Transport Energy Descent Plan for Oxford





A report for Transition Oxford Steve Melia, April 2009

Executive Summary

To avert the twin threats of peak oil and climate change, the Transition Oxford Plan aims to show a path towards a future where local economies and transport systems will no longer be dependent on fossil fuels. This will involve reducing travel distances, less car driving and fewer freight movements. It will mean more walking and cycling and also using public transport in a more rational way.

The aim of *Transform Oxford* to extend the pedestrianised area will improve the local environment in the city centre, and should be supported, subject to the following changes and additions:

- Bus priority measures on St Giles as illustrated in Figure 1.
- Relocation of the bus station to the area adjacent to the railway station.
- Cycle routes through the City Centre should be provided, and improved, as indicated in Figure 2.
- Total pedestrianisation of Queen Street should be avoided; the alignment should be protected as a future route for trams.
- Wherever possible, a carfree residential population should be re-introduced to the pedestrianised areas.
- The route between Magdalen Bridge and Longwall Street should be closed to general traffic this more radical proposal is the key to many of the longer-term recommendations. It could be initially introduced at peak times only.

Oxford is reaching the limits of what can be achieved through conventional buses running on congested radial routes. The longer term solution should involve:

- A light tram system as illustrated in Figure 4 and discussed in Section 5.3.
- The reopening of the Cowley branch line to passenger trains.
- Buses to complement and feed, rather than competing with the trams and rail.

Under current Government policies these proposals would be very difficult to progress. Political influence will need to be brought to bear on Central Government (through the City's MPs) to allow for more radical public transport solutions.

Conditions for **cycling** in Oxford are poor in many places. The following improvements are recommended:

- A long-term plan to match the comprehensiveness of the cycle networks in Freiburg and Groningen, as shown on Appendix 4.
- Identifying and remedying sub-standard cycle facilities and ensuring cycle routes have priority over other traffic at junctions.
- Surface improvements to the river and canal paths.
- Cycle crossings (preferably subways) at the roundabouts along the Northern Ring Road and Frieze Way/Oxford Road Kidlington.

There is a problem of coordination between the **transport and spatial planning** for Oxford which, if not addressed, will exacerbate the problems described in this report.

The spatial plans for Oxford and adjoining areas should be reconsidered. To reduce car dependency and improve the quality of urban life they will need to be changed to:

- focus on additional opportunities for intensification within Oxford
- reduce reliance on street-based buses along radial routes into the City
- reconsider the growth areas (Water Eaton is more sustainable than the Southern extension, until public transport infrastructure is available to support the latter)
- better coordinate the spatial and transport strategies for the future
- expand Oxford rather than the surrounding market towns, providing the public transport infrastructure is made available.

The environment of **district centres** should be improved by reducing traffic flows through them. Traffic restrictions at Magdalen Bridge will help this, as will the recommendations for Cowley Road shown in Figure 6 and Summertown shown in Figure 7.

Planning policies in Oxford should encourage **European style carfree developments** as described in Section 6.4:

- in the West End and on any other available sites in the inner areas of Oxford.
- near the new station at Water Eaton, and/or in the Southern Development Area if this can be served by rail or trams.

The Transition Town should explore the feasibility of a **carfree association** in Oxford.

A **workplace parking levy** should be introduced to help fund infrastructure improvements, and reduce car journeys into the City.

To implement the objectives of the Transition Oxford Plan, Sustrans and the Transition Town should aim to influence the public authorities to:

- Identify some potential 'quick wins'.
- Influence the later stages of *Transform Oxford*.
- Obtain a public commitment to the objectives of the Transition Oxford Plan, and a recognition that a new transport strategy will be needed to achieve them.
- Change the spatial plans for Oxford and surrounding areas.
- Promote a feasibility study into the tram and rail options outlined in this report.

Carfree days and **street parties** should be organised in areas targeted for more permanent road closures.

Transition initiatives should be encouraged in the **Oxfordshire market towns** – there is a need for co-operation to address the wider sub-regional transport challenge.

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1 The Brief

This report was commissioned by Sustrans for Transition Oxford, to respond to the County Council's Transform Oxford programme and, taking a longer-term perspective, to consider how transport in the City might evolve to support the energy descent planning of the Transition Town movement. The aim of this is to reduce dependence on oil and CO_2 emissions.

The report will concentrate mainly on transport within Oxford's boundaries and by Oxford residents, although sections 6.2 and 6.5 will address some issues related to the wider sub-region.

2 Where we are Heading?

2.1 Nationally and Regionally – in the Wrong Direction

Road transport accounts for 21.6% of the UK's domestic greenhouse gas emissions¹. Whereas emissions have been falling across the rest of the economy, from transport they have been continuing to rise. Amongst the many reasons for this, growing car use, and longer travel distances have all contributed:



Faced with a requirement under the Climate Change Act to cut emissions by 80% by 2050, Government policy aims to rely mainly on technological changes to vehicles²; most independent studies have concluded that these measures will not be enough³. As one study for the Royal Institute of Chartered Surveyors put it: "the behaviour of the driving public must also undergo a sea change."⁴

At a national level, the Department for Transport is forecasting growth in traffic volumes of 32% between 2003 and 2025, accompanied by a fall of 3% in CO₂ emissions⁵. Previous forecasts have proved over-optimistic on this aspect; emissions from road transport rose by 3% between 2000 and 2005.¹ The recession may bring a temporary respite, but past recessions (and past rises in oil prices) have failed to make any significant impact on the longer-term upward trend.

Government policy in recent years has sought to "reduce the need to travel by car³⁶ – which may or may not reduce actual travel by car – mainly:

- by increasing bus use
- by using the planning system to encourage walking and reduce commuting distances
- without seeking to restrain rising car ownership

There are several reasons for doubting whether this strategy is likely to succeed. Although the causes are complicated, there is a strong relationship between car ownership and car use. People in households with two or more cars travel more than three times as far in a year as people with no car⁷. The main problem is not that car owners drive instead of taking public transport, but that they travel further and more often⁸.

There is also a strong relationship between car ownership and bus use.⁹ Many studies have shown that conventional buses running on streets are less effective than other forms of public transport in attracting car drivers.¹⁰ Public transport improvements in themselves do not necessarily make a significant difference to car driving; increased patronage may come at the expense of walking and/or cycling (see the Freiburg example in Appendix 4).

Since the early 1990s, Government (and many others – see the Oxford's draft Core Strategy¹¹) have placed great emphasis on reducing travel through planning policies which locate bus stops, shops, services and employment within walking distance of most new development. Unfortunately, the results of this have been disappointing, particularly in new developments outside the inner cities, where car ownership is generally very high.¹² 'Walkable neighbourhoods', it seems, are a necessary but not sufficient condition for encouraging walking.

Alongside these weak measures ostensibly aimed at restraining the growth in traffic there has been a national and regional resurgence in road building, which is likely to make the problem worse. Of the priorities contained within the Southeast Regional Funding Allocation, nearly 90% of the funding – around £1.3bn – is allocated for schemes which are mainly road building or road improvements¹³.

If pre-credit crunch trends and policies continue, **aviation** will exceed all other sources of CO_2 emissions in Britain¹⁴. This is an area where public awareness is currently limited¹⁵. This report about transport at the city level will not focus on aviation but the Transition Town should bear it in mind whenever transport outside the city, or individual action on climate change are discussed.

2.2 Oxford?

This study has been able to obtain raw data taken from travel diaries issued by the *Access to Oxford* project which shows, for the first time, an all-purpose modal share for Oxford:

Modal Share, Trip Stages, All Purposes Source: Access to Oxford (2008)



Car use in Oxford is lower than the national average $(63\%)^{16}$. Rail use is roughly half, walking is similar; bus use is roughly double and cycling is roughly ten times the national average.

Travel to the City Centre shows a quite different pattern. The proportion of car journeys to the city centre has fallen over recent years, from 50% in 1991 with bus use and walking both increasing.¹⁷ The latest cordon counts show the following:

Trips to Oxford City Centre 2008 County Council cordon count



Appendix 2 shows the Census statistics by ward, illustrating the usual relationship between car ownership and car use, with both increasing (in general) with distance from the city centre. Bus use is higher than average in all wards except Holywell, where most people walk to work.

Oxford is fairly self-contained from an employment perspective: 76% of working residents work in Oxford¹⁸. This compares with less than one in six of a ward analysed within Didcot¹⁹. Appendix 3 shows the breakdown of commuting journeys by mode and distance: commuting distances of Oxford residents are lower than the national average. Relatively few people commute to London. Cycling and walking are common for shorter journeys to work; cars are used particularly for journeys between 10 and 60 km i.e. journeys outside Oxford to places other than London.

The increasing use of buses in Oxford has not been without its problems. Despite improvements to vehicle emissions standards, levels of nitrous oxide in the City Centre have continued to exceed the National Air Quality Objectives, which should have been achieved by 2005^{20} . This has potentially serious consequences for human health, particularly lung diseases. The latest monitoring report shows problems across the city, along radial routes and around local centres (e.g. Cowley, Headington, and Summertown)²¹. Within the central Air Quality Management Area cars still account for 60% of traffic. Buses account for 18% but emit two thirds of the nitrous oxide²². The recently announced Low Emissions Zone and the proposed rationalisation of bus services will improve this situation (possibly at the price of some increased fuel consumption and CO₂ emissions) but the County's modelling suggests high volume routes such as the High Street will still exceed the national air quality thresholds even when the Zone becomes fully operational by 2013^{25} . The air quality problems in local centres such as Cowley and Headington are mainly due to general traffic (much less to buses) so the Low Emissions Zone will not solve the problems there, either.

By UK standards, rates of cycling in Oxford are relatively high, although Cambridge and medium-sized European university cities²³ achieve much higher levels:



Whilst Oxford has a useful network of off-road cycle routes, and some other examples of good practice, overall the conditions for cycling compare unfavourably with European 'cycling cities'. Cycle routes lack continuity, there is a lack of cycle parking, facilities are often poorly designed and the most direct routes along the main roads are intimidating for all but the most experienced and determined. Appendix 4 describes transport and planning practice in Freiburg, Groningen and Muenster, examples which will inform the rest of this report.



