The City Council welcomes the Oxford Transport Strategy consultation and encloses its response. The Strategy prepared by the County Council represents a forward thinking and ambitious package of measures that could form the basis of a world-class transport system for Oxford.

We believe that the Strategy should go further to support walking, cycling and public transport, placing these modes at the top of a public transport hierarchy that guides the Strategy, and will require a significant re-allocation of road space. In Oxford’s constrained highway network the only way that the increases in forecast demand can be accommodated is by making the most efficient use of space possible. Our consultation response demonstrates that solutions have already been successfully implemented in other cities which share this vision and ambition. There is an urgent need for a clear programme to develop and deliver improvements to the city’s transport, where the need for investment is increasingly restricting Oxford’s economic potential and impacting on the quality of our environment and built heritage.

The City Council supports the principles for a mass transit based on our principal transport corridors. This needs to be fully integrated with other sustainable travel modes, including park and ride, rail, cycling and walking. It also needs to support the city’s requirement for sustainable urban extensions to meet its housing and employment needs. We also recognise the importance of rail and the need to ensure the redevelopment of the railway station, and the opening of the Cowley branch line for passengers within the next five years. A high quality bus service remains essential and we wish to see a review of routing with the service providers and a bus management strategy which can deliver further service improvements, including improved bus priority and extending dedicated bus lanes.

We believe that the success of our park and ride facilities needs to be supported and enhanced. Further analysis is required to identify the potential for new park and ride sites, but we are not convinced that the closure of the existing facilities will provide benefits. We support the development of a freight consolidation strategy and would wish to see previous work in this area now this taken forward.
As part of the mass transit network we would wish to see further consideration of the location and development of terminals, and believe that there are alternative and less costly solutions than bus tunnels. We strongly endorse the principle of a zero emission zone in Oxford, and this needs to work with the City’s Air Quality Action Plan.

The City Council believes that as a compact city we should set a radical and ambitious strategy for increased cycling and walking. An overarching walking strategy is needed. There is the potential for the Strategy to go further in its commitment to providing more space for these modes, creating better connections and improving the quality of the facilities, and adopting best practice from other European cities.

The City Council supports measures to improve the ring road and to increase capacity for traffic displaced by restrictions in the city centre. There is a potential range of measures (Intelligent Transport Systems) which may assist, including messaging for drivers on speed limits, congestion, route options and park and ride capacity. In the city centre we would expect an increased use of traffic control points, and potentially a Workplace Parking Levy to encourage use of sustainable transport modes. The Strategy is due to include an assessment of the city’s public parking needs, and we wish to see this undertaken. The available evidence suggests that public parking supply and demand in the city are broadly in balance. However, we also believe that Controlled Parking Zones should be extended to the whole city to avoid residential parking being overwhelmed. The access to our hospitals needs specific consideration, including the options for dedicated park and ride parking for staff and the potential for direct access to the ring road for emergency vehicles.

In conclusion, the City Council wishes to work with the County Council, the Local Enterprise Partnership and our partners, stakeholders and communities to support an ambitious and forward thinking strategy. Officers would welcome the opportunity to discuss with the County Council how it wishes to take this forward, the priorities and the programme. The City Council’s response to the Oxford Transport Strategy consultation remains in draft until approved by Members at the City Executive Board and Council later this year.

David Edwards
Executive Director

Contents

Executive summary ............................................................................................................. 1

1.0 Strategic Context ........................................................................................................... 3
  1.1 Introduction ................................................................................................................. 3
  1.2 A short history of growth and movement patterns in Oxford ........................................ 5
  1.3 National Policy ............................................................................................................ 6
  1.4 Local Policy ................................................................................................................ 6
  1.5 Supplementary Planning Documents (SPDs) ............................................................... 12
  1.6 Housing and employment needs ................................................................................... 13
  1.7 Effect on Movement .................................................................................................... 14
  1.8 Summary .................................................................................................................... 16

2.0 Learning from Elsewhere: European and UK Best Practice ..................................... 18
  2.1 Introduction ............................................................................................................... 18
  2.2 European Best Practice ............................................................................................. 18
  2.3 Bus Rapid Transit (BRT) Best Practice ....................................................................... 27
  2.4 Park and Ride (P&R) .................................................................................................. 31
  2.5 Cycling Development: UK and European Best Practice ............................................. 32
  2.6 Summary of lessons learned ...................................................................................... 33

3.0 City Centre Transport Strategy Principles ................................................................ 34

4.0 Mass Transit ................................................................................................................ 36
  4.1 Introduction ................................................................................................................. 36
  4.2 What is proposed? ...................................................................................................... 37

5.0 Walking and cycling .................................................................................................... 51
  5.1 Introduction ............................................................................................................... 51
  5.2 What is proposed? ...................................................................................................... 51

6.0 Managing Traffic and Travel Demand ........................................................................ 59
  6.1 Introduction ............................................................................................................... 59
  6.2 What is proposed? ...................................................................................................... 59

7.0 Integration and Delivery ............................................................................................. 65
  7.1 Introduction ............................................................................................................... 65
  7.2 Integration ................................................................................................................ 65
  7.3 Timing ........................................................................................................................ 65
  7.4 Funding ...................................................................................................................... 66
Executive summary

This report is Oxford City Council’s response to the consultation draft Oxford Transport Strategy published by Oxfordshire County Council as part of the broader Local Transport Plan consultation. We welcome the opportunity to comment on the proposals, which we consider to be ambitious and forward thinking. With the amendments we propose we believe the Strategy could set Oxford on course for being an exemplar of sustainable travel and we look forward to working with you on getting the Strategy right for the city.

Compared to other cities and towns, Oxford is unusual in that its primary movement structure in the centre is largely the same as it was 150 years ago. Many urban areas have added radial connections and a ring road but whilst this infrastructure has in the past been planned for Oxford, it has been abandoned due to its impact on the natural and historic landscape. The consequence, however, is intense levels of movement in the most historic part of the city. As the city grows pressure on its infrastructure will increase and a radical approach to the future pattern and type of movement is therefore needed. In Chapter 1 we expand on these issues setting out Oxford’s historic development and explore the challenges that lie ahead if increasing levels of economic growth are to be maintained into the future. The full suite of policy that must inform decision making within Oxford is summarised along with the high level impact on movement of the anticipated growth in housing and jobs.

In chapter 2 we look to transport best practice in Europe and the UK to inform our response and we have summarised some of the key lessons that must be borne in mind for Oxford’s new transport strategy. A key message is that any successful strategy must contain a package of properly integrated measures with priority given to sustainable modes over the private car.

In chapter 3 we distil this into key transport strategy principles for the city centre that should inform the Oxford Transport Strategy. These include establishing a clear modal hierarchy, creating a fine grained network for walking and cycling throughout the city, penetration of public transport services as close to the city centre as is practicable, a comprehensive review of bus operations in the centre, and a coarse grained network for general traffic, with no movement through the city possible for most of the day.

Chapters 4 to 6 set out our detailed response to the consultation. The key points are set out below.

We do not believe that the evidence base is sufficient to justify option selection at this stage. This is particularly the case for key areas such as the form of mass transit, bus operations, park and ride and tunnels and we believe the Strategy must reflect the fact that more work will be needed to inform preferred options. Where appropriate we have highlighted alternative options that should be considered alongside those proposed, such as radically different management of the bus network. We believe the proposed park and ride proposals are flawed and that the Strategy must retain the existing sites in order to serve those commuters living closer to the city. We do not believe that tunnels are a feasible solution for Oxford.

A consistent message across our response is that the Strategy does not provide sufficient priority for sustainable modes over the private car. With road space limited and largely finite within the city, the only way substantial growth in commuting can be accommodated sustainably is if a greater proportion of people walk, cycle and use public transport. This must be expressed through a commitment to radically reallocate road space. With more and more people already choosing to walk and cycle, despite a lack of consistent facilities, we know there is a huge appetite for this within the city and one that should be utilised. World class facilities for cyclists and an overarching strategy for walking are currently missing from the Strategy. We support the bold package of measures to manage demand for car use, although we question the benefits of congestion charging for a city the size of Oxford.

Chapter 7 includes our views on integration and delivery. We believe that the timing of implementation for the Strategy measures must be well balanced with capacity improvements, enhancements to walking, cycling and public transport and controls on access all closely linked. Some more work is required on this and we suggest key corridors are identified as a way of setting out how the measures will be integrated in practice.

An overseeing Strategy Board should be created to help steer the Strategy and agree priorities for funding. The Strategy Board should include the City Council and other key stakeholders. We believe that achieving consensus on the delivery of the Strategy will make the job of implementing it that much easier.
1.0 Strategic Context

1.1 Introduction

Oxford is recognised as a world class city, which is internationally known as a focus for the knowledge economy and for its academic stature, as well as being an international tourist destination and a regional service centre. The city has an outstanding built heritage and setting.

The city has excellent rail and road connections and is strategically located in the heart of Oxfordshire between two of the UK's largest cities: London and Birmingham. The A34, A4142 and A40, form a ring road around Oxford linking to the M40 and M4 and provide close links with the wider network of surrounding settlements including Abingdon, Didcot, Kidlington, Bicester and Witney (Figure 1.1).

The new East-West Rail line, Oxford Parkway station and rail electrification will provide direct rail connections to Bicester, and London Marylebone which will further strengthen Oxford’s economy. Its strategic location supports the growth of major businesses such as the MINI Plant Oxford.

The Oxford Canal and River Cherwell run north-south through the city linking Oxford to Kidlington/Birmingham and London whilst providing an attractive leisure corridor, in particular for canal boat hire, walking and cycling.
Oxford is situated within Oxfordshire Local Enterprise Partnership (LEP), which plays a key role in determining local economic priorities to provide a catalyst for economic growth and the creation of local jobs (Figure 1.2). Oxford sits within an arc of thriving settlements from Cambridge to Reading that have generally witnessed continued economic growth and investment. The arc ranks high for income levels, employment opportunities and close links to Oxford and Cambridge Universities. Facilities associated with the University of Oxford occupy a large proportion of north Oxford, creating an educational corridor that stretches to Begbroke Science Park near Kidlington. In addition, Oxford Brookes University further extends the educational quarter with three campuses situated across Oxford.

The continuing success of the city’s economy and its world class institutions depend on sustainable urban growth through a radical strategy which gives priority to sustainable modes of transport and increased investment in the city’s infrastructure to support this. The solutions identified in this response to the Oxford Transport Strategy consultation have already been successfully implemented in other cities which share this vision and ambition.
1.2 A short history of growth and movement patterns in Oxford

Oxford was established as a Saxon settlement where the road to the North and Midlands from the Solent and from the important Romano-British and Wessex town of Winchester forked the Thames. This road carried travellers along St Aldates, and gathered marketplaces around it on Commarket and St Giles. After the Norman Conquest, the road from London and the Thames Estuary to the Midlands, which descended from the Chilterns into the Thames Valley at Oxford as a staging post, grew continuously in importance. The south/north and south-east/north-west traffic met in a ‘T-Junction’ at Carfax, within the controlling Saxon walls. This junction was further secured by the Norman Castle established to its east, above the fords. This dominant pattern of movement has had a profound influence on Oxford’s urban form. Meanwhile, movement to and from the west was always secondary due both to the physical constraints of the Thames, and weaker demand for movement of people and goods from and to the west.

A dense town developed, mainly within the walls, limited by the unsuitability for building on the floodplains to the south-west and south-east. Religious foundations grew up on these green fringes of the town and under the protection of the Castle, and eventually gave rise to the early University. The Middle Ages brought local stability, allowing a permanent bridge across the Cherwell to be constructed at Magdalen, with a causeway and bridges across the Thames streams and islands built to the west. The expansion of the colleges, which were concentrated to the east of Carfax and within the town walls until at least the sixteenth century, began creating large urban blocks and extinguishing smaller routes through the town, adding pressure to the main roads, which is familiar to travellers in today’s city. This concentration of development between fluvial constraints and within a town wall helped give rise to the rich built heritage within the city centre, while the dominance of the movement from London begins to explain the generous scale of the High Street.

Between the seventeenth and nineteenth centuries, the University stagnated but parts of the town such as Beaumont Street were replanned and architecturally embellished. With the Industrial Revolution, through-traffic increased again and finally pushed the town decisively beyond the old core. The Oxford Canal connected the navigable Thames to the Midlands from 1790 and brought the development of Jericho and light industry to the north-west of the town. Brunel’s railway arrived through the Thames Valley to the city’s west, developing small suburbs around its 1844 and 1852 termini (Grandpont and Osney respectively). In the later nineteenth century, as University reforms brought a large increase of undergraduate students, steam plough and car manufacturing turned Cowley into Oxford’s main industrial suburb. Oxford’s population grew by 20% in the 1920s alone.

The pressure of industrial and private motor traffic drove the creation in 1935 of an A40 bypass at Oxford’s north-west corner, taking the junction of London-Midlands traffic with the north-south route outside the city to the north. A full ring road was envisaged, with a Hinksey to Botley road created beyond the south-east corner of town in 1938; the main transport pressure on Oxford was, as it had been for 900 years, movement from the south-east to the north-west. The ring road was not completed until the 1960s; when pressure was already growing for town centre traffic relief measures. While this removed much of the London-Midlands traffic from the centre, the primary movement routes through the city remained largely unchanged.

The castle historically played a role in overseeing key fording points and routes from the west, even as the eastern side of the town grew in importance for both movement and commerce. The urban structure of the city to the west, fragmented by the castle, River Thames, Castle Mill Stream and the railway, remains less successful in movement terms, despite the construction of the rail station and connections from the A34.

Throughout the country many other cities have built edge of centre ring roads – perhaps the modern day equivalent of city walls – and additional radial connections in a bid, not always successful, to move traffic more efficiently. Oxford has been unable to do this and although Marston Ferry Road and Thames Street were realised as inner bypasses replicating the north-west and south-east arms of the outer ring road, persistent schemes for a complete inner ring were abandoned as its enormous cost to the natural and historic landscape was recognised.

This has meant that much traffic has continued to come into the central, most historic and constrained part of the city. The four key radial approach routes are restricted by the floodplain and reliant on river crossing points established in the Middle Ages. This situation is unusual when comparing Oxford to other UK cities, and is a result of hundreds of years of development working with and constrained by the natural features of its immediate hinterland.

An understanding of this history and what it means for movement into and through Oxford is essential to the development of the Oxford Transport Strategy and informs our response to the consultation.

Figure 1.3 Hollar’s 1675 map of Oxford showing limited access from the west and impact of south-east - north-west movement on the urban form
1.3 National Policy

1.3.1 National Planning Policy Framework (NPPF), 2012

The National Planning Policy Framework (NPPF) sets out the Government’s planning policies for England and how these are expected to be applied. At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development. Under the overarching role of planning there are 12 core planning principles which underpin decision making. The most relevant policy for transport planning is the following:

“Actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.”

Chapter 4 ‘Promoting sustainable transport’ specifically relates to transport and movement stating that “transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel” (Paragraph 29).

Paragraph 31 highlights that local authorities, neighbouring authorities and transport providers need to work collaboratively “to develop strategies for the provision of viable infrastructure necessary to support sustainable development”.

Paragraph 32 states “decisions should take account of whether:

- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the Site, to reduce the need for major transport infrastructure;
- Safe and suitable access to the Site can be achieved for all people;
- Improvements can be undertaken within the transport network where costs effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.”

Paragraph 34 states that “decisions should ensure developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised.”

Paragraph 35 highlights that development proposals should maximise opportunities for alternative transport modes for the movement of goods or people. Therefore “developments should be located and designed where practical to:

- Accommodate the efficient delivery of goods and supplies;
- Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;
- Incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- Consider the needs of people with disabilities by all modes of transport.

Paragraph 36 identifies that a key tool for achieving the above principles is through provision of a Travel Plan.

Furthermore, Paragraph 38 highlights that for larger scale developments in particular “key facilities such as primary schools and local shops should be located within walking distance of most properties”.

1.4 Local Policy

1.4.1 Local Transport Plan (LTP) ‘Connecting Oxfordshire’ 2015-2031: Volume 1

Connecting Oxfordshire sets out Oxfordshire County Council’s policy and strategy for developing the transport system in Oxfordshire to 2031. The document was prepared with input from Oxfordshire’s district councils, its businesses, MPs, stakeholder groups and through public consultation. It forms part of the Local Transport Plan 4 (LTP4).

Overall it seeks to provide high level strategic aims, as set out in Oxfordshire 2030, the Sustainable Community Strategy. It takes into account the plans and ambitions of the Oxfordshire Local Enterprise Partnership in its Strategic Economic Plan (SEP) for Oxfordshire and so identifies transport schemes that will support the Knowledge Spine growth area. Connecting Oxfordshire is nonetheless a plan for the whole county; it also sets out our policy priorities for parts of the county less affected by the Knowledge Spine, thereby providing a basis for securing transport improvements to support development countywide.

Connecting Oxfordshire has been developed with a set of overarching transport goals:

- To support jobs and housing growth and economic vitality;
The key points highlighted in relation to transport include the following:

- To support the transition to a low-carbon future;
- To protect, and where possible enhance Oxfordshire’s environment and improve quality of life;
- To improve public health, safety and individual wellbeing.

To achieve these aims, ten objectives have been developed for transport to guide the area and route strategies and the bus, cycle and freight strategies that follow the policy section.

Proposed growth up to 2030

Oxfordshire is experiencing economic growth. Its economy is recognised as one of the best performing in the UK and its contribution to the UK economy is well above average. For example, Workplace Gross Value Added per head averaged £28,767 in Oxfordshire in 2013, compared with the UK average of £23,755. Meanwhile, its population is rising; it is home to around 635,000 people, a figure that has grown by over 10% in the past decade. This strategy sets out that by 2031 Oxfordshire will require 100,000 new homes to support economic growth and meet population growth and additional commuter trips to Oxford.

Furthermore, the strategy highlights that the growth of housing and employment will result in additional commuter trips to Oxford.

Forecasts are split into trips from Oxford and Inner Oxford and Outer Oxfordshire areas. Figure 1.3 indicates the location of anticipated growth and additional commuter trips.

Figure 1.4 Growth and additional demand

In order to reduce the number of trips made by car and provide an attractive alternative to the car, housing should be located:

- Close to jobs where people can walk or cycle to work;
- In places where people will be able to use high quality public transport to get to work;
- Where the car is not perceived as the default means of transport.

The county relies heavily on the A34, which forms part of the Oxford ring road, for internal trips; it operates over capacity at peak times carrying up to 70,000 vehicles per day, including a high proportion of lorries. This results in severe congestion and puts strain on the local and national economy.

The A40 link from Gloucester to London experiences serious delays to journey time, much of this traffic accessing large employment sites on eastern fringes of Oxford.

Figure 1.4  Growth and additional demand

Oxford City Council published Oxford 2026: Core Strategy Preferred Options in March 2007 and Further Preferred Options in March 2008 for public consultations to seek views on how Oxford should plan for, and manage growth and development up to 2026.

The Core Strategy provides an overarching strategy to inform decisions for the future growth over the next 15 years. Oxford needs to develop, while preserving those aspects which make it such a wonderful place to live and work. The Core Strategy aims to help manage change sympathetically and help deliver this Council’s vision for growth and regeneration in Oxford. It sets out policies and proposals relating to many of the Council’s priorities, including:

- New housing and regeneration at Barton;
- Economic growth and supporting employment at the Northern Gateway;
- The continuing renaissance of the West End of the City centre;
- A new district centre at the heart of Blackbird Leys and upgrading of the Cowley centre.

These priorities are highlighted in the Core Strategy key diagram shown in Figure 1.4. The Core Strategy strives to achieve these aims through the implementation of policies such as protecting Oxford’s key environmental assets, avoiding development on the floodplain and areas of high ecological interest, protecting Oxford’s heritage and the views of the historic core, and promoting high-quality urban design in both the public and private realm.
The Oxfordshire Strategic Housing Market Assessment 2014 identifies a requirement of 24,32,000 additional new homes are needed for Oxford to 2031. The Oxford Strategic Housing Land Assessment 2014 identifies the capacity for 10,212 new homes in the city.

To meet the housing needs targets the strategy identifies five priority areas for growth and regeneration across Oxford, these are: Barton, Blackbird Leys, Northway, Rose Hill and Wood Farm.

In terms of employment growth, the Central Oxfordshire sub-region, of which Oxford is the hub, forecasts an increase of 18,000 new jobs within the period from 2006-2016. However, in general Oxford is losing employment land to other uses, mainly residential. The supplementary guidance from the South East England Partnership Board apportions this between the districts with a monitoring figure of 7,111 for Oxford over that period.

