Oxford Transport Strategy

CONNECTING OXFORDSHIRE

OXFORDSHIRE COUNTY COUNCIL

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1. The Oxford Transport Strategy

The purpose of the strategy

The Oxford Transport Strategy (OTS) sets out Oxfordshire County Council's transport vision and strategy for Oxford over the next 20 years, as part of the fourth Local Transport Plan (LTP4). It identifies the current and future challenges for transport in the city and sets out a strategy based on a combination of infrastructure projects and supporting measures to enable economic and housing growth.

This strategy builds on a legacy of success in tackling Oxford's transport challenges through pioneering and innovative approaches which have enabled the city to grow and develop without year on year rises in traffic levels. For instance, the city's world first Park & Ride system, which began in the 1970s, has not only proven successful in containing traffic in the city, it has gone on to become a model subsequently adopted by cities around the world to address their own congestion problems.

This strategy builds on the successes of the past, quantifies the scale of the future challenges and proposes bold and innovative solutions.

Place

The future economic growth and attractiveness of Oxford is dependent on improving the quality of the entire city as a place

High quality and sustainable transport access is essential to accommodating growth and changing travel demand within the city's physical and environmental constraints

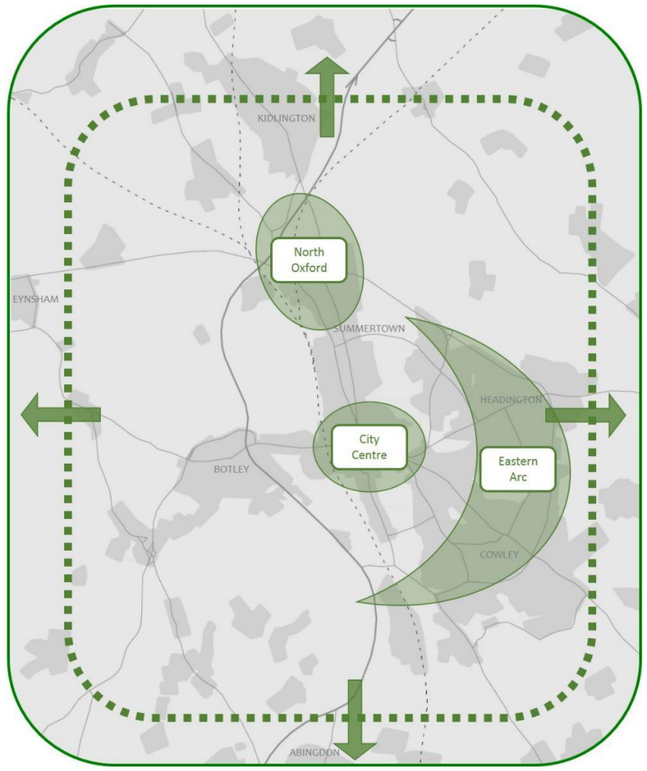
Access

The area it covers

Oxford's influence on transport does not stop at the city boundary. The OTS has been developed to cover the urban area of Oxford as well as the main transport corridors to and from the city.

There are three locations which will be the focus for future employment, housing and regeneration. These are:

- the **City Centre** – the cultural and historic heart of Oxford;
- the **Eastern Arc** – the largest employment area and most populated part of the city (which includes Marston, Headington, Cowley and Littlemore); and
- **North Oxford** – which includes Cutteslowe and Wolvercote and major corridors into Oxford from north of the outer ring road.



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2. The Scale of the Challenge

Transport impacts of growth

Oxford is an attractive, enterprising and dynamic city – a place that people from around the world want to visit and increasingly want to live and work in.

Oxford's population has grown at an unprecedented rate in recent years, with the number of residents rising by 14% between 2001 and 2013 (from 135,500 to 154,800 people). Despite the sizeable impacts of recession, overall job growth has been equally impressive, with 118,000 jobs in 2012, compared to 99,000 in 2001. Oxford has 33% more jobs per head of working age population (aged 16-64) than the South East as a whole.[1]

The additional travel demand generated by this growth has been well-contained in Oxford: overall, rises in traffic within the city have been avoided or minimised by the local authorities' transport and planning policies and schemes.

But despite these successes, the trend of sustained growth has brought challenges.

As a medieval city, Oxford's often narrow streets are, in many areas, unsuited to motorised vehicles. Peak period congestion is a persistent problem, with traffic building at bottlenecks which cannot realistically be entirely removed. Within the centre, cars, buses and delivery vehicles compete for limited space with pedestrians and cyclists. These create an uneasy tension between the demands for movement and access, and the desire to ensure the centre offers a highly attractive and vibrant environment for people.

As more people have moved to Oxford, pressure has been added to the city's housing stock, helping to drive up house prices at a faster rate than other areas and intensifying population density. Limited space for new development has contributed to a significant shortfall in affordable housing (particularly around the centre), resulting in changes to where people are able to live and accordingly how far and how they travel.

Oxfordshire has ambitious plans for growth, with proposals for 100,000 new homes and 85,000 new jobs to be created by 2031. The county has evolved into one of the UK's major hubs for knowledge-based industries, with Oxford at its heart. The recent Strategic Housing Market Assessment (SHMA) identifies that, within the city, there will be a need for up to 24,300 jobs and 28,000 new homes.

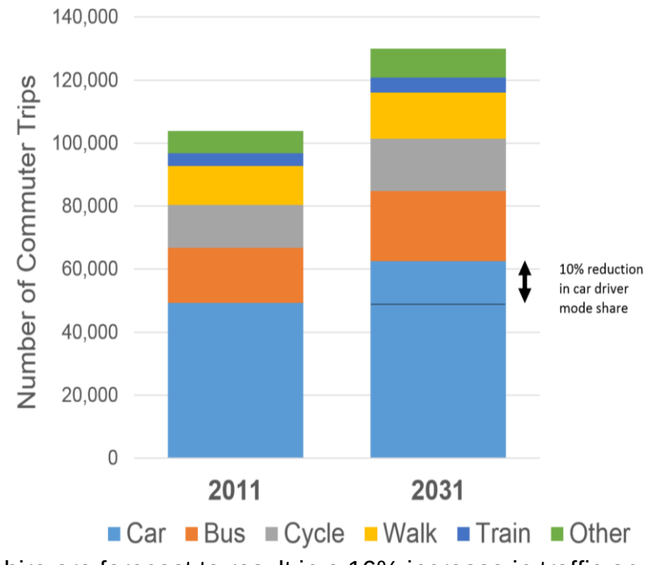
Whilst the modal share for public transport for trips to the city has increased steadily in recent years, travel by car remains the dominant form of transport to all destinations other than the city centre. With existing congestion already requiring extensive engineering solutions to junctions on the ring-road, the predicted growth of homes and jobs in Oxford and throughout the county will only exacerbate the problem.

What this means in future

Growth on this kind of scale requires a transport strategy of comparable ambition. A continuation of existing travel behaviour amongst new residents would threaten to over-burden the transport network and in turn significantly compromise the character of Oxford and quality of life of those living and working here.

It is estimated that job growth within and outside Oxford, could result in 26,000 additional journeys within the city boundary by 2031 – a 25% increase from 2011. Initial estimates suggest that, without improvements to the transport network and changes of travel behaviour, this could result in approximately 13,000 more commuter car trips each day.

The graph on the right illustrates what the impacts of growth could be on the number of commuter trips into and within Oxford if current preferred modes of travel remain unchanged. A 10% decrease in the car driver mode share is needed to prevent traffic levels rising.



Even the current Local Plans' pre-SHMA housing allocations in Oxfordshire are forecast to result in a 16% increase in traffic on

[1] Figures provided by the Office for National Statistics

Oxford's radial roads and 21% on the ring road in peak hours. By 2031, the impact of the resulting congestion is forecast to result in a loss of around £150 million from the economy of the city. Car journey times from the surrounding Oxfordshire towns are anticipated to increase on average by 18% to the city centre and 14% to Headington.

This increased demand for movement will also have significant adverse impacts on the environment, quality of life and health of the city's population.

More demand also means more buses, with the number of vehicles entering the city centre set to grow by over 40% if left un-checked, putting substantial strain on the historic core. Increased traffic will impact on local communities, and longer journey times will make it more difficult to reach jobs and services.

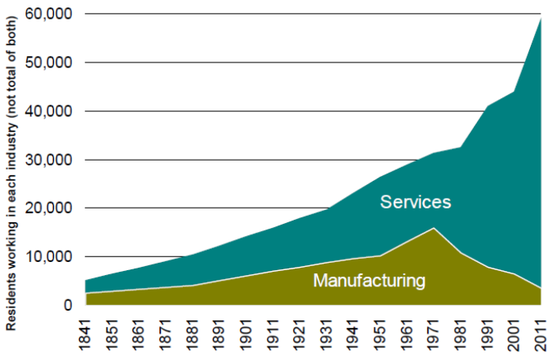
Without a step change in the provision transport infrastructure and travel options, the city faces serious consequences.

The key challenges for the OTS

The OTS has therefore been developed to correspond to the eight most crucial challenges for transport in the city.

Challenge 1: Oxford's economy is growing and changing

Oxford's key economic strength lies in high-skilled, knowledge-intense industries (including science, research and technology), building on the city's international renown as a centre of excellence in education and research. These sectors now account for the majority of jobs, whilst the relative number of positions within more traditional sectors (such as manufacturing and retail) is declining (see graph).



Employment in service related positions has grown rapidly since 2001

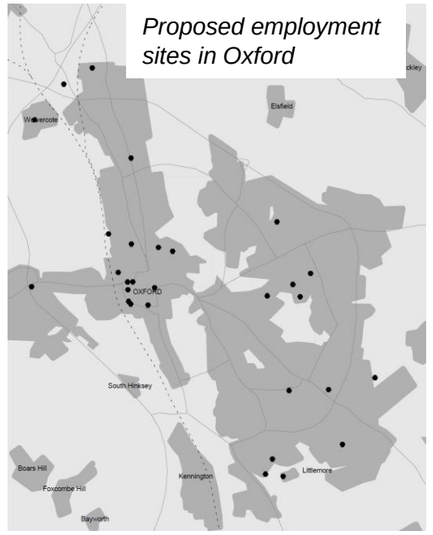
The city's tourism industry also goes from strength to strength, with 9 million visitors each year, and an estimated worth of £770 million for local businesses.

Oxford's businesses typically function within a global marketplace making strategic transport connections as important as local ones. High-skilled roles also frequently attract a more mobile and affluent workforce, who are able and prepared to travel greater distances to work. This is likely to be contributing to an increase in commuting into Oxford.

Key implications for the OTS: Congestion is a barrier to a competitive economy and future growth requires a well-connected, reliable and efficient transport network. Capacity is needed, but with space a key constraint, **the on-going provision of more road space is not a long-term option**.

Challenge 2: Economic growth is happening in new locations

Economic growth is bringing changes to the location as well as the nature of development. The Eastern Arc now surpasses the centre as Oxford's main area of employment (with 43,600 jobs compared to 39,800 within central Oxford). As the city develops in future, the largest proportion of new growth will occur outside the centre.



Proposed employment sites in Oxford

Oxford's transport networks have historically been developed to provide access to the city centre. New areas of growth require appropriate levels of access and strengthened linkages. The growth of the "Knowledge Spine" that includes the Eastern Arc, North Oxford, Science Vale and Bicester will also increase the importance for strengthened connectivity between these locations and good connections to strategic road and rail networks – particularly to maintain access to and from London and Heathrow airport.

Key implications for the OTS: High quality and integrated public transport is needed to support good connectivity across the city and to areas beyond traditional boundaries. This needs to be accompanied with measures to manage growth in demand for car travel.

Challenge 3: Oxford is a tale of two cities

Whilst, overall, Oxford's economy has thrived, not all residents have been able to share in the city's success. Large pockets of inequality exist, with significant areas of economic and social deprivation – particularly within the Eastern Arc.

Persistent issues of unemployment, low income and health inequalities are most concentrated within these locations, with a decline in low-skilled jobs leaving significant numbers of residents mismatched to local employment opportunities. A shortage in housing availability has pushed up the cost of accommodation relative to income, placing further pressure on the finances of lower-income residents.

With these types of challenges, travel can be a contributing factor. If communities are not well connected to employment or higher education and essential services and amenities, the opportunities and overall quality of life of individuals can be compromised.

Key implications for the OTS: The OTS must support initiatives to overcome the inequalities that continue to exist in Oxford. In particular, transport has an important role to play in supporting regeneration by strengthening access and providing opportunities for reaching employment, training, essential services and amenities.

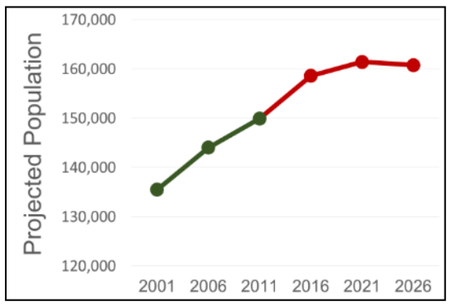
Challenge 4: Oxford is experiencing rapid population growth and demographic change

Oxford's rate of population growth is showing no sign of immediately abating as the city's universities and knowledge-based businesses continue to attract new residents.

With population growth comes increased demand for travel, but also opportunity for increased public transport. More densely populated places are more likely to support commercially viable public transport, supporting opportunities to manage traffic growth.

Whilst the majority will remain of working age, particular increases are predicted in those aged 14 or younger and 70 or older.

Key implications for the OTS: Managing the impacts of an increased population will require a strategy that seeks to encourage trips by walking, cycling or public transport over car travel. Changing demography means the OTS must deliver high quality transport choices which are accessible to all (irrespective of age, mobility level, or ethnic background).



Oxford's population is projected to exceed 161,000 people by 2021

Challenge 5: More people are travelling into Oxford each day and travel patterns are changing

The journey to work remains the most significant challenge for the transport network, and increasingly this involves people travelling in from outside the city. More jobs which require a commutable journey in Oxford are now held by those living outside the city (45,750) than those living within it (42,406).

Commuters who travel from outside of Oxford are typically far more car dependent and the total number of car commuting trips rose by 9% between 2001 and 2011. Trips to work by public transport have increased for those travelling from outside, but at far more modest levels.

People's travel is also changing: it is now the Eastern Arc, rather than the centre, which is home to more jobs than anywhere else in the city (43,600 compared to 39,800 within inner Oxford). As the city's growth plans are realised the transport network within the Eastern Arc is set to become even more important to Oxford's economic success.

Key implications for the OTS: A continuation of current commuting travel trends would represent a significant challenge to Oxford's growth. Congestion builds significantly at peak periods on the Outer Ring Road and along the A34 and A40 creating delays and unreliability. With more commuters travelling in, the only way that this future problem can be sustainably addressed is through a step change in commuting behaviour towards public transport.