Worcester Street junction

Given that Oxford is already fairly self-contained, further reductions in external journeys by Oxford residents would depend mainly on national and regional policies – on road capacity and 'out-of-town' development, for example. There may be opportunities for some modal shift from car to rail for journeys of intermediate length. Several of the recommendations in this report would help in this respect, but this focuses mainly on travel within Oxford.

3 Where we Need to be Heading

To avert the twin threats of peak oil and climate change, the Transition Town energy descent plans aim to show a path towards a future where local economies, and local transport systems, will no longer be dependent on fossil fuels. This will involve progressively reducing overall travel distances with a return to a more local way of living. It will mean less car driving and fewer freight movements. It will mean more walking and cycling and also using public transport in a more rational way, because public transport is not carbon neutral and as Oxford has experienced, its increasing use can cause a range of other problems.

Electric or hydrogen powered vehicles (where hydrogen production relies on electricity), and particularly electric or hydrogen powered cars, may have a role to play but offer no panacea. The UK currently derives just 2% of its energy use from renewable sources, and is struggling to reach its generation target of 15% by 2020^{24} . New sources of renewable energy can be used either:

- a) to reduce carbon emissions from existing coal or oil-fired power stations, or:
- b) to satisfy additional demand for electric transport

But until 100% renewable generation is reached, it cannot do both. Apart from its long-term environmental consequences, the same argument is also true of nuclear generation.

The transition town project is about more than reducing oil consumption, important though that is. It is about cities for people, streets for children and a better quality of urban life. This report aims to reflect all these aspirations as they apply to transport.

4 Transform Oxford

The aim of *Transform Oxford* to extend the pedestrianised area will improve the local environment in the city centre, and should be supported. The European cities reviewed in Appendix 4 and the experience of previous changes in Oxford¹⁷ suggest that removing routes for general traffic can also help to promote modal shift, but the effect of these proposals on general traffic will be very limited. The map shown below, taken from the consultation leaflet was somewhat misleading in this respect. The County Council have confirmed²⁵ there was never any intention to remove general traffic from the Eastern end of the High Street (blocking its access to Longwall Street and the North of the City). As none of the other roads are open to through traffic during the daytime at present, it seems *Transform Oxford* will make little difference to levels of car driving in the city.



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4.1 Bus Routes

Most of the proposed changes relate to bus routes. The suggested option (never a firm proposal) to terminate 'normal buses' at The Plain with transfers to a shuttle has provoked considerable opposition and is not now expected to be pursued. All changes of journey incur 'transfer penalties' – essentially a measure of the discouragement caused. Research suggests bus-to-bus changing generally incurs higher transfer penalties than other forms (e.g. bus-to-rail or rail-to-rail).²⁶ The shuttle idea would discourage many bus users, particularly those heading towards the railway station, and is not to be recommended.

For the time being, the continuing use of High Street-St Aldates-Speedwell Street (Westgate Centre) loop remains the 'least worst' solution for East-West buses (an alternative suggestion to reintroduce buses to Cornmarket Street would reverse a key gain from the previous pedestrianisation scheme, contrary to the objectives of *Transform Oxford*). Until some more radical solution is found, as discussed later, the High Street will remain a largely unfriendly environment for pedestrians, however.



High Street

Another problem for the buses can be anticipated from the next phase, when George Street and Magdalen Street are pedestrianised. This will divert buses onto Beaumont Street and Worcester Street North which are already affected by congestion, which is likely to grow.



Hythe Bridge Street looking towards Worcester Street junction

Recommendations

The most radical solution, with the greatest impact on traffic movements across the City would be to close this link to through traffic. This measure would sever West Oxford from North and East Oxford for general traffic, and would provoke considerable opposition; but these are the kinds of measures which will be necessary in the medium term if we are to meet the national targets on CO_2 emissions.

A less radical interim move would re-open the link between North and South Worcester Streets for buses, with signal priority co-ordinated at that junction and on the turning from Beaumont Street into St. Giles, where sufficient width exists to create a bus-only turning lane from the North. This should also take into account the need for buses from the North to drop off and U-turn. Some of the parking in front of St Johns/Balliol Colleges may need to be removed to create both bus bays and a southbound bus lane allowing buses to by-pass congestion at peak times, as shown in Figure 1.





Turning from St Giles into Beaumont Street

Same junction looking North up St Giles

This solution could also exacerbate the congestion for general traffic on Beaumont Street and Hythe Bridge Street and would re-emphasise the need to provide a better link for cyclists, as discussed below.



Figure 1 North/West Bus Priority Route

The **bus station** should be **relocated** to the area **adjacent to the railway station**, using some of the area currently allocated for short-term parking (which should be moved across the footbridge, retaining only a setting down area and a few disabled spaces north of the footbridge). This would facilitate:

- Better integration between bus and rail
- Pedestrianisation of all George Street
- A carfree mixed use development (see Section 6.4) on the bus station site



Bus Station



Railway Station Short-term Parking Area at 4pm, Wednesday April 1st

Under this suggestion, all services from the North, South and East would pass other bus stops in the city centre along their route to the railway station. A number of the existing longer-distance bus services already travel from the bus station to the railway station.

As many passengers for the London services are not travelling to the city centre, some **rationalisation of the London services**, so that some start from the park and ride sites for example, would help to reduce pressure on the city centre. The longer-term proposals in Section 5.1 would help this process.

4.2 Cycling

Oxford City Centre is already difficult to cross by bicycle. The existing restrictions on cycling along Cornmarket Street and Queen Street during the daytime sever the main North-South and East-West desire lines. As always in such circumstances (with cyclists or pedestrians) the rules are not well respected.



Cornmarket Street 'no cycling' zone

The alternative North-South route via New Inn Hall Street – part of National Cycle Network route 5 – is poorly designed for cycling and would need considerable work to make it a feasible route for journeys through the city centre for transport (as opposed to leisure) purposes.

The alternative East-West route via George Street and Holywell Street is currently affected by heavy traffic on Longwall Street, and would be severed completely if cycles are removed from George Street in the next phase of pedestrianisation.

European cities with historic centres have also struggled with these issues (see discussion of Freiburg in Appendix 4); there are no easy solutions. The DfT guidance on Cycling in Pedestrian Areas²⁷ suggests that pedestrians and cyclists "mingle readily" at "lower flows". Where flows are higher, more specific route guidance is recommended. The following examples from Denmark illustrate the kinds of semi-segregation which facilitates cycle movement in such circumstances. A daytime cycling ban applies to the pedestrianised area of Odense (in the background below). Though this is not perfectly respected, it seems to suffer from less of a problem than British pedestrian zones because a rapid, continuous, relatively direct alternative exists alongside it.



Odense route adjoining pedestrian area



Copenhagen route through pedestrian area

The routes from Oxford station to the city centre are poorly designed and intimidating, particularly for cyclists who are unfamiliar with the city:



Junction by Oxford Station - intimidating for cyclists unfamiliar with the city

Recommendations

Allowing cycling along the **desire lines** would be the best solution. Where these cross pedestrianised areas with a high flow, as in Cornmarket Street, semi-segregated facilities such as the Danish ones shown above would be recommended. If this is deemed politically unfeasible along Cornmarket Street, the alternative **North-South route** should be redeveloped to allow for less interrupted progress as indicated in Figure 2.

For the **East-West routes**, once the number of buses in Queen Street has been reduced, cycling should be re-introduced there. The longer-term recommendation for light trams along that axis would be easier to implement if pedestrians have not become accustomed to sole use of that space. A segregated cycle path along Queen Street could therefore perform a useful dual function.

Similarly, cyclists should not be excluded from George Street or Magdalen Street. The proposal to remove general traffic from Longwall Street, discussed below, would open up the possibility of a new East-West route, which might become more important if trams were introduced later.

The need for more **cycle parking**, and the better management of existing spaces, has been acknowledged by the County Council. The European cities provide examples of impressive cycle parking facilities at points such as railway stations (see Appendix 4). The experiment in Groningen of guarded cycle parking within multi-storey car parks is another idea which should be explored.



4.3 Re-introducing a Residential Population to the Pedestrianised Area

As described in Appendix 4, European cities such as Groningen have pedestrianised areas which include a substantial residential population, without providing additional parking. Though there would obviously be constraints on changes to historic buildings, a similar strategy in Oxford would bring transport, crime prevention and many other benefits.

The Princesshay development in Exeter is a recent precedent which appears to have been successful. The mainly retail redevelopment included 120 apartments in the pedestrianised area, and with just 23 allocated parking spaces. People queued overnight in the street to buy the first tranche of these in 2007.



Exeter Princesshay City Centre Development

The Key to Real Change: Magdalen Bridge 4.4

The recommendations so far have been made in the spirit of Transform Oxford, to improve its efficiency and support its quality of life objectives. Neither these recommendations, nor the County's proposals will make much difference to car use or energy consumption in Oxford. The 'easy gains' from pedestrianisation and bus improvements have already been made. To make further progress, against the tide of national and regional policy will require more radical measures. The drafting error in the Transform Oxford leaflet inadvertently suggested one of the most powerful possibilities: the closure of Magdalen Bridge to general traffic.



Figure 3 Magdalen Bridge

Exceptions would need to be made for deliveries at certain times, for buses, cyclists, pedestrians and emergency vehicles.

This would have the following immediate consequences:

- Removing the most direct route by car to the City Centre for around 60% of the city's population giving a substantial advantage to public transport, cycling and for some shorter journeys, walking and mobility scooters.
- A similar effect on many journeys between South/East and North Oxford
- Improving the environment for pedestrians and cyclists along the High Street and Magdalen Bridge
- Substantially reducing traffic and emissions along the main radial routes: Cowley Road, Headington Road and Iffley Road, which currently exceed national air quality guidelines in several places²¹.



