

Towards a Transport Energy Descent Plan for Oxford



A report for Transition Oxford

Steve Melia, April 2009

Executive Summary

Recognising 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 dependant 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.

Transform Oxford is an Oxfordshire County Council programme to extend the pedestrianised area, which 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 **Error! Reference source not found.** and discussed in Section **Error! Reference source not found.**
- 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 **Error! Reference source not found.** and Summertown shown in **Error! Reference source not found.**

Planning policies in Oxford should encourage **European style carfree developments** as described in Section **Error! Reference source not found.**:

- 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.

Contents		Page
1	The Brief	5
2	Where we are Heading?	5
2.1	Nationally and Regionally – in the Wrong Direction	5
2.2	Oxford?.....	7
3	Where we Need to be Heading.....	10
4	Transform Oxford	11
4.1	Bus Routes.....	11
4.2	Cycling	14
4.3	Re-introducing a Residential Population to the Pedestrianised Area.....	17
4.4	The Key to Real Change: Magdalen Bridge	18
5	Public Transport: Fundamental Problems & Long-term Solutions	Error! Bookmark not defined.
5.1	The Problems.....	Error! Bookmark not defined.
5.2	The possibilities for Rail	Error! Bookmark not defined.
5.3	Light Trams	Error! Bookmark not defined.
5.4	Other Changes to Bus Routes.....	Error! Bookmark not defined.
5.5	Reality Check: the Politics and Funding of Transport ...	Error! Bookmark not defined.
6	Other Measures in the Short and Medium Term.....	Error! Bookmark not defined.
6.1	Cycling	Error! Bookmark not defined.
6.2	Planning for Growth.....	Error! Bookmark not defined.
6.3	District Centres.....	Error! Bookmark not defined.
6.4	Carfree Development	Error! Bookmark not defined.
6.5	Non-Residential Parking and Travel into Oxford	Error! Bookmark not defined.
7	Getting There.....	Error! Bookmark not defined.
Appendix 1	Draft Declaration	
Appendix 2	Census Statistics on Car Ownership and Travel to Work	
Appendix 3	Distances and Modes of Travel to Work	
Appendix 4	Transport and Planning Practice in European University Cities	

Illustrated Recommendations

Figure 1	North/West Bus Priority Route.....	13
Figure 2	City Centre Cycle Route Recommendations	17
Figure 3	Magdalen Bridge.....	18
Figure 4	Rail and Tram Proposals.....	Error! Bookmark not defined.
Figure 5	North/East bus route	Error! Bookmark not defined.
Figure 6	Cowley Road – Proposed Break in Route for Through Traffic	Error! Bookmark not defined.
Figure 7	Summertown District Centre – Proposed Traffic Restrictions	Error! Bookmark not defined.