In order to allocate the housing and employment needs by 2026 several strategic locations in Oxford have been identified, the quantums of development are outlined as follows:

**West End**
- Provide around 700-800 new dwellings
- Provide additional student accommodation
- Provide employment- retail- at least 37,000 m² / office- 15,000m²
- New leisure and culture facilities
- 1-Form entry primary school

**Northern Gateway**
- Employment-led development (Class B1 use- 80,000m²
- 500 residential dwellings
- Leisure/ hotel use 7,450m²
Land at Barton
- 800 - 1,200 new homes (~65% of the new homes identified for the period 2014-2019)

Summertown
- Would support spatial strategy but is not fundamental to the delivery of the strategy
- 200-500 dwellings depending on landowner
- SHLAA identified Summerstown as developable, but no date has yet been given to develop it: this will be longer term.

1.4.3 Science Transit Strategy, Oxfordshire County Council, Connecting Oxfordshire: Volume 3. Integrated Transport Planning (January 2015)

The document sets out a future strategy for mobility in Oxfordshire to deliver local sustainable transport that connect the places in Oxfordshire where the majority of people will live and work over the coming 20 years. This is particularly true for the Oxfordshire Knowledge Spine (Bicester - Oxford - Science Vale UK), which the Oxfordshire Local Enterprise Partnership’s (LEP) Strategic Economic Plan (SEP) identifies as the key driver for local economic growth. Other parts of Oxfordshire will also be key contributors to the success of the county’s growth strategy. Banbury in particular is a hub for employment in its own right. Banbury, Witney and Carterton each have individual area strategies which provide housing for significant numbers of people who work in the Knowledge Spine. Science Transit relates to connectivity within, to and from the Knowledge Spine.

It identifies a number of strategic challenges in relation to this area and its connectivity:
- The anticipated scale of housing and employment growth will place significant additional demands on the county’s transport infrastructure;
- With an integrated approach to transport and land use planning, major new developments can be located and designed to support new transport services, providing the catalyst for change and bringing benefits to existing communities;
- Reducing carbon emissions to address climate change requires a radical change in the way transport is provided and used;
- Travel from highly desirable and affluent areas, predominantly rural market towns and residential hinterlands, is contributing to rising traffic levels and road congestion. Predicted local economic and population growth is likely to increase demand for car travel in the absence of viable and equally attractive alternatives, placing greater strain on existing networks;
- Continued rapid development of technology and communications will further accelerate the collection and transfer of data in both business and personal contexts.

The strategy recognises the need for an additional 100,000 homes (5,000 per annum) to be built in Oxfordshire between 2011 and 2031. Recent statistics have shown that there is currently a shortfall in housing provision, as only 5,360 homes have been built in three years 2011-2014.

Integration within spatial plans for the county and commitment to delivering Science Transit help address concerns over the impact of growth on transport networks.

To achieve this, Science Transit aims to become embedded within the future growth and development of housing and employment areas, as well as urban design of the areas it serves. The STS also forms part of the LTP4.

1.4.4 Oxfordshire LEP Strategic Economic Plan (SEP), March 2014

The SEP meets the LEP’s ambition for Oxfordshire to 2030 to encourage economic growth that meets the needs of the growing science and knowledge economy and places Oxfordshire at the forefront of the UK’s global growth ambitions. The plan focuses primarily on increasing business growth and productivity whilst also recognising the need to deliver housing and better integrated transport. The SEP aims to achieve better integrated transport across Oxfordshire through consolidation of development of high-tech industries and the public transport network.

The SEP prioritises key areas for growth of population, housing and employment along the ‘Oxfordshire Knowledge Spine’ (see Figure 1.6). It sets out initiatives to help deliver growth that focuses on improving connectivity of the Knowledge Spine and that will focus the key hubs to the wider transport network locally, nationally and internationally to bring benefits to Oxfordshire as a whole. In terms of transport, the key aims of the Knowledge Spine include to:
- Reduce the distance and barriers between the core economic areas across the Knowledge Spine through providing a minimum level of public transport services of four per hour and maximum journey time of 30 minutes;
- Increase the capacity and improve the efficiency and resilience of our local transport network by reducing congestion on key highway links;
- Spread the benefits of transport investment across wider Oxfordshire;
• Initiate groups to enable local partnerships to develop between universities and businesses to assist in the development of innovative technology and transport led approaches that enhance services, and manage infrastructure more efficiently;

• Increase the connectivity between people and the quality of the natural environment to develop integrated sustainable transport routes linking communities, economic centres and the natural environment.

To achieve these objectives, there are four overarching aims, one of which is related to transport; “innovative connectivity- to allow people to move freely, connect easily and provide services, environment and facilities needed by a dynamic, growing and dispersed economy.”

The SEP recognises that due to Oxfordshire’s strategic location within the UK road and rail network, there are excellent connections to airports, two of the largest cities in the UK - London and Birmingham - and globally but other connections are often slow, indirect and unreliable largely as a result of limited capacity. Thus, there is opportunity to develop rail and highway networks to ensure increased connectivity across Oxfordshire as a whole. This consolidated approach is vital to ensure a multi-modal transport system, innovative growth along the Knowledge Spine and reduction of carbon emissions. One of the key ambitions of the SEP is that the Oxford Science Transit will be a fully integrated public transport system that connects centres of innovation and economic growth with universities, and complements the road network to ensure the Oxford region is interconnected, linking employment, housing, retail and leisure opportunities (see Figure 1.6). Additionally, there is a need for a balanced transport system that accommodates future changes in travel patterns through promotion of sustainable modes of transport: walking, cycling and public transport systems.
1.0 Strategic Context

1.1 Introduction

The work to date has primarily focused on measures within the city centre, targeting reductions in bus emissions and co-ordinating with transport policy measures to improve pedestrian priority and access to the city centre by public transport services. The introduction of controlled bus gates to restrain traffic in the city centre has been effective in maintaining the operation of a bus priority route.

The AQAP recognises that there is no single solution to local air quality problems but rather a city-wide approach is essential. Therefore, the AQAP and Local Transport Plan (LTP) aim to meet the same overarching objectives; to improve air quality, reduce other environmental impacts and enhance the street environment as well as to:

- To support the local economy and the growth and competitiveness of the county;
- To make it easier to get around the county and improve access to jobs and services for all by offering real choice;
- To reduce the impact of transport on the environment and help tackle climate change; and
- To promote healthy, safe and sustainable travel.

The overall objective of the AQAP for the whole of the Oxford city area is to:

“Pursue the achievement of air quality standards and objectives across the city, and reduce carbon emission from transport activity”.

To meet this aim the AQAP sets out a number of targets based on emissions from transport across the city including:

- The City Council is required to work towards meeting an air quality objective for NO2 of 40 μg/m3 on an annual average basis, therefore the city aims to achieve a 50% reduction in transport NOx and PM emissions from 2005 to 2020;
- To achieve mean NO2 concentrations levels of at least 45 μg/m3 by 2020 and 40 μg/m3 by 2025 at the latest;
- To achieve a 35% reduction in transport CO2 emission up to 2020.

The AQAP acknowledges that a significant amount of work has been undertaken to improve air quality in Oxford. The work to date has primarily focused on measures within the city centre, targeting reductions in bus emissions and co-ordinating with transport policy measures to improve pedestrian priority and access to the city centre by public transport services. The introduction of controlled bus gates to restrain traffic in the city centre has been effective in maintaining the operation of a bus priority route.

Whilst it is recognised that air pollution results from a number of different activities which should be addressed using an integrated approach, the AQAP identifies transport emissions as the source requiring the greatest attention. The AQAP recognises that there is no single solution to local air quality problems but rather a city-wide approach is essential. Therefore, the AQAP and Local Transport Plan (LTP) aim to meet the same overarching objectives; to improve air quality, reduce other environmental impacts and enhance the street environment as well as to:

- To support the local economy and the growth and competitiveness of the county;
- To make it easier to get around the county and improve access to jobs and services for all by offering real choice;
- To reduce the impact of transport on the environment and help tackle climate change; and
- To promote healthy, safe and sustainable travel.

The overall objective of the AQAP for the whole of the Oxford city area is to:

“Pursue the achievement of air quality standards and objectives across the city, and reduce carbon emission from transport activity”.

To meet this aim the AQAP sets out a number of targets based on emissions from transport across the city including:

- The City Council is required to work towards meeting an air quality objective for NO2 of 40 μg/m3 on an annual average basis, therefore the city aims to achieve a 50% reduction in transport NOx and PM emissions from 2005 to 2020;
- To achieve mean NO2 concentrations levels of at least 45 μg/m3 by 2020 and 40 μg/m3 by 2025 at the latest;
- To achieve a 35% reduction in transport CO2 emission up to 2020.

The AQAP acknowledges that a significant amount of work has...
1.5 Supplementary Planning Documents (SPDs)

1.5.1 Balance of Dwellings SPD, OCC, adopted January 2008

The adopted Oxford Local Plan 2001-2016 (OLP) includes a policy for the provision of a balanced mix of housing types and sizes. The purpose of this Supplementary Planning Document (SPD) is to advise developers how the City Council will apply the policy. The OLP is part of the Local Development Framework (LDF) and thus the balance of dwellings SPD represents part of the LDF.

As part of Oxford’s LDF the vision for the Core Strategy includes a spatial objective to “ensure an appropriate mix of housing tenures, types and sizes to meet existing needs and future population growth as far as possible”. The Government’s key housing policy goal, set out in Planning Policy Statement 3: Housing (PPS3), is “to ensure that everyone has the opportunity of living in a decent home, which they can afford, in a community where they want to live”.

Although Oxford is identified as one of the best locations for economic growth in the country, it is also the least affordable housing location because of the lack of housing supply and choice. The document highlights that Oxford is experiencing a housing crisis. Not only is the need for housing far greater than the supply, but the new housing that is being developed is mainly small one- and two-bedroom flats. The continuation of this trend over a number of years will lead to a mismatch between need and supply. For example, in 2005/06 92% of the 896 units built were one- and two-bed flats; at the same time 85 family houses were lost to redevelopment, including conversions to flats. If this trend continues for ten years, at the annual rate of building 433 homes per year (adopted Oxford Local Plan Policy HS8), Oxford would grow by 4,330 units, but 3,980 would be flats.

This SPD outlines policies seeking to achieve mixed and sustainable communities; it is important to consider the appropriate mix of dwellings required at various levels and locations. The balance of dwellings therefore reflects the strategic mix required for Oxford and the size of the individual site. The Neighbourhood Area also provides the local context for assessing the impact of the continuation of these trends on the small and medium sites. A spatial hierarchy of areas is therefore proposed, as follow:

City: the strategic profile for Oxford as a whole sets the overall policy context, and indicates the appropriate mix of dwelling sizes for key areas, such as the City centre, the existing allocated sites, and those sites identified as part of the Preferred Options stage of the Core Strategy. This strategic profile provides guidance on the mix of dwellings for strategic documents such as the Core Strategy that are concerned with the spatial distribution of housing, future allocations and densities for various locations. The spatial distribution of dwellings will allow for generally higher densities in City and District centres that would naturally influence the potential type and size of the units produced.

Neighbourhood Areas: these reflect local sustainable communities. This level of enquiry allows a detailed analysis of pressures that exist within urban areas such as the level of multiple occupations, on-street parking pressure, rate of conversions, and the townscape character.

Individual sites: these comprise a range of different sizes, where the overall mix that can be achieved depends in part on the size of the site.

1.5.2 Parking Standards SPD

The Oxford Local Plan 2001-2016 (OLP) includes policies and standards for the provision of car parking and cycle parking for new development in Oxford. The OLP also sets out policy on the submission and content of Transport Assessments (TAs) and Travel Plans (TPs). The purpose of the Parking Standards SPD is to give further guidance on the policies in the OLP and promote good practice in support of our overall vision for sustainable development. It has also been written in line with national, regional and strategic guidance and the Oxford Community Strategy. Overall, the underpinning principle of the SPD is to support sustainable development that makes efficient use of land and resources and demonstrates good design.
1.6 Housing and employment needs

Oxfordshire is currently one of the fastest growing areas in the UK. The Oxfordshire Local Enterprise Partnership (LEP) and Strategic Economic Plan (SEP) both set out a vision for growing economic and housing growth. Figure 1.8 highlights the housing and employment needs targets for Oxfordshire and Oxford up to 2031.

The Oxfordshire Strategic Housing Market Assessment (SHMA) produced by GL Hearn in March 2014 identified there is an objectively assessed need for 100,000 new homes to be built in Oxfordshire in the period 2011-2031 (the equivalent of between 4,678 and 5,328 new homes per year) to meet existing and future housing needs. This figure includes unmet demand in Oxford as well as the need arising within the other settlements within Oxfordshire, making up the Oxford and Oxfordshire Housing Market Area. However, only around 3,000 homes per year are proposed by adopted or emerging Local Plans for the five Oxfordshire districts resulting in a shortfall of between 36% - 44% against the assessed housing needs for the county.

The assessment identifies that around 24-32,000 homes of the Oxfordshire target are required in Oxford. However, a land assessment study carried out by Oxford City Council (OCC) showed that there is developable land for a possible maximum of just over 10,000 new homes up to 2031. This gives a shortfall of around 17,000-21,000 homes which need to be provided in accessible locations to meet the city’s housing need.

In terms of employment, Oxfordshire growth plans up to 2031 set a target of 80,000 new jobs of which 23,000 new jobs will be in Oxford up to 2031.

The scale of the City’s housing need and employment growth as essential considerations for the Oxford Transport Strategy which need to be clearly articulated. The national planning policies make it clear that such development will need to be located to minimise the need to travel and ensure that sustainable modes of travel are adopted. This means that development will need to be served by the major transport corridors and located as close to the city as possible.

The City Council has set out a summary of Oxford’s growth needs and a process for determining the strategic options: Investing in Oxford’s Future: Deciding on Strategic Growth Options February 2014.

Oxfordshire Councils have committed to a programme of joint working to identify the strategic locations for growth to be completed by September 2015.

In order to meet these challenges there is a need to consider a number of different sites across Oxford, including areas within the Green Belt. The Oxford City Council have undertaken a review of potential sites around the city for residential growth up to 2031. The six potential sites are North of Oxford, South of Kidlington, Yarnton, Wick and Bayswater Farm, Wheatley, Grenoble Road (situated on Oxford’s southern boundary) and North of Abingdon (Figure 1.9). Analysis of these potential growth areas indicates that North of Oxford and South of Kidlington and Grenoble Road are situated on high frequency public transport routes and are currently considered the preferred sites for growth around Oxford.
1.7 Effect on Movement

Today, car ownership in Oxfordshire is high, resulting from a combination of existing patterns of growth and high income; for example, 88% of households in South Oxfordshire own a car compared to the national average of 74%. Forecasts based on future housing and employment growth across Oxfordshire predict the percentage of cars owned will increase by approximately 19% between 2013 and 2031. This growth in car ownership and car use is disproportionate to the estimated growth in the number of households, estimated at just 16% between 2013 and 2031. In recent years the general trend has been for the proportion of sustainable travel (pedestrian/cycle/public transport) in Oxford to be increasing, but declining in the rest of the county.

In order to meet the proposed growth targets, a strategic transport strategy is required that provides an opportunity to change travel patterns and provide real alternatives to the private car to help reduce traffic congestion.

1.7.1 Existing Commuter Trips to Oxford and Mode Split 2011

The origin and mode split of trips made within Oxford and from Oxfordshire have been calculated from data collected for the OTS by Oxfordshire County Council (Figures 1.11 and 1.12). Currently, (2011) around 42,400 trips are made within Oxford whilst 11,900 of these trips are made by car, a large proportion of trips are made by cycle or on foot, with a combined figure of 21,400 trips (50%). Additionally, around 20% of all trips within Oxford are made by public transport accounting for 8,600 trips. In comparison, the mode split of trips from Oxfordshire shows greater reliance on the car and a lower proportion of trips made by walking, cycling and public transport (45% by car...
compared to 19% by bus, 16% by cycle and 14% walking). A total of around 35,200 trips are made from Oxfordshire to Oxford. The distribution of these trips is quite evenly spread from the four districts of Oxfordshire. However, there are marginally more commuter trips made from The Vale of White Horse (10,750 trips) followed by Cherwell (9,500 trips). Fewer commuter trips are made from West Oxfordshire and South Oxfordshire (each 7,550 trips).

1.7.2 Additional demand

Figures 1.13 and 1.14 show the predicted additional commuter trips to and from Oxford in 2031 based on the Strategic Housing Market Assessment (SHMA) and the predicted increase in trip numbers by each mode. Figure 1.14 highlights that a large proportion of total commuting trips in Oxfordshire are made into Oxford. Based on the housing and employment growth forecasts, it is estimated that an additional 15,500 commuting trips to Oxford will be made. Cherwell accounts for the highest proportion of additional trips, with around 4,900 trips, whereas West Oxfordshire accounts for approximately 3,400 additional trips. Around 7,700 trips are made within Oxford itself and only 3,000 trips are made out of Oxford.

The 2011 modal split percentages have been used to estimate mode split up to 2031 to highlight which modes of transport are likely to create the most additional demand. Thus the mode split percentages of the total trips made within Oxford (7,700 trips) are as follows: 28% Car, 0% P&R, 20% Bus, 25% Cycle, 25% Walk, 0% Train and 1% Other. In comparison the mode split (%) of trips from Oxfordshire shows greater reliance on the car and a lower proportion of trips made by walking, cycling and public transport (45% Car, 2% P&R, 19% Bus, 16% Bus, 2% Walk, 2% Train, 2% Other).
1.0 Strategic Context

16% Cycle, 14% Walk, 2% Train and 2% Other). Surprisingly, the additional number of trips made by P&R are anticipated to increase by just 2%, the equivalent of 300 trips out of 15,500 additional trips from Oxfordshire. However, the cost of rail travel relative to other transport choices and the typical origin-destination (centre-centre rather than home-work) may constrain the growth in local rail commuting.

By 2031 the additional number of commuter trips from wider Oxfordshire to Oxford is anticipated to be around 15,500 trips. It is estimated that trips made by car are likely to create an additional demand of 7,000 trips by car. Additional demand for public transport is predicted to increase by approximately 3,000 trips and around 2,500 additional trips are likely to be made by bicycle. Surprisingly the additional demand for rail is expected to increase only by around 300 trips in to Oxford.

Overall the total number of additional trips by all modes of transport in 2031 is anticipated to be around 26,300 trips to Oxford (see Figure 1.14).

1.7.3 Impact of Traffic Congestion

Oxfordshire’s dispersed population and the location of housing growth at a distance from the major employment centres in the county, complex movement patterns and high levels of car ownership and usage, have resulted in a highly congested movement network. Due to the high proportion of commuters by car to Oxford, the issues associated with high traffic volumes and congestion are particularly apparent in and around Oxford. The A34 and A40 currently experience high levels of traffic congestion and delay. The A34 on the western boundary of Oxford and towards Didcot frequently operates over capacity and experiences long traffic delays, particularly at peak periods. Other key junctions serving strategic routes like the A34, A40 and A44 operate close to capacity during morning peak hours. As a result, the rising traffic volumes place stress on strategic routes, where minor incidents and disruptions which often result in major delays to commuters.

Anticipated future growths in population, employment opportunities and car ownership levels have an impact on the highways’ ability to cope with rising traffic volumes. It is anticipated that during am and pm peak periods there are likely to be delays along key routes in to Oxford, particularly on the A34 between Oxford and Bicester. Traffic delays on the highways network cause disruption to both car drivers and public transport services that rely on the same routes. At present, public transport routes only benefit from bus lanes on routes into or within Oxford; as a result, bus services experience long journey times between the other settlements in Oxfordshire.

1.8 Summary

Oxford is strategically located at the heart of Oxfordshire and on strategic transport routes by road and rail to London, Birmingham and Southampton. The SHMA has identified a requirement of 100,000 new homes in Oxfordshire by 2031, 24-32,000 new homes are required for Oxford. Additionally the number of new jobs is anticipated to increase by 80,000 jobs in Oxfordshire (a total of 23,000 new jobs in Oxford). Ultimately, growth of housing numbers and employment opportunities will increase the number of trips made using all modes of transport.

Despite the city of Oxford showing strong commitments to sustainable transport policies, car ownership levels will continue to rise with increasing employment opportunities and rising income levels. Therefore, to begin to change travel patterns and behaviours, it is of utmost importance to provide viable and more attractive alternatives to the car.
Evaluation of Oxford Transport Strategy (OTS) Objectives

The OTS sets out a vision for Oxford up to 2035, for the city to have an integrated transport network, providing reliable and sustainable methods of movement, enabling growth and comprehensively linking all communities. The overarching aims of the strategy are to support:

- A thriving knowledge-based economy, by enabling businesses to draw on a wide pool of talented people, innovate, and collectively grow through strong connections, and interactions and trade within global markets;
- An enviable quality of life for Oxford’s people, by providing safe, inclusive, healthy and convenient travel choices providing access for all to employment, services, retail and leisure opportunities; and
- Oxford as a city which best promotes its outstanding heritage through an attractive and vibrant public realm that offers a highly experience of global renown.