Magdalen Bridge



High Street

Road closures may cause three consequences²⁸:

- 1. Traffic reduction
- 2. Spatial traffic displacement i.e. detours
- 3. Temporal traffic displacement i.e. travelling at different times

The balance between these three effects (which may vary between the short and longer terms) will depend upon:

- The availability of spare road capacity
- Overall transport policy and other factors affecting travel behaviour in the city

The substantial programme of road closures in Freiburg, Groningen and Muenster have not made congestion any worse than in British cities (it appears considerably better) because of the other measures described in Appendix 4. Some of the potential displacement options are unlikely to occur in Oxford, because the roads are already operating at capacity e.g. crossing Donnington Bridge onto Abingdon Road as a means of reaching the City Centre in the morning peak hours (or vice versa in the evening peak). Overall, the potential for displacement in Oxford appears fairly limited, which is not to deny that some displacement (e.g. onto the Ring Road or Marston Ferry Road) may occur at some times.

Like any proposal which challenges existing patterns of car dependency, this one would clearly provoke considerable opposition. Some of the proposals in the rest of this report should help to alleviate at least some of that potential opposition, although ultimately, the question is one of political will. If the proposal is considered too radical, as an interim step, it could be initially applied at peak times only.

5 Public Transport: Fundamental Problems & Long-term Solutions

5.1 The Problems

There are several problems with the current public transport strategy for Oxford which are likely to grow more acute over time. Under current Government and local government policies, it is difficult to envisage any satisfactory solution to these problems. The recommendations which follow would require some fundamental changes or exceptions to those policies.

The radial routes into Oxford City Centre are struggling to cope with the volume of traffic at peak hours at present. A growing number of buses are held up in congested traffic at peak times, with opportunities for bus priority measures limited by physical space. Some recent research suggests that stop-start bus lanes offer no solution; they may actually make the situation worse, both in terms of journey time and variability²⁹.

Most journeys within cities are generally heading somewhere other than the city centre. Changing buses in the city centre to travel somewhere else will never be an attractive option compared to the car. Cross-centre bus journeys suffer from delays and variability, and some routes, which used to connect East and North Oxford for example, have been broken into two parts for this reason. By concentrating buses onto a few deviating routes, *Transform Oxford* is likely to make these problems worse.

Buses, particularly diesel buses, do not mix well with pedestrians in city centres. As the County is trying to reduce their volume on some routes, the planning proposals discussed in Section 6.2 would rely on yet more buses on radial routes into Oxford City Centre. The air quality improvements from the Low Emissions Zone (which is not expected to solve the whole problem) may therefore prove short-lived.

The step change in transport patterns sought by the Transition Town will not be achievable if the public transport strategy for the city remains solely focussed on street-based buses.

5.2 The possibilities for Rail

A few years ago, the County Council was actively considering a bus rapid transit system (the GTE) which would have followed the railway line for much of its route from North to South Oxford. It was abandoned mainly because it appeared unlikely to attract Government funding. More recently the promoters of the Weston Otmoor Eco-town proposed a tram-train system from Bicester to Oxford.

Although a detailed feasibility study was not part of the brief for this report, the possibility of a North-South tram-train system was considered. Tram-trains have been operated for many years in Germany, sharing the track with conventional trains and the roads with general traffic. They are not yet approved for use on British railways; a trial is underway between Penistone and Sheffield, although this will not share track with high speed passenger trains.

Since the GTE project was abandoned pressure on the rail network generally, and through Oxford station in particular have increased. The following proposed changes are at different stages of the planning process:

- One or two new bays for terminating trains from the South, mainly from London, freeing up some capacity for through trains on the other lines
- The Evergreen 3 project which would create a new link to London Marylebone via the Bicester line and a new station serving the Water Eaton Park and Ride
- East-West Rail, being promoted by a consortium of local authorities, which would link Oxford to Bedford, and eventually Cambridge, also following the Bicester line

The funding is in place for the Evergreen 3 project, and subject to a public consultation and inquiry, it appears likely to proceed in some form, as do the new bays for the London trains. East-West Rail is a longer-term project, for which funding has not yet been entirely secured.

Given these pressures a tram-train system running through Oxford station does not appear to be a realistic option. The possibility of re-opening the Cowley branch line for passenger trains (as mentioned in the Local Plan adopted in 2005³⁰) may still be a longer-term possibility, particularly if the Cowley motor works ever closes and that site becomes available for re-development. Without very substantial redevelopment of Oxford station, this would be restricted to a shuttle service, however.

Chiltern Railways considered the feasibility of reconnecting the Cowley Line to Princes Risborough before deciding on the Evergreen 3 solution. They concluded that development along the former track bed would make this a very difficult proposition today.

5.3 Light Trams

Though a North-South tram train system may not be a feasible option, there are several reasons why a street-based tram system could help to resolve some of the problems described earlier. Unlike buses, trams can mix with pedestrians in semi-pedestrianised areas because:

- a) Their routes are more predictable
- b) They can run closer together, taking less road space
- c) Capacity can be increased by coupling vehicles without the problems caused to pedestrians by articulated buses

There many examples around Europe where trams run through semi-pedestrianised streets in historic centres.



Freiburg Tram Route through pedestrianised centre

Research suggests that trams offer a more attractive alternative to the car than conventional street-based buses, making them more effective at achieving modal shift.¹⁰ Whether segregated bus rapid transit systems can match the performance of trams is a controversial and unresolved issue in the literature; for the routes discussed in this section bus rapid transit is not a realistic option as opportunities for segregation are very limited.

Overhead power lines may be considered inappropriate within historic centres, but the installation in the centre of Freiburg has avoided intrusive gantries (see above).

The main disadvantage of tram systems is the high initial cost. There are many towns and cities much smaller than Oxford with trams but these have generally been in place for many years³¹. Most of the European (and all of the British) cities which have installed new tram systems have been larger than Oxford. There is one recent exception: the French city of Mulhouse, which has a conurbation-wide population (equivalent to Oxford, Kidlington, Botley and Kennington) of 172,000. The first two tram lines (East-West and North-South) were completed during 2006, within the original budget of €249m³², and the system appears to be running well.



Mulhouse Trams through City Centre

Some French cities such as Caen and Nancy have installed hybrid trolleybus systems, which run as electric trams through the city centres, and can also run as a diesel bus in the suburbs. The experience of these has not been so successful. Caen opted for the trolleybus in the belief that it would be cheaper than trams, but the project ran to over double the original budget, costing \notin 234m.³³ The trolleybuses have suffered from technical problems, and there has been a suggestion that Nancy may abandon its system.



Caen Hybrid Trolleybus

Nancy Hybrid Trolleybus

Both of these cities (which have smaller populations than Oxford based on city boundaries, but are part of larger, more sprawling conurbations) appear to have suffered from the new technology 'guinea pig' problem.

There is, however, a new generation of "ultra light rail" systems under development, using largely tried and tested technologies, which should be considerably cheaper than conventional tram systems. The key difference with U.L.R. is that on-board power is used, meaning that the vehicles can be much lighter, running on rails which can be laid over the top of existing road surfaces, substantially reducing the capital cost.

There are several possible fuel alternatives. A small-scale trial ran in Bristol during 2002 using a flywheel-driven electric vehicle using "refuelling points" rather than continuous power lines. This trial appeared to run fairly successfully, but the scheme was discontinued because of land availability problems.³⁴

Hydrogen fuel cells are another longer-term possibility, although the cost and efficiency of this technology still has some way to evolve. Another fuel which could be viable in the shorter term is methane composted from domestic waste. Lille has recently constructed an anaerobic digester for compostable waste which produces methane to power a fleet of 127 buses.³⁵ Methane produced in this way is interchangeable with compressed natural gas, so the vehicle technology is fairly mature; emissions of nitrous oxide are considerably lower than even low emission diesel buses.

Methane buses could help to solve the air quality problems in the city centre, although trams or some guidance system would be necessary to enable the mixing with pedestrians. Running on steel rails improves fuel efficiency due to reduced rolling resistance. Energy consumption is also related to speed. Along the routes suggested below, speeds of more than 30 mph would not be appropriate, so the vehicles need not be as powerful as conventional buses or trams.

It should be noted that the Oxford Bus Company has examined various alternative fuels, and rejected natural gas, due to concerns about reliability³⁶. They also claim that CO_2 emissions from gas buses are higher – which is true where the source is natural gas, although different considerations would apply to methane from renewable sources (which would reduce emissions compared to the 'business as usual' option).

The four principal axes where trams could replace buses are Botley Road, Banbury Road, Cowley Road and Headington Road (with name changes). The most direct routes through the City Centre would travel along Cornmarket Street and Queen Street. The Water Eaton, Seacourt and Thornhill park and ride sites could provide three of the termini. The terminus for the Cowley route could depend upon the location of new development to the South. There do not appear to be any easy non-road routes into Blackbird Leys or Greater Leys. An anaerobic digester could be built alongside one of the park and ride sites, or to the South of the city as part of any new development.

The speed advantages which trams can offer would be fairly limited along these routes, as opportunities for segregation of traffic are few. The blocking of Magdalen Bridge to general traffic and the proposals in Section 6.3 would be important to prevent the trams being held up by congested traffic along the radial routes. Figure 4 illustrates the proposed routes along with the rail based North-South axis discussed in the next section.



Figure 4 Rail and Tram Proposals

5.4 Other Changes to Bus Routes

Where a tram system is installed, it is preferable for buses to complement and feed the trams (and tram-trains), as they do in Freiburg, rather than competing with them as in Manchester. The strategy here would enable the High Street to be closed to buses, preventing some damaging competition. The link shown below includes some narrow sections, although it is currently used by double-decker tour buses in one direction only. Closing the Eastern High Street to general traffic offers a free-running route for buses linking East/Southeast and North Oxford, which would also improve links to the University Science Area.

When the tram and tram-train systems were complete this would facilitate the relocation of the London bus termini to the park and ride sites.



