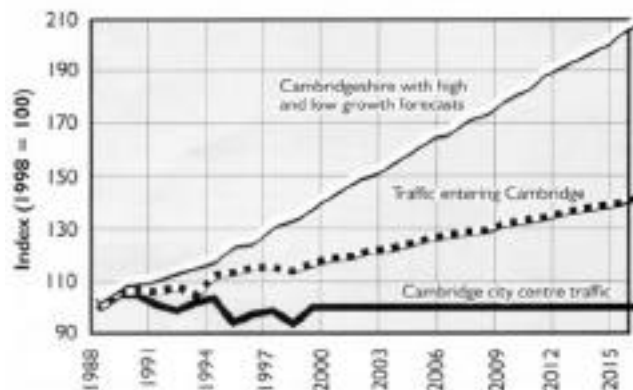
The purpose of the Cambridge park and ride as discussed above appears to be along the lines of catering for growth. However, the principal area of employment growth, through employment and hence travel demand, in the city over the coming decades is likely to be away from the centre, at the science park to the north and a new development by Cambridge University taking place to the west of Cambridge. Such developments are not centrally located and are manifestly unable to be served by park and ride as it is currently conceived.

Such journeys are presently given limited attention in local transport strategies. Access by sustainable modes such as the bicycle will be important here, and funding for this will be required.

As regards travel for shopping, a new shopping centre for Cambridge City centre, the 'Grand Arcade', has recently received planning permission. The scheme was in

competition with a proposed edge-of-town development on the northern fringe of Cambridge, a location hard to serve adequately by non-car modes.

Traffic Growth 1988 to 1998 and forecast to 2016



*Cambridgeshire County Council's traffic growth predictions (CambsCC 1999d) expect increasingly high levels of traffic growth (and which are beyond the rate of housing growth) and makes little attempt genuinely to tackle this problem (diagram from CambsCC 1999d)*

The increase in retail floor space due to the Grand Arcade will naturally lead to an increase in the number of trips to the city centre, and hence parking demand is likely to increase. However, the local parking policy, contained in the Local Plan states that "The City Council will oppose further car parks in the central area of the city preferring instead to provide further park and ride sites around the City edge" (Cambridge City Council 1996, section TR25). For the Grand Arcade, this refers to the proposed new park and ride at Trumpington, which is being funded by the developers to a substantial degree.

Without this extra parking the Grand Arcade scheme would be financially at risk. It is hence possible to assert that park and ride is preventing a less sustainable development elsewhere, because the northern fringe development is likely to have re-emerged had plans for the Grand Arcade been dropped.

However, the planning applications for the Trumpington park and ride site and for the Grand Arcade highlight an anomaly. While the former states that "it is not the intention to create additional travel into Cambridge" (WS Atkins 2000, p. 2 in the Environmental Statement section), the latter states "The Grand Arcade will generate in the order of 350,000 additional vehicle entries per annum to the park and ride sites ... 1000 park and ride spaces will be required to accommodate demand" (WS Atkins 1999, p. 129 in the Environmental Statement section). Hence the use for which park and ride is being made is confused, though given the fact that it is mostly being paid for by the Grand Arcade developers who will therefore dominate the agenda to some extent, the latter suggests that the scheme is intended as an economic one.

## Opportunity cost

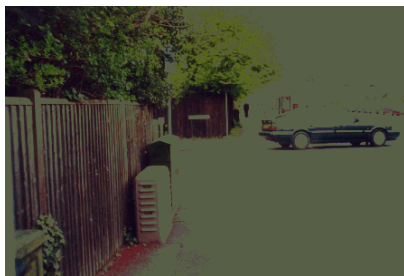
The present paper has established the likelihood that the Cambridge park and ride system is generating a net environmental disbenefit. However, an equally important aspect to analysis of the system is the opportunity cost which it consumes at the expense of other possible schemes. There are other possible transport investments that could potentially achieve modal shift, and these are discussed here. These are especially possible in the event of workplace parking charging, which could raise large sums of money for alternative transport projects.

It should be borne in mind, however, that not all such schemes suggested here might potentially gain political backing. Cambridge park and ride, in comparison, does have cross-party and cross-council support.