1 The Brief

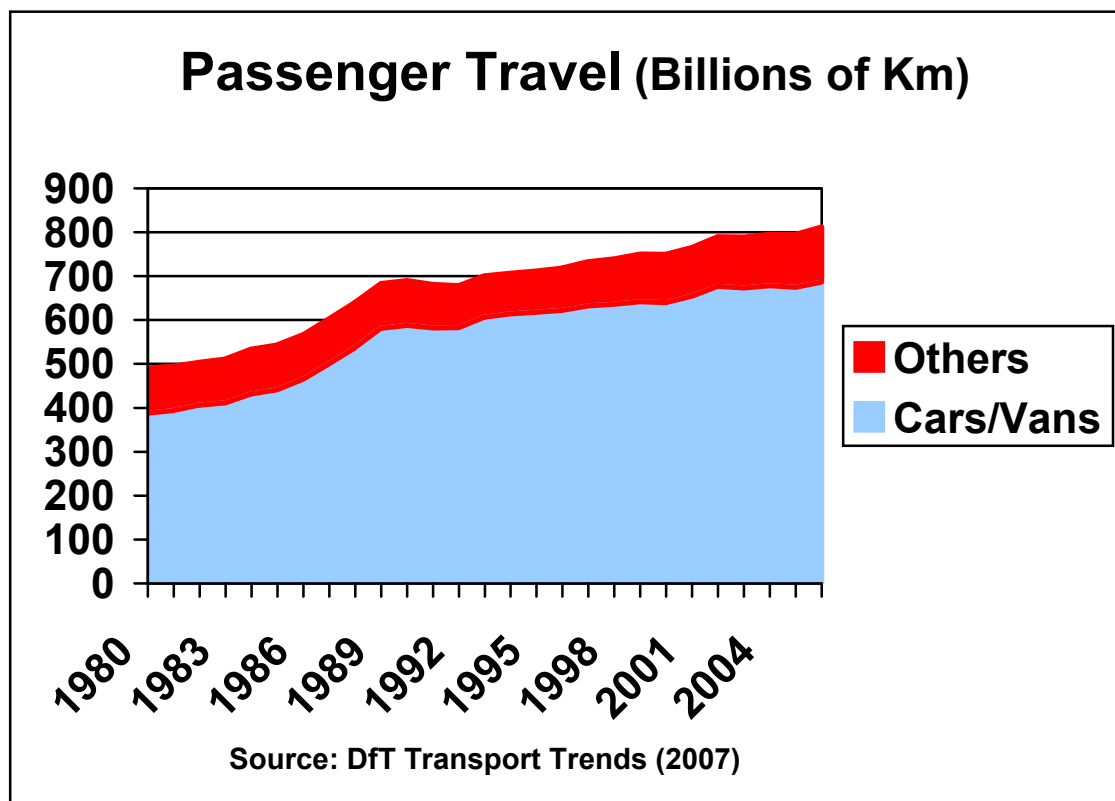
This report was commissioned by Sustrans for Transition Oxford, to respond to the County Council's Transform Oxford programme and, taking a longer-term perspective, to consider how transport in the City might evolve to support the energy descent planning of the Transition Town movement. The aim of this is to reduce dependence on oil and CO₂ emissions.

The report will concentrate mainly on transport within Oxford's boundaries and by Oxford residents, although sections **Error! Reference source not found.** and **Error! Reference source not found.** 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 car”⁶ – 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.

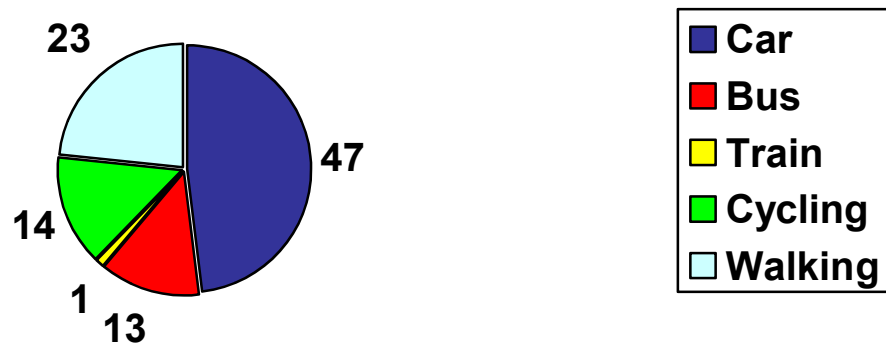
Alongside these weak measures ostensibly aimed at restraining the growth in traffic there has been a national and regional resurgence in road building, which is likely to make the problem worse. Of the priorities contained within the Southeast Regional Funding Allocation, nearly 90% of the funding – 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 CO₂ 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:

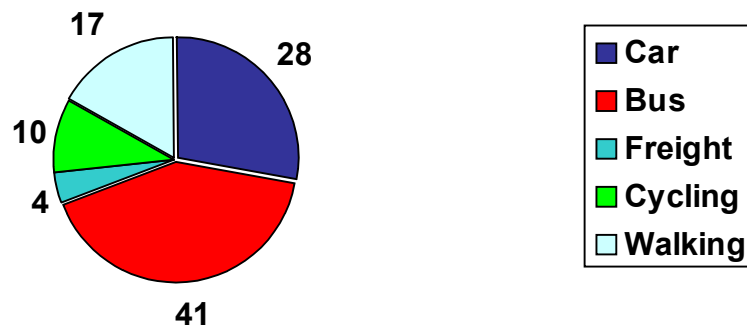
Modal Share, Trip Stages, All Purposes Source: Access to Oxford (2008)