Figure 5 North/East bus route

Longwall Street (above) and Parks Road

5.5 Reality Check: the Politics and Funding of Transport

Under current Government policies it would be very difficult to obtain approval for the recommendations made in this section. This is partly due to the influence of the bus companies on Government, which has ensured that highway authorities are able to bid for up to 90% of bus-related capital schemes, but only 75% of light rail schemes.

One reason for the regional emphasis on road building mentioned earlier comes from the DfT's project appraisal system, NATA, which attaches high values to the saving of time, particularly business time, and low values for CO₂ savings.³⁷ The recommendations outlined here would be very difficult to justify under NATA, since the benefits are partly qualitative and partly relate to climate change, with relatively modest opportunities for time savings. Over the next few years, substantial cuts in overall public spending in response to the growing levels of national debt are likely to make funding for any public capital projects more difficult. Tram systems may be able to make a small operating surplus, but they will never be able to fund the initial capital cost.

The Conservative Party has proposed a Carbon Reduction Fund, and Sustrans have been working on proposals to the Government to reallocate funds from the largely stalled Transport Innovation Fund, which was intended mainly to promote schemes involving congestion charging. Workplace parking charges are another possibility under T.I.F., as discussed in Section 6.5.

If it is recognised that current policies will not solve Oxford's transport problems, then political influence will need to be brought to bear on Central Government to allow local authorities and local communities to find a way out of these problems. Most of the other recommendations in this report may 'stand alone', although their effectiveness will be limited if they are not supported by the kind of public transport strategy outlined in this section.

6 Other Measures in the Short and Medium Term

6.1 Cycling

Appendix 4 describes the principle of filtered permeability, defined in a recent Government document as "separating the sustainable modes from private motor traffic in order to give them an advantage in terms of speed, distance and convenience"³⁸. There are many examples of filtered permeability benefiting cyclists in Oxford, some of which seem the result of deliberate policy:



Filtered permeability: Collins Street

Useless Cycle Lane: Park End Street

But as with all British cities, the application is inconsistent. For most routes, particularly towards the City Centre, the cyclist is offered a choice between a direct route along busy main roads, or deviating, interrupted, inconvenient alternatives. Cycle lanes are often too narrow, discontinuous and poorly designed at junctions.

Recommendations

To improve conditions for cycling and encourage non-cyclists to take up cycling for transport, a **city-wide audit of cycle routes** should be carried out with the following aims:

- A long-term plan to match the comprehensiveness of the cycle networks in Freiburg and Groningen, as shown on Appendix 4
- Maximising the opportunities for cyclists to make convenient uninterrupted short-cuts
- Ensuring that cycle routes have priority over other traffic at junctions
- Identifying and remedying sub-standard cycle facilities. Three tests should be applied:
 - Is there a 'cyclists dismount' sign?
 - Is the route easy to use for people on mobility scooters?
 - Is it easy to use for a tandem with a child trailer?

A yes to the first question, or no the others indicates the need for a re-design

The City could benefit from the experience of cycle planning in the Netherlands, whether through study visits, or employment of cycle planners with Dutch experience.





Dutch cycle routes used by mobility scooters

Dutch cycle route with junction priority

Some particular places are in need of urgent attention, including the route from the railway station to the City Centre, mentioned earlier, and the following **roundabouts**:

- Woodstock Road/Ringroad
- Banbury Road/Ringroad
- Frieze Way/Oxford Road Kidlington

The last of these should be part of a coordinated network serving Water Eaton Park and Ride and the new railway station.



Kidlington Roundabout

Woodstock Roundabout

Subways are probably the best way of providing for crossings at high volume roundabouts (as at the Headington Green Road Roundabout). It should be noted that the current fashion in Britain for replacing subways with traffic signals ignores best practice in European cycling cities. Wide, well-lit, well-designed well-used subways are a vital part of the cycling strategy in cities such as Groningen and Zwolle:



Zwolle: cycle and pedestrian tunnel under railway. Note separate pavement and no barriers

Segregated facilities for cyclists are not needed on roads where *both* the speed *and* the volume of traffic are low. This should be the aim wherever possible. A decision in principle needs to be taken on the **radial routes**, either blocking them to through traffic, as suggested at Magdalen Bridge, or if not, direct, continuous, properly segregated cycle routes (whether alongside the carriageway or elsewhere) need to be provided.

The **river and canal paths** form two potentially useful links for many journeys, and they are well used in places, but their surfaces are poor. Hard, flat surfaces (whether asphalt or stone) would help to improve their usefulness. Barriers are a problem at several points, such as the one shown:



Pothole on the Thames Path



This woman had considerable difficulty negotiating these barriers with child trailer

A **city-wide cycle hire** scheme is under consideration. The evidence from Paris suggests, where these are done on a sizeable scale, they can significantly increase rates of cycling. A suggestion that they should use some of the (already inadequate) cycle parking within the City Centre, would be counterproductive, however.

6.2 Planning for Growth

There is currently a problem of coordination between the transport and spatial planning for Oxford which, if not addressed, will exacerbate the problems described in this report.

Attempts to use the planning system to reduce car dependency have largely failed in Britain so far. This is particularly true of new private developments on the edge of towns and cities; those viewed as planning disasters, and those given awards for 'best practice' both suffer from similar levels of car dependency.³⁹

Conventional transport planning tends to assume that transport demand (the number of trips and their destination) is a 'given' for each location, the only variable being the modal split. The Transition Town aims will require a new approach: one which reduces overall travel distances. As discussed in Section 2.1 the most powerful influence on travel distance is car ownership. The key transport question when planning a new development is not 'how do we provide for travel from this place' but 'how easy and attractive will this place be for people living without cars'? The author's PhD research⁴⁰ suggests that, outside the inner cities, this will require access to rail. In the Oxford context, conventional buses on congested radial routes will not be sufficient.

While the County's transport planners are struggling to reduce the number of buses using these routes, the Regional Spatial Strategy and the Core Strategy for Oxford¹¹ (and reluctantly, South Oxfordshire⁴¹) are planning a major urban extension served solely by buses, which will be forced to use these same routes. The existing buses serving Greater Leys require a Council subsidy, and the layout of the roads would preclude any *useful* bus route serving both Greater Leys and a new development as illustrated below.

The land is within the Oxford green belt, which is to be moved outwards to accommodate it. There are, however, no plans to review the greenbelt around the planned new station and transport interchange at Water Eaton, which appears of no greater landscape value. It does adjoin some areas susceptible to flooding, but the area of search shown below is also subject to multiple constraints⁴¹. The proposal for the urban extension appears to have pre-dated the plans for Water Eaton station, and discussions with the planners suggest that the possibility of an extension to the North was never considered.



At the same time Cherwell District Council is proposing an extension to Bicester as part of the Eco-towns programme⁴², which would also be served solely by buses (despite a railway line passing through the site), many of which would follow same congested streets into Oxford.

The proposals in the previous section would help to overcome the transport problems of a Southern extension. The land is still available for an extension to the Cowley rail line as illustrated above (although this could disappear if not protected), or the light trams could be extended as shown. In the absence of such plans, Water Eaton would represent a more sustainable location for an urban extension.

Studies of the relationship between settlements in Oxfordshire suggest that expansion of the smaller towns is likely to be a much less sustainable option than expansion of Oxford itself⁴³ (a comparison with Didcot was also mentioned earlier¹⁹), so if the transport infrastructure can be provided, as suggested in this report, then expansion of Oxford in more than one direction, accompanied by restraint elsewhere in the County, may be the best alternative.

Urban Intensification

The most sustainable form of development from a transport and many other perspectives is urban intensification. Constraints on intensification within Oxford are contributing to unsustainable development in the neighbouring districts.

This is one area where national policy has been more helpful, but the gains of recent years are under threat from a growing backlash, based partly on a misunderstanding.

Oxford's draft Core Strategy¹¹ states:

"there are serious concerns about the number of family houses being converted into flats, scope is limited for further increases in densities outside the city centre and district centres."

The reality is illustrated by the following table:

	Oxford	England & Wales
Houses as a proportion of dwellings	71%	80%
Flats as a proportion of dwellings	27%	19%
Families as a proportion of all households	16%	20%
Single person households	34%	30%
Two person households	30%	34%

These figures are taken from the 2001 Census, but new build and conversion make only very slow changes to the overall stock. Had the pre-credit crunch trends continued for another 50 years, the proportion of flats in England would have risen to just 24.6%⁴⁴. As a university city, the proportions of single people (and flats) in Oxford is always likely to be higher than the national average.

The proportions of single person households are projected to rise in the years to come. The real danger is that misinformed planning policies will result in more greenfield car-based "family housing" to be occupied by one and two person households in the future.

The low density car-based retail and employment sites around the fringes of the city (including Templars Square Retail Park) and on radial routes such as those illustrated below, represent another opportunity for intensification, which current plans do not appear to recognise.



Low Density car-based retail and business development: Botley Road & Garsington Road

The economic downturn could offer an opportunity to redevelop some of these sites, retaining their employment (and where appropriate, retail) uses, introducing residential development, and reducing the car-based transport focus of both. The Westfield Centre in London is an interesting precedent (which includes a PC World Store) where the modal share of public transport after opening has been around 75%.⁴⁵

Recommendations

The spatial plans for Oxford and adjoining areas should be reconsidered. To reduce car dependency and improve the quality of urban life they will need to be changed to:

- focus on additional opportunities for intensification within Oxford
- reduce reliance on street-based buses along radial routes into the City
- reconsider the growth areas in the short-term (Water Eaton as a more sustainable location than the Southern extension, until public transport infrastructure is available to support the latter)
- better coordinate the spatial and transport strategies for the future
- expand Oxford rather than the surrounding market towns, providing the public transport infrastructure is made available.

Unfortunately, these recommendations may also encounter political difficulties, as the adopted South East Plan is expected to be published very soon. The scope for a change of approach should be explored with the authorities as soon as possible.