## Cycling

There is much opportunity to increase cycling by investing in safe and convenient routes, however this is happening only to a limited extent at present, due to constraints in terms of lack of funding and political will.

The Cambridge Campaign, a local transport campaign group, is proposing a number of cycling schemes, the most important of which



*Dedicated cycle provision, where it exists, often suffers from poor design (e.g. blind corners) and lack of priority, both demonstrated here*



*Cycle parking in the city centre is very highly in demand and is urgently in need of investment*

would be a 'supercycleway' running north to south across length of the city. They assert (Cambridge Cycling Campaign, Newsletter 18) that this would lead to a large modal shift to the bicycle, a sustainable mode, because there would be time savings for destinations compared to car journeys to/from destinations along the route, of which there are many. Such ideas are backed up by theoretical work on junction capacity (see, for instance, Mogridge 1990). The route would cost around the cost of a single park and ride site, and could be paid

for substantially by developer contributions resulting from the large amount of development presently taking place along the proposed line of the route.

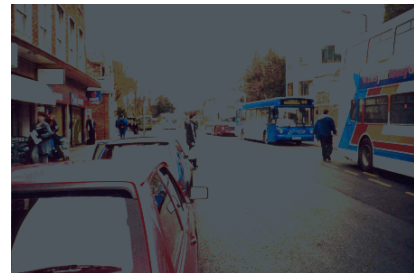
The campaign is one of a number of local transport pressure groups concerned about the extent to which transport policy and finance in the area is being dominated by park and ride provision. Others include Cambridge Friends of the

Earth and the local branch of Transport 2000, a national transport campaigning organisation.

The lack of emphasis on cycling as a means of traffic reduction may partially also be explained by the omission of this mode of transport from the traffic modelling software used by the council, SATURN (indicated in a talk by Assistant Director (Planning) of Cambridgeshire County Council, February 1999). This might also explain any possible over-emphasis on the ability of park and ride to result in traffic reductions.

### **Bus use**

Because bus provision is expensive and subject to the whim of the private operator, there is a limited amount that could be done to increase bus use. However, selective investment in rural routes has proven effective in increasing use, such as that from Haverhill to Cambridge, one of the 'Cambridgeshire Key Routes'. There is also potential for bus lane provision in various city locations.



*A variety of buses services serve the city centre – those pictured here include park and ride, the key routes, the rail link, and local buses*

### **Safety schemes and traffic calming**

There is anecdotal evidence to suggest demand from local residents for traffic calming in order to provide safer streets, thus boosting levels of walking and cycling. Initiatives such as 'safer routes to schools' and 20mph zones could be installed, but again, funding is limited.

### **Rail**

There have been proposals for several years for two new railway stations on the outer edges of Cambridge. These schemes form part of the Local Transport Plan but are likely only to be funded if some sort of congestion charging system comes into operation. Until then, park and ride will take priority over that funding. Such schemes could achieve genuine modal shift and be highly politically popular.

There is some talk of new tram systems to help ease congested routes in and around Cambridge, for instance the A14 north of the city between Cambridge and Huntingdon. This would require serious levels of investment.

### **City centre car use**

In the city centre, the core traffic scheme, which aims to remove unnecessary traffic in the city centre is generally accepted as the way forward for the area.

This requires investment in physical changes. There is further potential for expansion of this scheme, which has a variety of benefits.

### **Alternative travel into Cambridge from outside the city**

Discussions with, and questions put to transport officers from the County Council highlighted the belief that there is little possibility of achieving traffic reduction.

Park and ride seems claimed to be the only way to attempt to tackle this, and the analysis presented above suggests that the scope for this is limited. Furthermore, because park and ride caters primarily for the car driver (hence arguably increasing car dependency), the extent to which the root cause of this problem can be tackled is limited (CPRE 1998, p. 9). Sustainable solutions lie in more radical solutions such those mentioned above, though these will require funding. Park and ride is currently one of the barriers to this funding.