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

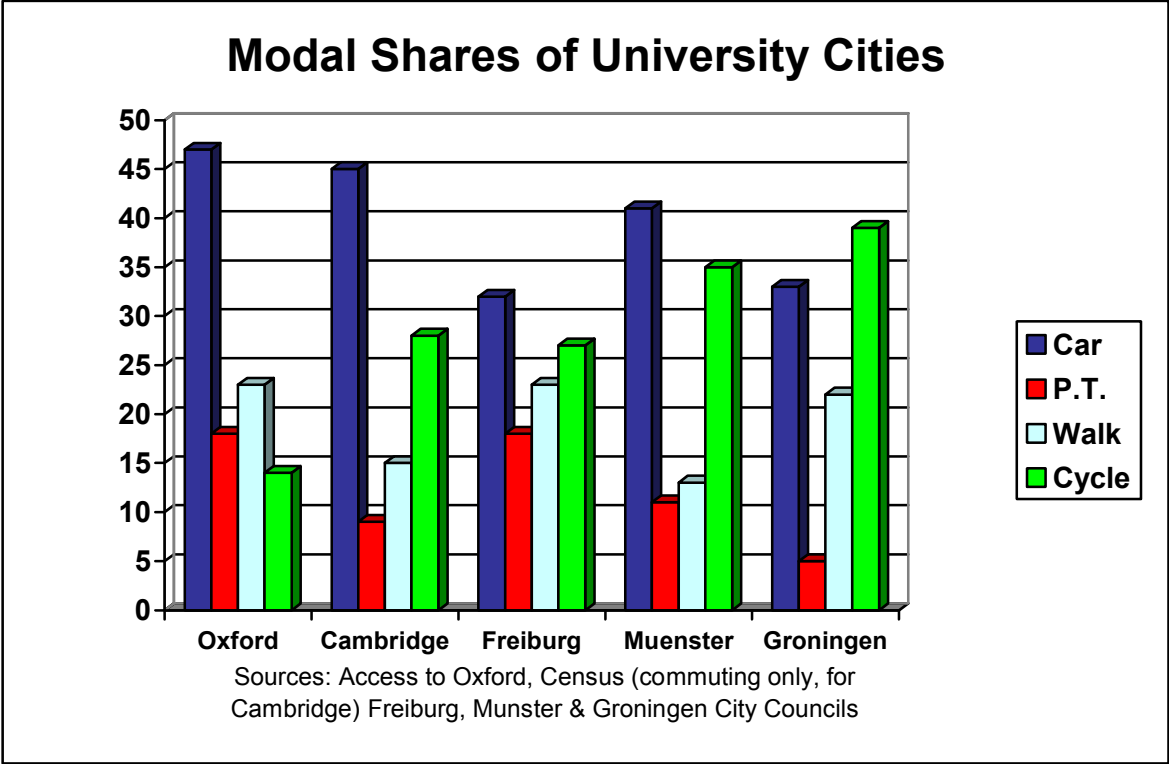


Appendix 2 shows the Census statistics by ward, illustrating the usual relationship between car ownership and car use, with both increasing (in general) with distance from the city centre. Bus use is higher than average in all wards except Holywell, where most people walk to work.