6.3 District Centres

A more localised pattern of shopping and living in general is central to the Transition Town initiative. Strengthening district centres within cities such as Oxford must be a key part of

this. The draft Core Strategy recognises the importance of district centres, their potential for intensification, and proposes various environmental improvements for pedestrians. These are all sound principles, but they do not address the fundamental problem: the volume of traffic severing these centres.

The proposal to close Magdalen Bridge to through traffic would make a significant difference to the Cowley Road and Headington centres. It should also be possible to go a step further at the City end of Cowley Road, as illustrated below:



Figure 6 Cowley Road – Proposed Break in Route for Through Traffic

The route would need to remain open for light trams. Whether the remaining buses could be diverted onto other routes would require further consideration.

'Access only' restrictions could be placed further out along all the radial routes leading from Magdalen Bridge, although these are difficult to enforce.

A similar approach could also be taken on Banbury Road on either side of the Summertown local shops:





Figure 7 Summertown District Centre – Proposed Traffic Restrictions

The current proposals for changes to Headington District Centre are a reasonably good example of the 'damage limitation' approach to traffic planning in local centres. The proposal to replace the subway has sparked a local campaign to save it. If the volume of traffic can be drastically reduced, a crossing at grade, or even a shared space solution may become appropriate, but it is difficult to see what would be gained under current circumstances. A

signalised crossing at that point could serve only to delay pedestrians (for up to two minutes at peak times) and exacerbate the air quality problems.



Headington Shops and (threatened) subway

6.4 Carfree Development

In those locations where it is feasible, carfree development is the single most effective means of reducing car use and improving the quality of life in dense urban areas. In the European carfree areas visited and studied by the author over the past three years, modal shares for cars vary between 5% and 16% of trips⁴⁶. The author has observed and interviewed the parents of children as young as five, who were allowed to walk, cycle and play freely around their neighbourhoods without direct supervision. The carfree areas appeared considerably more effective in this respect than conventional home zones open to traffic.



German carfree developments (Vauban, Freiburg, and Stellwerk 60, Cologne)

Carfree development should not be confused with the peculiarly British (and deeply flawed) concept of 'carfree housing' meaning 'housing with no allocated parking'. As practised elsewhere in Europe, carfree development provides:

- A traffic-free immediate environment
- A design focussed on travel by other means (usually including car clubs)
- Limited (ratios between 0.15 and 0.5 per dwelling) parking separated both physically, and financially from the housing

A similar definition has been adopted in the recent transport guidance for the Eco-towns³⁸. Carfree development generally requires some form of parking control in the surrounding areas, to avoid problems of overspill parking.

There are essentially three models across Europe:

- 1. Vauban, the largest example with a population of over 5,000. Vehicles are allowed down residential streets at walking pace to set down but not to park. Car owners must buy spaces in peripheral multi-storey car parks.
- 2. Smaller developments (50 600 dwellings) where vehicles are physically prevented from entering the sites.
- 3. Pedestrianised city centres, which in some European cities have much larger residential populations than their equivalents in Britain.

All three models could be applied to Oxford. Type 3 was addressed in Section 4.3. Any sizeable residential site within the inner districts of Oxford would be suitable for type 2. The West End Area Action Plan⁴⁷ refers to opportunities for 'car-free housing' defined in the British sense, but does not appear to rule out genuine carfree developments.

Type 1 would be suitable for larger sites. In outlying areas, access to public transport including rail becomes more important. A mixed use development at Water Eaton would provide an ideal site. The Southern Area would also be suitable if served by trams or tram-trains (probably not suitable if street-based buses are the only option).

A fourth possibility, which has not yet been widely tried (although some long-standing precedents exist, such as in Ancoats, Manchester⁴⁸) is to pedestrianise existing residential streets. This could be feasible where existing car ownership is low, the residents are sympathetic, and some land is available for minimal peripheral parking.

Whichever approach is taken, parking generally needs to be controlled in the surrounding areas.

More information about carfree development is available on <u>www.carfree.org.uk</u>, or the author, whose PhD focussed on this area, can advise further. Carfree UK, to which the author belongs, is planning to establish a London carfree association in the autumn. This will bring together people who live without cars and want to live in carfree neighbourhoods, with the aim of convincing developers and lobbying the authorities. If this is successful, a similar initiative could be explored in Oxford.

Recommendations

- Planning policies in Oxford should encourage carfree developments as defined here in the West End and any other available sites in the inner areas of Oxford.
- A sizeable mixed use carfree development should be planned near the new station at Water Eaton, and/or in the Southern Development Area if this can be served by rail or trams.
- The Transition Town should explore the feasibility of a carfree association in Oxford.

6.5 Non-Residential Parking and Travel into Oxford ⁴⁹

This report has mainly focussed on the travel patterns of Oxford residents. Some of the factors contributing to inward travel by non-residents depend on wider regional and national policies. There is however one change within the City which could have a wider influence. This relates to non-residential parking.

The capacity of off-road public car parks does not seem excessive: 1,547 in the City Centre⁵⁰ compares with 1,400 in Groningen (see Appendix 4). The parking charges in Oxford are also higher than the cities reviewed in Appendix 4. The greater problem appears to be the availability of private non-residential parking, estimated at 6,600 spaces within the central area alone³⁰. The retail parks already mentioned and low-density employment sites such as the Oxford Business Park all provide ample free parking, attracting long-distance car journeys from outside the City.

A **workplace parking levy** is one of the options available under the Transport Innovation Fund. This could be used to finance infrastructure improvements such as the ones mentioned earlier, as well as providing an incentive for employers to reduce parking spaces and encourage modal shift amongst their employees. Nottingham has been developing a T.I.F. bid incorporating a levy whose revenues would be used to extend the city's tram network. A decision is expected on this shortly, and it could provide a useful precedent for Oxford.

Reduction in parking within the City may create more demand for the **park and ride** sites which are already well used. Research conducted in Oxford provided some of the strongest evidence so far that park and ride redistributes but does not reduce car mileage⁵¹. Continuing expansion of park and ride sites is not a sustainable solution; it "cannot continue indefinitely", as recognised by the Local Plan³⁰.

To promote more sustainable patterns of travel into Oxford would require a range of other measures such as limitations on road capacity and improvements in rail connections across the wider sub-region. The **Transition Town** movement began in smaller towns, and encouragement should be given to similar initiatives within the **Oxfordshire market towns**, which could work together on some of these sub-regional problems.

7 Getting There

Transport is a difficult issue for transition towns. Unlike many of their other areas of interest, autonomous action by individuals and communities is unlikely to make a significant difference unless this also leads to changes in the policies and practice of public authorities and private companies. Community actions may contribute to a wider campaign, by, for example, organising carfree days or street parties in areas targeted for pedestrianisation or more permanent road closures. Streets Alive can help with the organisation of street parties⁵².

During the writing of this report, conversations with officers of the County Council in particular indicated a willingness to listen to suggestions from external organisations, and to consider more radical measures for the longer-term. Influencing the spatial planning process will be more difficult, but must also be addressed. A strategy to influence the public authorities should aim to:

- Identify some potential 'quick wins', such as the recommendations relating to cycling in this report, and possibly some opportunities for road closures.
- Influence the later stages of *Transform Oxford*
- Obtain a public commitment to the objectives of the Transition Oxford Plan, and a recognition that a new transport strategy will be needed to achieve them
- Obtain a recognition that the spatial plan for Oxford needs to be reviewed and changed to support these objectives
- Promote a feasibility study into the tram and rail options outlined in this report

The proposal to restrict access to Magdalen Bridge will be controversial. A public debate and a campaign will be needed to move this up the agenda.

As a first step, Appendix 1 is a draft declaration with could form the basis of a media release following the meeting on April 23rd (which may wish to amend it). The agreed declaration should be placed on the Transition Town website (along with this report). Organisations and individuals across the City could be invited to add their support. The support of the City's MPs should be sought, particularly in respect of the national policies which are obstructing the sort of public transport solutions recommended in Section 5.

This should then be followed by an approach to the County and City Councils, to begin the dialogue which will need to continue for many years to come.

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Notes

- ² KING, J., 2007. *The King Review of Low-Carbon Cars*. London: HM Treasury.
- ³ HICKMAN, R., HOUSE, V., BANISTER, D. and HOUSE, W., 2005. If, At First, The Idea is Not Absurd, Then There is No Hope For It: Towards 15 MtC in the UK Transport Sector. 2005, pp23– 27.
- ⁴ BROOK LYNDHURST, 2006. *The City Climate Challenge for 2050 Your city your responsibility* RICS.
- ⁵ <u>http://www.dft.gov.uk/pgr/economics/ntm/roadtransportforcasts08/rtf08.pdf</u>
- ⁶ DETR, 2001. Planning Policy Guidance Note 13: Transport. The Stationery Office.

⁷ DFT, 2007. *National travel survey : 2006.* London: Department for Transport.

- ⁸ WOOTTON, J., 1999. Replacing the private car. *Transport Reviews*, **19**(2), pp. 157-175.
- ⁹ From the 2001 Census (table CS061), the wards with the highest levels of bus commuting (119 with over 25%), all in larger cities than Oxford, all have car ownership substantially below the national average.
- ¹⁰ DAVISON, L.J., 2005. The Effectiveness of Bus Quality Partnerships in Achieving Government Transport Policy Objectives. PhD edn. University of Salford.

¹¹ On: <u>http://www.oxford.gov.uk/planning/corestrategy.cfm</u>. See section 1.6

- ¹² For example, Poundbury in Dorset, see: BECKER, A., 2006. Does mixed-use development reduce the demand for travel? BA edn. Bristol: University of the West of England. And Caterham Barracks in Surrey, see: KENNELL, K., 2004. Mixed Use Developments Are They Sustainable? MSc edn. University of Westminster.
- ¹³ Based on list in Local Transport Today issue 516, March 27th 2009
- ¹⁴ BOWS, A. and ANDERSON, K.L., 2007. Policy clash: Can projected aviation growth be reconciled with the UK Government's 60% carbon-reduction target? *Transport Policy*, **14**(2), pp. 103-110.