Challenge 6: Housing demand is not being met and there is a need for new high quality neighbourhoods

There is a currently a large gap between housing demand and new house completions within the Oxford area, contributing to a growing shortfall in supply. This is especially significant for the availability of affordable homes.

House prices are accordingly rising quickly and the urban population density increasing, as higher costs drive up occupancy levels (with 6.2% of houses considered to be overcrowded in 2013). The impact of increasing population density may be beneficial to making public transport more commercially viable, but the housing gap is also resulting in more people commuting into Oxford from other areas, adding to commuting traffic on the ring road and key radial routes.

Scattered small settlements and dispersed patterns of growth favour car travel and make commercially viable public transport more difficult. Delivering housing at the volume and of the type which is required in locations where travel demand can be largely accommodated through

public transport, walking and cycling will be crucial to managing future traffic growth. This is particularly important in the context of declining budgets for subsidised bus services.

Key implications for the OTS: The OTS should be used to help ensure development is located where it can be well served by public transport and where short-distance journeys can be made by walking or cycling.

Challenge 7: There is a need to better balance different needs in the city centre

The historic city centre and its narrow streets are part of the charm of Oxford to millions of visitors from around the world. But these streets also represent a challenge, with a public realm which is not befitting of a global tourist destination. With many major transport routes converging in the city centre, space for movement is at a premium.

Buses, coaches, cars, delivery and other motorised vehicles all need to gain access to the centre. But with large numbers doing so, they increase potential conflict with pedestrians and add traffic which impacts on Oxford's character.

Key implications for the OTS: The OTS has to strike the right balance between enabling efficient access to the city centre and providing a high quality place for people to enjoy once they arrive. Dealing with the implications of future growth in bus use is vital. The OTS needs to capitalise on current and committed public realm improvements and create a consistent character and feel that permeates across the city centre.

Challenge 8: There are major challenges with the urban environment and air quality

With space at premium, creating spaces for people and public enjoyment without compromising access becomes challenging.

Oxford provides an array of green areas, waterways and historic open spaces for outdoor enjoyment. But the city is affected by notable problems with airborne pollution which are a cause of health problems in some areas. Traffic noise affects some residential areas and certain city centre streets with high traffic or bus flows.

A citywide Air Quality Management Area was declared in 2010, with targets set for keeping Nitrogen Dioxide emissions at safe levels (below 45 µg/m3 by 2020) and reducing emissons of Carbon Dioxide (by 35% by 2020 from 2005 levels), Nitrogen Oxide and Particulate Matter (a 50% reduction of both).

Motorised vehicles are a key contributor to noise and poor air quality and a lasting solution will require a step-change in emission levels from vehicles within the built area. Without this, an increasing number of residents and visitors may be affected.

Key implications for the OTS: The OTS will need to consider how to work towards the targets for reducing transport-related noise and air pollution within the city. This will require measures to reduce traffic and to promote quieter, lower emission vehicles.

3. Objectives

A Vision for Oxford

By 2035 Oxford will have a progressive transport network, providing reliable and sustainable methods of movement, enabling growth and comprehensively linking all communities. This network will 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 which offers a highly attractive environment to live and work and a visitor experience of global renown.

The OTS has been developed to complement 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 OTS Objectives

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

4. The strategy components

An integrated approach

The strategy has three components: **mass transit, walking and cycling, and managing traffic and travel demand.** There is no single solution to tackle Oxford's long-term challenges: all three components are needed in combination to deliver the objectives of the OTS.

A new mass transit network for Oxford will be critical in meeting future connectivity needs in the city. This will deliver a step-change in travel choices for diverse movements within and into the city. A city-wide walking and cycling network will include continuous pedestrian and cycle routes and high quality spaces for pedestrians in areas of high footfall. Mass transit and walking and cycling improvements will be enabled and supported by an ambitious agenda of road space reallocation, and a much stronger focus on reducing traffic demand in the city.

The OTS also includes detailed proposals for the city centre, Eastern Arc and north Oxford. Within these areas, consideration has been given as to how each component (mass transit, walking and cycling, and traffic management) can be integrated.

The OTS will not mean "business as usual" for transport in Oxford. The proposals described will require a strong will for change from stakeholders, concerted leadership from the local authorities, and major capital investment. However, the County Council considers that the proposals in the OTS could be truly transformational and will provide an effective platform to unlock the future growth of the city.

The OTS provides a "2035 vision" for each of the core components, showing how the continuous, integrated transport networks will look once complete. Rather than detailing the exact specifications of how every link or junction will work, the OTS provides the framework and technical principles from which future studies and programmes and schemes can be developed.

The OTS is an evolving strategy that will be adaptable to future challenges and new technologies. It aims to serve the needs of Oxford's growing population and economy, but also provide a vital influence in decisions about where future housing should be located. It seeks, in particular, to direct growth to places where sustainable travel options can be made more attractive.

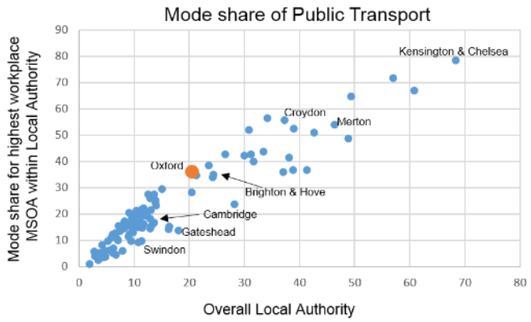
4. Mass Transit

Mass transit in Oxford is currently made up of the network of bus and rail services that provides strategic and local access to residents and visitors to the city. The anticipated growth of travel demand in the next 20 years means that the need for mass transit in the city, and throughout the county, will become increasing important because of its ability to move large numbers of people efficiently, making the best use of available infrastructure and minimising environmental impacts.

The existing situation

Mass transit in Oxford has been key to containing growth in traffic congestion in the city over the past 10 to 20 years, both enabling movement around the city for residents and for those entering the city from the wider county and beyond for work, retail and leisure.

In addition to dedicated city and inter-urban bus routes, the city's five peripheral Park & Ride sites provide excellent alternatives to the use of the private car in reaching the city, while Oxford's mainline rail station provides access for 5% of commuters to the city centre.



Oxford's position relative to other local authorities which have comparative workday populations, shows that the maturity of the public transport market is matched by few authorities outside of London (see the graph to the left showing 2011 Census Data).

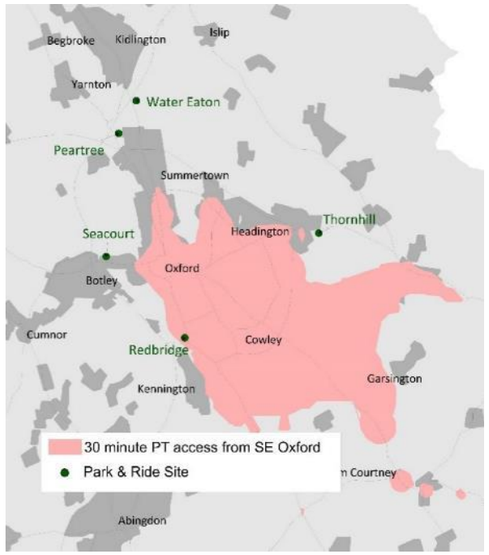
Limitations of the existing provision

Whilst the success of the bus network in the city has led to a continued rise in patronage, over the last decade the proportion of commuters travelling by bus has remained relatively static, particularly to areas such as Cowley and Blackbird Leys in the south-east of the city. At a city level, this has been partly due to the beneficial increases in walking and cycling as a major mode of travel for the city's residents.

However there are still areas of major employment for which have there have been no significant improvements to services to match the scale of growth. These include the area around Cowley and Blackbird Leys, home to over 18,000 jobs, which has no direct connection to a Park & Ride site and relatively poor connections to anywhere other than the city centre.

A drawback to the excellent bus service frequencies to the centre of Oxford (from a range of destinations both locally and further afield) is that upwards of 190 buses and coaches enter the city centre per hour at peak times, leading to noise, air pollution and substantial use of space in city centre streets.

The experience and movement of shoppers, students, workers and visitors to the city's 'flagship destination' is compromised by high volumes of buses. These buses are not just travelling through the centre, but also stopping and laying over. Since mass transit (and buses in particular) will be an even more important element of the city's transport system in future, it is vital that these negative impacts of the current system are recognised and addressed.



Oxford opened the world's first Park & Ride site in the 1970s. The Park & Ride system has grown since to provide over 5,000 parking spaces, helping to reduce traffic in the city centre by offering an easy and attractive alternative for those entering the city. All five sites are located close to the ring road, and are a popular choice for longer-distance commuting movements. However, this is exacerbating congestion on parts of the ring road, particularly around the junctions with the A40 and A34 in north Oxford. This congestion delays all traffic, including buses coming into the city. Traffic congestion is a serious issue affecting journey times and reliability of bus services from all parts of the city and county, particularly when approaching and crossing the ring road and on the radial routes into the city. Congestion also has a serious impact on public

transport within the Eastern Arc, making journeys on the orbital routes longer and less reliable (notably those which use the B4495).

Like many other cities of comparable size, Oxford's rail mode share is limited. The major commuter trip producers of Banbury, Didcot and Bicester are served by two or three direct Oxford services within peak commuting hours, whilst the position of the city's only station, to the west of the city centre, makes the Eastern Arc relatively inaccessible by rail without interchange onto local buses.

Future demand

Demand forecasts undertaken for Oxfordshire's 2013 Rail Strategy suggest that trips to Oxford Station could grow by as much as 70% by 2026, largely as a result of the improved connections and infrastructure proposed by Network Rail and the operators. Catering for this level of growth will require a marked improvement in access to the station from across the city, as well as major improvements to Oxford Station itself.

The bus network is also predicted to witness substantial increases in demand by 2031. Were travel to work patterns to remain as existing in terms of the main origins and destinations, over 4,500 new two-way bus trips would be made by commuters each day either into, within or out of the city – the equivalent of an additional 70 bus loads. With most services routing through, or terminating within the city centre, the additional congestion and conflict will only be exacerbated without a strategy to address the pressures placed on the city centre.

Vision for mass transit

The aspiration for 2035 is that Oxford will provide its residents and visitors with a connected, modern mass transit network which provides a cheaper, faster, and more reliable travel option than the private car for the majority of journeys to and between destinations in the city.

Mass transit in Oxford will consist of three modes:

- Rail;
- Rapid Transit (RT); and
- Buses and coaches.

The rail network serving the city will be modernised and extended. Existing and new stations will be integrated with the city's other transport networks and will provide a first-class passenger experience.

A new RT network will provide fast, high-capacity, zero emission transport on the city's busiest transport corridors, offering a tram-equivalent (or in future potentially tram) level of service and passenger experience.

The conventional bus and coach network will continue to grow to complement the RT and rail network, with more advanced vehicles and better infrastructure to improve journey speeds and reliability.

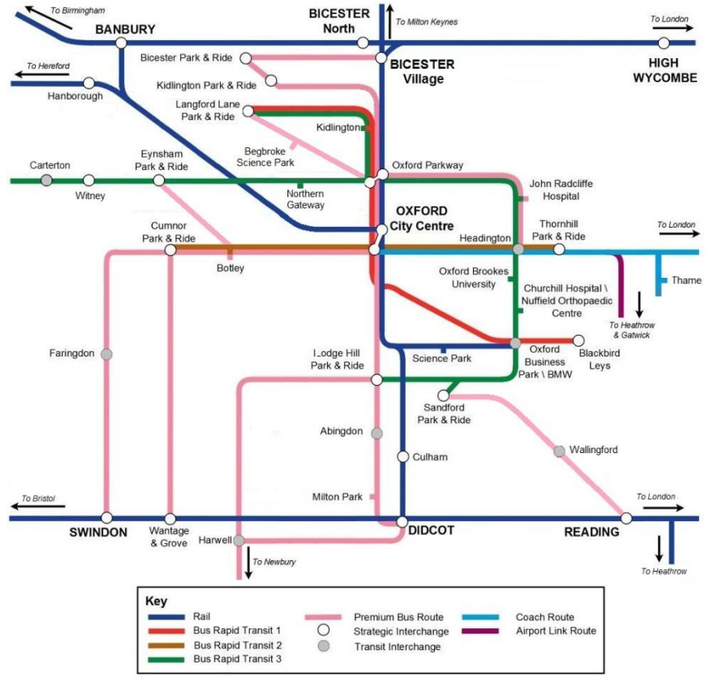
The problems associated with the predicted high intensity of RT and bus operation in the city centre will be tackled through a staged approach, culminating in the long term in the creation of transit tunnels under the city centre to fully reconcile the objectives of place-making and accessibility.