The OTS has been developed in line with the vision and goals of the Oxfordshire Local Transport Plan. The objectives of the OTS therefore respond to these goals, identifying the specific requirements for Oxford within the context of the LTP. The objectives are as follows:

<table>
<thead>
<tr>
<th>LTP Goal</th>
<th>OTS Challenge</th>
<th>OTS Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>To support jobs and housing growth and economic vitality across Oxfordshire</td>
<td>Oxford’s economy is growing and changing</td>
<td>Support the growth of Oxford’s economy by providing access to appropriately skilled employees and key markets.</td>
</tr>
<tr>
<td></td>
<td>Economic growth is happening in new locations and needs effective connectivity</td>
<td>Ensure business sectors are well connected to each other and are provided with effective, reliable, and resilient access to strategic networks.</td>
</tr>
<tr>
<td></td>
<td>More people are travelling into Oxford and travel patterns are changing</td>
<td>Provide effective travel choices for all movements into and within the city.</td>
</tr>
<tr>
<td></td>
<td>Oxford is experiencing rapid population growth and demographic change</td>
<td>Promote modes of travel and behaviours which minimise traffic and congestion.</td>
</tr>
<tr>
<td></td>
<td>Housing demand is not being met and we need high-quality new neighbourhoods</td>
<td>Focus development in locations which minimise the need to travel and encourage travel by sustainable transport choices.</td>
</tr>
<tr>
<td>To support the transition to a low carbon future</td>
<td>Oxford is a city of two cities.</td>
<td>Provide a fully accessible transport network which meets the needs of all users.</td>
</tr>
<tr>
<td></td>
<td>We need to better balance different needs in the city centre.</td>
<td>Provide an accessible city centre which offers a world-class visitor experience.</td>
</tr>
<tr>
<td>To protect and enhance Oxfordshire’s environment and improve quality of life</td>
<td>There are many challenges with the urban environment, air quality and density in the population.</td>
<td>Tackle the causes of transport-related noise and poor air quality and encourage active travel in the city.</td>
</tr>
</tbody>
</table>

The OTS is in line with national planning policy, which aims to promote sustainable modes of transport (public transport, walking and cycling), and focus significant development in locations that reduce the need to travel and are integrated into sustainable transport networks. Key national and local policies recognise that this can only be achieved with a strategic transport strategy that helps support jobs and housing growth and economic vitality across Oxfordshire. This means that business sectors need to be well connected by a range of effective transport modes for all movement across the county both within and to Oxford. Providing accessible public transport reduces the need to travel and helps create an integrated transport network that meets the needs of all users.

One of the key challenges facing Oxford up to 2030 is rapid population and demographic growth that inevitably results in higher demand on housing and employment. The OTS recognises that by improving walking, cycling and public transport, as well as restricting access by private car, travel behaviours can be altered thus reducing traffic congestion. This also encourages low carbon initiatives such as promotion of a range of travel choices including walking, cycling, and public transport and strategically siting new development. Both the OTS and the Core Strategy recognise that these initiatives among others help reduce the need to travel, thus helping to reduce carbon emissions.

The Core Strategy highlights four strategic locations in Oxford that could reduce the need to travel and provide sustainable transport choices. These are: the West End, Northern Gateway, Land at Barton and, in the longer term, Summertown. Oxford City Council have also identified six potential sites for new development including: North of Oxford, South of Kidlington, Yarnton, Wick and Bayswater Farm, Wheatley, Grenoble Road and North of Abingdon. It is recognised that the sites situated on high frequency public transport routes are considered the preferred sites for growth around Oxford. The OTS aims to consolidate the transport strategy through sustainable urban extensions with new development sites set out in the relevant documents in order to encourage sustainable transport choices.

The OTS acknowledges that more people are travelling into Oxford for work and that travel patterns are changing with a higher percentage of people being dependent on the private car for commuting. According to census data, the total number of car commuting trips rose by 9% between 2001 and 2011. The OTS states that in order to tackle the causes of transport related issues such as poor air quality and congestion, a step change in commuting behaviour towards public transport is essential. The Science Transit Strategy also recognises that a radical change in the provision and use of transport is vital to address climate change and reduce carbon emissions. The NPPF further supports this objective highlighting that local authorities and transport providers need to work collaboratively “to develop strategies for the provision of viable infrastructure necessary to support sustainable development”.

Furthermore, the OTS recognises the importance of protecting and enhancing Oxfordshire’s environment, as well as improving overall quality of life. To achieve this, there needs to be a balance between enabling access to the centre by sustainable modes and preventing private car trips.
2.0 Learning from Elsewhere: European and UK Best Practice

2.1 Introduction

This section sets out information on European and UK Best Practice from information oprovided on publically accessible sources. The aim is to gain understanding of how transport strategies have been implemented in other cities in order to inform the strategic transport strategy for Oxford.

The chosen Best Practice examples that have been analysed have many parallels with Oxford in terms of demography, urban form, scale of the city and relationship to local and strategic infrastructure. Furthermore the precedents are all university cities and many of which attract many tourists during the year.

Oxford

Population: ~152,000 (2011)

City form: historical city centre, 5km to edge of the city. The main road network consists of six main radial routes from the centre of the development to an outer ring road that surrounds the city. The city attracts tourists and it is known as a major university city.

Modal Split, commuting (2011): Walk 18%; Cycle 18%; Public Transport 19%; Car 37% Other 8%

2.2 European Best Practice

2.2.1 Freiburg, south west of Germany

Population: ~230,000 (2012)

City form: Compact, historical city centre bordered by rail line, Dreisam river and major roads, outer urban development along public transport arteries, ‘Green corridors’. 4km from the centre to the edge.

Modal Split, commuting (2004): Walk 24%; Cycle 28%; Public Transport 18%; Car 29%

Vauban district, all trips (2010): Walk/Cycle 64%; Public Transport 19%; Car/Motorcycle 16%

Parallels to Oxford: Historical city centre boarded by rail line, river and major roads, compact, outer development on public transport arteries.

Freiburg, an oft-quoted example in the UK, is considered Germany’s capital of sustainable living. It was not always so: in the 1950s and 1960s, Freiburg’s land-use plan endorsed geographic expansion and the use of motorised vehicles grew rapidly in Freiburg (higher than Germany as whole). A shift in public opinion led to a policy change in the early 1970s, which reversed this trend. In the period 1982-2007, car use decreased from 38% to 32% of all trips, the modal share of bike trips almost doubled (15% to 27%) and public transport use rose by more than half (11% to 18%). The number of trips with walking as the main mode actually decreased (from 35% to 23%), thought to be due to the introduction of low-cost public transport passes in 1984, which are transferable within households (Umwelt Karte, extended in 1991 to surrounding region). Accordingly, transport CO₂ emissions in Freiburg in the period 1992-2005 fell by 13.4% and travel is safer than the German average (3.7 versus 6.5 fatalities per 100,000 inhabitants, 2005). Additionally, social equity and the viability of public transport are high (operating costs only require 10% subsidy by government funding, 2008). During this period, Freiburg also experienced significant growth in population and its economy, becoming for example, Germany’s leader in green industries.

Figure 2.1 Strategic public transport network

Figure 2.2 Pedestrians mix with public transport in city centre streets
Radical but coherent policies implemented incrementally led to this success, and crucially, restrictions on motorised transport have been balanced by convenient, cost-effective and safe alternatives. Since 1973 the medieval city centre has been progressively pedestrianised (with a view to preservation), the light rail system has been maintained and in 1983 the first new tram route opened. Cars have been banned from the city centre. There are limited through routes for traffic, arterial routes have been widened or altered to increase their capacity. Cars have been banned from the city centre. There are limited through routes for traffic, arterial routes have been widened or altered to increase their capacity. The speed in residential areas is limited to 30kmph and parking has been provided at the edge of the car-free zone. 1970 saw the first bike network plan, with 29km of unconnected cycleways in 1972. Cycle infrastructure now comprises a fine grain network of 500km of cycleways which is characterised by its comprehensiveness, continuity and consistency. There are 5000 cycle parking spaces in the city centre as well provision at tram stops and 1000 spaces at the rail station. The overall approach is one of filtered permeability in which sustainable modes are separated from private motor traffic in order to give them an advantage in terms of speed, distance and convenience.

In general drivers of private motor vehicles are courteous, respecting the priority measures for cyclists. In contrast, some cyclists seemed comparatively aggressive and there are occasional conflicts with pedestrians on shared paths. Cyclists are allowed to use most of the pedestrianised streets but can only use the primary retail high street during evenings and at weekends.

The public transport system is fully integrated and cost-effective due to the Umwelt Karte (environment ticket). 65% of residents live within walking distance of a tram stop.

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 with UK cities of a similar size. Neighbourhood shopping centres and local markets are favoured by planning policy with large retail outlets in the city centre. There are also some ‘out of town’ retail parks, particularly to the north west of the city.

The principles of the transport strategy for the city include the extension of the public transport network, promotion of cycling, traffic restraint, channeling of motor traffic and parking space management.

Two new districts of Freiburg are noted for their sustainable transport: the Rieselfeld neighbourhood (developed 1994-2010) and the Vauban district (redeveloped 1993-2006). Vauban is a 41ha site of 2000 housing units built to a medium density with a population of 5000, located 3km from the city centre. It has one main thoroughfare with home streets which are car-free. Car ownership is actively discouraged, as car owners must pay the cost of the parking infrastructure (approximately £12,500 plus maintenance fee), with the result of only 160 cars per 1000 residents. The district is designed to make non-motorised access pleasant. For longer trips a car-sharing scheme operates and the area is well-served by frequent public transport and it is also part of the city’s extensive bicycle network.

Lessons learned for Oxford are summarised as follows:

- Restrict access to the city centre for cars through a combination of policy enforcements such as limiting through routes for traffic, pedestrianisation of streets, improvements to arterial routes to increase capacity and reducing vehicle speeds;

- Establish a cohesive and strategic cycle network with generous cycle parking at public transport interchanges. Ensure all residents are within a 10 minute walk to a bus stop;

- Encourage a mix of uses and higher densities around transport interchanges.

Photo sources: David Chernushenko from http://bikecitythemovie.ca

Figure 2.3 Cycling infrastructure designed into the streetscape
Figure 2.4 Generous cycle parking at the train station.
Figure 2.5 Vauban-‘car free’ residential street
2.2.2 Groningen, north east of the Netherlands

Population: ~190,000 (2011)

City form: Compact historic city centre (~1km diameter) surrounded by canals. Main road network consists of five radial routes from city centre to a ring road with radial arterial routes out into surrounding region. 6.5km from the centre to the edge.

Modal Split, commuting (2004): Walk 3%; Cycle 37%; Public Transport 8%; Car 50%; Motorcycle 2%

Parallels with Oxford: Population, size of city-6.5km from centre to edge, historic centre, high proportion trips made by bike 57%, similar ideal towards transport favouring pedestrians, cyclists and an integrated Public Transport system in the centre.

In recent years Groningen has alternated with Zwolle as the city with the highest proportion of trips made by bike 57%, much as with Freiburg. It was not always such a successful city in terms of the quality of life brought about by high levels of walking, cycling and public transport use. The rise of the motorcar in the 1950s and 1960s lead to planning policies that favoured motorised transport, with car ownership in Groningen above the national average. However, a traffic plan for an inner ring road around the city centre in 1969 met with much resistance, ultimately leading to a change of emphasis in urban development.

The new vision was one of a ‘compact and complete city’, with the historic centre conceived of as a ‘living room’ for the people, favouring pedestrians, cyclists and an integrated public transport system.

In 1977 a new traffic system was introduced that divided the historic core into four sectors, with a ring road built to encircle the centre. In this way, access by car was severely restricted: the only way to travel between sectors is by foot, bicycle or public transport. Car traffic is not completely removed, but is directed towards nearby car parks as efficiently as possible. The many traffic-free cycleways also meant that cycling was often the most viable mode of transport. During the 1980s traffic policy aimed to accommodate growing levels of motorised transport through infrastructure investment, which in fact led to ever higher levels of traffic: solving one congested junction simply relocated the bottleneck. The futility of this was recognised, as were the environmental and social consequences of excessive motor traffic, leading to policies favouring sustainable transport.

The emphasis on quality of life led to priority for journeys by foot, bicycle and public transport, motor traffic in the city centre was further restricted to goods and service vehicles. Car drivers are provided for with 11 P&R garages (3600 parking spaces).

An important part of the policy is road safety: a speed limit of 30kmph was introduced in all residential areas. Further, there are restrictions on the location of shopping facilities e.g. supermarkets may not be built adjacent to motorways, maintaining focus on the city centre as the main shopping location with neighbourhood retail centres for daily shopping.

Filtered permeability is an explicit element of transport policy for the city described as creating a coarse grain for private motor vehicles and a fine grain for cycles. 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. Various methods of achieving this filtered permeability are used including separate cycle paths, bridges, underpasses and bus/cycle gates.

Perhaps the most impressive area of progress is the cycle network. Already extensive in the 1970s, in the years 1989-2000, €23 million were invested in cycling infrastructure, investment that continues to grow. There are now 46 cycling routes in Groningen, forming a continuous and integral network. In common with most cities in the Netherlands there is a strong preference for segregation between cyclists and general traffic with separate paths preferred to on-road lanes wherever possible. Cycle lockers and shelters are provided at transport interchanges (e.g. 5000 parking spaces at the central rail station, Figure 2.7), cyclists have priority in traffic light signalling (e.g.}
green light twice per cycle) and cycling is allowed in both directions on many streets that are one-way for motor traffic. The net result of all of these policies is a high quality environment, an increase in people living in the city, an increase in visitors to the city and increased retail trade. Levels of cycling in Groningen have followed national trends falling in the 1960s and early 1970s, then recovering and have been rising strongly in recent years. The initial fall was caused by rising car ownership 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, growing network of cycle infrastructure and planning policy orientated towards urban intensification.

Public transport modal share is relatively low although this is believed to be due to the high proportion of cycling. The city does not currently have a tram system but there are plans to build one in association with expansion of the city to the east and west.

Lessons learned for Oxford:

- Create an inner ring road around the city centre to restrict access by car and reduce congestion from traffic passing through the city;
- A commitment towards sustainable transport policies that favour pedestrians, cyclists and the public transport system;
- Establish a continuous and integral cycle network which is includes routes segregated from traffic where possible.

2.2.3 Uppsala, Sweden

Population: ~200,000 (2010)

City form: University city since 1477, compact urban form

Modal split, all trips (2009): Walk/ Cycle 30%, Public Transport 5%, Car 65%

Parallels to Oxford: population, size of the city, city structure, university town.

In the last 5 years Uppsala has been working towards sustainable transport solutions in order to reduce emissions and meet energy efficiency targets of an increase of 20% by 2020.

Uppsala is known in Sweden as the cycling city, already has a relatively high level of cycling which accounts for over 25% of all trips (2009). The cycling infrastructure has been developed strategically covering an 8km radius across the city to establish a cohesive and integral network. This impressive cycling infrastructure includes high quality cycle routes, cycle storage integrated into streets and transport hubs and stations for air refills for bicycle tyres (which are free of charge). The city is developing a cycling policy and continues to upgrade its network of cycling lanes and infrastructure. The policy aims to maintain and enhance the routes to create an attractive, comfortable and safe cycling environment through a number of initiatives including:

- Provision of a generous amount of cycle stands and shelters at transport interchanges (for example the train station has capacity for over 2,000 cycle parking spaces, Figure 2.9);
- Maintain cycle paths to a high standard with high quality surface treatments, appropriate road markings and signage and cycle crossing points;
- Adapting the design of the street to cater primarily for the bicycle. In the city centre this includes initiatives such as shared surface streets with pedestrian and cycle priority and transforming on-street parking spaces into cycle storage (in one city centre street 150 cycle spaces were created from 15 car parking spaces, Figure 2.10);
- Raising cycling awareness through education and training programmes.

The combined result of all these design initiatives is a high quality environment, car-free city centre and cycling dominance. Through implementation of these initiatives it has been recognised that the success of achieving a bicycle-friendly city is not only due to the good design of cycle routes and cycle storage. Whilst this is fundamental to encourage people to cycle over using the car, it cannot be used in isolation. Changing drivers, cyclists and pedestrians’ awareness of other road uses through education and training programmes is vital in achieving cycling dominance.
Whilst Uppsala is one of the leading cities in cycling infrastructure, public transport only accounts for 5% of all trips, a number the city aims to double by 2020 while reducing car trips from 65% to around 30%. To achieve this goal, Uppsala is progressing a number of initiatives including car share and fundamentally reworking the public transport system around a few high capacity BRT lines. The public transport system aims to achieve frequent departures, dedicated bus lanes, signal priority at junctions, fewer stops, integration with the cycle network and new parking facilities on the periphery of the city. This initiative aims to improve the attractiveness of public transport while simultaneously reducing emissions. So far, around 50% of buses (2013) are running on biogas a number set to increase to 100% by 2020. The majority of biogas buses operate within the city centre, known as green city buses (Figure 2.12). The wider county bus network, running yellow regional buses (Figure 2.13), is divided into four zones with the city centre zone being the smallest (Figure 2.11). This integrated approach aims to give travellers a range of travel options by public transport where possible and appropriate.

The majority of the city’s taxis are also helping Uppsala meet sustainability targets through use of environmentally-friendly cars.

To ensure emission targets set out to 2020 are met Uppsala is looking to more innovative solutions including development of Personal Rapid Transit (PRT). This is a mode of public transport, also known as ‘podcar’, with small automated vehicles that operate on a network of specially built guide ways (Figure 2.14). A purpose built test track was used in Uppsala between 2007-2010, and operational approval consented in 2008. Since 2014 a further pilot scheme is undergoing development. If the PRT scheme is successfully implemented in the future, modal share of public transport is expected to increase from 3% to 20%, the equivalent of 4,200 daily trips by bus to 16,000 trips by PRT.

Lessons learned for Oxford:

- Promote cycling through a combination of training programmes to raise cycling awareness and improvements in cycle infrastructure including redesigning city centre streets to cater for the bicycle;
- Reworking the public transport system around a few high capacity BRT routes and using environmentally friendly buses that run on low carbon emissions such as biogas;
- Provide new car parking facilities on the periphery of the city which are intergated with the BRT system.
2.2.4 Padua, Italy

Population: ~214,000 (2011)

City form: Historic university city, compact size of approximately 8km from centre to edge. A motorway surrounds the city with a number of junctions and arterial routes connecting to the surrounding districts and settlements.

Modal split, all trips (2009): Walk 5%, Cycle 16%, Public Transport 22%, Car 48%, Motorcycle 9%

Parrellels to Oxford: The city is a similar in size, population and demoangraphi A ring road surrounds the city with radial routes connecting to surrounding settlements.

Similar to the case studies mentioned previously, an increase in car ownership had a detrimental effect on the environment leading to congestion and an increase in emissions. Rapid growth of the city occurred placing further pressure on the tight historic street network. The effects of congestion were most evident by the 1980s, with around 130,000 people (55% of the total population) making two or more daily trips by car, mainly to and from the city centre. Around this time, an environmental awareness began to develop with growing concerns about the need to preserve the city's heritage. Subsequently measures were implemented to limit the flow of car into the city centre parking facilities linked to public transport began to emerge.

Compared to the other cities discussed in the section, Padua has a relatively high proportion of trips made by public transport with a modal split of 22% of all trips. This is largely due to the development of the light rail Translohr tramway in 2007, the first line covers approximately 10.5 km in a north south direction through the city (Figure 2.15). The tram system is a sustainable mode of transport operating on electric motorisation with rubber tyres and a central guide rail. An on-board battery pack enables the tramway to operate without overhead cables in key pedestrianised public spaces within the city centre, for example in the main central square Prato Della (Figures 2.16 and 2.17). Future plans to extend the tramway with three additional Traslohr lines will further improve connectivity by public transport.

Whilst Padua is not the most advanced city in terms of its cycling infrastructure, its compact urban form with a tight historic grid the city lends itself to an accessible cycling environment. In recent years several sustainable transport initiatives are being progressed to encourage cycling. The old inner city street pattern became the blueprint for the city cycling and walking plan. Additionally the city’s medieval walls provide particular opportunities for cycle paths and walkways, for example the 11km Venetian wall provides a continuous cycle path and walking route for movement across the city and doubles as a tourist attraction. Another initiative involves creating dedicated cycle and walking infrastructure to segregate cyclists from vehicles either through raising the cycle path to the level of the footway or demarcated with bollards or planting. These cycle paths were designed to allow two-way flow of cycles one side of the street to make best use of the constrained street widths.