¹⁵ <u>http://www.dft.gov.uk/pgr/sustainable/climatechange/areviewofpublicattitudestocl5731?page=3</u>

- ¹⁶ From the 2008 National Travel Survey on: <u>www.dft.gov.uk/pgr/statistics/datatablespublications/tsgb/2008edition</u>.
- ¹⁷ PARKHURST, G., 2003. Regulating Cars and Buses In Cities: The Case Of Pedestrianisation in Oxford. *Economic Affairs*, 23(2), pp. 16-21.
- ¹⁸ <u>http://www.oxford.gov.uk/files/seealsodocs/77063/18%20Background%20Paper%20F%20(i)%20-%20Oxford's%20Economy.pdf</u> See Appendix 2.
- ¹⁹ Unpublished paper submitted by Peter Headicar to the Planning Practitioner Liaison Committee analyses Didcot Ladygrove ward, which adjoins Didcot Parkway. Very few of these people work in Didcot and, surprisingly, only 3% commute to Central London by rail.

¹On the IPCC 'by source' basis (different measurements are sometimes used). See: www.defra.gov.uk/environment/statistics/globatmos/gagccukmeas.htm#gatb22007

- ²⁰ <u>http://www.airquality.co.uk/archive/lagm/information.php?info=objectives</u>
- ²¹ Detailed Assessment Report 2008 on: <u>http://www.oxford.gov.uk/environment/air-previous-</u> ²² Air Quality Action Plan 2006, as above.
- ²³ Freiburg as above. Groningen Statistics from: <u>http://www.transpower-</u> rp6.org/uploads/media/Groningen Cycle City 01.pdf
- ²⁴ RENEWABLES ADVISORY BOARD, 2008. 2020 VISION How the UK can meet its target of 15% renewable energy, 0226, www.renewables-advisory-board.org.uk:
- ²⁵ Telephone conversation with Martin Kraftl, Senior Transport Planner.
- ²⁶ CURRIE, G., 2005. The Demand Performance of Bus Rapid Transit. *Journal of Public* Transportation, 8(1),.

²⁷ www.dft.gov.uk/adobepdf/165240/244921/244924/TAL 9-93

- ²⁸ The most authoritative review of the evidence on this question was: GOODWIN, P., HASS-KLAU, C. and CAIRNS, S., 1998. Evidence on the effects of road capacity reduction on traffic levels. Traffic Engineering Control, **39**(6), pp. 348-354. A summary of the findings are on: http://www.worldcarfree.net/resources/freesources/EvidenceontheEffects.rtf
- ²⁹ ANDERSON, J., MULLEY, C. and NELSON, J., 2008. No Car Lanes or Bus Lanes Which Gives Public Transport the Better Priority? An Evaluation of Priority Lanes in Tyne and Wear, 40th Universities Transport Study Group Conference, January 2008,
- ³⁰ www.oxford.gov.uk/planning/localplan.cfm

³¹ www.skyscrapercity.com/showthread.php?t=779550

- ³² http://www.mulhouse.fr/fr/letram.php?PAGEID=1653
- ³³ http://www.caendetoutesnosforces.fr/resources/documents/Les%20Echos%20-article.pdf
- ³⁴ www.bristol.gov.uk/committee/2002/ob/ob002/0415 4.pdf
- ³⁵ www1.eere.energy.gov/cleancities/pdfs/baesen.pdf
- ³⁶ www.oxfordbus.co.uk/content/doc/cms/alternative fuels.pdf
- ³⁷ A recent review of NATA has made some changes, likely to favour walking and cycling, but the fundamental issues mentioned here have not changed. See: www.dft.gov.uk/consultations/archive/2008/consulnatarefresh/natarefresh2009 pdf
- ³⁸ TCPA and DCLG, 2008a. *Eco-Towns Communities Worksheet*. London: Town and Country Planning Association, on: www.tcpa.org.uk/ecotowns.asp

³⁹ See article in *Local Transport Today* on: www.stevemelia.co.uk/lttbuses.htm

⁴⁰ Interim findings published on: www.stevemelia.co.uk/research.htm.

- ⁴¹ <u>www.southoxon.gov.uk/ccm/content/planning/local-plan/core-strategy-preferred-options-</u> <u>consultation.en</u>
- ⁴² <u>www.cherwell-dc.gov.uk/index.cfm?articleid=4167</u>
- ⁴³ HEADICAR, P., 2000. The Exploding City Region: Should it, Can it be Reversed? In: K. WILLIAMS, E. BURTON, M. JENKS and M. JENKS, eds, *Achieving Sustainable Urban Form*. Spon Press (UK), pp. 160-172.
- ⁴⁴ Calculation based on 2006/7 stock and build rates from Communities & Local Government, Housing Trends 2007. Flats represented 47% of all new build in 2006/7, but only added 0.36% to the overall housing stock.
- ⁴⁵ Duncan Bower, Development Director, interviewed on Radio 4: <u>http://news.bbc.co.uk/nol/shared/spl/hi/programmes/analysis/transcripts/19_02_09.txt</u>
- ⁴⁶ From: SCHEURER, J., 2001. Urban Ecology, Innovations in Housing Policy and the Future of Cities: Towards Sustainability in Neighbourhood Communities. PhD edn. Perth: Murdoch University Institute of Sustainable Transport. The 16% figure for Vauban was recorded at an early stage, before extension of the tram network there.

⁴⁷ www.oxford.gov.uk/planning/west-end-aap.cfm

⁴⁸ www.cabe.org.uk/case-studies/ancoats-and-new-islington?photos=true&viewing=305

⁴⁹ Thanks to Peter Headicar for suggesting the need for this section.

⁵⁰ www.oxford.gov.uk/transport/car-parking.cfm

⁵¹ PARKHURST, G., 2000. Influence of bus-based park and ride facilities on users' car traffic. *Transport Policy*, 7(2), pp. 159-172.

⁵² www.streetparty.org.uk

Appendix 1

Transition Oxford Plan: Draft Declaration on Transport

We the undersigned support the principles outlined in the Transport Energy Descent Plan for Oxford. We believe that:

- Tackling climate change and reducing energy consumption must become the guiding principles for all transport and town planning in Oxford. Addressing these challenges will also bring benefits to health and quality of life.
- Oxford's failure to achieve National Air Quality Objectives is a threat to public health. The Low Emission Zone will help in some places, but will not solve the problem. More urgent action to reduce traffic pollution is needed.
- Extending the pedestrianised areas of the City Centre as proposed in *Transform Oxford* is a useful first step, which could be strengthened by the introduction of a carfree residential population to the pedestrianised areas
- The principles of *Transform Oxford* should also be applied to District Centres such as Cowley, Headington and Summertown. Although complete pedestrianisation may not be possible, the fundamental problem of traffic volumes must be addressed.
- Facilities for cyclists across the City are generally poor. Oxford should aim to match Dutch standards of comprehensive, continuous cycle networks which give an advantage in time and convenience over the private car.
- Selective closures of roads to through traffic already applied in many places around the City can be a powerful tool for reducing car dependency.
- Oxford is reaching the limits of what can be achieved with conventional buses: a public transport strategy for the future will need to offer more competitive alternatives to the car, such as trams, light rail, and new rail stations.
- Housing and planning policy should encourage urban intensification within Oxford's existing boundaries.
- European-style carfree developments and carfree neighbourhoods should be part of the plan.
- Expansion of Oxford is a more sustainable option than major expansions of the surrounding smaller towns, which would lead to more commuting.
- Any major extensions to Oxford must be served by a viable public transport alternative (i.e. more than conventional buses).

Census Statistics on Car Ownership and Travel to Work - Oxford and Extensions

Mond	No car or	2 + cars			Passenger		Bus,			
ward	van in household	or vans	Home	Driving a car or	In a car or	Train/tram*	minibus, coach*	Ricycle*	On foot*	Other*
Yarnton, Gosford and Water Eaton	4.5%	59.6%	9.0%	67.5%	5.7%	0.6%	13.3%	6.3%	4.8%	3.9%
Kidlington North	7.8%	47.3%	7.8%	59.4%	6.4%	0.8%	16.4%	7.5%	7.8%	3.1%
Botley#	8.7%	50.2%	10.0%	56.3%	4.3%	2.2%	16.1%	10.8%	7.3%	2.9%
Wolvercote	12.8%	41.1%	11.8%	49.8%	4.1%	2.5%	18.9%	17.1%	6.2%	3.5%
Quarry and Risinghurst	14.3%	40.0%	7.6%	51.1%	4.8%	0.9%	17.0%	13.1%	10.9%	3.0%
Lye Valley	14.9%	42.5%	7.1%	49.1%	5.2%	0.7%	16.5%	14.2%	11.6%	2.8%
Marston	15.4%	37.8%	7.2%	44.8%	5.9%	1.7%	13.1%	21.7%	10.8%	3.0%
Headington	17.0%	38.3%	9.8%	36.8%	2.4%	1.0%	17.4%	14.0%	26.9%	3.3%
Headington Hill and Northway	17.4%	35.2%	7.3%	42.9%	6.0%	1.0%	17.8%	16.8%	12.4%	4.4%
Littlemore	18.3%	35.8%	7.5%	52.2%	6.2%	0.7%	16.6%	12.3%	10.0%	3.2%
Cowley	19.8%	31.8%	6.5%	45.3%	5.5%	1.2%	18.6%	15.3%	11.8%	3.4%
Rose Hill and Iffley	20.5%	33.1%	7.7%	44.3%	5.5%	1.4%	20.6%	14.9%	10.8%	3.5%
Summertown	22.0%	28.0%	11.8%	38.9%	3.1%	3.8%	18.4%	20.9%	12.9%	3.2%
Barton and Sandhills	22.4%	30.8%	6.7%	48.2%	7.1%	0.8%	21.9%	11.0%	8.4%	3.3%
Northfield Brook	22.9%	27.1%	4.1%	53.7%	6.5%	0.7%	22.0%	8.9%	6.6%	3.1%
Iffley Fields	25.6%	28.9%	8.9%	37.6%	4.3%	2.7%	19.0%	21.5%	13.8%	3.7%
North	26.5%	27.4%	12.6%	28.7%	2.0%	4.7%	8.4%	22.1%	31.4%	4.5%
Churchill	27.4%	28.2%	6.1%	38.1%	5.9%	1.1%	21.3%	11.6%	19.6%	3.4%
Cowley Marsh	27.5%	29.2%	6.0%	38.1%	4.7%	1.5%	21.7%	18.1%	13.7%	3.6%
St Margaret's	27.7%	28.0%	14.9%	32.9%	2.7%	5.7%	13.6%	24.2%	20.5%	5.8%
Hinksey Park	28.5%	25.8%	9.8%	35.4%	3.0%	3.8%	14.7%	19.6%	21.4%	3.3%
St Clement's	28.5%	33.2%	9.8%	31.5%	3.7%	2.1%	19.9%	20.2%	21.1%	3.7%
Blackbird Leys	31.5%	21.8%	5.0%	41.6%	7.9%	0.7%	24.2%	11.5%	11.7%	3.5%
Jericho and Osney	32.3%	22.1%	9.4%	33.7%	2.4%	6.9%	10.9%	16.3%	28.8%	3.1%
St Mary's	35.0%	24.7%	8.6%	28.5%	2.9%	2.1%	22.1%	21.1%	22.3%	4.6%
Holywell	43.9%	18.2%	13.7%	10.1%	1.3%	3.2%	6.2%	19.1%	55.5%	18.2%
Carfax	50.3%	13.6%	11.9%	20.8%	2.0%	6.1%	14.6%	11.3%	43.9%	8.8%
Oxford City	23.6%	31.1%	8.4%	41.1%	4.6%	2.2%	17.8%	16.2%	16.0%	0.2%
England	16.9%	41.0%	8.3%	60.5%	6.7%	8.1%	8.2%	3.1%	11.0%	2.4%

