Bicester Sustainable Transport Strategy
Volume I
Prepared for Cherwell District Council
July 2015

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Alan Baxter

Bicester Sustainable Transport Strategy
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Volume I

Alan Baxter

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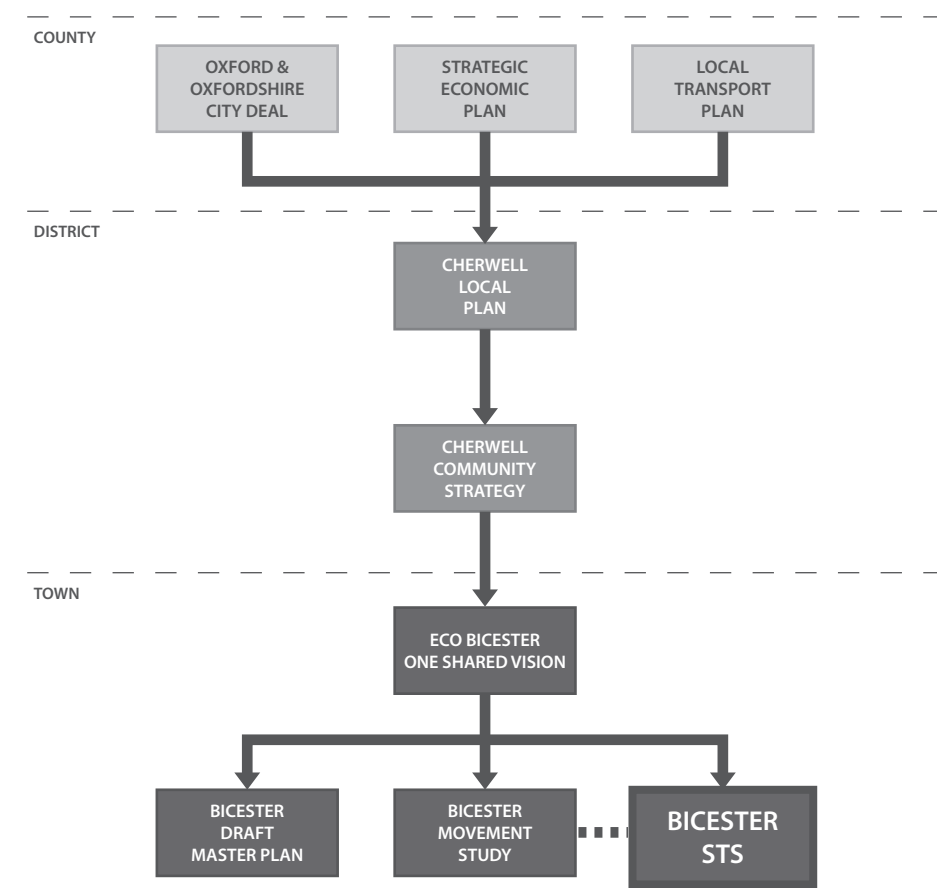**BICESTER MOVEMENT STUDY**

BICESTER STS

Figure 1.1 Relationship of the Bicester STS to other documents

Executive Summary

Bicester, a large market town in Oxfordshire with a population of 30,000 is due to undergo major expansion over the coming 20 years. Located on the train line between London and Birmingham, the town has strong relationships with Oxford and Banbury and lies within the Knowledge Spine. Development of Bicester has been relatively recent - up until 1961 the population was still only 5,500.

The town is roughly circular in form with peripheral and radial roads, between which residential areas are located. The conservation area of the town centre includes Market Square and Causeway, where St. Edburg's Church is located. Bicester's topography is relatively flat with large areas of open space including the nature reserve of Bure Park. Air quality is generally good but with some issues along the central corridor (King's End and Queen's Avenue), and there has been some flooding of the River Bure in the town centre in the past. Bicester has industrial areas, with the Bicester and Banbury College Campus well-known for its automotive focus. Retail destinations are the town centre and the internationally famous Bicester Village, to the south of the town. Local amenities - shops and schools - are located in the surrounding residential areas.

EcoBicester provides a sustainable vision for the growth of the town as a whole, while the Draft Bicester Masterplan outlines ambitions for the growth of the town including employment and housing in accordance with Local Plan requirements to 2031.

A wealth of national and local policy guides this strategy, from the National Planning Policy Framework to policy covering economic development, integrated transport and physical health. This is best understood graphically – see Figure 1.1. The strategy is also underpinned by previous transport studies of Bicester, including the Bicester Integrated Transport and Land Use Study, the Bicester Movement Study and the Travel Behaviour Demonstration Project, all of which aim to promote travel by sustainable means.

European and UK best practice examples are used to inform this strategy. Key messages from European towns for the successful implementation of sustainable transport include: the importance of commitment to policies favouring sustainable modes, implemented consistently over a sustained time period; the importance of investing in infrastructure; segregation of cycling; a coarse grid for motor vehicles and finer grid for cycling; the use of filtered permeability; the implementation of 20mph zones in residential areas; and integrated

ticketing. Houten (the Netherlands) in particular is used as a key example. It is similar to what Bicester may become and has a similar relationship to other major places and strategic infrastructure. While there are fewer outstanding examples within the UK, key messages from UK towns for the successful implementation of sustainable transport include: the importance of a governance structure that embeds cycling across a range of service areas for which a local authority is responsible; reducing vehicle speeds; investment in infrastructure; segregated cycling facilities; overcoming barriers and implementing smarter choices programmes.