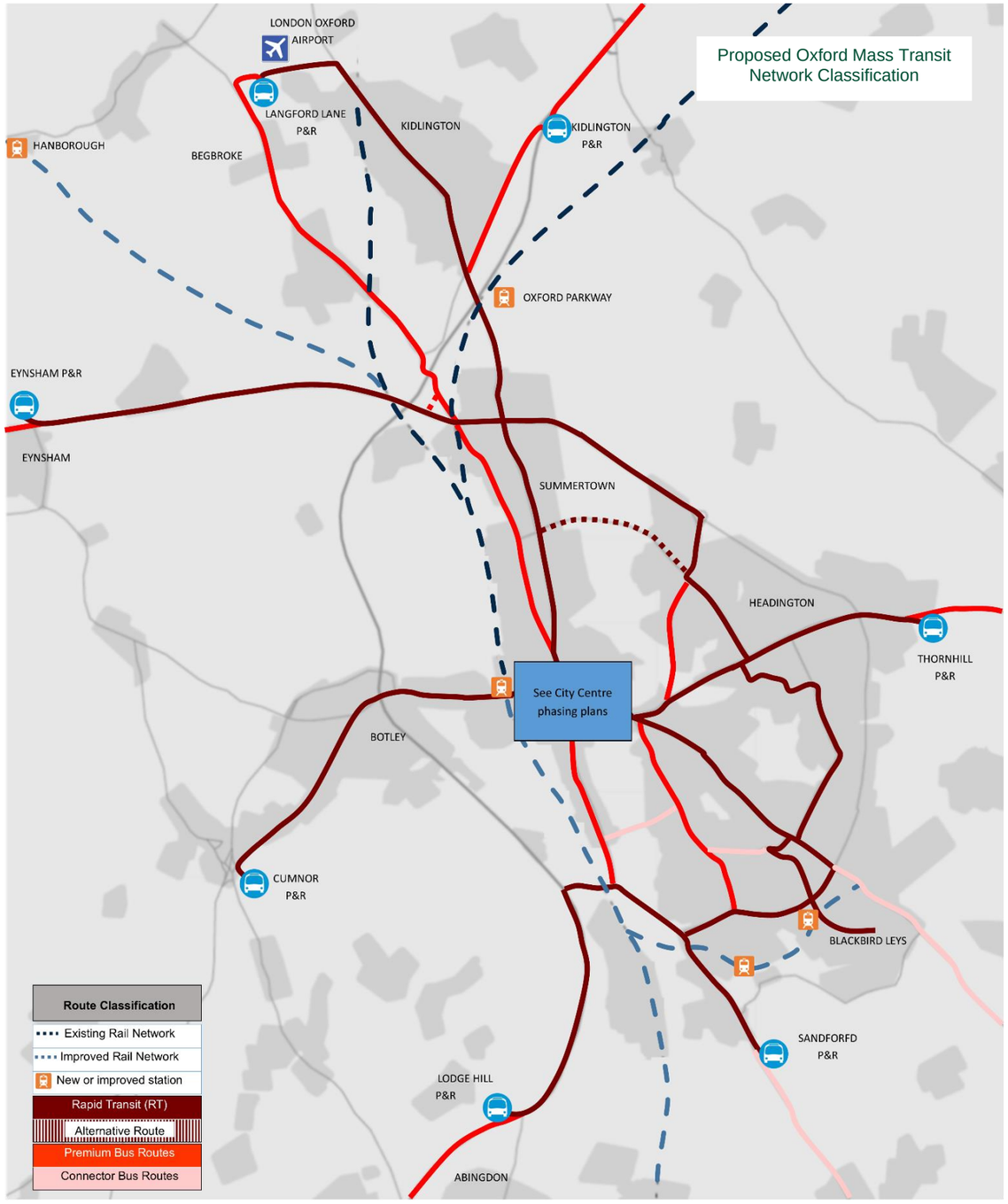
Proposed network

In combination with work on the Oxfordshire Science Transit and Oxfordshire Bus Strategy, the OTS helps to define the strategic transit network for the County (shown in the schematic plan). With Oxford as the central hub, the network will improve transport links within and beyond Oxfordshire; improve access for residents; and increase the connectivity to locations of major growth.

The OTS mass transit proposals are shown in more detail overleaf.

Further work and consultation is required to develop the design and implementation plan for mass transit in the city. This will include corridor studies of RT routes that will consider the design of facilities for mass transit alongside the provision for conventional bus services, cycling and walking, as well consideration of where routes should intersect.





Improvements to rail

If travel patterns and services remain unchanged, growth in Oxfordshire's population would increase patronage amongst commuters by 20% by 2031. However, due to the committed improvements to the rail network and services by2020, this growth could be as much as 70% at Oxford Station by 2026.

The following discussion considers the planned improvements of greatest significance to Oxford.

Oxford Station Masterplan

The City and County Councils and Network Rail have produced a joint master plan for Oxford Station (shown right). The master plan provides a bold vision and implementation strategy for the comprehensive redevelopment and improvement of the station, including:

- major rail capacity and passenger improvements;
- a new transport interchange, including bus station, taxi area and car parking;
- twice as much cycle parking as now, integrated into the station buildings;
- widening of Botley Road under the railway bridge to provide wider pavements and segregated cycle lanes; and
- complementary development to help fund the improvements and make the station a destination in its own right.

East-West Rail phase 1

From October 2015, Chiltern Railways are to provide a new service from Oxford to London Marylebone, operating via Bicester Village and a new Oxford Parkway Station at Water Eaton. These new links will provide Oxfordshire with new strategic rail connections (e.g. High Wycombe and Aylesbury) and an alternative route to London.

East-West Rail phase 2

The second phase will involve the re-opening (and subsequently electrification) of the line between Bicester Bletchley and Bedford/Milton Keynes, enabling passenger and freight trains

to connect between the south and west of England and the West Coast and Midland Main Lines. This will place Oxford at the centre of this expanded network, with strategic connections to the Milton Keynes growth area. A future phase will extend the line and services to Cambridge and beyond

Great Western Modernisation

Network Rail are implementing the re-signalling and electrification of the main line from London to Newbury and Oxford by 2016, and then Bristol and South Wales to 2017. This will include the introduction of new Inter-city Express (IEP) trains.

Cowley Branch Line

The Cowley branch line is currently used only for transporting freight by BMW. However, the line's proximity to the new and expanding employment area of the southern Eastern Arc, suggests that it could play a key role in future increased transportation of both freight and passengers.

The County Council is currently working with Chiltern Railways on their proposal to reopen the Cowley branch for passenger trains, creating stations at Oxford Business Park and Oxford Science Park and served by an extension of the London Marylebone to Oxford East-West Rail Phase 1 service. As an early phase, this would provide a useful new connection to the Eastern Arc, intersecting RT Line 3 at Oxford Business Park.

Longer-term, and as additional development comes forward, upgrades to the Cowley Branch Line could allow for more and higher frequency services, with the potential to serve growth in this part of the city.

Longer term

Other longer term rail priorities for Oxfordshire include:

- Didcot-Oxford Capacity Enhancements – requirement for four tracking to accommodate demand, enable new/extended services and fully realise rail potential as an alternative to the A34 corridor;
- Direct access to Heathrow Airport from Oxford/Didcot; and
- Provision of an Enhanced East-West Rail service pattern.

Rapid Transit

At a more local level, the ease of movement within the city and from the nearby towns of central Oxfordshire will be transformed by developing a level of prioritised road-based mass transit well in advance of current conventional bus services.

In considering the available options for road based mass transit solutions, a number of major constraints to delivery caused by the geography and urban form of the city have been considered, including:

- narrow road widths;
- limited scope for dedication of entire corridors to mass transit due to the need for access via all transport modes and a lack of diversion routes for alternative means of access;
- the need to ensure a quality of place in district centres on the radial routes; and
- environmental constraints such as the flood-plain.

These constraints make the possibility of delivering a mass transit system that requires major infrastructure and segregation extremely difficult without having a substantial disbenefit to all other modes of transport.

The table overleaf compares the strengths, weaknesses, opportunities and threats relating to the different mass transit options.

In light of this comparison and in recognition of physical constraints (in additional to factors such as cost, demand and network resilience) bus-based Rapid Transit is currently considered the optimum solution for Oxford and is likely to remain so into the medium-term. Beyond this point, and if demand reaches crucial thresholds through the long-term growth of the city, it may be appropriate for the network to be developed to include trams on certain corridors.

System	Conventional bus	Guided Bus	Bus-based Rapid Transit	Rail-based Rapid Transit / Tram
Strengths	Lowest cost of infrastructure and vehicle technology. Increases in capacity deliverable immediately. Vehicle size enables access throughout the road network.	High degree of priority on bus way sections. Can divert off the guided bus way if necessary. Outside of the city, space is available for widening and providing dedicated lanes.	Greater operating flexibility. Mixed running with traffic. Significantly lower capital and operating costs than rail or tram. Suited to dispersed urban form.	Permanence of infrastructure, vehicles and operations create confidence and aid long term locational decisions. High capacity services.
Weakness	High volumes of buses already add to congestion issues in the city centre and along the radial routes. The status quo is unlikely to encourage mode shift.	Sections of parallel guided kerb limit the scope for other traffic to cross the corridor. Width constraints make delivery within the ring road unfeasible. Shared use with cyclists not possible	Opportunities for additional priority over existing situation limited. Construction cost (£2m to £5m per km) is higher than standard bus prioritisation methods; Vehicles and technology are more expensive than conventional buses.	Space unavailable to allow complete segregation within ring road. On road operation with other traffic or roads would be closed to traffic. Inability to divert should problems be experienced on the road network.
Opportunity	Timed slot booking at stops will reduce bunching. Bus stop departure charges could raise revenue. Operators already implementing low emission technology.	High existing demand on radial routes within the city. Higher speeds from neighbouring towns would encourage modal shift.	Can be incrementally implemented - priority/stops/vehicles. Higher capacity vehicles to be introduced to reduce total volume of buses and deal with additional demand.	Connecting denser urban areas. High existing demand of corridors will be increased with growth.
Threat	Population and patronage growth are expected to be so high that excessive numbers of buses will add to congestion, noise and pollution	High construction cost. Ineffectual without RT-type solutions on most of the route (where guided track cannot be provided)	Increases in traffic flow caused by growth creates so much congestion that is not effective where road space is shared.	Very high construction cost (£20m+ per km of route), vehicle and operating cost. Failure to deliver necessary patronage will require subsidies. Technological advances could render scheme obsolete.

Bus-based Rapid Transit can offer significantly faster and more reliable journey times than conventional bus services. Rather than simply being a bus route with a higher level of priority over other traffic, bus-based Rapid Transit is an integrated system of facilities, services and amenities that collectively improve the speed, reliability, comfort and image of bus transport.

Typical features may include: a high level of road priority up to full segregation; larger, modern-looking, higher quality zero emisson vehicles; off-board ticket purchasing systems; faster methods of passenger boarding and fare collection; high quality passenger waiting facilities; real-time information systems; the extensive use of 'Intelligent Transportation Systems' in the operating control system; and a unique and attractive public image and identity. Rapid transit vehicles may be single or double-deck, depending on the operating conditions. With the large population growth in Oxford and in its wider catchment area over the next 20 years, Rapid Transit will be a vital component of Oxford's transport network.

Oxford Rapid Transit routes

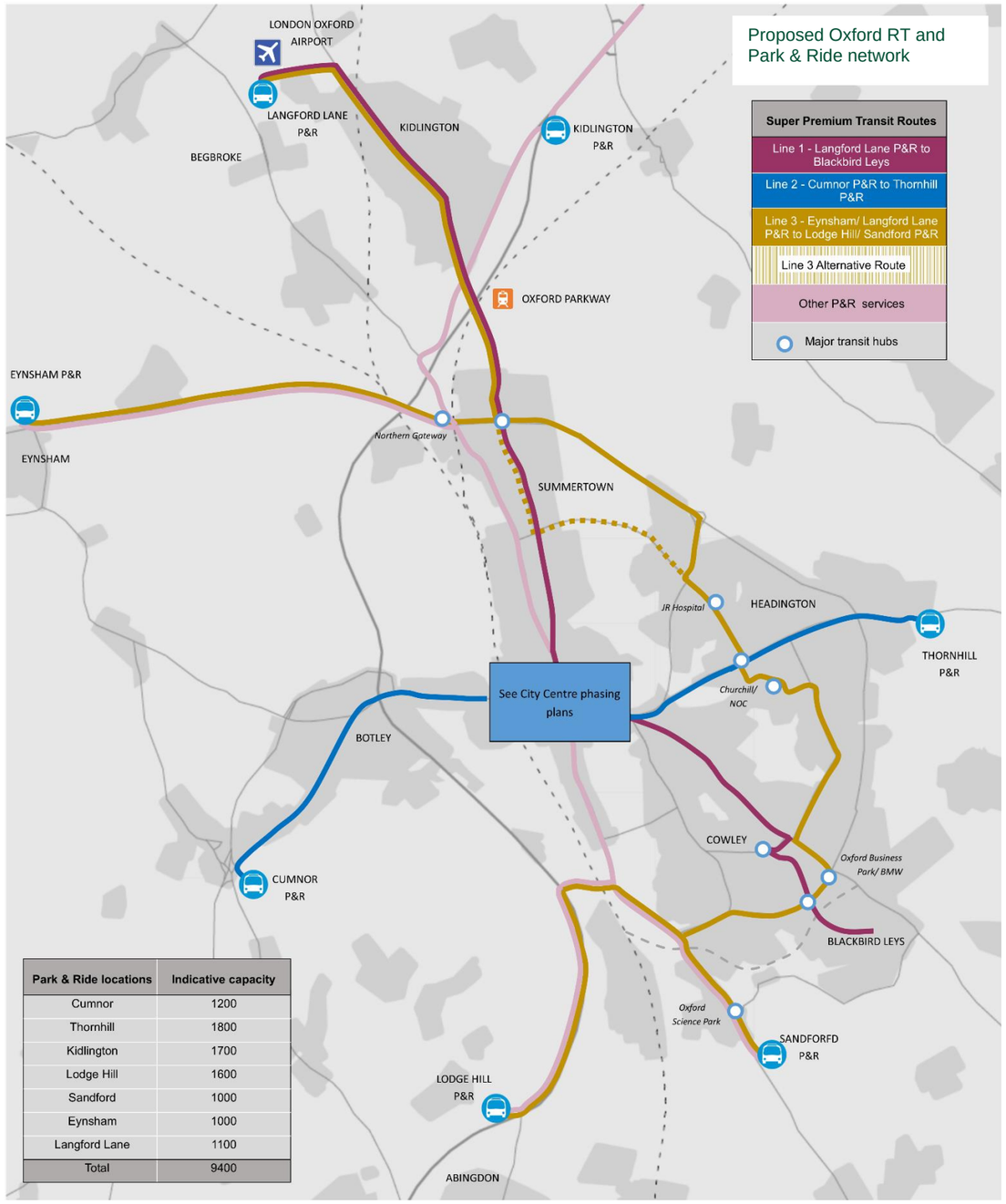
As shown on the plan on the next page, three RT lines have been identified for the city, linking a network of new Park & Ride sites (see later discussion) with the major employment and housing growth areas of the city centre, North Oxford and the Eastern Arc. All three lines are close to significant resident and workplace populations (see table below). Lines 1 and 2 are centred on existing corridors of significant bus patronage, serving as they do, the city centre, key radial routes and three of the city's Park & Ride sites.

Line		Length (km)	Catchment within 400m of proposed route	
			Resident Population	Workplace Population
1	Langford Lane P&R to Blackbird Leys	18.435	64,251	54,499
2	Thornhill P&R to Connor P&R	13.289	38,916	35,567
3a	Eynsham P&R to Sandyford P&R	23.248	45,022	32,091
3b	Langford Lane P&R to Lodge Hill P&R	25.547	53,473	37,418

Line 3, which separates into two branches in both the north and south of the city, delivers an orbital service, which has the potential to transform attitudes to travel both within and to the Eastern Arc. This is likely to be the most challenging line to deliver since existing bus use on this orbital route is relatively low, traffic congestion is substantial, and there are few existing bus priority measures in place.

Providing segregation on all parts of the RT network will not be possible (for example, where there is not sufficient space) or always necessary (particularly where congestion is not a problem). Where space is limited access restrictions can be installed to provide an almost traffic-free route, such as the one proposed on Hollow Way (see later discussion).