All percentages as a proportion of adults aged 16 to 74. # pieced together from smaller Census Areas. * Excluding home workers

Distances and Modes of Travel to Work from 2001 Census

Distances 2 - 5km 5 - 10km 10 - 20km 20 - 40km 40 - 60km Train 2.0% 0.3% 0.2% 0.5% 1.4% 5.4% 7.9%	London) 22.7% 18.6%
Train 2.0% 0.3% 0.2% 0.5% 1.4% 5.4% 7.9%	22.7% 18.6%
	18.6%
Bus, minibus, coach 17.8% 8.3% 29.9% 24.6% 9.0% 4.7% 3.7%	
Driving a car or van 41.1% 22.9% 34.4% 56.6% 78.1% 79.2% 81.3%	42.6%
Passenger in a car or van 4.6% 3.2% 4.5% 5.8% 6.8% 4.9% 3.5%	3.0%
Bicycle 16.2% 22.6% 22.4% 7.9% 1.9% 1.7% 1.0%	2.5%
On foot 16.0% 41.0% 6.4% 2.6% 1.0% 2.1% 1.0%	6.2%
Other 2.2% 1.7% 2.1% 2.1% 1.8% 2.0% 1.6%	4.4%
Column Total: 100.0% 100.0% 100.0% 100.0% 100.0% 100.0% 100.0%	100.0%
Oxford (proportion of all commuters): 100.0% 31.2% 34.1% 10.9% 7.9% 4.3% 2.3%	4.9%
England (proportion of all commuters): 100.0% 22.0% 22.1% 20.1% 16.7% 8.5% 2.4%	3.0%

Note: Home workers (8.4% in Oxford, 8.3% in England) are excluded from all the above statistics

Transport and Planning Practice in European University Cities

Over the past 3 years, the author of this report has visited and studied several cities across north-west Europe which have been relatively successful in reducing dependence on the private car. The three examples described in this appendix are all relevant comparators to Oxford: university cities with historic centres which have been progressively pedestrianised. One key difference, however, is that the historic road patterns have enabled traffic to bypass the city centres more easily than in Oxford.

The other cities are larger than Oxford, with larger proportions of students, according to the latest available figures, although there are potential differences of definition: ¹

	Oxford	Freiburg	Groningen	Muenster
Population:	151,000	219,000	181,000	278,000
Students:	11%	14%	25%	22%

The terrain in Muenster and Groningen is almost entirely flat, whereas Freiburg is more similar to Oxford: substantially flat, but with some challenging slopes on the outskirts.

The graph in the main report illustrates the following modal share statistics:

	Oxford*	Cambridge*	Freiburg	Muenster	Groningen
Car	46%	45%	32%	41%	33%
P.T.	18%	9%	18%	11%	5%
Walk	16%	15%	23%	13%	22%
Cycle	16%	28%	27%	35%	39%

* travel to work only. Sources: 2001 Census, (Ligermoet 2006) & City Councils

1. Freiburg, Germany

Freiburg, in Southwest Germany, is often held up as a good example of planning and transport practice; between the 1970s and 1990s, at a time when car use was rising elsewhere in Germany and the developed world, Freiburg succeeded in reducing it. The following notes were drawn up following a two week study visit there in August 2006. It included interviews with planners and transport planners from the City Council, and representatives of NGOs.

¹ Sources: (Ligermoet 2006), (SLB-W 2009), (Pucher, Buelher 2007). The Oxford information comes from two different sources: the proportion of students from the 2001 Census, which includes only 'usually resident' students. The population comes shown is the National Statistics mid year estimate on: <u>www.oxford.gov.uk/community/popnstats.cfm</u>. This page also states that there are now "more than 30,000 students" at the two universities which would equate to more than 20% without F.E. students etc.

Several of interviewees referred to a successful campaign during the 1970s against plans for a nuclear power plant as a turning point in Freiburg's history. These events, they explained, radicalised public opinion and led to the birth of the German green movement.

Freiburg's historic centre was progressively pedestrianised from 1971 onwards (Monheim 1997) and the following year, contrary to the national trend, a decision was taken to retain and extend the tram network. In 1984 a low-cost all mode regional public transport pass was introduced, which Fitzroy and Smith (1998) identify as the most important factor behind the doubling of public transport journeys over the following decade. In 2006, the season ticket cost 41€ per month and was transferable within households. "Nearly every household has one" according to the City transport planner.

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

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

Unlike the UK outside London, the public transport system benefits from a general subsidy and is directly run or franchised by the City Council. The tram system provides the backbone to the network. 70% of local public transport trips are made by tram; 30% by bus. Buses, along with regional rail serve suburbs and surrounding towns and villages as well as the inner city, but do not compete with trams along the central east-west spine of the City Centre. The trams run mainly along streets, often the central lanes of boulevards, with greater priority than the buses, but the system was suffering from a bottleneck along that central spine, where concentrations of pedestrians delayed their progress. As a result, cycling was often quicker. At the time of the visit, some extensions were planned to alleviate this bottleneck, although funding had not yet been secured – some of the planned improvements shown in red below had not occurred by the end of 2008.



Freiburg Tram Network with Walkable Catchment Areas (recent and planned extensions in red)

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

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

As in Oxford, the residential areas of the city have been covered by a 30 kmh (18 mph) speed limit, with the through routes kept at 50 kmh (31 mph).

A comparison between the two plans below illustrates the limited network of through routes for motor traffic contrasting with the fine grain cycle network. Similar traffic planning principles were observed, and sometimes articulated by transport planners, in other European cities with low levels of car use, including Groningen, as described below. The concept was described by Melia (2008) as *filtered permeability*. This term was subsequently adopted in the Eco-towns Transport Worksheet (TCPA, DCLG 2008) which defines it as: "separating the sustainable modes from private motor traffic in order to give them an advantage in terms of speed, distance and convenience". In Freiburg, cycling and trams are the modes particularly favoured.



Freiburg Cycle Network

The first cycle paths were planned in 1971. The cycle network has progressively developed since then to cover all parts of the city. The quality of the cycle network compares with the best of European practice, in the Netherlands, Denmark and other German cities. The mixture

of cycle lanes, shared paths, junction priority and traffic calmed roads can be found in many UK or French cities but the key differences are the comprehensiveness, continuity and consistent priority of cycle routes.



Junction priority lane

Cycle park at main railway station

Cycle parking is a problem in the centre, despite the 1000 place cycle park by the main railway station. By UK standards, drivers were courteous, respecting the priority measures, but some of the cyclists seemed comparatively aggressive. There are occasional conflicts with pedestrians on shared paths – facilities which the cycling federation has campaigned against.

Cyclists are allowed on the routes shown in blue through most of the pedestrianised area, but as shown below the main East-West and North-South routes are severed. This arrangement has not been without its problems: cyclists do not always respect the rules.



Pedestrianised area yellow, blue routes open to cyclists, dotted blue evenings & weekends

Through this combination of policies, according to municipal statistics, the modal share of car travel was reduced from 60% in 1979 to 43% in 1999 (Heller Undated). Cycling rose from 18% to 29%. These statistics did not include walking. Walking as a principal mode fell from 32% in 1982 to 23% in 1999. This was explained by the increasing take-up of the public transport season tickets: trips by public transport were believed to be substituting for some journeys which would otherwise have been entirely walked.

2. Groningen, Netherlands

Groningen is a city in the North of the Netherlands. Like Freiburg the removal of traffic from its city centre began in the 1970s. Unlike pedestrianised city centres in Britain, it has a relatively large residential population, which has grown by 18% in the decade to 2008 (Gemeente Groningen 2008). It was visited for five days during July 2007, including an interview with the Senior Transport Planner for the City Council.

The transport and planning policies of Groningen bear several similarities to those of Freiburg. Planning policy aims to create a "compact and complete city" (Gemeente Groningen 2006), attracting more people, including families with children, to live in the central areas of the city. Although the residential densities have fallen in recent decades, the city remains concentrated around its historic core: 78% of its residents and 90% of its jobs are located within 3km of the centre (Ligermoet 2006). Major retail outlets are concentrated in or directly adjacent to the City Centre.