Lessons learned for Oxford:

• Opportunities to integrate tramways through the city centre which operate on rubber tyres along a guide rail without overhead cables;

• Establish a strategic cycle network with a range of cycle routes (segregated from traffic, greenways and two-way shared paths) which use existing infrastructure where possible.

Photo sources: Translohr: Tramway on tires- www.lohr.fr

Figure 2.15 Translohr line through Padua, Italy in a north- south alignment

Figure 2.16 Trams, pedestrians and cyclists mix in the main city square

Figure 2.17 Translohr tramway
2.2.5 Strasbourg, France

Population: ~440,000 (2009)

City form: Historic city core with pedestrian priority streets, the city centre was classified as a World Heritage Site in 1988 and it is a university city (Figure 2.18).

Modal split, all trips (2009): Walk 33%, Cycle 37%, Public Transport 12%, Car 47%, Motorcycle 8%

Parellels to Oxford: Historic city core with pedestrian priority streets, university city.

The tramway in Strasbourg provides precedent of an efficient public transport system with a total of 6 lines covering 56km of land and 69 stations serving its 300,000 users per day. The network route map is shown in Figure 2.21.

The bus system is fully integrated providing frequent and reliable services across the city across 27 bus lines the majority of which operate Mondays to Sundays. Within the underlying tram and bus network the careful design of bus and tram stations facilitates efficient transfer between the different modes. Design principles include provision of adequate cycle parking, generous pedestrian space and pedestrian crossings on desire lines. Car parks are located around the outskirts of the city intergrated with the bus and tramway networks to discourage cars from the city centre.

The city’s compact urban form and fine grain street layout creates an ideal walking environment. Thus it is unsurprising that one out of every three trips made by residents is made by foot, increasing to one out of two trips (52%) for residents living in the city centre. Despite the high proportion of trips made on foot, 25% of trips of less than 1km are still made by car. One of the priority strategies for Strasbourg is to promote walking further to encourage users of other modes in particular car users to walk. A pedestrian plan for Strasbourg aims to reduce the reliance on the car and encourage walking through a number of design initiatives, these include;

- Encouraging walking through the organisation of walking related events and provision of city maps giving times and distances;
- Increasing space for pedestrians such as through footway widening and increasing the pedestrian shared spaces;
- Increasing the walkability of the city through the provision of additional pedestrian crossings (crossing point every 100m) and creating new pedestrian routes within residential areas;
- Local school initiatives to encourage young people and children to walk through a ‘pedibus’ or walking bus from residential areas;
- A longer term aim is to create a network of pedestrian highways connecting districts which are less than 2km apart.

The cycle infrastructure is extensive with a combination of around 77km of formal cycle paths, 12km of restricted one-way streets and 15km shared pedestrian and cycle paths forming a continuous and integral network (Figure 2.19). Additionally cyclists are also permitted to use some bus lanes within the city centre.

One of the strategies implemented to further encourage use of sustainable modes of transport public transport, walking and cycling is to undertake improvements to the various modes in tandem to encourage interchange between modes. This has been particularly evident in the city centre through the implementation of the tramway together with giving pedestrian priority on key streets within the city centre (Figures 2.20 and 2.22). So far, this resulted in a reduction of car traffic in the city centre and a 43% increase of passengers using public transport.

Figure 2.18 Strasbourg city form
Photo sources: http://www.en.strasbourg.eu

Figure 2.19 High quality cycling infrastructure

Figure 2.20 Pedestrianised street in the city centre
Figure 2.21 Tramway network (Tram lines A-D)

Figure 2.22 Tramway infrastructure
The city operates a car share scheme which aims to improve the attractiveness and accessibility of employment and amenities by offering convenient parking facilities in the city centre and encouraging alternative sustainable modes of transport. New sustainable initiatives are being tested such as Toyota are introducing plug-in Hybrid Vehicles (PHVs) as well as a dedicated charging infrastructure in Strasbourg (Figure 2.23).

To further encourage sustainable modes of transport as viable alternatives to the car, parking for privately owned vehicles is strictly regulated in the city centre. Strasbourg has been divided into three parking charge zones each with regulated maximum length of stay times and pricing tariffs, Figure 2.24 and 2.25.

Lessons learned for Oxford:

- A commitment to policies that favour pedestrians and cyclists (i.e. increasing pedestrian space and crossings and provision of city maps showing direct walking routes, times and distances);
- Implement a number of sustainable transport initiatives in tandem such as improvements to public transport systems alongside creating pedestrian priority streets;
- Implement car parking enforcements such as parking zones and parking charges combined with car share schemes to discourage use of the private car.
2.3 Bus Rapid Transit (BRT) Best Practice

Bus Rapid Transit (BRT) systems provide a flexible bus network which involve either the construction of a guided busway segregated from local traffic or buses mixing with local traffic and priority at traffic lights along a bus corridor. This provides an efficient and reliable sustainable mode of public transport as an alternative to typical city buses or tram line.

In the last 5 to 10 years the UK has seen a growth of BRT systems with around 11 operational BRT systems in the UK. The growth in this mode of transport is partly due to the growth of cities and the focus on sustainable transport initiatives. The BRT provides a more cost effective and flexible option to light railway systems and it is more efficient to implement into existing street layouts. Figure 2.26 illustrates the capacity performance of BRT systems compared to other modes.

Due to the flexibility of BRT the bus system can be adapted according to the context and form of the city and for the overall aims the transport strategy is trying to achieve, three scenarios and relevant precedents are as follows;

- Provide radial connections from the city centre to suburbs (Strasbourg and Nantes);
- Connection between different suburbs without passing through the city centre (Amsterdam and Paris);
- Public transport axis within smaller cities (Saint Nazaire, Granda).

Effective BRT systems need to integrate holistically with land use planning along their routes to ensure the location and design of routes and transport hubs are linked with demand for the service. It is important the capacity of the BRT’s reflect expected increases in future demand as the city develops.

Alongside implementation of BRT networks improvements can be made to walking and cycling infrastructure, this includes the following key principles;

- Provision of cycle parking at BRT stations;
- On-road kerbside cycle lanes provided along BRT corridors;
- Ensuring access to all including people with physical disabilities, including facilities such as; access ramps or street level access to stations, bus stops and buses and tactile paving at crossings linked to the stations.

Four best practice case studies (both in the UK and worldwide) are analysed in this section to demonstrate how this sustainable transport mode can be successfully integrated into the existing street structure of cities.

---

Figure 2.26 BRT capacity compared to other modes. Source: Wright, 2011
2.3.1 Cambridgeshire Guided Busway

Population: 122,725 (2012)

Modal Split all trips typical working day (2010): Public Transport 9%, Car 70%, Walking and Cycling 21%

Passengers demand per year: ~3,500,000 (2014)

System length: 40 km (2013)

The Cambridgeshire Guided Busway is one of the most advanced BRT routes in the UK, and the longest guided busway stretch in the world at 16 miles in length. The network links Cambridge and Cambridge Science Park with St Ives and Huntingdon to the northwest (on a former rail corridor), and the M11 to the south. The infrastructure consists of both guided stretches and conventional street routing (Figure 2.28).

Despite the cost overruns and delays during construction, when it opened in 2011 it carried 2.5 million passengers in the first year of operation. Current ridership (2014) is around 3.5 million passengers per annum, with the fleet size and frequencies adjusted according to demand. Since the busway opened, the volume of traffic on the A14 has decreased slightly, which is likely to be partly due to more people travelling on the busway rather than by car. Furthermore, the busway has decreased the majority of journey times by approximately 5-10 minutes (Figure 2.29).

The infrastructure is currently operated by Stagecoach and Whippet Coaches under a public-private partnership. One particularly notable aspect of the busway is that it was designed to link with the new development namely the proposed new town of Northstowe with 9,500 homes and further extensions have also been considered.

<table>
<thead>
<tr>
<th>Journey</th>
<th>Before busway</th>
<th>After busway</th>
</tr>
</thead>
<tbody>
<tr>
<td>St Ives East St to Cambridge Rail Station</td>
<td>57 mins</td>
<td>48 mins</td>
</tr>
<tr>
<td>St Ives Bus Station to Cambridge Rail Station</td>
<td>55 mins</td>
<td>53 mins</td>
</tr>
<tr>
<td>St Ives Bus Station to Addenbrooke’s</td>
<td>55 mins</td>
<td>56 mins</td>
</tr>
<tr>
<td>Swavesey Boxworth End to Cambridge Centre</td>
<td>1 hr 1 min</td>
<td>46 mins</td>
</tr>
<tr>
<td>Impington Railway Vue to Cambridge Rail Station</td>
<td>31 mins</td>
<td>26 mins</td>
</tr>
<tr>
<td>Fenstanton to Cambridge Science Park</td>
<td>55 mins</td>
<td>49 mins</td>
</tr>
</tbody>
</table>

Journey times before and after the busway
Times taken stop-to-stop from Traveline.org.uk

Figure 2.27 Cambridgeshire busway network map. Source: OpenStreetMap and contributors, original uploader Peter Eastern (accessed Feb 2015)

Figure 2.28 Journey times before and after the busway

Figure 2.29 Cambridgeshire guided busway.
Source: BRT Handbook 2012-2013

Figure 2.30 BRT bus stop

Photo by Dave Harwood
2.3.2 Luton-Dunstable Busway [FTR train to plane]


Passenger demand per day: 30,000 (estimated 2010)

Passenger demand per year: 9,000,000 (estimated, 2010)

System length: 12km (4km unguided)

The Luton-Dunstable BRT sought to address a number of key issues including poor east-west journey time reliability and high levels of short car journeys within Luton and Dunstable.

Passenger surveys undertaken in October 2013 (BRT UK Handbook 2014/2015) indicate that overall there was positive feedback with regard to the quality of service (journey times, frequency, quality of stops and passenger information available). It is evident that journey times have improved as a result of the BRT (Figure 2.33).

A shared path for pedestrians and cyclists was created along a section of the busway. Recent surveys carried out in 2013 showed there has been an increase in the number of people cycling by around 21% (between 2009-2013), both on this new shared path and on routes towards the busway from the north.

The implementation of the new busway has increased capacity, frequency and the number of buses operating along the routes which gives opportunity for new development adjacent to the route, Figure 2.34.
2.3.3 York region suburbs north of Toronto, Canada

Population: 1,032,524 (2011)
Passenger demand per day: 35,300 (2008)
Passenger demand per year: 10,590,000 (2018)
System length: 59km (2008)

The York Region, Toronto has long been considered a model of good transport planning practice. Toronto, as with many cities around the world, has experienced residential and employment growth. This resulted in issues relating to urban sprawl, an undefined city centre, high car dependency and grid locked arterial roads with high levels of congestion. Today the region shows a commitment towards providing innovative sustainable public transport solutions to enhance accessibility to a range of transport modes and to improve the quality of life. One of the aims set out in the Vision 2026 strategic plan was to ‘enhance the region through the promotion of alternative transportation methods’.

The first of these initiatives and perhaps the most noteworthy to date was focused on creating an efficient rapid transit network that integrated buses, rail and convenient intermodal interchanges (Figure 2.35). The first stage of the Bus Rapid Transit (BRT) was implemented in 2005, seeking to provide a high quality route in a low density environment. During the first implementation stage the BRT network was branded and promoted to attract sufficient passenger numbers and provide a desirable alternative to the car through initiatives including:

- Reducing travel times on buses through simple and efficient routes and frequent services;
- High quality vehicles and stations to maximise passenger comfort including appropriate seating, help points, ticket vending machines and free wi-fi (Figure 2.36);
- Providing real time information.

There are further plans to extend the BRT corridors and provide more substantial infrastructure such as dedicated bus lanes.

In order to change transport trends away from the car towards higher use of public transport modes, this scheme demonstrates that an exemplar BRT scheme requires a cohesive network as well as an attractive and frequent service.
2.4 Park and Ride (P&R)

2.4.1 Queen’s Drive P&R, Nottingham

As part of Nottingham Councils’ commitment to reduce CO₂ emissions between 2015-2026 by 26%, the Queens Drive Park and Ride has been transformed into an ‘EcoHub’ that promotes sustainable transport and acts as a catalyst for future sustainable transport strategies. It operates a traditional P&R but with sustainable electric buses, an initiative launched on 12th June 2014 (Figure 2.37). As part of this initiative electric charging points have been installed within the P&R site (27 overnight chargers and three daytime fast chargers) and at Broadmarsh Bus Station and bus operator depots. This gives a total of 60 electric chargers across Nottingham city, a number which will increase by a further 20 by 2016.

As well as the electric P&R service this site further promotes sustainable transport solutions through the following initiatives and facilities (Figures 2.38 and 2.39):

- Cycle hub offering cycle hire and secure storage;
- Cycle training;
- Car charging points;
- An Asda home delivery collection point;
- A visitors’ centre; and
- A new footpath link to the River Trent to improve connectivity on foot and bike.

Future plans for the P&R to further expand the sustainable network includes initiatives such as electric car hire and demonstration days, electric bike hire and the potential for a new electric ferry to Trent Bridge.

Figure 2.36 Electric buses

Figure 2.37 City card used to access secure cycle storage

Figure 2.38 Visitors centre with real-time information

Source: http://www.nottinghamcity.gov.uk/cyclehubs
2.5 Cycling Development- UK and European Best Practice

Bicycle-friendly cities

The infrastructure should enable the cyclist to make direct, comfortable cycle journeys in attractive and safe traffic surroundings if cycling is to compete with the car. Many of the best practice studies outlined previously in this chapter have demonstrated that high-quality cycle infrastructure can lead to a higher proportion of bicycles in the modal split. Bicycle-friendly design means that the cyclist is given the same quality of space as other road users. According to the Design Manual for bicycle traffic (2007) five of the main requirements to achieve a bicycle-friendly environment include:

- Perception and being able to ride side by side adds to the attractiveness and comfort of the cycle environment;
- Offer cyclists the most direct routes, this will ensure journey times are quicker than by car and thus make cycling more desirable;
- Ensure safe conditions for cyclists such as reducing traffic speeds and increasing space available for cyclists;
- Create a comfortable environment for cyclists through high quality surface treatments;
- The need for a complete, comprehensible bicycle infrastructure that forms a cohesive network.

A cohesive cycle network consists of a variety of cycling infrastructures. The cycle network in Copenhagen demonstrates the variety of cycle infrastructure; 84% of kerb-segregated cycle lanes alongside highways, 6% painted cycleways and 10% greenways. Greenways were often the first routes to be developed in the UK for cycling, but as opportunities to implement them are exhausted provision has turned to on highways, In Copenhagen it is normal practice to create cycle lane by removing on-street parking, while alternative space is found to accommodate the cars, usually outside the city centre.

London’s cycle superhighways are primarily comprised of brightly coloured blue lanes which are not physically segregated from the main carriageway. The recent proposal to create an east-west link joining together the superhighways in the city centre is seen by some as an opportunity to use kerb-segregated lanes using the Dutch or Danish model.

In the 1970s Germany’s provision for cycling included cycle lanes alongside the highway but physically separated from it. More recently, painted lines has become common practice and the majority of one-way street allow two-way movement of cycles.

In terms of integration of the cycle lane and bus provision, best practice is generally to create ‘floating bus stops’ where bus stops are segregated from the footway by the cycle lane. This provides a safer route for cyclists away from conflict between vehicles but risks conflict between pedestrians and cyclists. This is currently part of the proposals for the superhighway in London.

Traffic management initiatives such as reducing vehicle speeds and creating shared surfaces for vehicles, cyclists and pedestrians can help to create better conditions for cyclists.

In Copenhagen a new initiative known as the ‘Green Wave’ was introduced to encourage more people to cycle regardless of their standard and confidence levels of cycling. Figure 2.41. The principle is that the traffic lights are coordinated during peak hours for cyclists so that if they travel at a speed of 20 km/h the lights will turn green. This wave ensures all cyclists travel at the same speed and therefore it improves efficiency of the journey and improves safety and more importantly perception of safety.

High quality cycle parking is an essential component of the cycling infrastructure. Cyclists need secure and attractive cycle parking facilities which are located in well overlooked areas, near amenities and transport interchange hubs and out of pedestrian desire lines.

Figure 2.39 Cohesive and integral cycle network

Figure 2.40 The Green Wave, Copenhagen

Source: Copenhagenize and fietsberaad.nl.
2.6 Summary of lessons learned

Overall the Best Practice precedents have demonstrated that from the outset towns and cities should show a commitment to policies favouring sustainable transport modes and the importance of establishing a comprehensive strategic strategy for the city as a whole. To encourage sustainable modes of transport over the car it is of the utmost importance to integrate the different modes to allow a greater accessibility to residential areas, employment and key facilities.

However, this is not enough on its own; the examples highlight the need to implement a variety of sustainable initiatives to discourage use of the private car and encourage more walking, cycling and public transport use. In each Best Practice example a combination of ‘push’ measures to discourage the use of the car and ‘pull’ measures to improve the attractiveness of sustainable transport modes are used.

Push measures mostly involved discouraging the use of the car through creating a coarse grid for vehicles by restricting access to a number of streets particularly in the city centre, high parking charges, limiting parking supply and reducing carriageway space. The majority of the initiatives implemented within the case studies were pull factors that aim to make sustainable modes more attractive and viable. This includes initiatives such as investing in high quality walking, cycling and public transport. Other initiatives involved upgrading the P&R sites to provide greater variety of sustainable uses.

Key conclusions from Best Practice are summarised below:

- A commitment to policies favouring sustainable transport modes, which are implemented over a period of time with a clear strategy. This will include an innovative and joined-up strategy for all modes across the city.
- It is of the utmost importance that improvements to walking, cycling and public transport must be accompanied by a balance of measures to control private car use.
- Integration of networks of sustainable modes of transport, for example to provide a number of cycle parking stands at bus stops to encourage the use of cycling and public transport.
- Create a coarse grid for vehicles and restrict or prevent access to the city centre. Restrictions need to apply to car parking such as parking zones with time and charge restriction and locating car parks on the edge of the city. Furthermore, the car parking restrictions need strict enforcement or problems of illegal parking may occur.
- Create a fine grain cycling grid. Cycling network to be of high quality, comprehensive, continuous and complete.
- Investing in high quality cycling infrastructure: integrate high quality and generous cycle parking at public transport interchanges, adapt the design of the street to cater for the bicycle such as converting car parking spaces into cycle parking and raising cycling awareness through education and training programmes.
- Create cycle paths that are segregated from traffic which takes the most direct route from the residential areas to the city centre and key areas of employment.
- Create high quality pedestrian routes through initiatives such as increasing pedestrian space, increasing the number of pedestrian crossings on desire lines and giving pedestrian and cycle priority on key city centre streets.
- Integrate land uses to ensure employment uses, schools, community facilities, open spaces etc are within walking, cycling distance or close to a bus stop.
- Innovative use of P&R sites such as cycle hubs with secure storage and training, car charging points, home delivery collection points and use of electric buses to increase movements by sustainable modes.
- Introduce integrated and financially attractive public transport ticketing. Provide real-time information, high quality buses and shelters and maximise frequency of buses.
- Implement transport infrastructure of sustainable modes walking, cycling, public transport prior to a new development being built, this will encourage use of sustainable modes over the car.
- Establish a cohesive BRT network that provides a high quality and frequent service and provides a viable alternative to the car.
3.0 City Centre Transport Strategy Principles

The evolution of towns and cities in Britain over many centuries is much affected by the dominant patterns of movement to and through them as well as being influenced by topography and natural features such as rivers.

Oxford is particularly unusual in the development of its urban structure which has been shaped by its rivers, its centrality in southern England, political importance and by its primary purpose for many centuries as a self-contained seat of learning and not just a market town. It is also unusual in that its primary movement structure in the city centre is largely the same as it was 150 years ago. Many cities as they have experienced 20th century expansion have added radial connections from the suburbs to the centre and have often constructed new roads to distribute traffic around rather than through the centre. For good reason these infrastructure changes have not taken place in Oxford. However, the consequence is that there are a limited number of radial corridors and that movement between these takes place in the central, most historic part of the city. As constraints on its growth are eased, a radical approach to the future pattern and type of movement is therefore needed as the city’s special role in the map of Britain increases and it begins to realise its huge importance in the economy.

Due to the nature of its primary urban structure, the city centre is where the greatest concentration of movement occurs – this is where movement related to employment, shopping, education, leisure and tourism all coincide. However, due to their often tight and narrow nature, the streets of the core have a finite capacity in terms of the number and size of vehicles that can be accommodated. Going above this capacity creates an uncomfortable environment for those walking and cycling and could result in deterioration in the built fabric of the city.