Providing direct RT access to the hospitals in Headington is also a major challenge, with opportunities limited by the density of development within the surrounding area. Longer term master planning of the John Radcliffe Hospital and Churchill Hospital sites may provide an opportunity to consider alternative access arrangements.



Park & Ride locations	Indicative capacity
Cumnor	1200
Thornhill	1800
Kidlington	1700
Lodge Hill	1600
Sandford	1000
Eynsham	1000
Langford Lane	1100
Total	9400

The conventional bus network

In addition to the proposed RT routes serving the city, the use of conventional buses, particularly as inter-urban connections will remain a vital part of Oxford's mass transit network.

Whilst there will be clear benefits to many existing bus services as a result of partial sharing of routes with the RT services, the County Council is committed to improving journey times and reliability through prioritisation on the network whilst working with operators to ensure that customer experience is maximised.

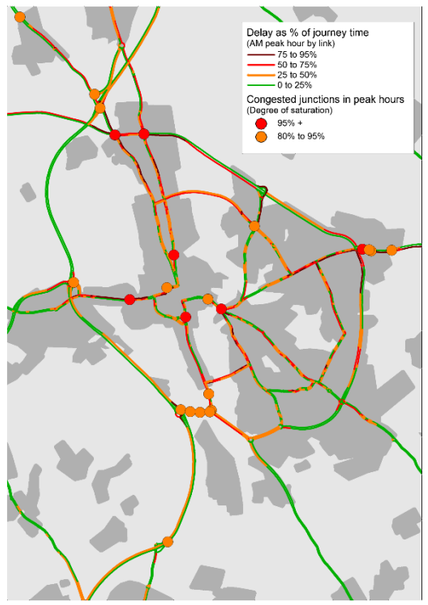
In line with the Oxfordshire Bus Strategy, bus corridors outside of the RT routes have been divided into 'Premium' and 'Connector' routes.

Within the city, routes which continue to provide services to the Park & Ride sites (but which do not follow the RT routes) will be classified as Premium routes, as will those which have service frequencies higher than two per hour. All other routes are classified as Connector.

The future of Park & Ride

Oxford's Park & Ride sites have been hugely successful in reducing traffic in the city centre by providing an easy and attractive option for visitors entering the city.

However, there are already substantial link and junction delays (as shown opposite) which occur on all approaches to the ring road, with particular hotspots located to the west (A420, A40), north-west (A44) and south (A34, A4074) during the morning period. In order to reduce congestion on the approaches to the city, it has become necessary to 'intercept' car trips further away from the city.



Morning arrivals at the Peartree, Water Eaton, Redbridge and Seacourt P&R sites contribute, in particular, to traffic using the three A34 interchanges to the west of the city. Removing this demand through capturing those users further from the city would have an immediate positive impact on the operation of the A34 and the other roads that it intersects as vehicles using the sites would no longer need to cross it.

Future housing and employment growth within Oxfordshire is set to further exacerbate congestion on the A34, the outer ring-road and other corridors that feed into the city, unless traffic can be captured before it reaches them. The expansion of the current city-edge Park & Ride sites to meet forecast levels of demand would add substantially to traffic levels on already congested routes.

New outer Park & Ride sites are therefore proposed at the following broad locations. All of these locations have direct access to the ring road and city, and are on routes that will pass through more residential areas so will have a greater potential catchment than existing sites. Linking outer Park & Ride directly to RT lines will also mean quicker journey times to and from the city, which will help to ameliorate the increase in distance travelled on mass transit and dedicated Park & Ride services.

Location	Corridor(s)	Main Catchment	Proposed car park capacity
Eynsham	A40	Witney, Carterton, Cheltenham, Gloucester	1,000
Langford Lane	A44, A4260	Chipping Norton, Banbury, Worcestershire, Warwickshire,	1,100
East of Kidlington	A34 (north)	Bicester, Banbury, Milton Keynes, Bedfordshire	1,700
Cumnor	A420	Cumnor, Farringdon, Swindon, Wiltshire	1,200
Lodge Hill	A34 (south)	Abingdon, Didcot, Science Vale, Newbury, Hampshire	1,600
Sandford	A4074	Wallingford, Didcot, Henley, Reading, Berkshire	1,000

These new sites will be particularly important in providing attractive points for drivers to transfer from their cars to mass transit services across the city: either making use of direct services or being able to seamlessly transfer between services at key interchanges across the network.

In order to build upon the success of Park & Ride, attract new users and cater for the new demand generated by growth, the new sites will provide almost double the existing capacity. This increased capacity will be essential as more of Oxford's visitors and workforce originate from outside the city.

Facilities at the Park & Ride sites will fulfil the criteria required at high quality interchange hubs, with the design and layout also enabling passing services to interchange seamlessly. Facilities will need to include significant provision for those wishing to cycle for part of the journey, whether that is from their point of origin to the bus service (Cycle & Ride), or from the Park & Ride site to their destination (Park & Cycle).

A comprehensive Park & Ride study is required to confirm the future role of Park & Ride for the city. This will assess the viability of an outer ring of Park & Ride sites including potential locations, size and design. The future need at existing city-edge Park & Ride sites will also be considered, including whether these should be closed or reduced in size. If the latter, then city edge Park & Ride sites would be included within the proposed zonal parking charge system (see section 4), with parking costs at a premium compared to using outer city alternatives. Thornhill P&R is already well located and will be retained and expanded.

Full or partial closure of city edge Park & Ride may also provide the opportunity to redevelop existing sites. These could potentially accommodate various land uses, including other transport uses (such as freight consolidation centres). Once the East of Kidlington site opens, Water Eaton will remain a major transport hub and interchange, but car parking would be for rail use only.

Given the need to reduce the amount of traffic approaching the city, and objectives to encourage a greater share of travellers to use mass transit for their entire journey, expansion of existing Park & Ride sites over the medium to long term is not supported. It is however recognised that small scale expansion of some existing sites may be necessary on a temporary interim basis as demand increases in the short term.

Supporting infrastructure

The classification of the road network will be important to delivering the vision for Rapid Transit, and in determining the scope of infrastructural work that will be need to be implemented. Classifications need to not just reflect the existing strategic value of public transport on corridors throughout the city, but also to recognise how future demand will change and what the role of each corridor is in enabling economic growth.

Corridor prioritisation

RT and buses will be prioritised to enable smooth, fast and reliable progress through:

- segregation (e.g. bus lanes);

- selective vehicle detection and prioritisation at traffic signals;
- traffic reduction;
- traffic management (e.g. queue relocation); and
- removal of obstacles such as loading and parking bays.

In turn, this will help to attract new users and, by reducing numbers of cars, will also help to tackle congestion on these corridors.

Mass transit corridor classification
Rapid Transit lines RT services will be prioritised through the application of the standard principles for Rapid Transit design. Services will be frequent, utilising higher-capacity and more advanced vehicles. RT corridors are those which form the most strategic level network, connecting key destinations, business clusters and providing access for skilled employees and key markets. RT corridors are those which have the highest levels of existing bus patronage or are expected to play critical roles in linking growth areas. The interchange between standard bus services and modes of transport to allow ease of movement to all destinations will be a core element of a RT.
Premium Bus Route Premium routes will be applied to corridors on which there are high levels of existing inter-urban or local patronage and which connect workers to employment destinations, and visitors to city centre. Premium routes will interchange with RT at key destinations along their routes, providing users with an increased level of flexibility for how they complete their journeys.
Connector Bus Route Connector routes will link local destinations within Oxford. Service frequencies will be lower than on other routes.

For the RT lines in particular, the aim of the above measures will be to create a continuous part-physical, part- virtual "track" for vehicles to make unimpeded progress. However, within the ring road, existing road space is at a premium along all corridors, particularly in the district centres where speed of movement must be a secondary after the quality of place. In these instances it will be necessary to have a greater emphasis on ensuring that public realm provides excellent opportunities for stop and interchange facilities, and managing traffic, loading and parking to minimise delays to mass transit

The level and type of prioritisation will therefore vary significantly by corridor. For example:

- on the ring road and the approaches to the city, land is often available for widening to include dedicated or segregated bus lanes, possibly including tidal bus lanes;
- on Botley Road west of Binsey Lane there is sufficient highway land to provide a continuous outbound bus lane whilst improving the quality of cycle infrastructure;
- on Cowley Road, limited road width would be better allocated to improving the public realm in the district centre and the prioritisation of buses will be provided by relocating or rationalising kerbside parking and reducing traffic;
- along much of the inner ring road, widening to provide segregation will not be an option; instead, general traffic will be controlled through metering at traffic signals or restricted through the implementation of access controls such as bus gates, and parking and loading will be restricted.
- along each corridor the potential to alter priority at junctions, include or improve bus priority at traffic signals, and to extend bus lanes to stop lines will be assessed against the related expense to general traffic.

Mass transit corridor prioritisation
Rapid Transit lines Full vehicle detection and prioritisation at traffic signals. Dedicated or fully segregated lanes included where achievable. 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.

Stops

Stops along the RT routes will be located and designed to create the best possible access and environment for all users. Design features will include:

- sufficient length to accommodate multiple services at once, and for higher capacity multi-door vehicles in future which will enable free-flow boarding through multiple doors and fixed, short dwell times at stops as at tram or light rail stops;
- provision for level boarding - initially for existing low-floored vehicles but future proofed to ensure that all boarding points on higher capacity vehicles are equally accessible;
- off-board fare recognition;
- real-time arrival and onward journey displays;

- battery charging infrastructure for electric buses;
- being safe and convenient, minimising conflict between those waiting and other road users by allocating sufficient shelter capacity; and
- being inset from the main carriageway and offset to stops for services in the opposite direction to minimise the opportunity for services blocking other vehicles.

Buses using RT corridors will also benefit from many of these facilities.

Transit hubs

At strategic locations along the routes, such as the Park & Ride sites, rail stations and district centres, high quality interchange hubs will facilitate seamless interchange between RT and conventional bus services or onto an onward mode. Proposed hub locations are shown on the network diagram on page 12. Whilst hubs will differ in scale from one location to another they will offer all or most of the following elements:

- 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 park and ride 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.

City centre

In the city centre, the key challenge is to cater for the forecast growth in conventional bus and RT patronage over the next 20 years, whilst also improving the visitor experience. This requires some radical thinking about how mass transit is accommodated, in terms of terminals, stops and routeing.

In the short-term, it is possible that some conventional bus services could be rerouted away from busy areas, including High Street, without impacting on service quality and access. This may include services to south-east Oxford, which could be routed along Abingdon Road. Further work is required with the bus operators to understand the potential for alternative patterns of service and whether this would provide any additional capacity within the city centre.

Similarly, further consideration of how longer distance scheduled coaches are routed and how the access the city centre is required, including services to London and the airports. Options may include relocating these to outer terminals and/or routing services through different parts of the city.

Tourist coaches are important in bringing large numbers of visitors to the city throughout the year but they can also cause congestion and other access issues with informal set down and pick up in the city centre. With growing numbers of tourists coming to the city and with increased restriction on vehicle access to the city centre proposed (see later discussion), more suitable and adequate arrangements to set down and pick up passengers will be required. In addition, the provision of adequate long stay off street coach parking is required. The temporary relocation of long stay coach parking to Redbridge Park & Ride since the closure of the Oxpens coach park, will be evaluated;the Redbridge area may be appropriate for a more permanent solution. Other city-edge Park & Ride sites may also be appropriate.

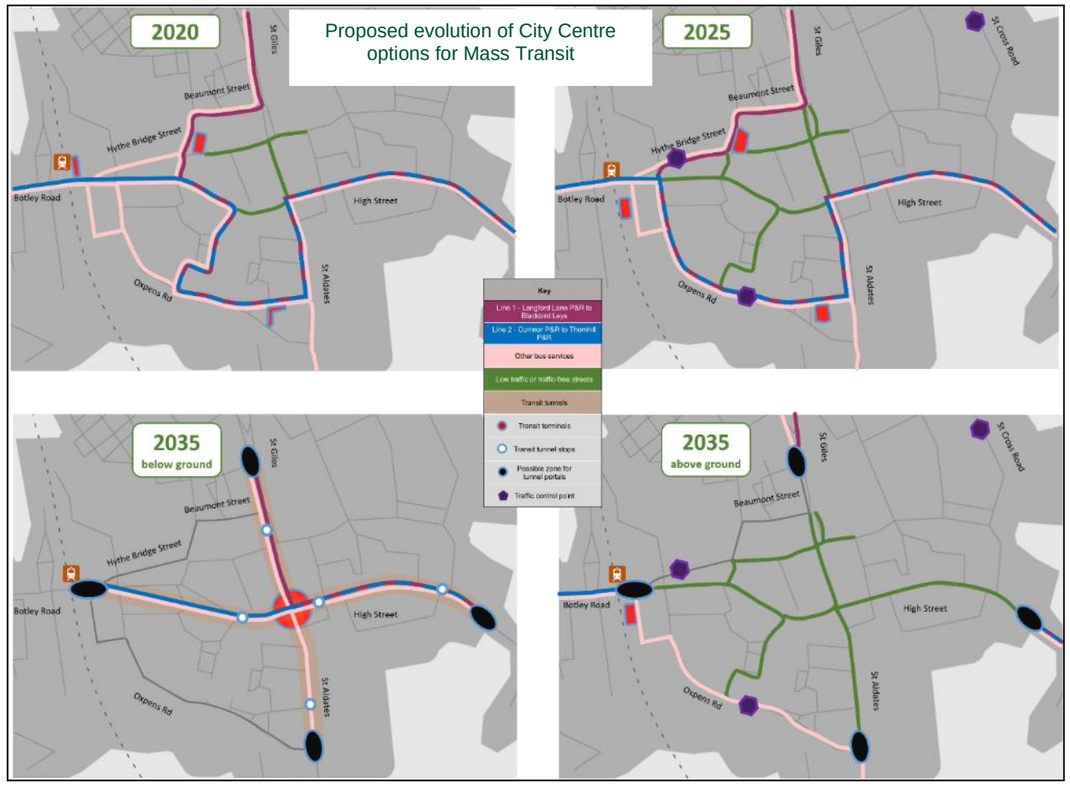
The proposals for transit terminals in the city centre build up in phases (detailed in the table and plans overleaf).

These will act as the termini for many of the existing services which currently require access and layover facilities in the central core. Increasing the overall capacity of off-highway terminal points, initially by developing surface level sites, will enable a better operating and passenger environment and reduce conflicts with other road users in busy city centre streets.