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 2005²⁰. 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 2013²⁵. 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 2020²⁴. New sources of renewable energy can be used either:

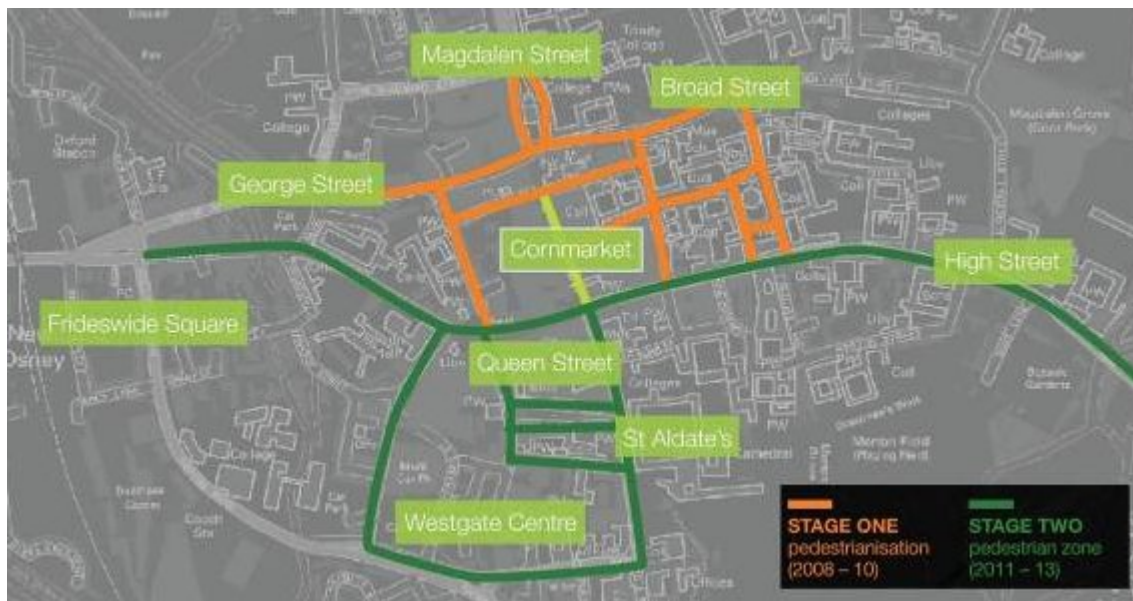
- a) to reduce carbon emissions from existing coal or oil-fired power stations, or:
- b) to satisfy additional demand for electric transport

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.



Produced with permission Oxford City Council (OS Licence 1000233432008)

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 CO₂ 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.