The growth of the wider population of the city together with increased employment in the centre will increase the intensity of movement in the core. As stated, a radical approach is needed to the future pattern and type of movement. In this context, we have set out below and illustrated on Figure 3.1 the key transport principles that we would want to see applied to the city centre. These are informed by the approach taken in other cities, primarily in mainland Europe, the limitations of the built fabric and the aspiration for the centre to be a world class environment.

Figure 3.1 Strategic movement principles into the city centre
The principles set out are the ideal that we would want to see used but we acknowledge that there will need to be some flexibility in their application.

Modal Hierarchy

The modal hierarchy for the city core should be; Pedestrians, Cyclists, Buses/Coaches, Servicing Vehicles, Private Vehicles. This hierarchy must be applied to decision making about the allocation of street space within the city core. The application of this hierarchy will vary depending on the particular location in the city core although in general we would expect the use of shared space and pedestrianised streets and spaces to be greater in the centre than on the edge.

Walking

The journey time for walking across the core is a maximum of 25 minutes and from the edge to the centre is 10 minutes. The vast majority of those living, working and visiting the city centre can therefore travel between key destinations on foot. A high quality walking environment must be created throughout the city core and not just in the centre. Space for people on foot must be maximised whether that be through widened footways or through the use of shared space/pedestrianised streets. Appropriate types of crossing facilities must be located on key desire lines and high quality, well maintained paving used throughout. Vehicle speeds must be calmed to between 10 and 20mph and the size of vehicles must be as near to human scale as possible, not intimidating.

Cycling

Journey times by bicycle between key destinations in the core are a maximum of 10 minutes. A high quality cycling environment must be created in order to maximise the uptake of this highly sustainable mode. The majority of streets in city core should be designated as ‘Cycle Streets’ in which cyclists have priority and motorised vehicles are ‘guests’. Vehicle speeds must be calmed to between 10 and 20mph and the size of vehicles must be as near to human scale as possible, not intimidating. Generous levels of easily accessed cycle parking must be provided and these must meet the needs of a range of users who have different journey purposes. A public cycle hire scheme must be implemented in the city core with hire stations located at transport hubs and key destinations. In particular, the scheme must be highly accessible to visitors to the city. A network of key routes should be established and signed to allow visitors to navigate the city by bicycle.

Buses & Coaches

Cycling or walking will not be an appropriate or realistic transport mode for a substantial number of people wanting to access the city core. The city’s bus services should be the first choice for motorised vehicle access to the centre, being more attractive than the private car. Bus services must penetrate the city core and transport people close to the retail, employment and educational areas as is practical. A series of transit hubs should be established which provide high quality waiting facilities for passengers and allow some spaces for buses to lay-over. There should be a comprehensive review of the bus network in the city with a view to minimising the lay-over space required in the centre but also the need for buses to pass through the very centre of the core. Consideration should be given to implementing an electric shuttle mini-bus that will connect transit hubs with key destinations.

Servicing Vehicles

Servicing of businesses and educational institutions is an essential requirement for the city. However, the impact of vans and heavy goods vehicles on the urban fabric and other street users must be minimised. Partnerships must be established with major businesses and educational institutions with the objective of developing delivery and servicing plans that reduce the number of vehicle movements and maximise the opportunity for these to take place outside of the period 8am to 6pm. Linked to these partnerships, servicing centres should be established outside of the city core in order that deliveries to multiple businesses/institutions can be consolidated into fewer vehicle trips. Local consolidation centres within the city core could further help reduce the impact of servicing in the centre.

Private Vehicles

The requirement for private vehicles to access the city core should be accommodated but not encouraged. Movement through the city core by private vehicle should be restricted for the majority of the day – cross city movement should take place using the inner ring road and outer orbital route. The attractiveness of private car parking should be reduced through use of a workplace parking levy and public provision should be consolidated in a few multi-storey car parks located on the edge of the core retail area.
4.0 Mass Transit

4.1 Introduction

Although the overall numbers of people using public transport to get to work in Oxford has increased as a result of population growth, the proportion of total trips undertaken on rail or by bus has not increased significantly between 2001 and 2011. Nonetheless, the proportion of total travel is comparable to some London boroughs, which reflects both the maturity of public transport provision in Oxford and the population’s inclination towards sustainable urban living.

For those getting to work on public transport, the bus is by far the most popular mode. Despite a substantial increase in passenger volumes on the train, the overall proportion of commuters getting to Oxford by train was only five percent 2011.

The Eastern Arc already provides more jobs than the city centre and as employment growth becomes even more focused on the area, and begins to accelerate in Northern Oxford, the bus will remain the dominant mode of public transport as these areas can only be partially served by rail at Water Eaton/Oxford Parkway and potentially using the Cowley branch line. However, unless there is a step change in public transport serving these areas of employment growth, many commuters, particularly from outside the city, will choose to drive.

Acknowledging this pattern the Oxford Transport Strategy focuses on bus based solutions to Oxford’s transport challenges. We agree with this approach in the short to medium term although the extent to which Bus Rapid Transit could be a test bed and precursor to light rail should be explored. We suggest however that the evidence base does not appear to be sufficiently developed to support the chosen options and therefore that the Strategy needs to be more flexible. The delivery and operational structures of whatever form of mass transit is adopted will need to be robustly evidenced and must involve close consultation with the City Council and other key stakeholders before options are formally selected.

The Strategy acknowledges the detrimental impact that over 190 bus and coach services entering the city centre in the peak hours currently has on the quality of the environment. With the potential for up to 70 additional buses in the peak hours if current travel patterns persist this too is a key concern for us and one we will return to in our comments below. We do not believe that tunnels are the solution to this problem, particularly in the context of heritage asset constraints, but that alternatives are possible and must be considered.

If the population and economic growth in the city is to be accommodated sustainably and without impact on the quality of the urban environment the existing positive travel patterns of the city’s resident and working populations needs to be capitalised on and radical improvements made to public transport services and the way they operate. We believe there is a need to more radically address the use of road space in the city to ensure maximum efficiency. Fundamental to this is accelerating the shift from the private car that planning and transport policy have successfully been delivering over the last 20 years.

We believe more emphasis needs to be placed on linking and integrating the three strands of mass transit, walking and cycling and travel demand management. We will return to this point later in our submission.
### 4.2 What is proposed?

The Strategy refers to a number of rail projects that are already underway, programmed or planned. These include:

- The new Oxford Parkway station
- East-west rail phase 1 – connecting to London Marylebone
- East-west rail phase 2 – connecting to Bletchley
- Electrification of the Great Western Mainline
- The Oxford station masterplan proposals
- Cowley Branch Line opened to passengers with stations at Oxford Business Park and Oxford Science Park

Linking to Oxfordshire Science Transit and the Oxfordshire Bus Strategy a network of enhanced bus services, Bus Rapid Transit (BRT) and rail improvements are envisaged, as set out in Figure 4.3.

#### Figure 4.3 Proposed strategic transit network

The Strategy contains the following key proposal:

1. Bus Rapid Transit line 1 - Langford Lane P&R to Blackbird Leys (via city centre)
2. BRT 2 - Thornhill P&R to Cumnor P&R (via city centre)
3. BRT 3a - Eynsham P&R to Sandford P&R (orbital route via Headington)
4. BRT 3b - Langford Lane P&R to Lodge Hill P&R (orbital route via Headington)
5. Premium and connector bus routes created on non BRT routes, in line with the Oxfordshire Bus Strategy
6. Six new P&R sites created further out from the city in order to intercept car trips before they reach the outer ring road. These replace the existing P&R sites, except for Thornhill, which remains. These would include cycle provision, including hire (cycle & ride or park & cycle). The existing P&R sites would close
7. Transit hubs will be created at strategic points on the network - these will facilitate interchange between BRT lines, bus routes, rail, taxi and the enhanced cycle network
8. Transit terminals are proposed in the city centre to accommodate service access and layover facilities. These are proposed off-street in the locations shown below and would be replaced when bus tunnels are opened
9. Two bus tunnels crossing the city centre from north to south and east to west
10. New buses are proposed that are higher capacity than double deckers, allow free-flow boarding, facilitate on-board fare recognition and are fully accessible
11. A zero emission zone is proposed in the city centre to start by 2020, with a city wide zone by 2030
12. Smart mobility measures are proposed that allow users to plan journeys better using various devices
13. Renewal of the Quality Bus Partnership is proposed, with a focus on establishing the principles of the BRT operation including measures such as departure slot booking, consolidation and joint operation of services to reduce bus numbers, inter-operator and smart ticketing

The remainder of this paper will focus on the proposals set out above.
4.3 Rail

Improvements to rail do not appear to be fully imbedded and integrated within the Strategy – rail should play more of a prominent role.

The Strategy anticipates an increase in rail patronage at Oxford Station of 70% to 2026. This is due to the substantial improvements programmed on the surrounding rail network – namely electrification, increase in services as part of the Intercity Express Programme and East West rail rather than any significant increase in overall numbers commuting to Oxford by rail.

The new Oxford Parkway station is due to open later this year and will have 100 cycle parking spaces and over 800 car parking spaces as well as being located adjacent to Water Eaton P&R. It will provide a connection to Bicester and London, with services to Oxford commencing early 2016. The station will provide much enhanced public transport accessibility, which could help deliver additional housing in the area as identified in the Oxford Strategic Growth Options study in 2014.

Two new stations are proposed along the Cowley Branch. Chiltern Rail are pursuing the potential to have a new passenger service on this line by 2020. This is a key project for the city. These have the potential to help unlock land identified for potential housing development in the Oxford Strategic Growth Options study. Equally as important the stations will improve access to the established employment centres of Oxford Business Park and Oxford Science Park as well as future employment growth in the area. However, the stations might also attract commuters into the area and could have an impact on local parking.

We suggest that the Strategy should include additional proposals for rail, including for example the potential for a new parkway station accessed from Grenoble Road. Additional suggestions regarding rail are set out in section 5. The requirements for any additional infrastructure, for example twin tracking of the Cowley branch line to accommodate passenger services, should be included. As part of this the potential for running light rail services on the line, particularly linking with the suggestions for additional stations in section 5, could be explored.

Although we acknowledge that rail currently only plays a minor part in Oxford’s travel patterns, we believe there is the potential for this to increase and that rail should form a larger part in the Strategy.

The redevelopment of Oxford Station is of critical importance to strategic rail services serving the city. The existing facilities are completely inadequate, and the outline masterplan sets out the principles including the requirement for six tracks and two island platforms. The masterplan has been endorsed by the Department for Transport, Network Rail and partners. Funding and a delivery programme are now required for implementation before 2020. The replacement of the Botley bridge is an essential element to increase track capacity and for essential improvements to the highway network.

4.4 Bus Rapid Transit and the bus network

Higher capacity forms of mass transit should be considered. The proposed BRT routes must be flexible to ensure coordination with urban extensions. Higher frequency and higher capacity BRT services are needed. Radical road space reallocation is necessary to improve journey times and provide a reliable service. A clearer bus management strategy is needed. A fundamental review of the routing of services in the city centre is required. The need for and scale of layover of services in the city centre must be challenged. Articulated vehicles are not suited to the city centre. Transit hubs must integrate successfully into the public realm.

Options analysis

A SWOT analysis was undertaken to inform the choice of preferred mass transit. Conventional bus, guided bus, bus rapid transit (BRT) and light rail were considered. For reasons of flexibility, cost, network resilience and greater attractiveness to users in comparison to conventional bus, BRT was selected. We support this choice, which is appropriate given the need to increase capacity and quality quickly and the need to strike a balance between delivering a significantly enhanced service capable of attracting users and a system that is affordable. However, we note that there is significant interest and on-going discussion between key stakeholders regarding the potential role that trams might play in Oxford’s future.

We believe the Strategy should reflect this on-going discussion and that BRT should be proposed as the first stage of a long term strategy to grow demand and move towards forms of mass transit, such as trams, that might provide higher capacity and a high quality journey experience. This would help reduce the impact of buses on the city centre, although the requirements for multiple tracks would need careful thought. We believe that a tram network would attract a wider range of users than a bus-based solution, would help unlock strategic development sites, which might also provide funding opportunities and could offer part of an alternative strategy to buses running in tunnels. Given the lack of detailed evidence supporting the BRT option we believe that the Strategy should not rule out alternative modes of mass transit at this stage.

Central to the improvement of the current bus services and BRT is the re-allocation of highway capacity to these modes within the principal transport corridors. The practical implications of this need to be established and accepted if this is to become a practical solution.
BRT routing and overview

The proposed routes align well with the continuing growth of the Eastern Arc as a location for employment and serve the local and district centres of Summertown, Cowley, Headington and its hospitals, Blackbird Leys as well as Oxford Business Park and Oxford Science Park. The routes have the potential to align with our aspirations for urban extensions, which are shown in Figure 4.4.

Six potential locations for intensification have been identified, with the sites north of Oxford and South of Kidlington and around Grenoble Road currently being investigated in more detail. We expect these extensions to be high-quality urban neighbourhoods with levels of density that will both support and demand high frequency mass transit. BRT line 1 and 3 have the potential to serve the key northern development site but the current proposals do not serve the Grenoble Road site. The Strategy should include BRT connections to all development sites, or refer to the need for the final routing to be flexible to accommodate urban extensions in liaison with the City Council. This should include a direct connection to the city centre.

A direct connection for buses to the John Radcliffe hospital from the ring road would help reduce congestion in the area. However, we do not believe the suggested alternative line 3 alignment through Dunstan Park and Headington Cemetery would be achievable given the negative impact this would have on these public spaces. We have similar concerns with the alternative alignment to the south of Churchill Hospital through Southfield golf course. The Strategy should set out the aspiration for achieving such connections to the hospitals and commit to working with us on developing options.

A service headway of 10 minutes is proposed on lines 1 and 2, with a 15 minute headway on line 3.

This level of service is unlikely to offer the kind of ‘turn up and go’ operation that is essential if large numbers of people are to choose it over using private cars. The frequencies would be bolstered by the running of general bus services, however this could reduce the quality of service by adding to delays and congestion and reducing the coherence of the offer to the public.

A substantially higher frequency of service should be provided; we would suggest at least double that proposed.

No information is provided regarding the overall capacity of the BRT lines. However, given the number of buses proposed, their likely seating capacity, the length of the routes proposed and average running speed, we have assumed a total capacity of around 3,500 passengers per hour across all lines. In the context of 18,000 existing bus trips and an additional demand, even if there is no modal shift, of around 4,000 trips to and within the city, the extent to which BRT can be central to the city’s public transport network is doubtful unless substantial increases in capacity can be achieved and existing services better coordinated. The question of coordination is touched on in more detail in chapter 6.
A package of measures are proposed for each route in order to secure the following average peak hour running speeds:

- Line 1: 20 to 25 km/h
- Line 2: 20 to 25 km/h
- Line 3: 30 km/h

Around 60 measures are identified and include:

- increasing the total length of bus only (or restricted traffic) operation by 1km for line 1, 1.2km for line 2 with line 3 receiving bus priority on the A40, bus lanes on Marsh Lane and on Hollow Way.
- localised widening of the highway or road space reallocation at pinch points
- extending bus lanes to junctions
- adding bus detection to traffic signals

Although these measures are positive and welcome we question the extent to which they represent a step change in provision for buses as they do not fundamentally address the allocation of road space. We are concerned that the SWOT analysis for mass transit states as a weakness of BRT that “opportunities for additional priority over [the] existing situation [is] limited”, a point that is repeated throughout the strategy. If BRT is to be a success then it must offer a substantially improved service in comparison to existing buses. A robust and integrated package of measures is required that brings together high frequency, high capacity services, road space reallocation and travel demand management. This final point will be discussed in chapter 5.

We do not believe the assumed peak hour running speeds set out above will be achieved through the current proposals. Given the limited evidence base supporting the proposals the Strategy must include a commitment to modelling the impacts of the routes so that the need for traffic restraint measures, including those to reduce rat-running on adjacent streets, can be targeted, along with the need for additional capacity on the ring road. As set out in section 5 we believe journeys times from the proposed P&R sites to the city centre will be longer than they are currently. To help reduce this we suggest that alternative measures, such as guided busways be explored as part of the Strategy, particularly on the ring road and between nearby villages.

Bus stops

An essential component of a BRT network is to have high quality stops that are accessible for all users, technology that allows for off-bus payment and facilitates multi-door boarding and real time and on-ward journey information. The Strategy includes these features and notes that at key locations ‘transit hubs’ will provide a greater range of facilities, which is welcome.

Bus stops are proposed to be inset from the carriageway in order to minimise delay to general traffic. We are concerned that this will cause delays to buses re-entering the carriageway, that the space for the bus laybys will need to be found from the footway and therefore that scope for providing safe cycling facilities around the stops, for example in the form of floating bus stops, will be reduced. Consequently we do not believe the current proposals give adequate priority to buses over general traffic.

Alternative options

As discussed above our view is that the potential of BRT will only be realised if the services are given substantial priority over the private car. We do not believe the current proposals will achieve this.

The city centre accommodates a large number of buses at present. This has impacts on the quality of the environment and safety, as demonstrated by the 88 accidents involving buses in the city centre over the five years to May 2014. The Strategy proposes gradually increasing the pedestrianised area of the city centre with buses serving the outside of it.

We recommend that more radical measures should be included within the Strategy. An example is the creation of ‘sustainable transport corridors’ where only public transport, walking and cycling is permitted and general traffic is excluded during the day or managed in other ways, such as on a tidal basis. On routes where there are parallel roads this could be achieved by maintaining a corridor for general traffic. For example Banbury Road could be designated as a sustainable transport corridor with Woodstock Road for general traffic. A similar arrangement could be envisaged on Hythe Bridge Street and Park End street.

The need to maintain vehicular access to property, businesses and local facilities such as Summertown car park, would need to be carefully considered and additional measures, such as a mixture of access only and bus only running, would need to be investigated along the routes. The impacts on air quality of the general traffic routes would need to be monitored and mitigation measures, such as traffic reductions, planting and green walls implemented where necessary.
Where there are no parallel routes, for example along London Road, robust demand management measures will be needed to ensure traffic volumes are reduced to a level that allows for uninterrupted running of services. These would include access restrictions that do not allow traffic to pass through the city centre, better management of servicing activity, the workplace parking levy and should be complemented by increases in capacity on the ring road.

Once established these sustainable transport corridors can become the precursor to even higher capacity forms of mass transit linking new urban extensions to the city centre.

An alternative to the ‘sustainable transport corridor’ approach would be to introduce one-way gyratory systems in these locations. This would create additional capacity and could also have tidal working incorporated into the system – for example allowing buses additional capacity southbound in the AM peak and vice versa. However, one-way systems tend to have a negative impact on the quality of the environment by encouraging speeding, creating platoons of vehicles and increasing vehicle miles. All of which makes them less attractive for walking and cycling. Furthermore, if BRT services were to be split over the one-way system this would create a more complicated service for users, with north- and south-bound stops separated. For these reasons a gyratory approach is not recommended.

**Bus network**

All those routes that carry bus services that serve the P&R sites or have at least two buses per hour using them are proposed to be designated as premium routes. All other routes will be classified as connector routes. A suite of measures are proposed for each type of route, with fewer measures proposed on premium and fewer again on connector routes.

The measures proposed will help provide more reliable journey times for buses but are likely only to be effective if the improvements are set within a broader package of travel demand management measures. As discussed in regards to BRT, coordination of bus services in the city centre will be essential to a sustainable long term strategy.

We note that Iffley Road, which carries a high frequency service to Rose Hill, is shown as being a Connector Route, rather than a premium. The two services an hour ‘premium route’ threshold is too low for an urban area such as Oxford. We believe the non BRT bus measures should begin to be implemented in the short term so that bus reliability is improved and priority established on primary routes. The proposals set out within the Strategy are very high level. Further information will be required regarding the planning of network development so as to ensure proper coordination between services and land use policies. The Strategy proposes that the measures to be implemented to support buses will be assessed against the ‘related expense to general traffic’. As set out above a more holistic approach is required that seeks to minimise general traffic and reallocate road space to buses, walking and cycling.