The measures identified for 2020 and 2025 will lead to a significant reduction in the number of buses in several key city centre streets. However, even with the 2025 proposals in place three issues remain: very intensive mass transit operation in High Street and St Aldate’s; the ambition for mass transit to have *direct* access through the city centre (only possible via the pedestrianised Cornmarket Street and proposed pedestrianised Queen Street); and walking distances between transit terminals and destinations (such as those experienced due to the pedestrianisation of Cornmarket Street).

	Phasing of city centre bus terminals and access		
Terminal	**2020**	**2025**	**2035**
Oxford Rail station	The continued use of the existing stops and stands in the station forecourt and Frideswide Square prior to the completion of the Oxford Station Masterplan	Relocated bus facility to the south of Botley Road to include 13 stands on site and a further 5 on Becket Street.	Continued operation of station interchange, linked to transit tunnel stop(s) nearby
Gloucester Green	Refurbishment of the existing facility to improve passenger experience and operation	Complete refurbishment and expansion of the site to increase the capacity make better use of space including passenger facilities	Closure of the bus facility and the opportunity to redevelopment the site. All stops relocated to transit tunnels nearby.
Speedwell Street	Continued use and extension of existing bus stands at the Butterwyke Turn.	Closure of the on-street stands and change of use of an identified development site on Speedwell Street such as the Telephone Exchange.	
Transit tunnels	-	-	Terminals and stops within the tunnels for the majority of services
Access	**2020**	**2025**	**2035**
	Queen Street and George Street closed to buses.	Magdalen Street, Park End Street, New Road, Castle Street and Norfolk Street closed to buses. Services will route through Hythe Bridge Street and Oxpens Rd/ Thames St/ Speedwell Street with the benefit of traffic restrictions.	Majority of bus services in the city centre will operate within the tunnels, with limited surface running only.

A potential longer-term option to address the challenges of providing increased capacity for buses and RT within the city centre and preserving whilst also enhancing the centre's historic character, would be to tunnel beneath it, thereby removing the majority of the mass transit operation from street level. New 'stations' would be constructed underground, close to the main attractions in the city centre. RT and bus services could run with ease directly across the city centre, without being impeded by other road users or using indirect routes. Interchanges between north-south and east-west routes would be provided, solving several issues faced by passengers and operators in the existing situation.



Whilst the construction cost would be very high (benchmarked costs for similar schemes suggest a capital cost in excess of £500 million), the resulting positive impacts on the public realm, conservation, safety and accessibility would be substantial.

A growing number of cities around the world are looking to this type of a solution as an innovative and bold approach to reconciling what can be conflicting demands for space within their centres. Examples include the North American cities of Boston and Seattle (which has a tunnel and an underground terminal for both light rail and bus services) and Perth in Australia.

The technical or environmental feasibility of constructing transit tunnels has not yet been considered in detail. Clearly, there would be very substantial construction works (and construction risks) and environmental impacts. Within the central core, parts of commercial properties may need to be purchased to allow for street-level entrances to the tunnel stations.

Any business case for such a proposal would need to consider the benefits to passengers and reduced operating costs for the service operator(s). Innovative sources of financing would also

need to be considered, including financing of borrowing costs through departure charges for all services (such as those often used to pay for maintenance or renewal of bus stations).

Vehicle technology

As the resident and workforce populations of the city grow, there will be additional impetus on providing capacity for passengers. To meet this challenge on the RT routes, it is proposed to cater for the additional demand whilst mitigating the impacts of additional vehicles on the network. Vehicles on the RT Lines will be:

- higher capacity than existing buses;
- capable of allowing free-flow boarding and alighting from multiple entrance points;
- fitted with on-board technology to facilitate fare recognition; and
- fully accessible from all stops along routes.

As bus-based RT becomes a standard convention in the provision of mass transit in cities, technology is improving to provide high-capacity, zero-emission vehicles. A fleet of vehicles (similar in style to the articulated Citea recently introduced in Cologne (pictured) are envisaged to provide short/medium distance trips along all RT lines.

Through the application of a Traffic Regulation Condition, Oxford city centre is already a Low Emission Zone and operators have made great efforts in delivering vehicles which met Euro V emission standards, and are working on introducing even cleaner technologies in the near future.

However, the ambition of the OTS is to start a city centre zero-emission zone for all vehicles by 2020, with the zone being gradually expanded over time as the required infrastructure and technology develops. This will support objectives to improve air quality and targets to reduce emissions from vehicles. Further private sector investment from operators on all routes will be required, not just the short to medium range services, and be achieved through the deployment of electric buses, advanced electric-diesel hybrid vehicles with an electric drive mode for emission-free operation in built up areas, and routeing changes as outlined above.

As battery and induction charging technology improves, vehicles will be able to cross the whole city whilst on full electric power, enabling the creation of a city-wide zero-emission zone by 2035. Vehicles which cannot comply with specific emission standards will be required to terminate at Park & Ride sites outside of the city.

Smart mobility

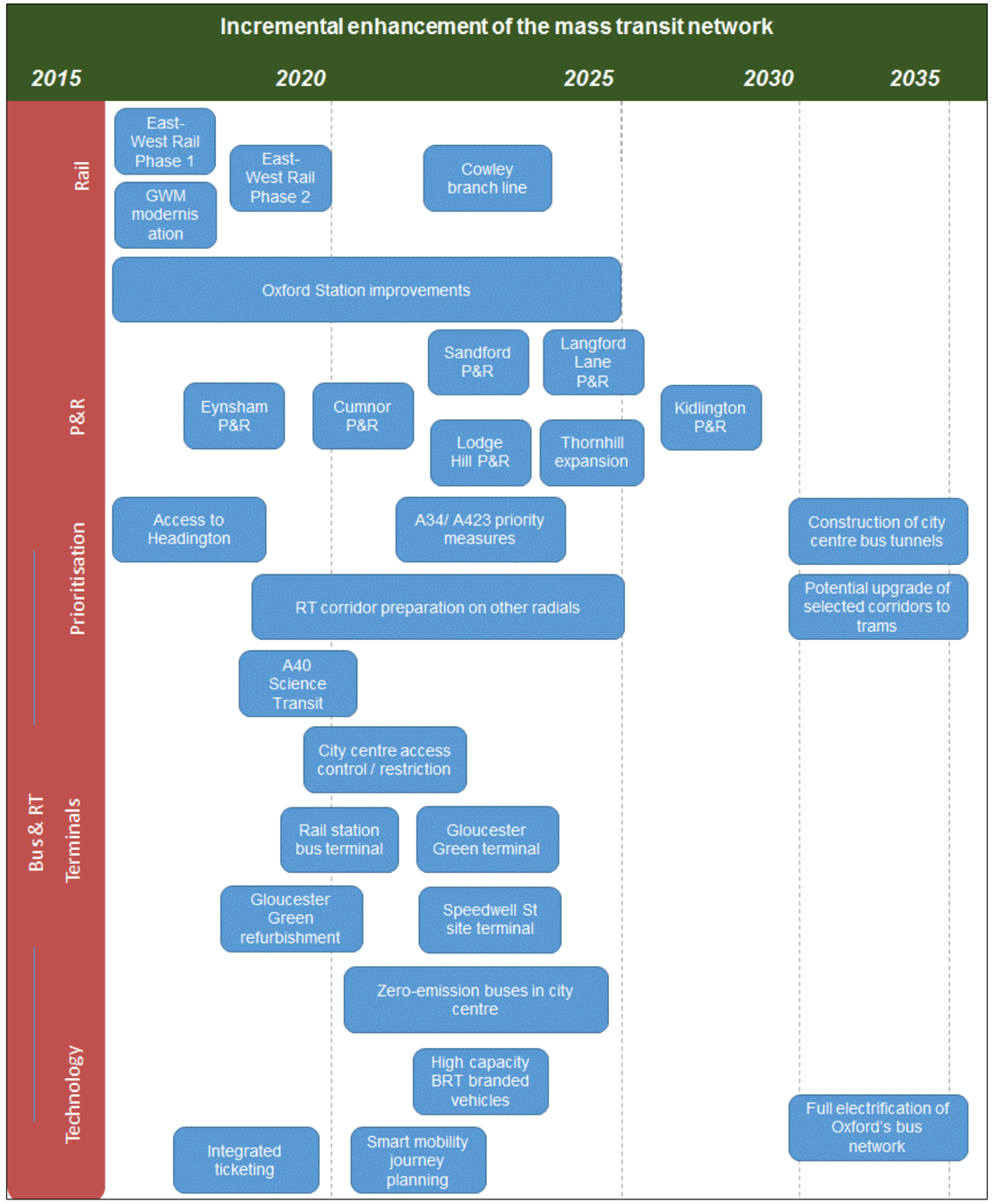
The Science Transit Strategy is leading initiatives for public and private sector partnership in the county to deliver cutting edge Smart Mobility Information in the form of digital data sources that will be:

- relevant to different user contexts and journey purposes at all journey stages;
- available via multiple sources (web, smartphone app, digital TV);
- updated in real-time, to provide the latest insights and intelligence; and
- capable of providing comparative travel time and cost information for an individual's options.

For those without access to personalised digital data sources, all information will be linked to displays at stops, hubs and on-board services.

Implementation

Phasing of capital investment



Future evolution of operator partnerships

From providing direct services from the Park & Ride initiative in the 1970s, the signing of a voluntary Quality Bus Partnership in 2006 to provide a policy framework for improvements to routes and corridors, to the creation of the city centre Low Emission Zone through the introduction of a Traffic Regulation Condition, and a Qualifying Agreement to coordinate bus timetables signed in 2011; OCC has a long tradition of working in partnership with bus operators. This has been a key element in achieving a significant level of bus patronage amongst residents and visitors of the city.

The Oxfordshire Bus Strategy, completed in tandem with LTP4, proposes the renewal of county-wide and area specific QBPs, in association with the operators and with particular focus within Oxford being on ensuring a quality of service and establishing the principles of RT operation:

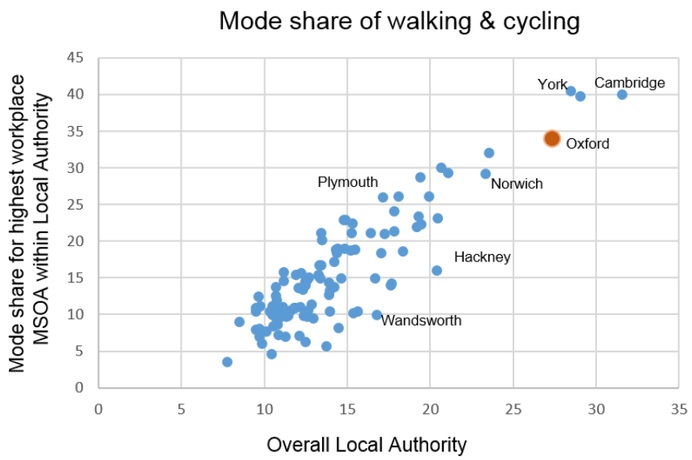
- Greater time-based and geographic coverage of bus services based on evidence of when and where people want to travel;
- Punctuality and reliability improvements through identifying the source of delays to bus services and jointly developing evidence-based solutions;
- Operation on busy radials and within the city centre to be managed through techniques such as Departure Slot Booking;
- Commercially appropriate consolidation and joint operation of services to further reduce the number of buses entering the city centre;
- Further availability of inter-operator (and multi-modal) smart ticketing building on the work in Oxford;
- Quality, capacity and environmental performance of vehicles; and;
- Interchange with other modes such as the rail services and facilities for improving onward journeys by foot and bicycle and for those will mobility impairments.

4. Walking and Cycling

Walking and cycling are extremely efficient forms of movement over short distances in terms of road space and impact on the highway network. Oxford is already one of the leading UK cities in terms of mode share of walking and cycling, however the ambition is to continue enhancing this position. To do so will require influencing further mode shift through encouraging people to walk and cycle by making their journeys easier, safer and more cost and time efficient in comparison to other modes.

The existing situation

A significant proportion of trips within Oxford are made on foot or by bicycle - 50% of commuter trips made by residents of the city. Investment in the transport network, including local public realm and cycle schemes, has contributed to a 30% increase in walking and cycling to work by residents in the city between 2001 and 2011. Oxford now has one of the highest mode shares for walking and cycling when compared to other local authorities (see graph of 2011 Census data) with similar sized workforces, and is of a similar maturity to many inner London authorities. Walking and cycling are also the favoured modes of the 30,000 full time students in the city.



Limitations of the current network

Given the size of the city (with no two points within the ring road being more than 11 km apart), Oxford should be able to challenge Cambridge as the city with the highest proportion of residents walking or cycling to work.

In consultation for the OTS, cycling interest groups have suggested the biggest barriers to further improving the cycling mode share are related to the lack of high quality routes which provide continuous facilities, conforming to a specific standard. The piecemeal, location specific approach is seen as discouraging new, inexperienced and safety-concerned cyclists from choosing to cycle as a preferred mode of transport.

Public realm improvements and pedestrian route enhancements have been made, particularly in the city centre and district centres. However, there is much more to do to make walking in Oxford a better experience.

The severance of walking and cycling routes is also a common issue at the edges of the city. As Oxford has expanded to include significant residential and workplace populations on the outside of the ring road, the dominance of motor vehicles in the transport hierarchy at junctions has not been challenged. With the committed developments at Northern Gateway and Barton Park likely to be added to in future, the issue of severance caused by the ring road will become even more critical, even for short journeys between homes and workplaces.

Future demand

The main commercial streets within the city centre already experience very high footfalls. In peak hours, Queen Street has an hourly footfall of between 3,000 and 4,000 – comparable to that of the wider and fully pedestrianised Cornmarket. Elsewhere in the centre, Broad Street and High Street can see footfalls of up to 2,300 people per hour at peak times.

The redevelopment of the Westgate Centre is expected to result in a 54% increase in retail space in the entire city centre and an increase in visitors to the Westgate Centre from 5 million to 16 million per year.

Were travel to work patterns to remain as they are now, over 5,500 new two-way commuter trips would be made by walking or cycling as the main mode each day within the city. It is also expected that they will feature as the critical modes for onward journeys for the additional 5,400 commuters arriving by bus or train.

Vision for walking & cycling

By 2035 Oxford will be a world-class cycling city that will be accessible to everyone, regardless of age, background or cycling experience.

Walking in the city will be a pleasant, comfortable experience, with an outstanding public realm in the city centre and district centres.

Cycling and walking will be at the heart of continued and sustainable growth and contribute to a higher quality of life for its residents and workers while maintaining its visitor appeal as a world renowned city of culture and history.

Enhancing the cycle network

Cycle route enhancements are needed to provide safe and direct access to employment, educational and commercial destinations, but also to extend coverage across residential areas. Achieving this will require a combination of high quality routes providing access to key destinations, better cycle parking and other measures which make cycling easier and more attractive for short and medium-distance trips.