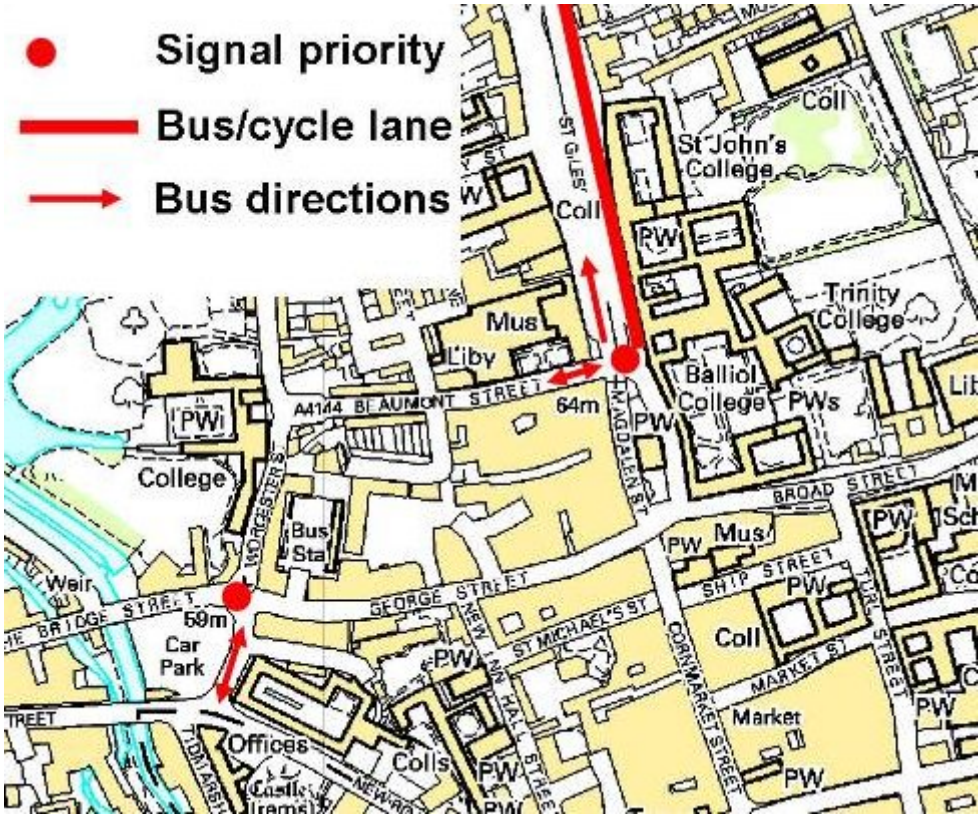


Figure 1 North/West Bus Priority Route

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 **Error! Reference source not found.**) 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 **Error! Reference source not found.** 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.