### Table 3.1 Qualities of various mass transit options (source: TfL)

<table>
<thead>
<tr>
<th>Model Characterisation</th>
<th>Bus</th>
<th>Minimum Bus Priority</th>
<th>Premium</th>
<th>Main City Corridor</th>
<th>Medium to Low Density Urban Centres</th>
<th>Low Density Urban Centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum capacity</td>
<td>2,500  pphpd</td>
<td>4,000 pphpd</td>
<td>6,000 pphpd</td>
<td>12,000 pphpd</td>
<td>16,000 pphpd</td>
<td>30,000 + pphpd</td>
</tr>
<tr>
<td>Capital cost</td>
<td>&lt; £1m</td>
<td>£1m - £2m</td>
<td>£1m - £2m</td>
<td>£1m - £2m</td>
<td>£1m - £2m</td>
<td>£1m - £2m</td>
</tr>
<tr>
<td>Capacity per passenger lane km</td>
<td>8.5 p - 10.0 p</td>
<td>7.5 p - 8.5 p</td>
<td>7.5 p - 9.0 p</td>
<td>7.5 p - 9.0 p</td>
<td>7.5 p - 9.0 p</td>
<td>7.5 p - 9.0 p</td>
</tr>
<tr>
<td>Average speed</td>
<td>10 - 14 km/hr</td>
<td>12 - 16 km/hr</td>
<td>14 - 20 km/hr</td>
<td>16 - 22 km/hr</td>
<td>18 - 24 km/hr</td>
<td>20 - 26 km/hr</td>
</tr>
</tbody>
</table>

Table 3.1 Qualities of various mass transit options (source: TfL)

NB - ‘maximum bus priority’ corresponds to BRT

### Table 3.2 Bus corridor prioritisation

- **BRT**
  - Full bus detection and prioritisation at traffic signals.
  - Dedicated or fully segregated lanes included where achievable.
  - Bus lanes extended to junction stop lines.
  - Bus gates and access restrictions to reduce traffic levels.
  - Uncluttered low-traffic or traffic free streets in the city centre.
  - Strict kerbside controls and daytime loading bans.

- **Premium bus routes**
  - Stricter kerbside control/urban clearways.
  - Kerbside parking removed at pinch points.
  - Bus detection included at key junctions.
  - Bus lanes where achievable.

- **Connector bus routes**
  - Some bus detection at signals.
  - Kerbside parking removed at pinch points.

Table 3.2 Bus corridor prioritisation
Transit hubs

The Strategy introduces the concept of Transit Hubs, with a number of potential locations suggested, as set out in Figure 4.4. The hubs could include a number elements, and the Strategy includes:

- waiting and off-board payment facilities will be well sheltered or enclosed;
- accommodate high frequency services, and large flows of people, at peak times;
- facilitate seamless, stress-free transfer across multiple modes of travel;
- be situated in locations that are close to the strategic highway network, providing maximum opportunity for P&R and mode-shift from private car use;
- maintain safe walk and cycle access by keeping people segregated from public transport and vehicle movements;
- have appropriate levels of convenient and secure cycle parking; and
- become an integral part of the land-use mix to create vibrant centres of activity that reduce ‘dead-time’ commonly associated with interchange between travel modes.

These facilities are key to the success of the BRT concept and the hubs are welcome in principal.

No detail is provided regarding the physical form the hubs might take or how they might be successfully integrated into Oxford’s public realm and built environment. The strategy should provide further detail on the hubs, particularly when they are located at the junction of heavily trafficked roads. We question how the proposal to accommodate P&R at the hubs could be successfully integrated into the designs without negative impacts on surrounding streets. Drop-off facilities should be included in the vicinity of the hubs. We believe that the existing P&R sites could fulfil the role of transit hubs.
4.5 The future of park and ride (P&R)

Moving P&R sites further away from the city will reduce their attractiveness, for commuters but also for users of an expanded city centre retail offer. The impact of the P&R sites on the A34 does not appear to be significant. It should be used to reduce the impact of the P&R sites on the main road network. There does not appear to be sufficient capacity on the proposed BRT network to accommodate P&R demand. The impact and role of rail in P&R has not been investigated. Better use could be made of the existing P&R sites and they are likely to be required in the overall strategy, with possibly additional provision further out of the city. The Strategy should diversify P&R and develop the concept further. A different approach is required to freight consolidation.

Oxford’s P&R sites have played a key role in controlling the growth of traffic within the city. If they are to be successful they must offer commuters a cost effective method of getting into the city quickly. This is a fine balance and we believe that moving the P&R sites further out of the city, thereby increasing journey times and cost, will significantly reduce their attractiveness to commuters. Any changes to the P&R sites must be well coordinated with access restrictions and increased parking charges in the city centre. This is addressed in more detail in chapter 5.

The evidence base supporting the P&R proposals in the Strategy is weak. The proposed approach has not been tested or subjected to a rigorous level of review, no sites have been selected and there is a very limited analysis of alternative options. The modelling analysis underpinning the proposals also appears to be underestimating the existing demand for the P&R sites. Taken together we question the extent to which the work done can form the basis for a robust preferred option and therefore the Strategy should include a range of options, including the alternative we suggest below.

Journey times to the city centre from the existing P&R sites take between 15-25 minutes. No comparable information is set out in the Strategy for the new sites but we believe that journey times into the city centre will be significantly longer for the proposed sites, particularly for Eynsham, Kidlington, Sandford and Lodge Hill where no direct BRT services are provided. Their distance from the city centre will also deter commuters from walking or cycling, as currently happens from the more central sites.

The potential for a BRT connection from Lodge Hill and Sandford to the city centre should be investigated. Additional options for sites outside the ring road but closer to the city should also be investigated.

The evidence base supporting the Strategy assumes a negligible number of commuters and visitors to Oxford live closer to the city than the proposed remote P&R sites and that they do not have access to BRT or other bus services suited to their travel needs. We consider this is a poorly evidenced assumption, given there has been no meaningful analysis to support it. In reality, there are populated areas within the proposed ‘outer ring’ of P&R sites who for whatever reason will not use or have convenient access to BRT or other bus services serving the destination they require, and equally will not wish to drive away from the City to then double back using the new sites. Examples include parts of Kidlington and Kennington, as well as villages such as Yarnton, Cassington, Begbroke and other outlying housing within this area.

Overall, given the overall greater bus travel distance, there is a real risk that people will be deterred from accessing Oxford at all, triggering negative economic consequences. Others may decide to drive all the way into the City irrespective of higher cost, or park in inappropriate locations, or rent spaces on private property over which the local authorities have no control.

The Strategy states that a key motivation for relocating the P&R sites is to reduce the impact the existing sites have on the outer ring road, citing the addition of 460 trips in the AM peak from the Peartree, Water Eaton, Redbridge and Seacourt sites on the three A34 junctions to the west of the city. The strategy refers elsewhere to improving capacity on the ring road by introducing Intelligent Transport Systems (ITS) but does not relate this to P&R sites.

The Strategy does not provide any supporting evidence to support the assertion that 460 trips from the existing P&R sites have a significant negative impact on the operation of the A34, which carries up to 70,000 vehicles every day around Oxford. We believe it is unlikely that the trips generated have a significant impact on the operation of the A34. Furthermore, if there were any impact, we believe it could readily be mitigated through minor junction modifications or better use of ITS. The Strategy should include reference to the potential for ITS measures to be employed that, for example, could include VMS directing drivers to sites with spare capacity.

We are concerned, as set out above, that the proposed priority measures for BRT and other buses are not sufficient to ensure running times that will represent an attractive service to commuters. In addition, it is not clear that the capacity of the BRT services is sufficient to meet demand. Across all lines there appears to be capacity for around 3,500 passengers in the peak hours. The total capacity of the proposed P&R sites is 9,400 and the Strategy forecasts that an additional 18% of current P&R users (excluding those using Thornhill) will catch the bus instead of using the new sites. This reinforces our view that the capacity of BRT needs to be substantially increased if it is to represent a transformative mass transit system for Oxford.
Freight consolidation

The Strategy states that the existing P&R sites could be converted to use as freight consolidation centres.

We believe that the impact of such centres at the existing sites, particularly given the high volumes of HGV traffic this would represent, would be higher than the impact of the existing P&R use. The impact on air quality as well as the need for changes to the surrounding highway to accommodate a higher volume of large vehicles would be negative. Our view is that this use would not be suitable at the existing P&R sites and would not contribute to a reduction in congestion on the ring road. Previous work has identified the Unipart site as a potential location for freight consolidation. The Strategy should reference this potential and the benefits of linking freight consolidation to the zero emission zone proposals, as discussed in section 7. More generally the location of freight consolidation centres will need to relate to demand for freight within the city and existing freight networks.

Alternative options

We believe that a strategy should be developed that retains the existing P&R sites, investigating the use of decking to increase their capacity where necessary.

The City Council is developing proposals to extend the Seacourt P&R by 700 spaces in order to meet demand from the west of the city and have undertaken detailed studies on the feasibility of this expansion, including on local highway capacity. Our view is that the expansion of Seacourt should form part of the P&R element of the Strategy.

If some or all of the existing P&R sites are retained and new, more remote sites created the benefits of ‘intercepting’ traffic earlier can be realised without decreasing the attractiveness of P&R for commuters who live closer to the city. We suggest that further analysis is likely to support the need for both existing and some new P&R sites over the period of the strategy.

Buses could be run that serve both the new and existing sites. The sites closer to the city such as Seacourt and Redbridge, would then serve those that live nearer, reducing wasted mileage as a result of otherwise having to ‘double-back’ to remote sites. The sites would be priced appropriately to encourage use of the remote site options whilst still being cheaper than city parking options. This would allow the new sites to be smaller and less costly. Maximising the cycling connections from the closer sites will be crucial to encourage greater take up of cycling.

The strategy does not consider the potential feasibility of connecting the existing P&R sites at Redbridge and Water Eaton via rail to the city centre. This would have benefits in terms of reducing city centre bus traffic and could represent an enhanced offer to commuters, depending on service frequency. The option of light rail might be investigated as part of this and as set out in section 2.

The connectivity of the P&R sites to both public transport and the strategic road network create a unique opportunity to expand the function of the sites. Given our pioneering of the concept in the 1970s Oxford should now be leading their evolution. We believe that the more diversified role that P&R sites could play has not been fully investigated and should include:

- Parking for tourist coaches. This should be linked with access restrictions so that they are removed from the city centre
- Remote school drop off points. This would help reduce the impact of the school run on the city by providing school hubs where pupils might be met by teachers and transported into the city by bus, this would be reinforced by access restrictions
- ‘Buy and collect’ retail facilities so that visitors can shop in the city centre then collect their goods at the P&R sites, such as is seen at Trumpington P&R in Cambridge for John Lewis
- Electric charging points for both cars and buses
- Cafes
- Remote work hubs
- Cycle hire and repair facilities
4.6 City Centre - Transit Terminals and Tunnels

Transit terminals will be an important element of reducing bus traffic in the city centre. Expansion of Gloucester Green is unlikely to be possible. Tunnels will have an unacceptable impact on the centre of Oxford and would displace, rather than solve traffic problems. We suggest an alternative pattern of bus operations. This will require new arrangements with the bus operators. Long distance and tourist coaches should be subject to access restrictions.

Transit Terminals

The Strategy identifies that the key challenge in the city centre is to allow for BRT and bus patronage to grow while also improving the quality of the environment. Transit terminals are a key component of the Strategy’s approach to achieving this. The terminals would be introduced by 2025 and are proposed at Oxford Rail station (as set out in the Station Masterplan proposals), Gloucester Green (complete refurbishment and expansion of the existing site) and Speedwell Street (new off-street site to be identified, potentially the Telephone Exchange) and are set out in Figure 4.6. The terminals would act as access and layover points for services and would include waiting facilities, ticketing points and service information. As they would be located off-street there would be the opportunity to remove the existing on-street bus stands in Speedwell Street.

As well as the sheer volume of buses, the existing bus layover patterns in the city centre also cause problems in terms of impact on the quality of environment and ease of pedestrian movement. The transit terminals and the Strategy more broadly assume that a similar operating pattern to that currently existing will continue.

We support the proposals for a transit terminal at Oxford Station, as set out in the Station Masterplan. However, we do not believe that Gloucester Green can be expanded without the removal of buildings to the east or west, which is unlikely to be acceptable. Gloucester Green may have a valuable role if reconfigured and the options for use by local buses or long distance coaches evaluated. The Telephone Exchange site on Speedwell Street could be well located to provide transit terminal facilities, particularly serving an expanded Westgate Centre. However, the site is owned by the City and is in operational use on a long lease to BT, who advise that the equipment located within the building would be hugely expensive to relocate. Therefore, its release in the foreseeable future is unlikely. A capacity assessment of any of the transit terminals taken forward should be undertaken as the mass transit options are developed. It may be that other sites and buildings could be considered in the vicinity of Gloucester Green and Speedwell Street.

As set out below, we believe that a different approach is required in the city centre with changes to bus partnerships both forming an integral part of the Strategy.
Tunnels

The Strategy proposes that by 2035 two tunnels are introduced that would run east-west and north-south under the city. These would allow a large ‘low trafficked core’ to be created with significant benefits for those walking and cycling and for the city centre environment more generally.

While we agree that removing buses from street level would have a significant positive affect on the environment in the city centre we do not believe that tunnels are possible in Oxford. There are a number of reasons for this.

The portals where the tunnels break ground would be substantial pieces of highway infrastructure with long ramps, complicated arrangements to connect them to the existing highway and mechanical plant for ventilation. The construction would require bored tunnels, rather than cut and cover, which implies significant depth which limits surface access for passengers at intermediate points. The indicative locations shown (Figure 4.7) are all within the Central (University and City) Conservation Area, while the southern portal is also located on a Scheduled Ancient Monument (The Norman Grandpoint Causeway). Given the unique concentration of fine quality buildings in the city centre and that settlement of the area stretches back for millennia, it is difficult to envisage any locations that could be constructed without significant damage to heritage assets, including archaeology.

While the tunnels would remove buses from the city centre, the problems of noise, vibration and severance would be displaced and intensified at the portal sites, compounding the already severe visual and heritage impacts of the physical infrastructure.

Access from the tunnels to the surface would be necessary in the city centre. At the very least this would require the conversion of commercial properties, if not the demolition of buildings to accommodate the volume of passengers, and related fire regulations and access requirements. Ventilation shafts along the route of the tunnels are also likely to be required with additional impacts on commercial properties and heritage assets within the city centre.

Even if the tunnels were technically feasible the £600m cost is unlikely to represent value for money when compared to alternative measures.

We are strongly of the view that tunnels are not appropriate in Oxford. Alternative, less costly and more sensitive solutions must be found to improve the quality of the city centre environment while providing for substantially increased capacity.
Alternative options

We believe that the proposals to provide an enlarged network of low trafficked streets within the city centre, as shown in Figure 4.6, can form the basis of an alternative strategy to tunnels. In order to achieve this without unacceptable increases in bus traffic on St Aldates and High Street, bus services would need to be managed differently. We believe this can be achieved through different bus operating patterns, refocused so that only a proportion of services pass through the city centre. One potential way of achieving this might be to split routes so that the majority of services on Line 1 from the north run from Langford Lane to Cumnor and on Line 2 from the east from Thornhill to Blackbird Leys, rather than into the centre. The remaining ‘cross city’ buses running north to south would be routed via High Street, St Aldates, Oxpens Road, Hythe Bridge Street and Banbury Road when passing around the centre. Interchange would be provided at the transit terminals identified at Gloucester Green and Oxford station so that passengers on the non ‘cross city’ buses could change if required. To the east, where it may be harder to identify an acceptable location for a transit terminal, the proposed routes could be split at The Plain roundabout, following the proposed routeing between Thornhill and Blackbird Leys as set out above. An ‘inner orbital’ route could be operated around the city centre linking the terminals and The Plain roundabout with key destinations such as Oxford Station, Westgate, the High Street and Science Area. This service would connect with the BRT lines and provide onward connections to the P&R sites.

This would leave the very core of the city centre without direct bus services. In order to ensure that those who are less mobile such as the elderly, disabled and people with buggies or heavy shopping can still access the centre a shuttle bus could be operated to provide services through the city centre. This could be operated along the lines of the Metroshuttle in Manchester with smaller, electric vehicles and might link the Gloucester Green terminal with Speedwell terminal via New Road, Queen Street and St Aldates. Further work will be required to establish the origins and destinations of bus users so that a clearer picture can be developed of the impacts of reducing city services.

Alternative routeing options might include greater use of the A40, this would allow quicker journey times to be achieved from the north to employment opportunities in the south. A further alternative might be to run services from the east (Thornhill) or south (Sandford / Lodge Hill) beyond the Plain Roundabout via the Science Area in order to provide better connections to the city centre and beyond.

The provision of cycle hire docking stations within the vicinity of the key interchanges set out in Figure 4.8 would allow for onward journeys by bike to the city centre.

In conjunction with the proposals for mass transit only routes set out above and with appropriate controls on traffic access, a more sensitive and significantly less expensive solution may be possible. This would have the potential to evolve into a higher capacity mass transit system as ridership develops with larger vehicles or trams on the radial routes described above. To ensure the efficiency of these services, a different approach to managing bus services would be required and this is set out below.

The Strategy must consider alternative options to tunnels for achieving a high capacity mass transit system for Oxford that is sensitive to the fine built heritage of the city.
High capacity buses

The Strategy envisages a fleet of high capacity buses serving the BRT routes into the city. These would be capable of allowing free-flow boarding, smart ticketing and would be fully accessible. The potential for electric hybrid or full electric buses is also set out. While a step change in the quality of vehicles is essential to encouraging commuters out of their cars and onto BRT, the vehicles must be suitable for Oxford’s streets. We are concerned that large articulated vehicles are not appropriate through the centre of Oxford and aside from their visual impact on the public realm, their impact on pedestrian and cyclist safety is also of significant concern.

We support the vision for significantly improved vehicles to support the BRT service, however their routing through the city centre is unlikely to be acceptable. We believe that the alternative bus operating patterns we have set out above could be managed so that only vehicles appropriate to the city centre environment run on the ‘inner orbital’ routes with the larger vehicles identified in the Strategy only operating on the radial routes. Buses in the city centre need to be of human scale, not intimidating.

Figure 4.9 an example of an electric micro bus that would be suitable for running in the city centre

Figure 4.10 Examples of high capacity electric (top) and hybrid (bottom) articulated buses, potentially suitable for radial routes
Bus operator partnerships

The current operator arrangements, including a Quality Bus Partnership and Qualifying Agreement, have provided many positive outcomes such as integrated timetables and a shared smart ticketing platform. Bus services are frequent with modern, low emission, buses. The Strategy proposes the renewal of Quality Bus Partnerships as the vehicle for implementing the changes proposed.

We believe that for services to be improved to the level required to achieve the bus operating patterns a new approach is required.

Bus franchising allows the public sector to control the routes of bus services and service levels as well as ensuring integrated ticketing and branding. We believe that this level of control will be essential to the success of the ‘sustainable transport corridor’ approach set out above. The model is successfully employed in London and is being proposed in Greater Manchester and West Yorkshire. We believe that a coherent bus network, operating in the way we have set out above, can only be achieved through the use of franchising. The mechanism for achieving this would need to be given significant thought and would likely require coordination of services at the county level or through a combined authority.

The price of travel on the existing bus network discourages many from using it. Controlling, and where possible reducing, the cost of travel must be an objective for the Strategy. Reduced price family tickets should also be encouraged, which would help to make public transport more competitive in comparison to the car.

Long distance and tourist coaches

The Strategy does not address long distance or tourist coaches. While the services provided are a sustainable and relatively cost effective way of accessing the city we believe that their impact must be managed.

We believe that access to the city centre for long distance and tourist coaches should be restricted as part of the traffic management measures discussed in chapter 5. Dedicated space could be provided at Thornhill to accommodate the laying over requirements for long distance coaches from London, with passengers then being required to use the BRT system. This option would require further work to establish the access and service needs of the operators. The potential for complementary ticketing arrangements would need to be investigated to ensure the services remained an attractive way of reaching the city. A possible alternative may be to restrict the large long distance coaches to more limited stops and routes within the city or to the edge of the city centre to mitigate their environmental impact.

Tourist hop on / hop off services should also be subject to traffic control restrictions with the potential for time based restrictions for a limited number of services. The potential for alternatives for tourists such as greater promotion of walking tours or rickshaws services, should be considered.

Smart mobility

A series of proposals are set out in the Strategy relating to smart mobility and the use of data to improve the quality of experience for users of public transport.

We support this approach and believe that Oxford’s strengths as a centre of research should allow the city and county to take a leading role in the development of such platforms. Companies, such as Siemens, are already seeking real-world scenarios to try innovative smart solutions and the Strategy should build on this and link with work under way elsewhere, such as the Future Cities Transport Systems Catapult.
4.7 Zero emissions zone

We strongly support the principle of a zero emission zone in Oxford. We recognise that the timetable set out for its implementation is ambitious, particularly for the city wide zone. The Strategy must include the air quality targets set out in our Air Quality Action Plan.