We propose a network based on a hierarchy of Cycle Super Routes and Premium Routes (shown in the figure opposite) and Connector Routes linking major origins and destinations. As with mass transit, particularly improvements are needed in the Eastern Arc, where 69% of journeys to work are 5km or less, but only 44% of trips (made by Eastern Arc residents within the city) are made by walking or cycling. The routes shown represent corridors - where possible, the actual route will follow the main road highlighted, but in some cases a direct parallel alternative may be necessary or more desirable.

Particular priorities for cycle route improvements are:

- Links to the city centre, especially radial routes;
- Orbital routes in the Eastern Arc; and
- Links to and between Northern Gateway and Oxford Parkway.

Whilst it would be desirable to provide Cycle Super Routes on all major routes in the city, this is not likely to be possible on all corridors, particularly where Rapid Transit facilities are proposed (e.g. Banbury Road), or where there are busy shopping areas (e.g. Cowley Road). In these cases a Cycle Super Route will be provided on a near-to-parallel alternative if possible (in the above cases, on Woodstock Road and Iffley Road).

Cycle corridor classification
Cycle Super Route • 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.
Premium Route • Premium routes will also 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.
Connector Routes • Connector routes will be strategic quiet ways with a particular role in connecting Cycle Super Routes and Premium Routes to residential areas; • It will not always be possible or necessary to provide a continuous physical features on a connector route because of the need to balance road space for other users, however clear and consistent signage will be present along the routes and will be accompanied by wayfinding totems at decision points; • One-way streets will, where possible, be upgraded to include marked or segregated contraflow cycle lanes.

Those corridors considered appropriate for classification as Cycle Super Routes are:

- The B4495 from Summertown in the north through to Abingdon Road in the south;
- Woodstock Road and through the Science Area;
- Abingdon Road;
- Marston Road;
- Iffley Road;
- Botley Road; and
- Routes within the city centre.

Other routes may be added to this list, but based on known constraints and the need to provide RT infrastructure in other corridors this is considered a realistic starting point.

This long-term blueprint for cycling in Oxford can be implemented on a phased basis. Measures will be designed to enable them to be enhanced to accommodate a significant increase in future levels of cycling in the city.

Route treatment

The constraints of narrow roads, mature trees and street furniture are a challenge to providing continuous fully segregated cycle lanes or paths on most of the roads in the city. In many cases where full segregation is feasible, those schemes have already been implemented, albeit that in some cases improvements are still required to those schemes to bring them up to a higher standard. Where possible, every effort will be made to provide a similar level of segregation, however in most instances the most achievable (and best) form of high quality cycle provision on Cycle Super and Premium Routes will be on the carriageway.

In all cases, the reallocation of road space must consider other roads users and the built environment, but providing cycle lanes - whether mandatory, semi-segregated or advisory - will enable a far greater degree of continuity and uniform design than seen at present. As detailed in the cycle corridor classification table, on-street lanes will be designed to an absolute minimum width of 1.5 metre, with a recommended width of 2 metres on Cycle Super Routes. To achieve these widths it will often be necessary to undertake reallocation measures such as removing on-street parking, reducing footways to a minimum 1.8 metre width (in areas with a low footfall) and removing road centre lines.

To improve safety for cyclists, when placed into shared lanes with buses and RT vehicles, lane widths of 4 metres to 4.5 metres will be provided unless total road widths do not allow this. In the longer-term, it may be justified in some areas for cycle facilities to replace bus lanes.

Oxford already has a good network of recommended quiet routes for cyclists but a lack of signage and wayfinding information means they can be difficult to find or navigate. Essential to the success of the network will be improvements to those roads and paths which serve the purpose of connecting Super and Premium cycle routes to homes, workplaces and services which do not fall on the main corridors. In most cases it will not be necessary to provide any physical infrastructure beyond navigational aids, however work will be undertaken to provide contraflow cycle facilities on one-way streets, and will progress opportunities to create

additional crossings between the eastern and western halves of the city such as the Jackdaw Lane Bridge.

Oxford's waterways are an important part of the cycle and pedestrian network across the city, providing traffic free, and some cases, more direct alternatives to on road routes. Funding has already been secured to improve the Thames towpath and other connecting routes to the west and south east of the city centre. Further opportunities will be taken to further enhance waterway routes, including opportunities to provide a new cycle and pedestrian path as part of the proposed Western Conveyance Channel in the city.

Junction treatment

In the 5 years between 2009 and 2014, 75% of all cycle casualties occurring within Oxford as a result of traffic collisions, took place at or within 20m of a junction. Whilst improving the continuity of the network will encourage more people to take up cycling, without improvements to junction safety the casualty rate at junctions is likely to rise as flows increase.

A central concept of the Oxford Cycle Strategy is therefore to address key junctions with segregation, priority or safer treatments for cyclists.

Many of the signalised junctions within the city have had Advanced Stop-Lines (ASLs) added in recent years to provide priority for cyclists. It is proposed that these are added to the remaining junctions, or to new signalised junctions as standard. In all instances cycle lanes should be continuous providing a feed-in lane to the ASL. Where necessary this will require narrowing or reducing vehicle lanes on the approaches to junctions. Other, innovative treatments such as pre-signals for cyclist, two-stage right-turns, or cycle bypass-tracks will be considered in improving safety at large signalised junctions.

A significant barrier to cycling to and from the communities and workplaces outside of the ring-road is the lack of sufficient safe crossing opportunities. To reduce the severance caused by the ring-road, crossings, both at street-level or grade-separated will be provided. The signalisation plans for the Wolvercote and Cutteslowe roundabouts include toucan crossings for this purpose, for example

Cycle lanes on Super or Premium cycle routes will be continued through junctions, emphasising cyclists' priority at side road junctions. Side road entry treatments with raised tables and reduced corner radii to reduce vehicle speeds will further improve safety. On the Connector network, contraflow routes will be designed with physical protection for cyclists at entry points.

Cycle parking and signage

A significant increase in cycle use will require a substantial increase in secure cycle parking provision. The demand for cycle parking in the city and district centres considerably exceeds the formal provision in places and, at present, there is very little opportunity for substantial on-street expansion in the locations where it is needed most. Public realm schemes, which include rationalisation of on-street vehicle parking such as those for St Giles and Broad Street, will provide opportunities for increasing cycle parking. However they are still unlikely to meet demand as street level space is still scarce.

Throughout the city, innovative short-term approaches such as renting commercial premises and conversion to cycle parking facilities will provide additional parking supply, however these are likely to be expensive due to the limited supply of sites at the very centre of the city.

A longer term solution to providing significant quantities of cycle parking will be to provide underground or basement cycle hubs. The underground cycle park in Tokyo provides an example of how additional cycle parking spaces can be provided in a crowded city. Opportunities to locate one or more in the city centre will be explored. The Oxford Station masterplan includes 1200 spaces within two such facilities on either side of Botley Road. Another example, which could be delivered in the short to medium term, is the conversion of the existing Gloucester Green underground car park to a dedicated cycle hub. These could become commercially operated cycle hubs which are run in partnership with private operators, providing bike hire and bike maintenance facilities.

Signing to all primary and secondary destinations will be provided throughout the city. This will be comprehensive and immediately recognisable along whole routes, and as a minimum each sign will show Destination, Direction and Distance. Further information such as named or branded routes, and whether a route is lit or unlit could also be provided. In conservation areas signing will need to be sensitive to the surroundings, whereas on busier routes, such as Super or Premium cycle routes, advanced and at junction signing will be required to enable cyclists to adopt the correct road position. Consideration will also be given to the use of road markings and other measures to avoid sign clutter.

Encouraging walking

Walking is the most sustainable travel option: it is feasible for the vast majority of the population, it is relatively quick for short distances, and it is a practical way of introducing physical activity into day-to-day life. Walking is already popular for many journeys in Oxford, particularly for relatively short distance journeys to work; approximately 25% of journeys to work for people who both live and work in the city are made on foot. However, 39% (over 17,500 trips) of all journeys to work within the city are under 2km in length, suggesting an opportunity to improve the mode share.

The key challenge is to improve the quality of the walking experience in the city – not just for existing pedestrians, but also to encourage more people to walk as a logical choice for short trips in the city.

As part of the proposed mass transit and cycle enhancements, pedestrian improvements will be implemented. There is a clear opportunity for local walking networks to integrate with the city-wide cycling network, to ensure a coherent approach to the roles of walking and cycling on quiet streets, and ensuring that pedestrians and cyclists can co-exist in the busier corridors, sharing space where appropriate.

There is also a clear role for public realm improvements to be integrated with measures to improve access on foot and transit stops and interchange hubs. The mass transit programme should, in particular, be considered as an important opportunity to improve public realm and simplify the local streetscape in Cowley, Headington and the Cowley Road. Public realm improvements should be integrated into multi-modal access improvements in the centres of Cowley and Headington, to improve pedestrian footfall, promote local shopping and stimulate local regeneration.

There is a need for major improvements to public realm and ‘sense of place’ in the city centre. In the short term, the pedestrianisation of George Street and Queen Street, as well as public realm improvements to St Giles, Magdalen Street and Frideswide Square will greatly improve the quality of public place within the city centre. By 2025, the establishment of the city periphery transit terminals and traffic control measures will allow Park End Street, New Road, Castle Street and Norfolk Street to become an extension of the low trafficked central core and will provide an almost uninterrupted walking route from the station to the centre. In the longer term, the ambitions for shifting bus movements underground will allow for more radical public realm improvements on High Street and St Aldates where opportunities are currently limited due to their key role as the only access to the centre from the east.


Artist’s impression of George Street

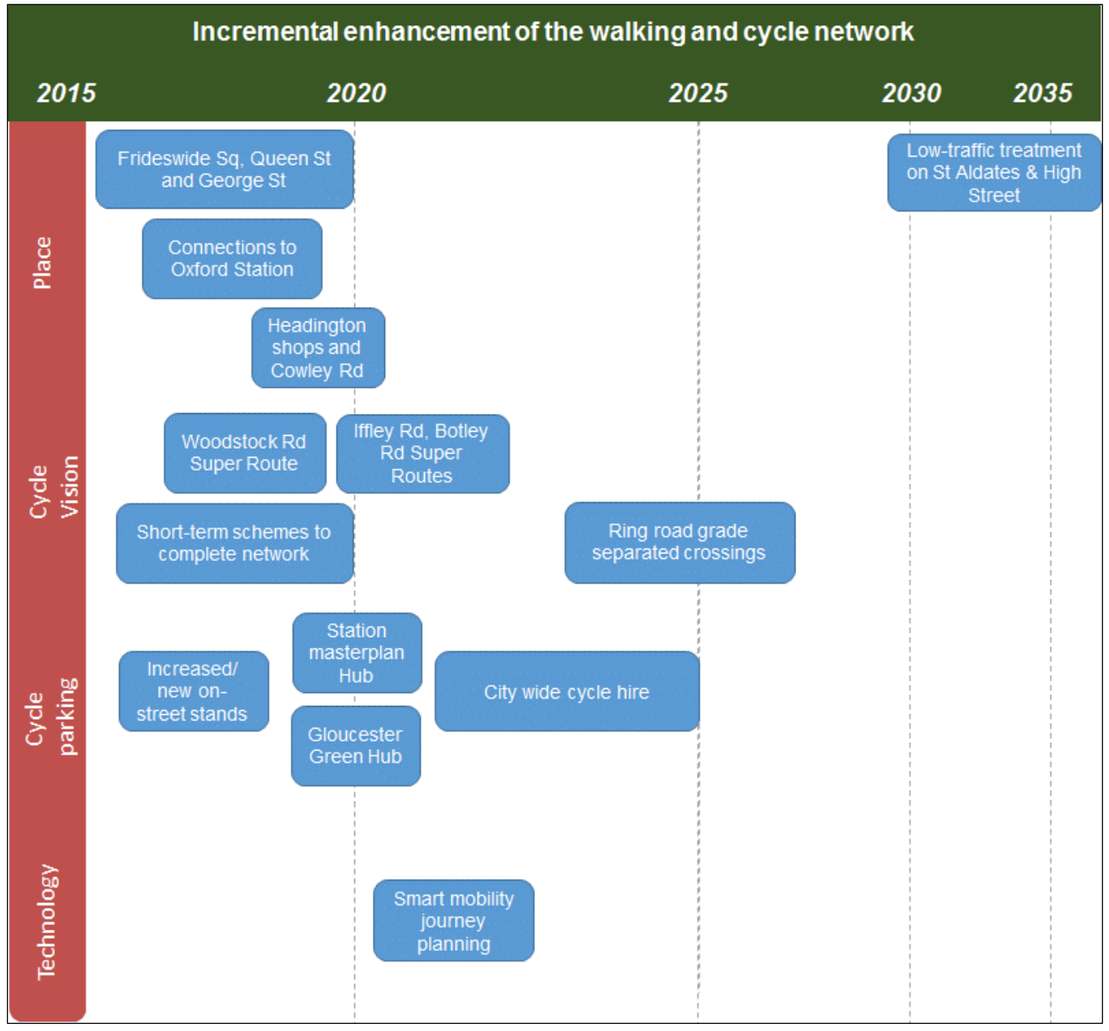
The walking improvements can be implemented on a phased basis, building on the interventions that have already been identified. The reduction in traffic in the city centre and, over the longer term, transformation of mass transit will enable an ambitious approach to walking and public realm improvements. Additionally, further improvements will be made to pedestrian crossing points within the centre (especially where side streets meet larger roads), with particular emphasis on improving safety and convenience.

Technology

Journey planning information for walking and cycling, and the benefits to health and the environment will be prioritised within the future intelligent mobility technology which is being progressed as part of the Science Transit project. This will include real-time comparative information for trips made by walking or cycling against other modes.

Implementation

Phasing of capital investment



4. Managing Traffic and Travel Demand

Why manage demand?

In broad terms, demand for travel arises as a result of economic and social activity. Densely populated, thriving and prosperous places have the highest levels of travel demand (though not necessarily the highest levels of *traffic* demand).

Transport planning tends to be focused on accommodating ever increasing travel demands by providing more capacity for travel, whether in the form of mass transit capacity, new pedestrian and cycle routes, or more road space for car traffic. Total transport capacity needs to be increased to enable growth in housing and employment. However it is widely understood that providing extra capacity (for any mode) also generates additional demand.