A final point to consider as regards the sustainability of the Cambridge park and ride system is the use of green belt land. It may be recalled that government guidance states that 'park and ride schemes are inappropriate development in green belts' (DETR 1999a, p. 18). Like the issue of removal of parking, the Cambridge scheme is hence not fully conforming to national planning policy. Similarly, Cambridge's Structure Plan, the master plan for the Cambridge area, states that "there should be no net overall loss to the environment. It is important to be able to demonstrate in those areas where 'trade' of environmental assets takes place, that overall there is a net benefit" (quoted in WSAtkins 2000, p. 19 in the Environmental Statement section). This case has yet to be convincingly made.



*Thin streets, once choked by traffic, are now freed by the Core Scheme for the use of cyclists and buses*

## **Conclusions on Cambridge park and ride**

Data suggests that the Cambridge park and ride system is environmentally unsustainable, and is economically unsustainable to run. In these respects, it is a questionable use of public money. It is however of benefit to the Cambridge City centre's economy, which is a valid application, albeit likely to be at cost to the environment as it is currently run.

The available data, particularly on parking, shows that Cambridge park and ride is merely displacing and increasing rather than reducing car traffic, and might also be causing some abstraction from bus services (which is socially inequitable), and is doing so at cost to the taxpayer.

The environmental sustainability aspect is further compounded by the opportunity cost it consumes, at the expense of other modes. These factors inherently build in car dependency, as development of non-car modes is limited by it.

The system is, however, a suitable response to the wish to increasing the viability of the city centre, although safeguards are needed in the form of other policies to reduce congestion there, which are not yet fully developed. It is argued however, that other solutions could do the same but with less environmentally detrimental effects. Such solutions could potentially be as politically acceptable as park and ride.

Park and ride has a place in solutions to Cambridge's transport problems but is no panacea and is currently over-represented in terms of spending. For a large proportion of the transport budget, it provides for only a small percentage of trips into Cambridge, and its potential for expansion here is limited.

Modifications to the scheme could partially or wholly mitigate the environmental effects, possibly without affecting the economic benefits the system brings. These are along the lines of those suggested by commentators on national policy, namely better integration with conventional bus services, adjustments to user fees in order to reduce subsidy, removals of city centre parking, and less concentration on park and ride at the expense of other modes.

# Appendices

## Appendix 1: Summary of cost and extensiveness of park and ride

Location in relation to Cambridge city centre	Site name	Present capacity	Intended full capacity	Year of opening	Total cost of site when at full proposed capacity	Cost of bus priority measures
North	Clifton Road	0 (210 before closure)	-	Pre-1978, closed 1999	Negligible	-
East	Newmarket Road	540	1000	1997	£2.97m	£0.65m
South	Cowley Road	550	550	1989	Negligible, plus £0.15m for upgrade	£1.14m
South	Babraham Road	200	700	1999	£2.96m	None used
West	Madingley Road	450	1000	1996	£1.41m	None used
South West	Trumpington Road	0	1500	2001	£4.88m	None used
Outer P&R sites	Outer ring of park and ride sites, possibly in villages	0	For future	From 2003/4	£3.25m up to 2005/6	-

Source: CambsCC 1998b, p. 15, 43, 48 and CambsCC 1999b, p. 225-6, F3

Obtaining exact data is problematic:

- Different sources quote slightly different amounts of parking and different costs.
- It is impossible to determine from all the available data whether money from city centre parking revenue (see appendix 4) used to pay for the sites is included or additional to the site cost quoted in the data sources above.

The data shows that the total cost of site provision will, by 2003/4 be £12.23m, with £1.78m spent on bus priority measures. The bus priority measures were designed for the park and ride schemes but can potentially be used by conventional service buses, though in practice there are few other services running in these locations. The cost of this provision has therefore been included in indicative calculations.

## Appendix 2: Travel data for Cambridge city centre

Cambridgeshire County Council produces a yearly report on travel data in Cambridgeshire (most recent are Cambs CC 1998a, 1999e, 2000b). Data from these is reproduced here.

It should be borne in mind that some of the data is subject to variation due to effects such as the weather. However, the data gives an adequate indication of relative modal split. Data is given by the number of people and not vehicles, to enable a fairer comparison with non-passenger-bearing modes such as cycling and walking.

### Travel within the city centre

Data is based on the number of people crossing the River Cam 'screenline' (an imaginary line) per travel mode over a twelve-hour period. This approximates to the number of transport movements in the city. Although it omits certain parts of the city, it gives an adequate indication of the relative modal split.