The whole of the city of Oxford was declared an Air Quality Management Area in 2010 as the city was unlikely to meet the annual mean air quality objective for nitrogen dioxide. As a result we published an Air Quality Action Plan in 2013. Great strides have been made to improve air quality, including, in partnership with the County, the introduction of a Low Emission Zone (LEZ) in 2014. The bus operators have worked hard to ensure their fleet complies with the requirements of the LEZ.

The Strategy recognises that more must be done and proposes a Zero Emission Zone for all vehicles by 2020 in the city centre with the zone expanding gradually until, by 2030, the whole city is included.

The Strategy must ensure that it complements and supports the objectives and targets set out within our Air Quality Action Plan.

We strongly support the principle of a zero emission zone in Oxford. We believe that its implementation in five years is ambitious and a strategic approach to implementation and expansion would be required, particularly given the recent bus fleet investment and our joint experience of the time required to develop and implement the existing low emission zone. We would like to see more detail setting out the phases of implementation of the zone, with a specific focus on addressing locations with the poorest air quality first. We would also like consideration of any potential knock-on impacts, to ensure that areas of poorer air quality are not relocated as a result of the implementation of the Zero Emission Zone. We would particularly welcome a focus on freight and delivery vehicles as these contribute significantly to overall emissions in the city centre and to date there has been little focus on reducing emissions from this sector.

The phased approach should also be applied to the city-wide zero emission zone by 2030 as we do not believe it is realistic to expect every resident within Oxford to have purchased an electric car by this point. We consider that an equalities assessment of the impact of this proposal would be required. More detail on how the zone might be expanded and subsequently enforced for general vehicles should be included. We would like further details on measures that would be taken to ensure that access to appropriate vehicles for residents is maintained, for example, through the provision of car clubs.

The Strategy should include the targets set out for surface transport in our Air Quality Action Plan, which we set out below:

- Achieve mean NO₂ concentrations levels of at least 45 μg/m³ by 2020 and 40 μg/m³ by 2025 at the latest
- Achieve a 35% reduction in transport CO₂ emission from 2005 to 2020; and
- Achieve a 50% reduction in transport NOₓ and PM emissions from 2005 to 2020.

Given the importance of air quality we believe that the subject should have its own heading within the Traffic and Travel Demand section.
5.0 Walking and cycling

5.1 Introduction

Oxford already has levels of walking and cycling significantly higher than much of the UK. Around 50% of city residents travel to work on foot or by bike, which is an increase of 30% on 2001 levels. The city’s 30,000 students also favour walking and cycling as their main modes of travel. If the existing travel to work patterns continue there would be an additional 5,500 walking and cycling trips each day by 2031, with the same number of bus and rail passengers then walking to their final destination. In reality we must go further and aim to encourage more people out of their cars and off public transport.

The compact nature of the city makes it ideal for walking and cycling but there are challenges. The quality of cycling facilities is patchy, with a lack of coherent routes and not enough cycle parking. Although a lot of good work has been done – for example the pedestrianisation of Cornmarket – and more is underway – for example at Frideswide Square – the quality of the pedestrian environment remains poor in many places and key routes are dominated by buses with insufficient footway widths. The provision of new housing further from the city centre will make it harder for new residents to walk and cycle due to the extra distance involved and the severance caused by the outer ring road. All these issues must be addressed if the Strategy is to be successful.

We believe that the key to providing for a substantial growth in walking and cycling is to radically reallocate road space away from the private car. We do not believe the Strategy goes far enough for walking and cycling, either in terms of the level of commitment to providing more space for these modes or in the quality of the facilities proposed. As for mass transit a greater focus is required on integrating travel demand and traffic management into the Strategy. We will return to this point later in our submission.

5.2 What is proposed?

The Strategy contains the following key proposals.

1. Cycle super routes - continuous and uniform provision with high quality facilities
2. Cycle premium routes - lower level of provision but with a continuous treatment
3. Cycle connector routes - quietways, contraflow cycle lanes
4. Improved signage and wayfinding for cycle routes, including branding for routes and signage to enable cyclists to adopt correct road position
5. Programme of addressing key junctions to improve cyclist safety, including to reduce severance over the outer ring road
6. Provide additional cycle parking through temporary conversion of commercial premises and creation of cycle hub at Gloucester Green
7. Pedestrian improvements will be implemented as part of mass transit and cycle enhancements
8. Park End Street, New Road, Castle Street and Norfolk Street become part of the low trafficked core within traffic control measures and St Aldgates and High Street following opening of tunnels
9. Journey planning information for walking and cycling will be prioritised within future intelligent mobility technology

The remainder of this paper will focus on the proposals set out above.
5.3 An enhanced cycle network

The Strategy should include a more ambitious package of measures to encourage cycling, drawing from European best practice. A process should be adopted to manage competing demands for road space, with walking and cycling given priority. Cycle routes must be consistent and largely segregated on Super Routes. Cycle Super Routes should be provided from the east and better connection made south to the Grenoble Road area and proposed Sandford P&R. Further improvements to access over the ring road should be considered. Additional innovative ways of providing more cycle parking are required. A consistent design standard should be created for signage, which would reinforce the branding of routes. Twenty mph limits should be created on all streets that carry cycle routes or high volumes of pedestrians. A cycle hire scheme should be included.

Cycle Super and Premium Routes

The Strategy proposes a hierarchy of cycle routes with differing levels of interventions in order to address the existing problem of incoherent and poor quality cycle routes across the city. As for the BRT network, the hierarchy of routes have been designed to provide connectivity to the city centre and the growing areas of housing employment to Eastern Arc as well as to the north and south (Figure 5.2). The routes proposed are high level and the Strategy notes that the actual alignment might change.

The Cycle Super Routes (CSR) are at the top of the cycle route hierarchy and will involve the most significant interventions. The measures included in the Strategy are set out below:

• As a minimum requirement, there will be a high level of continuous and uniform provision for cyclists travelling in both directions;

• On some corridors, cyclists will share wide bus lanes in at least one direction;

• Complete or semi-segregation will be provided wherever possible (otherwise mandatory cycle lane markings will be used);

• Cycle lanes will be designed for a minimum width of 1.5m; however 2m will be considered the default width for the busiest sections;

• Advanced Stop Lines, already present at many signalised junctions in Oxford, will be the default standard and will include 1.5m feed-in lanes. Cycle lanes will continue through junctions to reaffirm the position of the cyclist in the view of other road users;

• Loading and parking bans or timed restrictions will be in place and enforced during peak times or throughout the day;

• Where segregation is not possible or desirable (e.g. parts of the city centre or the narrow part of Hollow Way), traffic levels and speeds will be reduced to create shared-use low or traffic free streets.
The Cycle Premium Routes (CPRs) provide a lower level of interventions, with the following measures set out in the Strategy:

- Premium routes will provide cyclists with uniform cycle lane provision in both directions. However these are likely to be shared with bus lanes, and will in many cases be standard width;
- Dedicated cycle lanes will be mandatory in places and should continue through junctions to reaffirm priority;
- As a minimum requirement, premium routes will be free from obstruction;
- Advanced Stop Lines will have at least some form of feed-in lane;
- In future development sites, design guidance for internal roads should meet the premium route criteria.

The Strategy notes that narrow highway boundaries, mature trees and street furniture make providing continuous cycle routes challenging and that reallocation of road space must consider other road users and the built environment. While this is undoubtedly true we believe that the most sustainable modes, walking, cycling and public transport, should be accorded far higher importance and that the Strategy should adopt a bolder approach to restricting access by private cars. This reflects both the current importance of walking and cycling in the existing mode split of the city’s commuters and its potential to become an even more integral part of Oxford’s travel patterns.

The Strategy must deliver world class cycling facilities of the sort seen in cities such as Freiburg, Copenhagen, Amsterdam and more recently from the bold steps taken in London to provide segregated cycle routes through the centre of the city. The current Strategy falls some way short of this and must be more ambitious and radical.

We believe the corridor based approach is right but that the Strategy should include a clearly stated process for resolving competing demands for road space at pinch points where space is at a premium. This process should refer to a modal hierarchy that places walking and cycling at its apex.

There is an obvious appetite for sustainable travel in the city and building on this by providing consistent, safe and continuous cycle routes is essential. It will also encourage those living further from the city centre, or using P&R, to choose cycling.

The use of segregation, either on or off carriageway, must be standard on the CSRs as far as possible, although we acknowledge that highway constraints will limit the scope in certain locations. In these situations traffic should be reduced or removed through control measures and general traffic speed reduced, as suggested in the Strategy. The process we propose above for resolving competing demands at pinch points would establish a consistent approach to dealing with these situations and establish a clear priority.

Figure 5.2 Proposed cycle routes
The use of ‘green wave’ signalling has been introduced in Copenhagen and should be adopted along CSRs as part of the Strategy. Through coordination of signals cyclists travelling at around 12 mph will pass along the corridor unimpeded by red lights. Vehicles traveling faster will gain no advantage and be stopped at red lights. In this way speed is reduced and a more civilised street environment is created.

A major issue for both pedestrians and cyclists in Oxford is poor quality footways and carriageways. We believe that the Strategy should include a specific commitment to improving the quality of surfacing along all cycle routes and maintaining them to a high standard thereafter.

The proposals do not include a direct Cycle Super Route (CSR) from the east to the city centre. We appreciate that this is challenging, particularly given the provision of the BRT route along London Road, but substantially improved cycle connections from the east are required in order to ensure the growing employment market there develops more sustainably and that cycling from Thornhill P&Rs is an attractive option to the city centre. There are no Super or Premium proposed routes to the more central proposed P&R sites at Sandford or Lodge Hill. The existing Seacourt, Redbridge, Water Eaton and Pear Tree P&R sites would benefit from Super Routes. Potential urban extensions to the north are well catered for by the proposals but sites to the south, around Grenoble Road, and east, around Barton Park, are not.

The Strategy should include a commitment to providing better connections to the south, include the Grenoble Road area and the Sandford P&R. This could be achieved by extending the proposed CSR.

To the east there should be a strong commitment to provide a radial route into the city that includes many of the CSR features set out in the Strategy, as well as the additional features we propose below. This could follow London Road if traffic management measures, such as access restrictions, reduced vehicle flows sufficiently, although we acknowledge there would remain difficult pinch points, such as around Headington Hill Park. Alternatively parallel routes could be considered, potentially connecting the ring road around the Barton Park proposals to the city via the John Radcliffe hospital.

The Strategy does not consider the contribution that Oxford’s waterways might make to cycling from the north and south along the Oxford Canal and River Thames. Although it would not be appropriate and there would not be capacity for these waterways to carry significant volumes of cyclists, they could provide useful connections, particularly for less confident riders. The Strategy should set out an approach to the waterways.

The Strategy identifies that 75% of all cycle casualties occurred within 20 m of a junction. One measure proposed to address this is more consistent use of Advanced Stop Lines with feed-in lanes with additional measures, such as pre signals for cyclists, ‘considered … at large signalised junctions’. We believe the Strategy falls some way short of embracing measures that, although innovative in the UK, are commonplace in mainland Europe.

The Strategy must commit to providing a more detailed package of measures that will be used consistently along key corridors and through most, if not all junctions along the CSRs. These should include:

- Dutch style roundabouts (Figure 5.3) and equivalent treatments at signalised junctions (Figure 5.4)
- Cycle pre signals
- Two stage right turns for cyclists
- Banning left turns for general traffic in areas where the conflict is particularly dangerous
- Providing left turn ‘slip roads’ for bikes to allow crossing through red lights where there is sufficient space at the junction

Other measures to make cycling more attractive might include rain-sensitive traffic signals that give cyclists priority in wet weather and cycling ‘resting posts’ at junctions.

![Figure 5.3 Roundabout in Rotterdam (source: google)](image1)

![Figure 5.4 Signalised junction with island protection (source: TfL)](image2)
Cycle Connector Routes

Connector Routes sit below the Super and Premium Routes and will mostly be provided on quieter streets, serving the function of connecting residential areas to the main cycle routes. On the connector routes there will not necessarily be physical provision of facilities except navigational aids. Contraflow cycling is proposed on one-way streets, with protection for cyclists at entry point, and additional east-west crossings will be investigated such as the Jackdaw Lane Bridge.

We support the measures proposed and the function of the Connector Routes.

Severance and the ring road

Urban extensions will form a significant part of the strategy for Oxford’s future. These will be high density extensions to the city rather than low density suburbs. If the travel patterns of the city are to be repeated in these extensions then cycling connections must be of the highest quality. The issue of severance caused by the ring road is rightly identified as a problem in the Strategy. Street level and grade separated crossings are proposed to address this.

In proximity to new urban extensions where residential density and new demand for walking and cycling will be high, a more innovative approach to walking and cycling might be considered. An example is the Hovenring in the Netherlands. Such a scheme would allow cyclists and pedestrians to cross over a major junction without incurring delay and could connect with a corridor of high quality facilities as part of a CSR. One potential location could be the Littlemore Roundabout. The feature would also act as a landmark gateway to the city and a symbol of the commitment Oxford is making to sustainable travel.

Figure 5.5 Hovenring, Netherlands (source: H Hahn)
**5.0 Walking and Cycling**

**Cycle Parking**

A shortage of safe and secure cycle parking is a significant issue within the city, as can be seen by the level of informal cycle parking that takes place. Public realm schemes will incorporate increased cycle parking but the Strategy acknowledges that this alone is unlikely to meet growing demand. A significant increase in cycle parking is proposed at Oxford station as part of the masterplan. The Strategy suggests that the Gloucester Green underground car park could be converted to a dedicated cycle hub including cycle parking, cycle hire and maintenance facilities. Other measures might include renting commercial properties to provide cycle parking.

We support the provision of additional cycle parking as part of public realm improvement schemes but agree that this is unlikely to meet demand in the longer term. The alternative measures set out, such as conversion of the Gloucester Green underground car park to a cycle hub and use of commercial properties in the city centre, and should be explored in more detail. We are concerned that the cost of converting properties to cycle hubs will be prohibitive. The Strategy should focus on providing cycle parking in addition to other parking in the city centre. We are aware that the level of car parking in the city centre is relatively modest and is expected to decrease further with the release of sites for development and reduction of on-street parking. The Strategy is due to include a detailed assessment of parking in the city. Careful thought would need to be given to the economics of converting Gloucester Green.

More dispersed cycle parking around the city centre is also required to help meet demand around key attractors of cyclists. One innovative measure recently introduced in Tokyo is mechanised underground cycle parks. The cycle park has a relatively modest footprint above ground while below ground space for around 200 cycles is provided. Though these would carry high initial capital costs they would not require the loss of commercial space and running costs could be met through parking charges. Such cycle parking could be incorporated into new public realm schemes.

*Figure 5.6 underground cycle parking for 200 bikes in Tokyo (source: Getty Images)*

**Cycle Signage**

A signage strategy is proposed that will provide cyclists with directions to all primary and secondary destinations. These will, as a minimum, include destination, direction and distance. The signage might also include the name or brand of the route and carry additional information such as whether a route is lit, where this is does not have an impact on conservation areas. On busier routes signage might inform cyclists of correct road positioning. Road markings will also be used to reduce the potential for clutter from signage.

We support the concept of named routes and view this as an important part of creating consistent and legible routes through the city. A design standard for the routes would help establish consistent signage and what is appropriate in different locations. For example in residential areas modest repeater plates signing route name or number would be sufficient whereas on busier roads larger directional signs might be appropriate. In all instances signage and road markings must be used sparingly while ensuring that routes are easy to navigate. We do not support signage at junctions indicating to cyclists correct road positioning and believe this should instead be achieved through good scheme design.

**Twenty mile per hour limits**

The majority of residential streets in Oxford are subject to 20mph limits, helping to create safe and pleasant walking and cycling environments. A number of key streets that will carry high volumes of pedestrians and cyclists, such as London Road and Woodstock Road, are not subject to 20mph limits.

We believe that 20mph limits should be introduced on all streets within the city that will be designated as Cycle Super or Premium Routes or will carry high volumes of pedestrians. In effect this will mean all key radial routes into the city. This will complement the proposals for shared use and low traffic streets and could partly be controlled by our ‘green wave’ proposals on key cycle routes. The even wider introduction of 20mph limits in Oxford will result in fewer accidents, a more civilised street environment and will help encourage even more to walk and cycle. In large part the 20mph limits would be self enforcing through the range of traffic management, walking, cycling and mass transit measures proposed as part of the Strategy.
Cycle hire

Cycle hire is referred to as part of the potential range of services included within the proposed cycle hubs but the potential for a wider scheme is not discussed.

Cycle hire schemes have been successfully introduced in cities across the UK and abroad and are being trialled successfully in Headington under the OxonBike brand. We believe that the Strategy should include an expanded OxonBike scheme. Given the compact nature of the city a scheme that covers the whole of the city could be envisaged within the medium term. We acknowledge that providing docking stations on-street would be a challenge but a holistic view might be taken as part of the broader review of city and district centre car parking proposed. Cycle hire docking stations within the vicinity of the interchanges shown in Figure 4.8 would offer longer distance commuters the opportunity to interchanges from BRT onto bikes.

5.4 Encouraging walking

The creation of a low trafficked core is welcome but it should not create problems for those with limited mobility. An overarching walking strategy is required. A wayfinding strategy should be developed.

The Strategy contains limited detail regarding improvements for walking. It states that as part of the proposed mass transit and cycle enhancements, pedestrian improvements will be implemented and that walking and cycling networks should be integrated. Public realm enhancements will form part of the proposals at transit stops and interchange hubs.

The need for improvements to the public realm and the creation of a ‘sense of place’ in the city centre is identified, with the pedestrianisation of George Street and Queen Street and public realm improvements to St Giles, Magdalen Street and Frideswide Square forming key short-term measures. With reference to the mass transit proposals, by 2025, the Strategy suggests that transit terminals and traffic control will allow Park End Street, New Road, Castle Street and Norfolk Street to become part of a low trafficked central core.

We support the city centre proposals and agree with the need to create a strong sense of place that responds to Oxford’s high quality built environment and ensures the city continues to attract visitors from around the world. The idea of a low trafficked core is welcome, however the access needs of those that are less mobile must be considered and sufficient public transport provided within a short walking distance of key city centre destinations. This access issue could be addressed in the way set out in our response on mass transit.

We are concerned that the Strategy does not set out an overarching approach to improving the walking environment. Improving the public realm along with mass transit interventions will help improve key routes but the Strategy should go beyond this and seek to create a coherent walking network so that residential streets, where a significant proportion of walking trips will start, connect well to the main thoroughfares taking advantage of existing streets, footpaths and rights of way. As part of this the Strategy should set out an approach for targeting improvements in areas where there are deficiencies in the walking environment and it should refer in general terms to the package of measures that might be used to address them – for example improved crossings and lighting, consistent use of dropped kerbs, improved paving and reduced street clutter. A commitment to consistently high quality maintenance of footways should be an integral element of the Strategy to ensure footways are safe and attractive to use. Better quality footways and consistent dropped kerbs also help those who are less mobile or using mobility scooters to access the city more freely and with confidence.
A broad programme for the public realm enhancements outside the city centre should be established and as for cycling, a network of key routes should be identified. A consistent way finding strategy should be developed that helps pedestrians navigate through the city. The City’s District Centres are an important priority and are the focus of intense pedestrian movement.

As part of the broader overarching approach to walking described above we believe that there needs also to be a commitment to reducing street clutter generally, and in the city centre in particular. The potential for ‘greening’ the transport network through tree planting and other measures, such as green walls, should also be explored and existing street trees protected.
6.0 Managing Traffic and Travel Demand

6.1 Introduction

As set out earlier, Oxford has experienced unprecedented growth in its population over the last 15 years. However, a combination of effective transport and planning policies has meant the volume of car traffic has reduced in the city centre and walking and cycling has increased. The next 15 years will be even more challenging.

If existing travel patterns were to persist the growth in housing would result in 13,000 new commuter trips by cars into or out of the city. The DfT predicts a 37% increase in vehicle trips in peak hours on Oxford's highway network to 2035. Such increases in traffic are not compatible with the maintenance of a high quality urban environment in Oxford and they are not compatible with the mass transit, walking and cycling measures proposed in the Strategy. Simply staying still in terms of traffic volumes would require a reduction in car driving mode share of 10% by 2031. However, if additional capacity is to be found for more pedestrians, cyclists and more reliable public transport an even more significant reduction is required.

We support the bold package of measures contained within the Strategy and the fundamental principle of setting out a general presumption against travel by car within the urban area. The measures proposed build on what has been shown to work in Oxford already such as traffic restrictions and parking charges and learns from examples elsewhere in the UK, such as the Workplace Charging Levy in Nottingham.