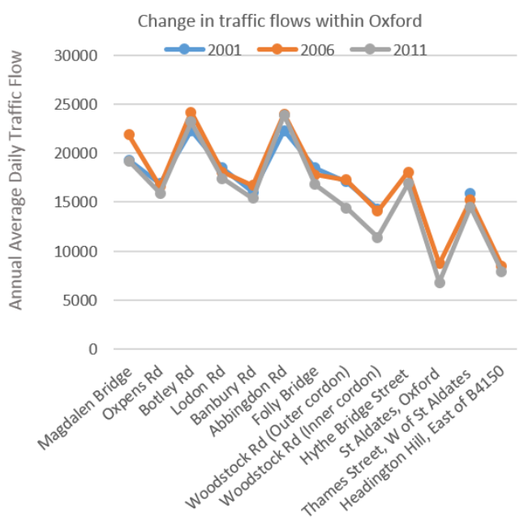
For road improvement schemes, for example, this sometimes means congestion relief is temporary because new capacity is quickly used up by new trips. Similarly, schemes that reduce car traffic through mode shift create new capacity in the road network, which then re-fills with new car trips. Neither case is a zero-benefit outcome, since the network is carrying more people, but congestion has not necessarily been reduced.

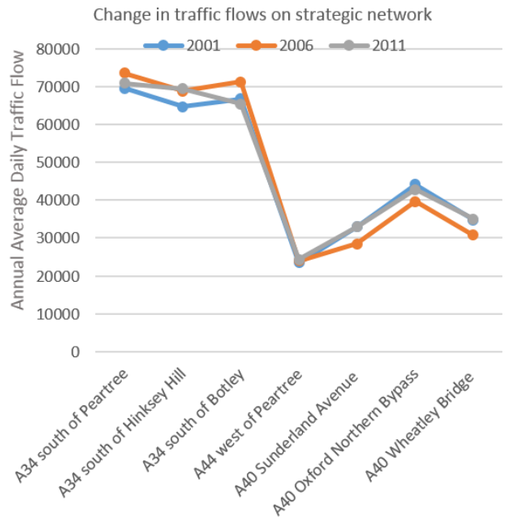
For this reason, the intention in Oxford is to combine schemes that increase transport capacity (for example the mass transit, walking and cycling schemes outlined in the previous two sections) with measures to manage car traffic and total travel demand.

Existing situation

In the ten years between the Census surveys of 2001 and 2011, Oxford's population grew by over 16,000 people (a change of 13%) whilst the number of jobs in the city increased by around 14,000 (16%).

Despite this, traffic flows on most key roads within the city (shown in the left-hand graph below) have actually dropped over the same period. On the ring-road and the strategic network outside of the city (shown on the right-hand graph), traffic flows have increased, albeit marginally, or remained relatively constant. Looking even further back, traffic flows into Oxford city centre have reduce by 24% since 1993.





These reductions in traffic have been achieved through a combination of measures, including:

- city centre traffic restrictions (e.g. the bus gate in High Street);
- high public parking charges;
- planning policies that restrict parking supply in new developments;
- controlled parking zones to remove free on-street visitor and commuter parking;
- public transport, walking and cycling improvements, including Park & Ride expansion; and
- targeted road capacity improvements – largely on the ring road

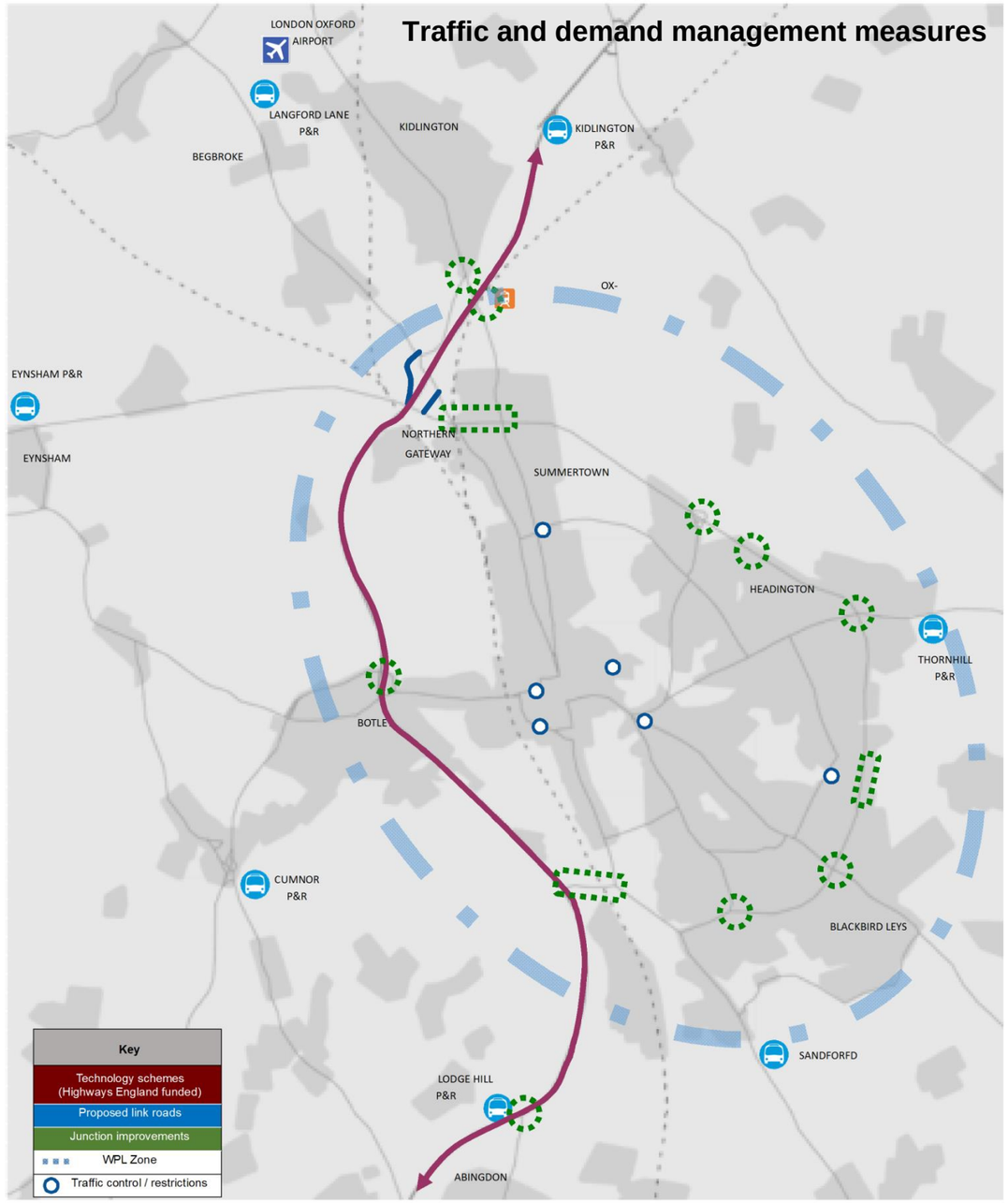
Vision for managing traffic and travel demand

By 2035, mass transit, walking and cycling will be seen by residents and visitors alike as the best and cheapest way to travel around the city. The wealth of information on travel conditions and options will enable people to make an informed choice of how best to access their chosen destination by any mode.

Driving alone to places of work will be significantly less desirable than other travel options, and there will be a general presumption against movement by car in favour of other more space-efficient modes within the urban area.

Learning from Oxford's past successes, this will be achieved through a combination of charging, traffic restrictions, planning policies, and targeted capacity improvements. Current and emerging network management and journey planning technology will also be used.

Future demand for travel



Despite the relatively stable level of traffic flow since 2001, the Department for Transport forecasts that the number of vehicle trips in Oxford during the peak hours will increase by 37% between 2011 and 2035 (taken from the National Trip End Model forecast which is based on the development growth outlined in the Local Plans).

Were travel to work patterns to remain as they are now, over 13,000 new two-way commuter trips with an origin or destination within the city would be made by car as a result of the SHMA related housing growth by 2035 (an increase of 27% against 2011).

With existing levels of congestion in and around the city already resulting in significant delays, any increase in traffic, let alone at the levels predicted above, will present serious challenges to enabling economic growth in Oxford.

Highway capacity improvements

The implementation of access restrictions in the city centre and Eastern Arc and reallocation of road space to other modes will support the goals and objectives of the LTP4 and the OTS by providing networks of sustainable travel options. This fundamental principle relies on the general presumption against travel by car within the urban area.

However, it is acknowledged that access by car is still a necessity in a dynamic city, and the outer ring road will be promoted as the primary route for all short-distance car trips.

The outer ring road will be increasingly important for cross-city movements because the OTS proposes to reallocate road space and introduce traffic restrictions on some of the roads within the city to enable mass transit, walking and cycling improvements,

The existing policy of improving the key ring road interchanges is therefore consistent with the proposal to remove trips from the 'inner ring road' (the B4495) and other inner city routes. This will be continued in the short-term with the schemes at Cutteslowe and Wolvercote Roundabouts; whilst longer term plans at the A34 Botley and Peartree interchanges are being considered by Highways England, along with Intelligent Transport Systems (ITS) such as Variable Message Signs and variable speed limits to be applied along the A34 corridor. The proposed ring road improvements are shown on the plan opposite.

A direct highway link from Oxford's northern bypass to the John Radcliffe Hospital is considered inappropriate as environmental and planning constraints mean any solution is likely to be prohibitively expensive. There is also concern that it would merely shift existing traffic and environmental problems elsewhere. Reducing traffic on roads that serve the hospitals by

providing a step-change in mass transit and improved walking and cycling routes, and through implementation of demand management measures, will improve access to all the hospital sites for all users.

Workplace parking

Whilst the package of OTS measures already examined will contribute to an increase in the share of trips made by non-car modes, the abundance of free workplace parking within the city is a significant threat to achieving the step-change required to avoid the considerable negative impacts of growth. The 2011 Census indicates that over 39,000 employees within the city use the private car as their main mode of travel to work, with a quarter being residents of the city. In common with most other towns and cities, parking charges levied by the local authorities in Oxford currently target public parking – i.e. on-street parking and parking in public car parks. This has been a useful tool in managing traffic, but given that a) there are many times more workplace parking spaces in the city than public parking spaces and b) car trips to workplace parking spaces are generally made at peak times, there would be clear benefits in being able to influence the use of these spaces.

An Oxford workplace parking levy

In order to gain much needed control over the use of the private car as a means of travelling to work within Oxford it is proposed, subject to further work and consultation, that a city-wide Workplace parking levy (WPL) is introduced.

It is believed that a WPL would have three significant benefits for the city, which will be critical to ensure growth is not limited by the constraints of traffic related congestion:

- shift to use sustainable modes – as those staff who have parking charges passed down by their employer will be incentivised to seek alternative methods of getting to work.
- funds generated through the application of a WPL would be ring-fenced solely for the reinvestment into the transport network (including operation of the WPL), improving alternatives to the private car and thus further influencing mode choice; and
- a charge on spaces - regardless of whether they are used - will encourage employers to reduce their supply of private parking; saving the employer money spent on maintenance but also presenting the opportunity to redevelop land previously used for parking for employment or housing.

A similar overall approach to that used in Nottingham is proposed, but will need to be adapted for Oxford and its employers. With minimal exceptions, the levy would apply to all employers with a provision of employee parking over a certain threshold. Whilst the OTS proposes that the whole city is subject to a WPL, differential rates will be examined across the city – for example with a premium rate in the city centre and rates elsewhere which are dependent on the level of accessibility by sustainable modes.

A city-wide WPL is likely to require the further expansion of Controlled Parking Zones (CPZs) to ensure that parking is not just displaced to other areas beyond the workplace. Large parts of the city are already covered by CPZs and where these have been implemented they have been extremely successful in removing commuter parking. Further work will be required to understand where additional CPZs are needed along with consultation with local residents.

Traffic control points

The implementation of the five city centre bus gates in 1999 marked a considerable improvement in the control of traffic volumes within the city centre. During peak hours, vehicles passing directly through the city centre only account for 15% to 20% of all trips entering the area, with the majority of people accessing workplace, education or retail destinations. Most users of the road network therefore already expect to use orbital traffic routes further out: either the B4495 route through the Eastern Arc connecting Summertown with Abingdon Road, or the A34/A40/A4144 ring road as the means of moving around the city.

Reducing city centre through trips

The ambition of maximising the city centre's value as a shopping and tourist destination depends on being able to vastly improve the public realm for pedestrians. There is also a risk that a WPL could, by reducing traffic into the city centre, release capacity which would be filled by through traffic. Therefore, it is proposed that traffic levels are reduced in the longer term by placing further restrictions on through traffic (whilst allowing unimpeded bus movements) by implementing access controls:

- On Thames Street – allowing access to Westgate from the south or west only but preventing or discouraging any through trips.
- In the vicinity of Worcester Street or Frideswide Square – thus preventing or discouraging trips from west to north but maintaining access close to the Oxford Rail station; and

- On St Cross Road, preventing or discouraging traffic from using the Science Area as a city centre ring road.

These locations are shown on the map on the previous page.

These restriction points could be full or part-time closures – similar to the existing bus gates – or road user charging points (see below). A permit based system for those requiring access (residents, blue badge holders etc) will be investigated.

Inner ring road

To provide the necessary service journey time improvement for RT Line 3, it will be necessary to reduce the impact of congestion caused by high vehicle flows on the B4995. This will be achieved in part through junction improvements and priorities, as described in the mass transit section. In addition, traffic restrictions in the form of access restrictions (e.g. bus gates) or charging points will be used to redistribute traffic to the outer-ring road. Two measures already identified include:

- A timed access restriction (e.g. bus gate) or road user charging point, on Hollow Way
- Turning restrictions onto Banbury Road from Marston Ferry Road.

Road user charging

Road user charging could also be a potential option for reducing traffic levels on certain routes without a complete closure. This could be implemented in conjunction with a WPL (with some examples of where this could be applied listed above).

Despite the successful implementation of the London (2003) Congestion Charge schemes, no other UK city has since implemented a similar scheme, and there are relatively few examples in other European countries. This can be attributed to a lack of political will, but also as such schemes require large capital investment costs for the infrastructure, payment mechanisms and back-office equipment as well as significant operating costs - the 21km^2 London CC zone cost over £200 million to implement and requires an operating budget of £120 million per year.

Charging only for use of very specific “premium” road links in the city centre and Eastern Arc, would enable start-up and operating costs to be minimised. Nevertheless, a road user charge is unlikely to raise significant revenue and is best seen as a network and traffic management tool rather than a means of generating funding for transport improvements.

Public parking

Public parking in Oxford is already very limited compared to other cities, particularly in the city centre. In 2013, Oxford city centre had 1,670 public off-street car parking spaces, compared to 3300 in Cambridge city centre and 5,200 in the centre of Reading. Despite this, city centre spaces are rarely fully occupied, though this is likely to change once the Westgate Centre is redeveloped. Oxford’s economy, including the retail and leisure sectors, is not heavily dependent on people driving into the city centre, largely because the Park & Ride, bus, walking and cycling networks provide convenient alternatives.