Research on Sustainable Mobility and the Built Environment reveals a clear association between walking and cycling and the urban variables of density, land use mix, proximity and connectivity. Links between transport system characteristics and design characteristics are less clear, and evidence suggests that psychological and social factors mediate these associations. Research is now attending to models that propose that walking and cycling is dependent on demographic, psychosocial and physical environmental factors, and a multi-level approach is necessary to encourage behaviour change towards active travel.

A study of the existing movement network established existing conditions. Key findings were:

- **Walking and cycling**
  Walking and cycling within most residential areas is relatively easy, but the main radial roads have limited or poor quality provision – with the exception of Banbury Road north of the London-Birmingham railway. While the town centre is easily accessible on foot, the pedestrianisation of Sheep Street and one-way traffic on Causeway present significant barriers to cycling through the town. Provision of cycle parking in the town centre is limited and very well-used.

- **Trains**
  Bicester is well connected by rail with two train stations: Bicester North, which lies on the route between London Marylebone and Birmingham; and Bicester Town, which is currently undergoing redevelopment and will re-open providing service between Oxford and London Marylebone (2016), and eventually as far as Cambridge, forming part of East-West Rail.

- **Buses**
  While there are quite a number of bus routes serving Bicester and neighbouring towns and villages, the provision is somewhat confusing with some very infrequent and others under-used. The most frequent service is the S5, which runs every 15 minutes and serves the town, Kidlington and Oxford. There is also a taxibus service from Bicester North station and shuttle bus services to Bicester Village. The bus interchange is in the town centre on Manorsfield Road by the Pioneer shopping centre – this is newly built and provides a good level of bus stand and information.

- **Strategic Road Network**
  Bicester is well-situated in the strategic road network, located immediately east of the M40, with the A34 and A41 running south of the town. Within the town there are primary routes (peripheral route), secondary & tertiary routes (radial roads) and residential streets. Of these, the roads with the highest traffic flows are the A41 (>20,000veh/hr) and the ring road to the north and east of the town (flows between 16,000 and 19,000veh/hr). The speed limit within the town is 30mph. There is copious provision of car parking within the town centre, with car parks on average only at 50% capacity.

- **Accessibility and Connectivity**
  In terms of neighbourhood access and connectivity, access to residential neighbourhoods is generally from the radial roads, with less connectivity between neighbourhoods due to the predominant cul-de-sac form of the road layouts. The town centre is accessible on foot within 20 minutes from most areas of town. Bicester is very accessible by bike – most parts of the town are within a 10 minute cycle of the town centre and both train stations, with all of the existing development within an easy 15 minute cycle.

- **Movement**
  The existing movement profile for Bicester shows that residents generate a total of 86,500 trips per day, of which 56% are contained within the town. Overall, 31% of trips by residents are undertaken by sustainable modes and 69% by private motor vehicle. The future movement profile predicts that in 2031, residents will generate a total of 132,300 trips per day, of which 59% are contained within the town. Overall, 40% of trips by

residents will be undertaken by sustainable modes and 60% by private motor vehicle.

A level of behaviour change is necessary to achieve the NW Bicester goal of a modal share of at least 50% for sustainable modes, and the strategy goal of 40% for the town as a whole. The complexity of how modal choices are made is considered, establishing distance as a limiting factor. Bicester's compact size gives the town a great advantage in encouraging sustainable travel particularly for the purposes of leisure, education, town centre shopping and work. Future opportunities for Bicester include place-making, particularly the historic core; innovation, and branding with EcoBicester and Bicester Village.

The vision for the strategy is to create a network of transport infrastructure and services that make it easy and attractive to travel by sustainable means. The principles underpinning the strategy are that it be: Sustainable, Resilient, Incremental, Modal Priorities , a Hierarchy of Routes, High Quality and Integrated.

The future movement strategy considers all modes and their integration. Key points are:

• The walking and cycling network is divided into primary and secondary routes, and is based on the core principles of coherence, directness, safety, comfort and attractiveness. The base network of existing facilities requires upgrading in order to fulfil these principles, set out in a comprehensive schedule of improvements. The focus for improvements will be to crossing facilities at radial distributor roads and minor residential roads. In the town centre, through movement of motor vehicles is to be restricted, with cycling facilitated and traffic speeds slowed to less than 20mph.

• The strategy proposes interchange hubs at the two stations, encouraging multi-modal journeys. The possible closure of London Road level crossing is of major concern, impacting bus services and cutting off Langford Village, Graven Hill and East Bicester from the town centre.

• Bus provision is made legible by separating out longer distance and town services. A local retail relay route is established along the north south corridor (connecting also the new park and ride to the south), with all other town services passing through the town centre bus station - enhanced to form the major interchange hub. These changes would be phased and all new bus stock would be accessible, low carbon and have smart ticket readers.