We believe the Strategy should go further and be more explicit about those measures that will be introduced and how they will integrate with the rest of the Strategy. A package of smarter choices measures promoting sustainable travel through awareness raising, training and education should also be included to help reinforce the physical measures proposed. The Strategy needs to be explicit that in addressing the requirements for housing and economic growth development must be linked to the national policy requirements for adopting the most sustainable transport modes and reducing the need to travel, which supports the case for sustainable urban extensions.

6.2 What is proposed?

As set out earlier, Oxford has experienced unprecedented growth in its population over the last 15 years. What is proposed?

The Strategy contains the following key proposals.

1. Capacity improvements on the outer ring road
2. A Workplace Parking Levy
3. Traffic control points in the city centre and eastern arc
4. Road user charging
5. Changes to city and district centre public parking
6. Introduction of zone based parking charges
7. Improved freight management
8. Improved taxi interchange

The remainder of this paper will focus on the proposals above and will set out the need for a package of smarter choices measures.
6.3 Capacity improvements

Longer term measures for capacity improvements on the ring road are required to accommodate traffic displaced by restrictions in the city centre. Greater use should be made of Intelligent Transport Systems.

The Strategy rightly determines that capacity increases on the outer ring road will be necessary as capacity within the city is reduced. Improvements are proposed on the outer ring road at the Cutteslowe and Wolvercote Roundabouts. These are programmed for implementation in 2017/18 and are to be funded through the Oxford and Oxfordshire City Deal. The longer term capacity enhancements at the A34 Botley and Peartree interchanges, with £50m funding from government committed, are set out along with the introduction of Intelligent Transport Systems. Additional schemes are referenced to the SE on the ring road and, elsewhere in LTP, at Headington and on A34 junctions from P&R.

We support the general principle of targeting capacity increases on the outer ring road but are concerned that the Strategy needs to set out a commitment to further capacity increases, linked with restrictions in the city centre. We acknowledge that detailed measures cannot be identified now and therefore believe that a process should be set out for identifying, and prioritising capacity improvements in the future. This could include a commitment to modelling the impact of traffic restrictions, identifying the level of traffic volume reductions required to make them work and how much of that traffic might be displaced onto the outer ring road and where.

We agree that Intelligent Transport Systems are required on the outer ring road and believe that the Strategy should set out in greater detail what it might be used for. This should link with the proposals for the P&R sites and as well as alerting drivers to speed limits or congestion, and should direct drivers to spare parking capacity as a way of reducing unnecessary mileage. Such systems will also be integral for alerting drivers to the restrictions within the city as they approach radial routes from the outer ring road and might be used to inform drivers of journey times by different modes. This forms part of an overall need for holistic and integrated parking management.
6.4 Managing demand

We welcome the use of a Workplace Parking Levy. Traffic control points will be important to the success of the Strategy and their introduction should come sooner to be coordinated with the WPL and other measures. We do not believe road user charging is appropriate for Oxford. The policy for consolidated public parking in the city centre and zoned parking charges will require careful consideration and consultation with car park operators.

Workplace Parking Levy

The Strategy notes that 39,000 commuters working in the city travel by car, with around a quarter of these being city residents. Compared to just 1600 public car parking spaces, it is clear that the supply of private car parking needs to be reduced if drivers are to be encouraged out of their cars. In order to address this a Workplace Parking Levy (WPL) is proposed. The levy would be charged on all parking spaces within the city with minimal exceptions. The city centre would be charged at a premium rate given the abundance of alternative transport options available. The Strategy presents three key benefits of the scheme, which are mode shift, revenue generation that would be ring-fenced for transport improvements and an incentive to reduce car parking that will reduce business costs and encourage more efficient use of land.

We agree that the large supply of private car parking in the city is a barrier to sustainable travel that needs to be addressed as part of the Strategy and we are supportive of the introduction of a WPL. We are concerned that many large employers, either due to location or culture, will initially choose not to adjust parking levels and that in the short term at least the effectiveness of the WPL might be limited. However, as the walking, cycling and public transport measures begin to be introduced we hope this will change and employers will begin to remove car parking. We believe that the WPL will be an important funding tool, as has been the case in Nottingham. Ring fencing revenues for the additional investment required in city transport will be essential if the measure is to gain widespread public support.

Traffic control points

The city centre bus gates have been integral to the reduction in city centre car traffic seen in Oxford in recent years. However, despite these controls modelling undertaken by the County suggests that 15-20% of traffic in the city centre is through traffic, with even higher levels in the interpeaks. In order to reduce this and to ensure reductions in traffic brought about by the WPL are not replaced with new trips, the Strategy proposes a series of new traffic control points.

The proposed locations are shown in Figure 5.2. In the city centre these would be located on Thames Street (but allowing access to Westgate), Worcester Street or Frideswide Square (but allowing access to the station) and St Cross Road (preventing traffic using the Science Area as a city centre ring road). On the inner ring road a control point would be provided in order to ensure traffic flows do not impact on the operation of BRT line 3 on Hollow Way, with a turning restriction onto Banbury Road from Marston Ferry Road also proposed.

The Strategy states that the restrictions could be full or part time or act as congestion charging points (see below) with permits for those requiring access. The access restrictions would apply to taxis.

We support the proposed traffic control points. We believe that such restrictions are essential to the success of the Strategy and, in combination with the WPL, will help to minimise vehicular traffic. The restrictions should be introduced sooner than proposed and at the same time as the WPL for the reasons set out in the Strategy and to aid improved running of bus services and the creation of a safer walking and cycling environment.

The use of city centre restrictions for cars, or ‘filtered permeability’, has been successfully used in many towns and cities in Europe, including Houten in the Netherlands and Freiburg in Germany and their experience is highly relevant to Oxford.
Road user charging

The potential for road user charging, potentially using the locations described for traffic control points above, is set out in the Strategy.

Given Oxford’s modest size in comparison to cities where congestion charging has been successfully introduced, such as London and Singapore, we do not believe that the extent of the scheme would be sufficient to justify the high cost of its introduction. For similar reasons traffic control points can be successfully targeted on key roads, as the Strategy has done, to ensure through traffic can be eliminated while maintaining access. We are also concerned at the potential impact that charging infrastructure could have on the public realm given the likely need for ANPR cameras.

For the reasons set out above we do not support a road user charging approach and believe that the access control approach is more appropriate for Oxford.

Public parking

Car parking is already limited in Oxford and is substantially lower than in cities such as Reading and Cambridge. City centre public parking is rarely fully occupied outside of the weekends and due to the success of P&R, as well as the high level of public transport accessibility more generally, Oxford’s economy is not reliant on people driving to their destinations.

The Strategy proposes a strategy of consolidating public parking into fewer locations in the city centre, improving their quality and managing them in such a way as to discourage long stay and commuter parking and encourage more electric cars and higher occupancy. The use of live parking information delivered via apps, the web, electronic signs and GPS devices are proposed to ensure best use of capacity.

In the district centres parking levels are generally proposed to remain as existing, except in Cowley primary district centre, which has a substantial overprovision. Decking or building over car parks is suggested as a means of making more efficient use of space with charges set so as to discourage long stay and commuter parking.

We support the public parking measures set out and the strategy of broadly maintaining parking levels, which in real terms will require a significant reduction in car driver mode share, particularly following the expansion of the Westgate centre. As noted earlier, the Strategy is due to include an assessment of the city’s parking requirements, and this needs to be taken forward. The current position is a continuing decline in public parking capacity.

Significant thought will need to be given to the consolidation of city centre car parks, their location in relation to the proposed traffic control points and the impact that larger car parks, with higher volumes of traffic movements, might have on the local road network and air quality. As a significant operator of car parking in the city centre we will need to be closely involved as the approach to car parking develops.

A zonal parking charge system, incorporating the P&R sites, is proposed that in broad terms would charge according to access to public transport and cycle facilities. In this way a further disincentive to drive in areas where there are sufficient alternatives would be established. The Strategy states that parking at P&R sites would carry a charge due to the need to ensure there is no incentive to drive to the sites unnecessarily and to ensure the operators can cover their costs.

The strategy of charging more for parking in accordance with accessibility to public transport and improved cycling facilities is welcome. As for public parking the mechanism for achieving this, given that there are different operators for on- and off-street parking, will need to be given careful thought and introduced collaboratively.

We agree that travelling completely by sustainable modes must be cheaper than driving to P&R and then catching a bus. Therefore, we believe that the P&R sites should carry some charge in addition to the bus fare but that the level of the parking charge should be kept low in comparison to the city centre. The additional for P&R sites facilities we referred to in the mass transit chapter might be capable of generating revenue that could reduce the cost to the user.
6.5 Freight, taxis and development management policy

More detail should be included for measures such as consolidation facilities. How to achieve increased out of hours deliveries will require careful consideration to ensure restrictions imposed through the planning process can be removed or amended without negative impacts. We recognise the need to successfully incorporate taxi operations into Oxford’s transport network. Additional work will be required between the City and County Councils to inform the location of development.

Freight

The Strategy forecasts that around 2,500 HGV trips will be made to, from or within the city between 8am to 6pm per day, with over a third of these occurring in the AM peak. Building on the work undertaken in support of Oxford’s Low Emissions Strategy and Air Quality Action Plan the Strategy includes a package of measures intended to manage freight. These include:

- Delivery and Servicing Plans;
- Construction Logistics Plans;
- Out of hours deliveries;
- Compliance with increasing emissions requirements;
- Local consolidation points; and
- Freight consolidation centres for business, retail and construction

The measures proposed are welcome and many already form part of the adopted Air Quality Action Plan for Oxford. However, there is a need to link the measures more closely to the rest of the Strategy and provide more detail on what is proposed. For example more detail should be provided on the potential form of the local consolidation points, how they would operate and how sites would be made available.

Freight consolidation centres are only likely to be successful if freight operators have a strong incentive to use them. The city centre Zero Emission Zone provides such an incentive as a consolidation centre would allow operators to continue to serve Oxford without having to replace their fleets. The potential location for consolidation centres needs to be given further thought. As set out earlier we have doubts about using decommissioned P&R sites, as they are likely to have a continuing role in their current use.

The principle of encouraging out of hours deliveries is welcome and could be tied more closely to the freight consolidation centre proposals. The approach will need careful thought as many restrictions will be subject to planning conditions, which could in certain locations be in place to protect residential amenity.

Taxis

Taxis will play an important role in Oxford’s transport network. The Strategy refers to the growing importance of route management as access restrictions increase and the need for high quality interchanges with the proposed BRT routes at P&R sites, transit hubs and Oxford and Oxford Parkway stations. Taxis will also be subject to the proposed city centre Low Emission Zone in 2020 and city-wide by 2030.

We agree that taxis will continue to play an important role in Oxford. A balance will need to be struck between recognising the role of taxis as a complement to public transport while managing numbers so that traffic volumes are reduced overall in pursuit of an improved city centre public realm. We welcome the provision of facilities for electric charging at locations where taxis stand.

Development management policy

The Strategy refers to the need to reduce parking in new development, build at higher density and promote high quality ‘neighbourhood design’ and cycle facilities. The Strategy states that the BRT and cycle networks set out in the Strategy should help to influence where future housing is located.

Our Core Strategy already seeks to minimise car parking and prioritise walking and cycling in new development (CS13), only allows development that provides appropriate levels of density, with higher levels in the city and district centres (CS23) and only permits development that achieve a high quality of urban design (CS18). The City Council is making the case for new sustainable urban extensions around the city and has published an informal assessment of the green belt and a further detailed analysis of growth options. A core tenet of our approach is that these extensions create new of high quality neighbourhoods that integrate with the existing urban fabric of Oxford, with excellent public transport, cycling and walking links into other parts of the city, so that they are functioning communities that can be easily served by public transport and other services.

We agree that planning and transport policy should be closely linked and that new housing should be located in areas with excellent public transport. Notwithstanding our firm view that urban extensions to Oxford is the most appropriate option for future growth in transport terms, we are concerned that the evidence base supporting the Strategy is not sufficiently well developed to provide the basis for effective planning or mitigation for any of the possible growth options for Oxford. We are undertaking our own studies on this in respect of high level transport strategies supporting urban extensions, and close working between the City and County Councils will be required.
6.6 Additional work required

A Smarter Choices programme should be included in the Strategy. Additional measures are required around the hospitals to manage and minimise traffic congestion. Controlled Parking Zones should be extended to the whole city.

Promotion of sustainable travel

The Strategy should contain a package of Smarter Choices measures for influencing the way people travel in Oxford. This will complement the physical measures set out and could include:

- Education – providing cycle training, increasing awareness of the benefits of active travel
- Encouragement – cycle loans, promoting walking, cycling and public transport through events and walking initiatives such as walk to work week and other travel challenges, promotion of car sharing and car clubs, personalised journey planning, car free days in the city centre
- Engagement – school, workplace and university travel planning

Access to hospitals

The hospitals to the east of the city, particularly John Radcliffe and Churchill, create a large amount of travel demand both from staff and visitors. For staff the increase in the cost of living and the lack of affordable housing in Oxford has meant that many now travel from outside the city. The impacts of the hospitals on traffic congestion is significant. The Strategy should consider in more detail how this might be addressed. Specific measures might include dedicated parking at Thornhill P&R for staff, with fast direct and frequent bus connections to the hospitals (potentially utilising the new bus-only link road from Barton Park to the JR Hospital), and the provision of improved, or dedicated, bus links between the main hospital campuses. The feasibility and options for a direct connection from the hospitals to the A40 Northern by-pass need to be assessed, as this would remove a significant number of traffic movements through Headington and potentially improve access and response times for emergency vehicles. The Smarter Choices measures set out above will also be highly relevant.

Controlled parking zones

As the WPL is introduced, public transport hubs implemented and public parking charges increased in line with the proposals set out above the need to ensure on-street parking is properly controlled will be heightened. The Strategy should extend Controlled Parking Zones to the whole of the city so that residential parking is not overwhelmed.
7.0 Integration and Delivery

7.1 Introduction

The Strategy prepared by the County represents a forward thinking and ambitious package of measures that we believe could form the basis of a world-class transport system for Oxford. We have highlighted in chapters three to five areas where changes are needed and we look forward to engaging with the County to ensure our common aspirations for a better Oxford are achieved.

A key theme to emerge in our comments is that the Strategy must go further for walking, cycling and public transport, placing these modes at the top of a transport hierarchy that guides the Strategy and leads to significant reallocation of road space. In Oxford’s constrained and finite highway network the only way that the increases in demand forecast can be accommodated is by making the most efficient use of space possible.

7.2 Integration

The successful delivery of the Strategy is dependent on setting clear priorities and ensuring the measures proposed are properly integrated. We believe the current wording does not provide sufficient commitment for non-car modes and that too often the need for radical improvements are caveated by reference to assessing the impact on general traffic. We believe there should be a clearly stated set of priorities that guide the Strategy and a process for dealing with conflicts at pinch points, of which there will be many in the city.

We suggest this process is informed by a transport hierarchy that places walking, cycling and public transport at its apex and that road space be allocated accordingly with a presumption that general traffic is reduced or removed to accommodate the movement of sustainable modes. The process would draw on the full package of measures set out in the Strategy and be applied on a corridor basis. For example, where road space on a key transport corridor is limited the first priority would be to ensure that there is a safe and attractive walking environment, suitable for the volume of pedestrians. Next the requirement for high quality cycling facilities would be considered, with exact facilities dependent on the status of the route (i.e. Super or Premium). The provision of public transport facilities would then be reviewed, again dependent on the status of the route (i.e. BRT, Premium). Where there was a conflict between cycling and public transport, consideration would be given to how to best resolve it. Measures might include alternative direct routes for cyclists on quieter streets, tidal bus lanes or widening of the highway. After this the space requirements of general traffic would be considered. The use of modelling would inform the volumes of traffic that could be accommodated on a route and the need for traffic control measures, rather than whether or not sufficient facilities for sustainable modes are delivered.

The targeting of additional capacity on the outer ring road would be informed by the need to remove traffic from key corridors, the assumptions made for mode shift and the resultant likely volumes of traffic displaced.

Overall a much greater focus on integration should be developed. One potential way of doing this might be to identify key corridors – London Road, Banbury Road, Iffley Road for example – and set out how the Strategy would be applied to them. This would include the measures used, when they would be implemented and the interactions between them. This would help embed a clearer understanding of how implementation would be taken forward and the need for a balanced package of demand management, walking, cycling and public transport schemes.

7.3 Timing

The measures set out in the Strategy must be delivered in a coordinated way with demand management elements complementing increases in capacity on public transport and improvements to the walking and cycling environment.

We are concerned that additional highway capacity on the outer ring road and rationalisation of parking on radial routes is proposed to be delivered within the first five to seven years of the Strategy with demand management measures such as the WPL and city centre traffic control coming somewhat later on. In general we believe that the programming of works should be subject to further work once the detailed package of measures are known. The Strategy should set out clearly the principle that traffic control will accompany improvements to public transport and walking and cycling measures. Without this walking and cycling will not be sufficiently attractive and public transport will be slowed by congestion, reducing its advantages over the private car.

We appreciate that the Strategy will evolve over time as schemes are developed, funding becomes available and development begins to change travel patterns. To accommodate this the Strategy must acknowledge that it is a dynamic document and set out how the City Council and other key stakeholders will be engaged in its development over time. This should involve the creation of a overseeing Strategy Board that meets periodically to discuss progress and funding opportunities and to agree the programme for future years. The Strategy Board would help set priorities as part of delivering a flexible and scalable investment plan for the Strategy.
7.4 Funding

Funding the measures set out in the Strategy will require a mixture of public and private sector finance and close working with key stakeholders and government. The Strategy sets out the following potential funding streams:

We believe the Strategy has identified some forward thinking funding mechanisms. However, securing significant funding through Tax Increment Finance and capturing development values requires clarity in the location of future development and planning and is difficult to apply in the local context. We note that getting the charging levels right will require a fine balance between generating income and not reducing the competitiveness of business, or increasing charges to transport users.

A more detailed breakdown of the cost of each measure should be produced to help with prioritisation and business case development. We believe that prioritisation of schemes and bidding for funding should form part of the remit of our proposed Strategy Board. By achieving consensus on the measures to be funded and the timetable for delivery, the chances of securing public sector funding and agreement on the private sector funding mechanisms is that much greater.

### Table 7.1 Potential sources of funding

<table>
<thead>
<tr>
<th>Potential Sources of Funding</th>
<th>Private sector</th>
<th>Transport operators</th>
<th>Transport users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer contributions (EE)</td>
<td>Freight fees (E)</td>
<td>Workplace Parking Levy (E)</td>
<td></td>
</tr>
<tr>
<td>Contributions for new developments to be maximised and prioritised towards public transport wherever possible, over road infrastructure.</td>
<td>To be applicable until companies sign up for the use of a consolidation centre. Revenue can be ring-fenced for use on freight management and air quality improvement schemes.</td>
<td>This will likely be a modest but valuable source of income for investment into further Mass Transit, walking and cycling schemes.</td>
<td></td>
</tr>
<tr>
<td>Local business rates (EE)</td>
<td>Operator investment (E)</td>
<td>Parking charges (EE)</td>
<td></td>
</tr>
<tr>
<td>To be retained by Oxford City Council to generate funding for infrastructure, including transport. At a countywide level, business rate growth within the Enterprise Zones should be retained for reinvestment.</td>
<td>The roll-out of very low and zero emission vehicles is welcomed and must continue. Further support to schemes which will provide more reliable services should be sought.</td>
<td>Increases in public car parking charges outside of the city centre should be used to support the implementation of the Mass Transit lines.</td>
<td></td>
</tr>
<tr>
<td>Tax Increment Financing (EEE)</td>
<td>Bus stop / bus stand departure fees (E)</td>
<td>City centre cordon / entry charges (E)</td>
<td></td>
</tr>
<tr>
<td>An increasingly used financing tool which uses future business rate income from new development to provide backing for infrastructure, including transport.</td>
<td>Bus stop or bus stand departure fees should be implemented to help fund city centre revisions to the transit network. This may also encourage operators to consolidate services.</td>
<td>Given the limited existing through trips in the centre it is assumed that only a limited return on investment in operating costs would be gained.</td>
<td></td>
</tr>
<tr>
<td>Tourism business levy (E)</td>
<td>Rail station use charges (E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local business leaders should be encouraged to establish an Oxford Tourism Business Improvement Districts (TBIID) which draws together private sector funding based on a scalable business rate levy to collectively invest in local improvements, including transport.</td>
<td>Rail station use charges on Train Operating Companies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tourism coach entry fee (E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge to be applied to companies for city entry (payable on parking within designated coach bays) will be used to pay towards Mass Transit prioritisation schemes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>