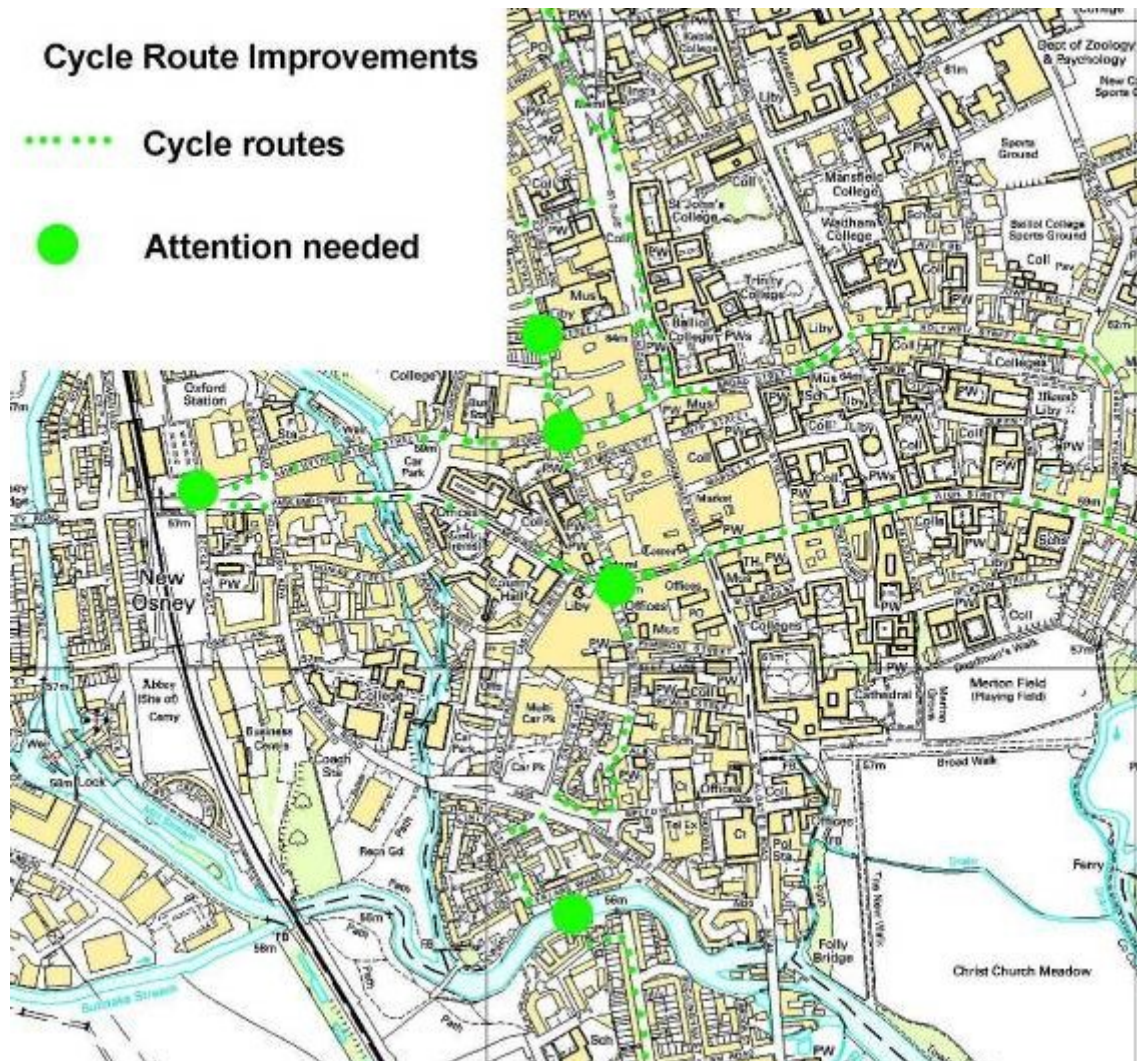


Figure 2 City Centre Cycle Route Recommendations

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

4.4 The Key to Real Change: Magdalen Bridge

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.

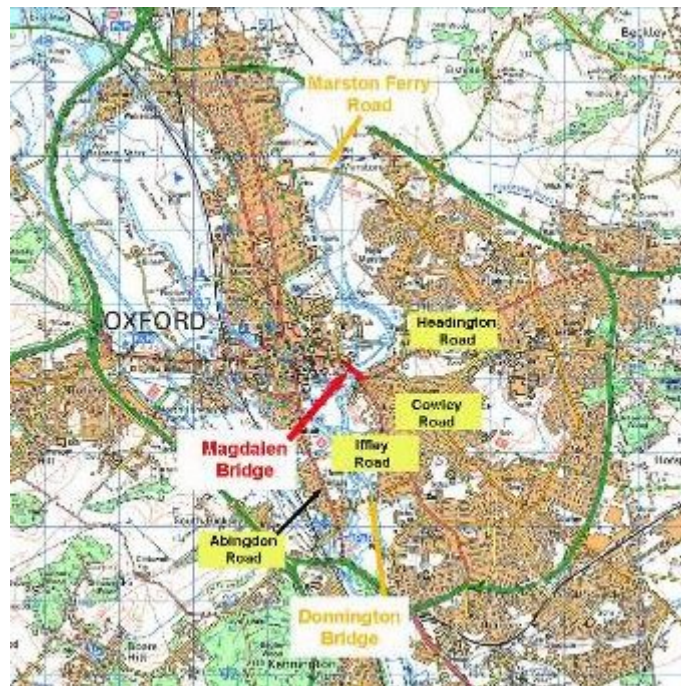


Figure 3 Magdalen Bridge

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.

-
- ¹ On the IPCC 'by source' basis (different measurements are sometimes used). See: www.defra.gov.uk/environment/statistics/globalatmos/gagccukmeas.htm#gatb22007
- 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 <http://www.dft.gov.uk/pgr/economics/ntm/roadtransportforecasts08/rtf08.pdf>
- 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: <http://www.oxford.gov.uk/planning/corestrategy.cfm>. 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: KENNEL, 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 <http://www.dft.gov.uk/pgr/sustainable/climatechange/areviewofpublicattitudestocl5731?page=3>
- ¹⁶ From the 2008 National Travel Survey on: www.dft.gov.uk/pgr/statistics/datatablespublications/tsgb/2008edition.
- ¹⁷ PARKHURST, G., 2003. Regulating Cars and Buses In Cities: The Case Of Pedestrianisation in Oxford. *Economic Affairs*, **23**(2), pp. 16-21.
- ¹⁸ [http://www.oxford.gov.uk/files/seealsodocs/77063/18%20Background%20Paper%20F%20\(i\)%20-%20Oxford's%20Economy.pdf](http://www.oxford.gov.uk/files/seealsodocs/77063/18%20Background%20Paper%20F%20(i)%20-%20Oxford's%20Economy.pdf) 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.

-
- ²⁰ <http://www.airquality.co.uk/archive/laqm/information.php?info=objectives>
- ²¹ Detailed Assessment Report 2008 on: <http://www.oxford.gov.uk/environment/air-previous-reports.cfm>
- ²² Air Quality Action Plan 2006, as above.
- ²³ Freiburg as above. Groningen Statistics from: http://www.transpower-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>