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

The cycle network shown below has been progressively developed since the publication of a new traffic plan in 1969. In common with most Dutch cities, there is a strong preference for higher levels of segregation between cyclists and general traffic, with separate paths preferred to on-road lanes, wherever possible. This approach is directly contrary to the one followed in the UK where the most recent guidance re-states a hierarchy of solutions, seeking to avoid segregation wherever possible (DfT 2008).



Groningen 'Coarse Grain' Network for Motors (With permission: Gemeente Groningen)



Groningen 'Fine Grain' Network for Cycling (With permission: Gemeente Groningen)

In recent years, Groningen has alternated with Zwolle as the city with highest proportion of trips by bicycle in the Netherlands (Ligermoet 2006) and probably the developed world, as the Netherlands has the highest proportion at a national level. According to the transport

planner, cycling rates in Groningen followed national trends: falling through the 1960s and early 1970s, then recovering, and had been rising strongly during the previous five or six years. The initial fall was caused by rising car ownership and use and a planning policy which encouraged decentralisation. Factors influencing the recovery have included:

- A rise in the status of the bike
- Growing concern over health
- Traffic congestion
- Constraints on driving and parking
- The growing network of cycle infrastructure
- A planning policy oriented towards urban intensification

On the most recent measure, using traffic counters, cycling accounted for 59% of traffic movements within the city (Vissers 2008).

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

Pedestrianisation

During the 1960s there was a considerable increase in car traffic leading to a traffic plan for major roadbuilding within the city boundaries. In 1972, a new coalition Council decided to radically change the traffic plan. The aim was to bar through traffic from the City Centre, whilst improving access for buses and bicycles. This was initially done by dividing the historic centre into four segments which, whilst each remained open to traffic, were divided by a cordon permeable for bikes but not cars. The plan was strongly opposed by retail business interests. Following its implementation in 1977 surveys provided conflicting evidence on the impact of the changes on city centre shops. Those studies which asked shopkeepers to report on the effects tended to show a more negative picture than those which examined objective measures such as visitor numbers (Tsubohara 2007). During the late 1970s the Council resisted pressure from the retail businesses to reverse the traffic plan, and as the progressive removal of traffic continued the businesses gradually became more positive towards the strategy.

The transport planner said that the City Council and Chamber of Commerce worked closely together. During the time of the visit, the Chamber was funding a trial of free supervised cycle parking in the multi-storey car parks within the City Centre. Some research (reported, not seen) indicated that shoppers by bicycle spent a similar amount to shoppers by car, but spread over a larger number of trips. Amongst Groningen residents, 46% of trips to the City Centre are made by bicycle compared to just 9% by car.

Visitors from outside the city tend to use the car or public transport to a greater extent, which changes the overall modal shares. An important element of these journeys to the City Centre is the culture of shopping by bicycle, which is observable everywhere across the City and in many other places in the Netherlands. The thirty guarded cycle parking facilities around the city and particularly in the City Centre may have helped the development of this culture.



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



Groningen City Centre (the area within the moat – roughly 1km²)

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

	Cars/100 households	
Netherlands	89.1	
Groningen	50.7	
Groningen City Centre	28.7	

Car Ownership in Groningen and the Netherlands. Source: Gemeente Groningen 2008

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

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

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

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



The examples of filtered permeability across the City were many and various, including separate cycle paths, bridges, underpasses and bus/cycle gates. The flows of cycle traffic on radial routes between the centre and suburbs were also substantial. In other aspects such as density and relatively unrestricted parking the suburbs built during the 1970s and 1980s appeared similar to those built around the same time in British cities.

3. Muenster, Germany

Muenster (population 278,000) is "Germany's No.1 cycling city", with rates of cycling increasing to 35% of journeys by 2001 (Ligermoet, 2006). It has approximately 60,000 students and its terrain is fairly flat. It was visited for three days during the summer of 2008.

Unlike a number of German cities of similar size, Muenster has no tram or metro system. The share of local public transport – essentially buses – at 11% is lower than cities such as Freiburg. The city centre is substantially pedestrianised and closed to through traffic.

Ligermoet (2006) and Pucher and Buelher (2007) describe the comprehensive strategy which has supported the growth in cycle use in Muenster. The cycling network is comparable in quality and comprehensiveness to Dutch cities, with one difference. Although policy aims to provide separate space for cyclists and pedestrians, often using separate paths, following usual German practice, on-street cycle routes are often built into the pavements on the same level. Both cyclists and pedestrians tend to treat the whole surface as a shared space in those circumstances, which is acceptable where the flows are limited; the hybrid paths used in the Netherlands and Denmark lead to greater segregation and tend to function better where flows are higher.



Cycle path flush with pavement



Muenster Promenade

The centre-piece of Muenster's cycle network is the Promenade - an 'inner ring-road' open only to cyclists and pedestrians. It is full road width with one or two separate pavements on either side. Although some pedestrians walk on the central path, cyclists are able to make more rapid progress than in conventional shared paths or shared space streets. Its intersections with the radial roads use traffic signals and some underpasses.

Filtered permeability is an important principle of transport management in Muenster, not only in the centre, but across the city as a whole. One aspect of this policy is described by Pucher and Buelher as follows:

"car travel is often detoured by artificial dead ends and deliberate street blockages of various sorts, reducing the speed and convenience of car travel."

Many examples of this policy were visible across the city, sometimes using bollards. In some places it appeared part of a policy to reclaim road space for the public realm.



Bollarded street



Reclaimed street space

The full panoply of means to create shortcuts for cyclists and pedestrians can be seen across Muenster, including its suburbs e.g. separate paths, bridges, underpasses, false one-way streets etc.

Muenster North

The area around Muenster North railway station provides an interesting mini case study of how filtered permeability is achieved there. Muenster North is on the edge of the city, 2.5km from the centre.



Muenster North



Employment Area near Muenster North Station (blue arrow plan left)



Muenster North Station (yellow arrow)

The western side of the station was mainly employment area, the eastern side mainly residential. On the above plan the blue lines are the cycle network, some of which are on segregated paths (often as wide as a road) and some on roads closed to through traffic. The red crosses indicate key points where pedestrians and cyclists are allowed through, and motor vehicles are not. A small car park and Covered cycle parking is provided at the station, which is also a nodal point for buses. Observing the station around the evening rush hour, the largest proportion of station customers arrived on foot, followed by cyclists. Relatively few appeared to use cars or buses.

4. Lessons for Oxford

Lessons from these three examples have informed the main report. The first conclusion which may be drawn is a hopeful one: the progressive removal of traffic suggested by *Transform Oxford* has been a key part of the successful strategy of these three cities to restrain car use and promote quality of life, though other factors have also been important.

The modal share statistics shown in the introduction to this appendix come from differing sources, so the comparison should not be taken as exact, but the pattern of trams contributing to higher modal shares for public transport has been observed across Germany and elsewhere (Hass-Klau 2001). To some extent, the sustainable modes appear to substitute for each other – the reduction in walking observed in Freiburg offers a cautionary tale of unintended consequences in this respect. But in all three cities, comprehensive transport and planning policies have helped to restrain car use.

Filtered permeability, comprehensive and continuous cycle networks, and the quality of segregated facilities have all contributed to the higher rates of cycling in these three cities. Cycle parking has been a problem, but more effort has been put into tackling these problems than seen so far in Oxford. With a similar focus on improving conditions for cycling, there should be considerable potential for increasing rates of cycling across the city.

References

DFT, 2008. *Cycle Infrastructure Design*. Local Transport Note 2/08. London: Department for Transport;Scottish Government;Welsh Assembly.

FITZROY, F. and SMITH, I., 1998. Public transport demand in Freiburg: why did patronage double in a decade? *Transport Policy*, **5**(3), pp. 163-173.

GEMEENTE GRONINGEN, 2008. Statistisch Jaarboek. Groningen: .

GEMEENTE GRONINGEN, 2006. *Progressive!* Groningen: Planning and Economic Affairs Department.

HASS-KLAU, C., 2001. Walking and the relationship to public transport, *Australia: Walking in the 21st Century*, ", February 2001, pp81-90.

HELLER, P.W., Undated. Sustainable Human Development in a Medium-sized City: The Example of Freiburg, Germany. Online:

http://www.canopusfund.org/article freiburg Heller.pdf: Canopus Foundation.

LIGERMOET, D., 2006. Continuous and Integral: The Cycling Policies of Groningen and Other European Cities. 7. Rotterdam: Fiets Beraad.

MELIA, S., 2008. Neighbourhoods Should be Made Permeable for Walking and Cycling But Not for Cars. *Local Transport Today*, **January 23rd**.

MONHEIM, R., 1997. The Evolution from Pedestrian Areas to 'Car-free' City Centres in Germany. In: R. TOLLEY, ed, *The greening of urban transport : planning for walking and cycling in Western cities*. 2nd edn. Chichester: Wiley, pp. 253-265.

PUCHER, J. and BUELHER, R., 2007. At the Frontiers of Cycling: Policy Innovations in the Netherlands, Denmark and Germany. *World Transport Policy & Practice*, **13**(13),.

SLB-W, 2009-last update, struktur und regionaldatenbank [Homepage of Statistische Landsamt Baden-Wuerttemberg], [Online]. Available: http://www.statistik.baden-wuerttemberg.de [January 16, 2009].

TCPA and DCLG, 2008. *Eco-Towns Transport Worksheet*. Town and Country Planning Association.

TSUBOHARA, S., 2007. *The effect and modification of the Traffic Circulation Plan (VCP)traffic plannign in Groningen in the 1980s.* 317. Groningen: Urban and Regional Studies Institute.

VISSERS, H., 2008. Groningen Cycle City, June 2 to June 5 2008, GTZ Transpower; Gemeente Groningen.