Mode	1999		1998	
	People	Modal split	People	Modal split
Cars	72,376	51%	82,022	54%
Taxis	4,132	3%		
Motor cycles	1,368	1%	1,423	1%
Bus and coach	13,261	9%	14,800	10%
Goods vehicles	9,595	7%	9,167	6%
Pedal cycles	18,480	13%	20,746	14%
Pedestrians	22,361	16%	24,682	16%
Total	141,573	100%	152,840	100%

Source: CambsCC 1999e, p. 13, 14 and CambsCC 2000b, p. 14, 15

### Travel into the city centre

Data is based on the number of vehicles passing through a radial cordon of measuring sites. This approximates to the number of vehicle movements into the city. Every main road into the city is covered. The position of the park and ride sites with respect to the monitoring sites is such that park and ride patronage is likely to be split between the cars and taxis division and the bus and coach division.

Mode	1999		1998	
	People	Modal split	People	Modal split
Cars and taxis	180,561	77%	183,435	77%
Motor cycles	2,349	1%	2,243	1%
Bus and coach	20,113	9%	20,550	9%
Goods vehicles	26,205	11%	25,345	11%
Pedal cycles	5,567	2%	5,555	2%
Pedestrians	1,040	<1%	1,089	<1%
Total	235,835	100%	238,217	100%

Source: CambsCC 1999e, p. 13, 14 and CambsCC 2000b, p. 14, 15

## Appendix 3: Parking provision for Cambridge city centre

The following data shows the parking provision available in the wider city centre (approximately within the 'core' area):

Type of parking provision	Number of spaces
On-street (pay and display)	2,022
Off-street (public car parks)	3,420
Park and ride	2,200, set to increase to 4,750
Private non-residential *	40,000
Private residential *	Unknown
Residents' bays *	1,522

Source: CambsCC 1999b, p. 20 and 307

\* It should be borne in mind that these types of parking indicated will have relatively little effect on park and ride usage since they are not paid for at the point of use and may often be free and/or reserved.

## Appendix 4: Revenue raised from on-street parking charges

The following table indicates finance for two years only, although other years follow similar patterns.

Section	Subsection	Forecast 1999/2000 (£)	Forecast 2000/1 (£)
Income	Surplus* pay and display	960,000	1,100,000
Expenditure	Traffic wardens	230,000	250,000
	Park and ride running costs	310,000	350,000
	Park and ride management	25,000	40,000
	Capital financing	775,000	800,000

Source: CambsCC 2000a, p. 7

The balance between income and expenditure is accounted for by other relatively smaller expenditures (e.g. footways, coach management, and so on) and by the balance carried over from the previous financial year.

\* The term 'surplus' refers to the revenue raised having first deducted the cost of running the service, such as machine maintenance and purchase, labour for money collection, and so on.

## Appendix 5: Costs and extensiveness of park and ride provision

The following table shows in detail the costs of provision and the number of spaces for each of the park and ride sites, split down by year, with a further split down for the phases of construction.

Site	Phase	Cost (£) and number of spaces for each budget year												Total cost (£)		Total spaces
		Before 96/7	96/7	97/8	98/9	99/00	00/1	01/2	02/3	03/4	04/5	05/6	Site	Bus priority		
Madingley Road	1	0	560	0	0	0	0	0	0	0	0	0	1410	0	1000	
	2	0	0	0	400	0	450	0	0	0	0	0				
	3	0	0	0	0	0	0	0	0	0	0	0				
	Number of spaces	0	500	0	500	0	0	0	0	0	0	0				
Newmarket Road	1	0	891	1211	25	0	0	0	0	0	0	0	2977	645	1000	
	2	0	0	0	0	0	800	50	0	0	0	0				
	Bus priority 1	0	0	155	90	0	0	0	0	0	0	0				
	Bus priority 2	0	0	0	0	0	400	0	0	0	0	0				
	Number of spaces	0	0	500	0	0	500	0	0	0	0	0				
Cowley Road	Original	?	0	0	0	0	0	0	0	0	0	0	145+?	1135	540	
	U/G	0	45	0	0	0	100	0	0	0	0	0				
	Bus priority 1	385	200	0	0	0	0	0	0	0	0	0				
	Bus priority 2	0	0	0	0	0	50	500	0	0	0	0				
	Number of spaces	540	0	0	0	0	0	0	0	0	0	0				
Babraham Road	1	0	43	40	450	1480	100	0	0	0	0	0	2963	0	700	
	2	0	0	0	0	0	0	50	700	100	0	0				
	Number of spaces	0	0	0	0	200	0	0	500	0	0	0				
Clifton Road	Original	?	0	0	0	0	0	0	0	0	0	0	?	0	0	
	Number of spaces	190	0	0	0	-190	0	0	0	0	0	0				
Trumpington	1	0	0	0	30	50	500	2400	1050	0	0	0	4880	0	1500	
	2	0	0	0	0	0	0	0	50	700	100	0				
	Number of spaces	0	0	0	0	0	0	1000	0	500	0	0				
Future sites further away	Various	0	0	0	0	0	0	0	250	1000	1000	1000	3250	0	?	
	Number of spaces	0	0	0	0	0	0	0	?	?	?	?				
YEARLY COST TOTALS		385	1739	1406	995	1530	2400	3000	2050	1800	1100	1000	15480	1780	4740	