In the district centres, which are less well served by alternative modes, public parking is important to maintain the vitality of shops and services located close to residential areas.

City centre parking

In the city centre, levels of public parking will be maintained at approximately the same levels as in 2014, albeit reorganised to make better use of land. Specific measures include:

- consolidation of public parking into fewer locations, predominantly underground (e.g. new Westgate car park), with existing surface car parks redeveloped for other uses and on-street parking rationalised as part of public realm improvements (for example, St Giles and Broad Street);
- all parking to meet high standards of security and design to provide a welcoming experience;
- charges to encourage the efficient use of parking capacity throughout the day and year – no half-empty car parks – and to discourage arrivals during network peaks;
- charges should discourage or prevent long stay or commuter parking;
- consider discounts for full cars (4 + occupants);
- provide easy-to-use payment options, linked to retail/leisure discounts or other incentives to encourage off-peak arrivals;
- provide live parking space information from journey origin to parking space via journey planner, apps, web, electronic signs, GPS devices and in car-park systems;
- all public car park exits to be signal controlled with generous internal queuing space to allow controlled discharge of traffic onto the road network; and
- all car parks to provide for electric vehicle charging.

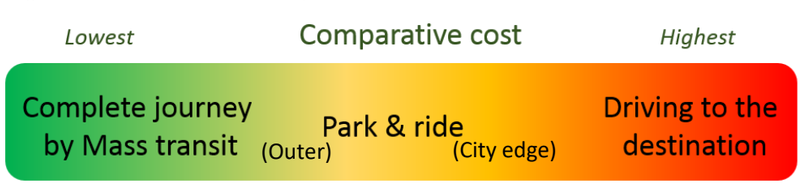
District centres

For district centres, the County Council's approach is to:

- Support the vitality of district centres (which offer local amenities in sustainable locations close to residential areas) by maintaining a modest level of attractive, low cost and easily accessible short stay parking;
- Maintain current levels of public parking in all district centres, except Cowley primary district centre which currently has substantial over-provision occupying land which could be redeveloped for other uses;
- Deck or build above car parks to make efficient use of land;
- Discourage or prevent commuter or long stay use through pricing or fines.

Zone-based parking charges

It is proposed that a zonal parking charge system is adopted across the city, including Park & Ride car parks. Classification of charging zones will be based partly on their level of accessibility by other modes, so may change as and when the other OTS measures (such as a RT or cycle super route connection) are introduced. The zonal system will be designed to encourage alternatives, in priority order:



Parking charges will therefore be lowest at outer Park & Ride sites, but are unlikely to be free because a) this could create an incentive to use Park & Ride even when another alternative is available and b) the operators of Park & Ride car parks will need to cover their costs.

Freight/ deliveries

Demand forecasting for 2031 indicates that around 2,500 HGV trips will be made to, from and within the city between 8am and 6pm per day, over a third of which would occur during the morning peak hour. To reduce the impact of freight on congestion, noise and air quality, the following measures will be developed:

- delivery & Servicing Plans;
- construction Logistics Plans;
- out of hours deliveries;
- freight will be expected to comply with increasing emissions requirements.
- local consolidation points; and
- freight consolidation centres for business, retail and construction.

Role of taxis

Taxis and private hire vehicles will continue to be an important part of Oxford's integrated transport network; perhaps even more so as further traffic controls and restrictions reduce the attractiveness of the private car as a means of accessing the city centre. As the nature of the city centre streetscape changes, with more streets becoming access only or closed to vehicles at certain times, so will route management for taxis.

Given the importance of taxis throughout the city, it will be vital to ensure that a high level of interchange is provided with the proposed RT routes at Park & Ride and major hubs, plus also at Oxford and Oxford Parkway stations.

As part of the objective for a zero-emission Oxford city centre by 2020 (and city-wide by 2035), taxi operators are being encouraged by Oxford City Council to invest in electric vehicles for their fleets. Oxfordshire County Council will work in partnership with taxi and private hire business to ensure that designs for RT transit hubs, Park & Ride sites, and other council run public locations with taxi stands will have facilities for electric vehicle charging.

Development management policy

The evolution of policy will have a critical role to play in delivering growth without adding unnecessary traffic.

Existing policy will therefore be reviewed to ensure that parking standards throughout the city are seen as an absolute maximum, which are to be applied only in exceptional circumstances. This will include the use of a formula to determine a development's parking standard based on the assessment of future public transport and walking and cycling access.

In planning new development, there is increasing evidence that neighbourhood design – including housing density and layout of routes for public transport, walking and cycling – is a strong influence on use of these modes by residents. Traditional densely populated areas have lower overall travel demand and car ownership and higher use of sustainable modes than newer suburban developments.

In addition the strategy will need to "nudge" people towards travelling less or choosing sustainable modes, by promoting neighbourhood design that is based on research and best practice from other cities. Developers of homes and workplaces will also be required to apply vastly enhanced requirements to provide access and facilities for cyclists. Any new commercial operation will be required to adhere to standards for the management of logistics.

The role of the OTS in planning new development

The Strategic Housing Market Assessment for Oxfordshire has presented a highly ambitious growth target of 28,000 houses for Oxford. Research undertaken by the city council suggests that a maximum allocation of 10,228 houses will be achievable within the city boundary, made up of committed developments and other sites identified in the local plan plus an element of 'windfall' housing.

It is anticipated that Oxford's remaining unmet demand could, with agreement from the other Oxfordshire District Councils, be accommodated outside of the city boundary. More pressure is therefore likely to be placed on edge of city locations, within the outlying towns / villages and potentially in entirely new locations. There is a danger that a rush to build more houses could favour speculative development of sites that are harder to serve by sustainable transport modes.

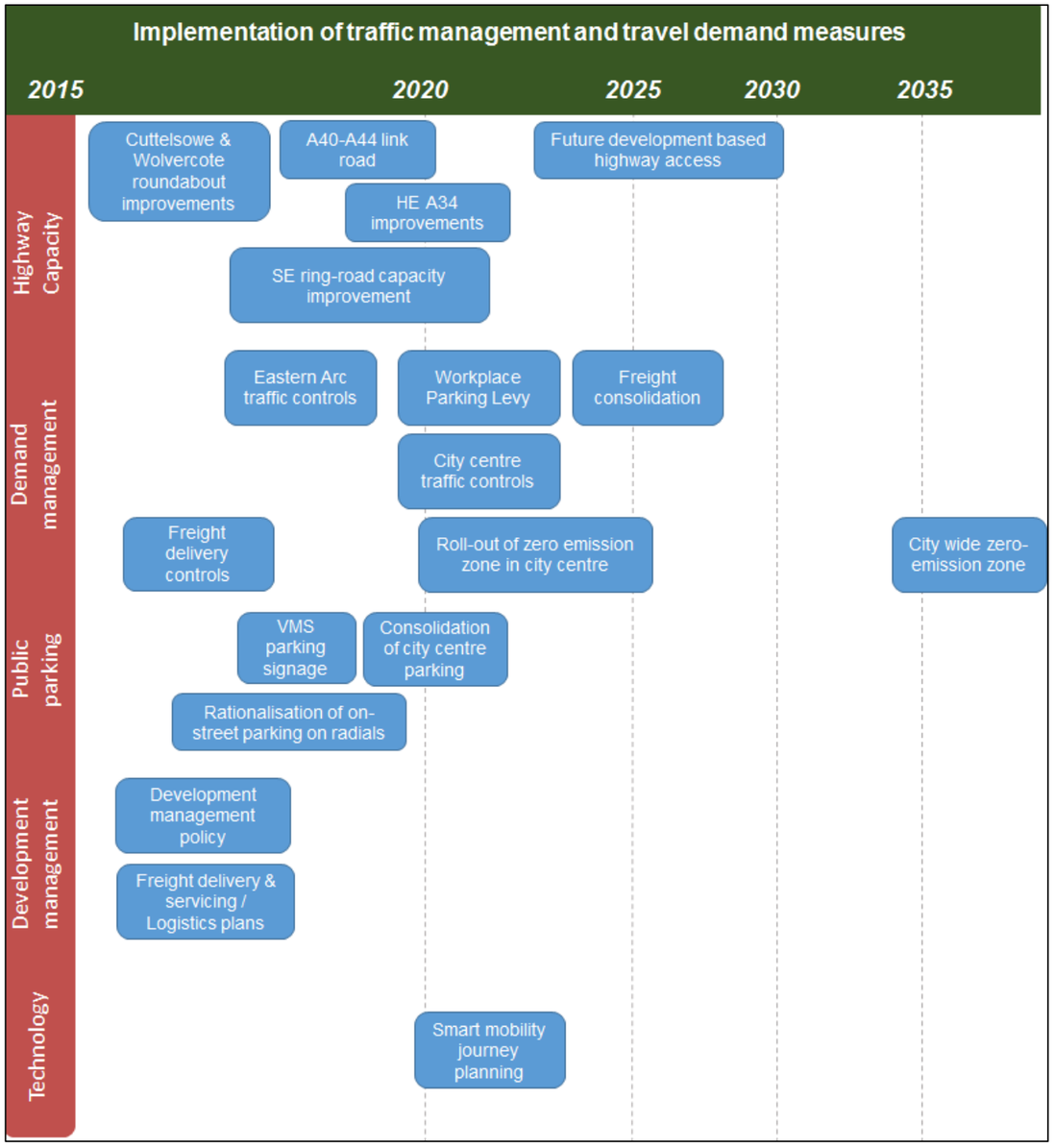
The OTS has defined the optimum corridors for RT and cycle networks, extensions of which should help to influence decisions about where future housing should be located.

To the south of the city, RT Lines 1 & 3 will provide a fast, high capacity transit service directly into the City Centre and Eastern Arc, with both having potential to be extended towards Abingdon and south of Grenoble Road. The future role for passenger services using the Cowley Branch Line is particularly relevant here, with the potential for a rail spur to link to a development south of Grenoble Road.

Similarly, to the north of Oxford, RT Lines 1 & 3 route through Kidlington and Eynsham, opening up large areas with access to a direct RT service to Oxford city centre and growth areas in the Eastern Arc.

Implementation

Phasing of capital investment



5. Implementation of the OTS

The cost of improvement

The OTS calls for a step change in transport investment within Oxford to preserve the vitality of one of the most important centres to the economy of the South East. Investment needs to reflect the scale of change needed to achieve the city's vision for growth, but equally must be achievable with a recognition of the need to deliver the best value for money from constrained resources. This consideration is implicit with the principle of the incremental development of mass transit, where networks will be developed on the basis of allowing for future expansion as needed, not precluding this through fixed and inflexible infrastructure or technologies. Should demand in future necessitate greater segregation, the potential cost should be considered now.

Detailed costing will be determined through more in-depth studies into the measures identified within this strategy. However, initial estimates suggest that the implementation of the OTS will require a total capital investment (including funded schemes) of around £1.2 billion. When factored against the level of growth expected within the county in the next 20 years, this equates to an investment of approximately £14,000 per additional job and home.

Approximately half of this figure would be required to fund the city centre transit tunnels alone (which will require the most significant shift in the way transport infrastructure is currently funded). The remaining c£600m of capital investment would represent an annual investment of £30 million per year over the next 20 years, roughly double the County Council's current annual spend on transport infrastructure in Oxford.

The next steps

The transport improvements detailed within the OTS sets out a framework for progressive transformation of the transport network within the city by 2035. However, many of the more ambitious schemes will be developed incrementally, as and when the need for them to mitigate for the planned growth is established, and when funding is secured.

The County Council's 2 and 5 year capital investment programmes will see us deliver the schemes for which committed funding has been secured, including utilising the £93 million City Deal and Oxfordshire Growth Deal investments; developer funds and Community Infrastructure Levy funding, and local authority funds. The design, consultation and implementation of many of these short-term schemes are already underway.

The OTS provides a framework and context for future funding bids. Each corridor contains a combination of interconnected transit, cycle, place and demand management elements. In many cases, schemes will be developed and implemented on a whole corridor – rather than mode-specific – basis.

The OTS has introduced the County Council's ambitions for several high-profile schemes which will enable radical changes in how people move around the city. At present, schemes such as zero-emission RT and the Workplace Parking Levy are in the feasibility stage, and in the next year work will be undertaken to develop the optimum solutions and funding programmes through collaborative working with public transport operators, major employers and other stakeholders.

We will look to utilise Oxford's position as a home to a truly world-class research and development sector to work with the university, college and science sectors to help take the strategy forward, including the innovative Smart Mobility and technology proposals identified under the County Council's Science Transit Strategy.

Crucially, in light of the substantial potential housing and job growth within Oxford and the wider county, the County Council will work closely with the City Council and district planning authorities to implement the principles and infrastructure of the OTS.

Funding the OTS

The delivery of the measures and interventions recommended by the OTS will rely in part on private and private sector funding streams of an appropriate level, phasing and balance between revenue and capital funds.

- The long-term focus of the OTS means uncertainty for future availability of funding. The investment plan must therefore:
    - Be flexible and scalable to adjust to the value of future funding streams and the timescales for funding availability; and
    - Provide a business case for securing funding from the private and public sectors.

Central and local government, the private sector and transport operators and users all have a key role in future funding and delivery. The County Council's approach to funding will need to be as ambitious and forward-thinking as the strategy itself. A series of opportunities have been identified which are presented within the table opposite.

	Potential Sources of Funding	(£ = modest contribution; ££ = moderate contribution; £££ = significant contribution)
Private sector	**Transport operators**	**Transport users**
Developer contributions (££) Contributions for new developments to be maximised and prioritised towards public transport wherever possible, over road infrastructure.	**Freight fees (£)** 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.	**Workplace Parking Levy (£)** This will likely be a modest but valuable source of income for investment into further Mass Transit, walking and cycling schemes.
Local business rates (££) 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.	**Operator investment (£)** 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.	**Parking charges (££)** Increases in public car parking charges outside of the city centre should be used to support the implementation of the Mass Transit lines.
Tax Increment Financing (£££) An increasingly used financing tool which uses future business rate income from new development to provide backing for infrastructure, including transport.	**Bus stop / bus stand departure fees (£)** 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.	**City centre cordon / entry charges (£)** 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.
Tourism business levy (£) Local business leaders should be encouraged to establish an Oxford Tourism Business Improvement Districts (TBIDs) which draws together private sector funding based on a scalable business rate levy to collectively invest in local improvements, including transport.	**Rail station use charges (£)** Rail station use charges on Train Operating Companies	
	Tourist coach entry fee (£) 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.	