Source: CambsCC 1998b, p. 15, 43, 48 and CambsCC 1999b, p. 225-6, F3

### Notes:

- Running costs are included in 2001 onwards. Other years may include this, but the data is unclear.
- Site provision costs may be higher by possibly several million pounds, because it is not possible to ascertain whether proceeds from city centre parking revenue are included

## **Appendix 6: Subsidy to park and ride users**

The following calculations are necessarily indicative because data on parking and transport spending is widely dispersed and often incomplete.

Total subsidy per user for inward and outward journey taken together = cost of running the service per year / number of users per year.

The principal costs incurred by the service are purchasing, developing and maintaining the sites, the cost of managing the system, and running the bus services. Given that subsidy is the only source of income to the system other than user fees:

Subsidy for running the service per year = cost of site provision over a year + yearly park and ride management costs + yearly cost of running the bus services – revenue raised from users paying to use bus the bus

Splitting this down:

Site provision cost = Initial cost of provision of all sites totalled together X notional rent rate per year

Data on maintenance is unavailable; however the cost of this would be marginal.

The cost of running the bus services may be calculated for each of the two routes (north-south and east-west) using:

Cost of running the bus service = Fully-inclusive cost of running a bus per mile X bus distance travelled per day X operational days per year

And:

Revenue raised from users paying to use the bus = Average cost per ticket X number of users per year

Putting these together:

Total subsidy per user for inward and outward journey taken together = ( (initial cost of provision of all sites totalled together X notional rent rate per year) + yearly park and ride management costs + (fully-inclusive cost of running a bus per mile X bus distance travelled per day X operational days per year) – (average cost per ticket X number of users per year) ) / number of users per year

Available data gives:

- Initial cost of provision of all sites totalled together = £5,975,000 (source: see appendix 5)
- Notional rent per year = 0.08 (see notes)
- Yearly park and ride management costs = £395,000 (CambsCC 2000a, p. 7)
- Cost of running a bus service per km = £1.30 (Parkhurst 2000, section 7)
- Bus distance per day = 1926km (Parkhurst 1999b, p. 13, taken from WSAtkins 1998)
- Operational days per year = Weekdays and Saturdays, i.e. around 312 days per year
- Average cost per ticket = £1.00 (Source: user leaflet from Cambridgeshire County Council)
- Number of users per year = 810,000 (CambsCC 2000b, p. 18)

This gives a subsidy per user per pair of journeys of:

$$= ((5,975,000 \times 0.08) + 395,000 + (1.30 \times 1926 \times 312) - (1 \times 810,000)) / 800,000$$

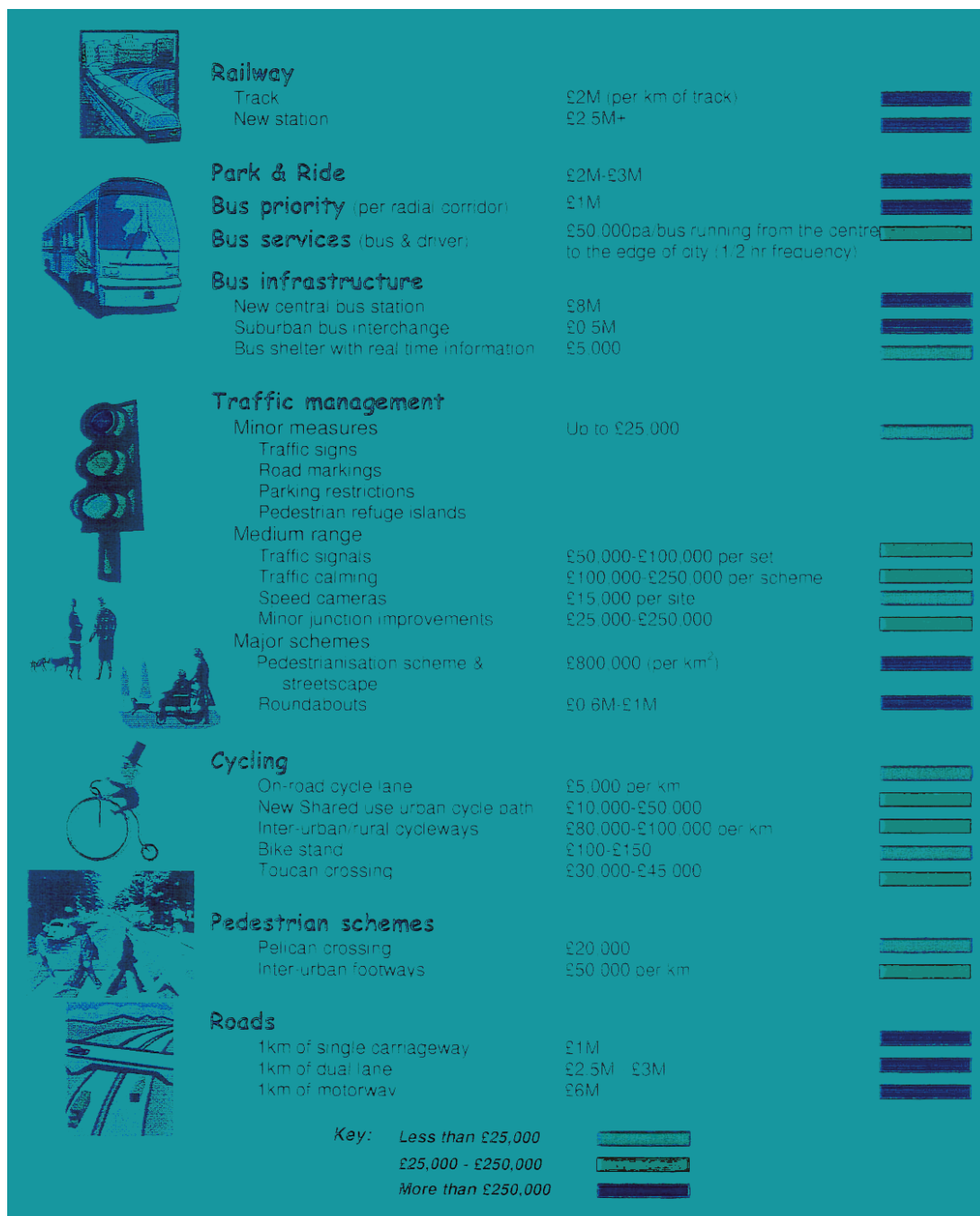
$$= £1.06$$

### **Notes:**

- Notional rent rate represents the cost of not investing/using the capital in other ways. The only available data for this is Parkhurst (2000, section 7), who assigns this as 8%. It is fair to include this as a subsidy both because it is necessary to the existence of the scheme and its further expansion and because it is also an opportunity cost, meaning that the money could be used for other potential projects.
- The figures above are based on the currently existing services.
- Site provision costs include bus priority measures for reasons already noted.
- Site provision costs may be higher by possibly several million pounds, because it is not possible to ascertain whether proceeds from city centre parking revenue are included

## Appendix 7: Cost of infrastructure improvements

This chart gives an indication of the levels of investment expenditure required for infrastructure improvements.



Source: Internal (unpublished) document from Cambridgeshire County Council

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