• Changes in the town centre would allow the retail centre of Bicester to expand, in tandem with the town's wider expansion. This is a particular opportunity for Market Square, which is currently undervalued and dominated by parking and a one-way traffic gyratory. It is proposed to pedestrianise the northern and eastern sides of the Square as well as Causeway. Through traffic would be restricted to buses, taxis and cycles between the hours of 7am and 7pm. Implementation would take place gradually, and be supported by a servicing & deliveries and car parking strategy to ensure its successful operation.

• Current retail space is approximately 35,000m2 with car parking provision of 1,160 spaces, or one car parking space per 30m2 of retail space. With the town's expansion, retail space and parking provision should also increase. The additional parking would be provided by development on the site of the Claremount car park - forming a retail anchor to the south east of Market Square, which would mirror the retail anchor of Sainsbury's/Vue to the north west. This would increase retail space in the town to approximately 45,000m2, and car parking provision to approximately 1,250 spaces.

• Even with sustainable transport gains, the modal share for car driving for Bicester would still be 60%. The use of electric and ULEV vehicles for these trips would make these car trips more sustainable. There is currently a high level of funding available for this, and ULEV are also more pleasant and healthy in terms of air pollution and noise levels. Recommendations include strategic placement of electric charge points and an electric car club. These improvements align with the EcoBicester vision and offer positive branding opportunities.

Infrastructure improvements are critical to creating an environment where sustainable travel is the most popular choice, but this will be most effective when supported by the management and implementation of a smarter choices and active travel programme. This should be funded and staffed appropriately. Particular opportunities for Bicester with potential for change are identified, and measures proposed include travel awareness campaigns, a sustainable travel roadshow, work with rail stations, sustainable transport hubs, workplace engagement, a commuter challenge, school engagement, residential personalised travel planning and community street design.

Alan Baxter

1.0
Introduction

Bicester Sustainable Transport Strategy

Alan Baxters and Sustrans were appointed in April 2014 by Cherwell District Council to prepare a Sustainable Transport Strategy which will underpin the current expansion of Bicester. Working in collaboration with Tim Jones (Oxford Brookes), Alan Baxters and Sustrans have first assessed the existing context – in terms of policy, best practice, infrastructure, and transport service provision – and, with this as a firm basis, have then developed the Transport Strategy.

Purpose of the Sustainable Transport Strategy

In 2009, Bicester was identified as one of four locations in the UK with the potential to develop an Eco-Town. Among other developments, such as that at Kingsmere to the south of the town, the construction of the Eco- town is currently in progress, and will ultimately provide up to an additional 6,000 residential units, in addition to leisure, retail and employment facilities. This Sustainable Transport Strategy has been commissioned in recognition that there is a need to bring together previous transport studies and policy, as well as to thoroughly assess existing transport provision in order to establish a comprehensive, integrated and deliverable strategy, and maximise the benefits of development for the wider town. In 2014 Bicester was awarded Garden Town status by the Government.

Relationship to Other Documents

This study sits in the wider policy context. Key documents, reviewed during the course of this study, are illustrated in Figure 1.1, which shows how the Strategy sits within local policy and transport planning for the town of Bicester, and, equally, its relationship to local and national policy. This study takes into account previous work, as well as aspiring to the visions put forth in local policy documents, such as "Eco Bicester One Shared Vision" and national transport policy documents, such as the government's "Door to Door Strategy" (see Figure 1.1).

Approach and Structure

Part 1 of this report is an initial piece of work which provides a thorough review of policy documents relating to Bicester from National to County to District to Local level. Equally, previous transport studies and transport assessments pertaining to planned development are considered. Further, best practice in sustainable transport in the UK and continental Europe is discussed, as is current research on the area of sustainable mobility.

The town itself is considered in transport terms from the wider view to the local – describing its national significance, regional relationships, demographics, landscape and topography, as well as summarising locations of facilities and amenities. The existing transport infrastructure and service provision for the town is documented in detail, and movement patterns and accessibility are assessed. This baseline movement study forms a solid basis for the Sustainable Transport Strategy, which comprises the Part 2 of this report.

2.0
Understanding Bicester

2.1   Location & Context

Bicester is a large market town in Oxfordshire, 12 miles north east of Oxford, 50 miles south east of Birmingham and 50 miles north west of London. It is located in the Cherwell District, within which Bicester is second in size to Banbury in terms of urban area. Five Cherwell wards make up the urban area of Bicester.

The town lies just north of the A41 and close to the M40. The town has two railway stations, providing a fast, frequent rail service to London and Birmingham, and in the near future, a restored service to Oxford. The town is advantageously located on the transport links connecting the town with Oxford, Science Vale (Harwell) and the wider south-east region. The development of this so-named 'Knowledge Spine' is leading to an increase in science- and technology-based businesses in the area, exploiting innovations and spin-outs from academic research.

The town has strong links to the military, with Bicester Garrison located in Ambrosden to the southeast, and the former RAF Bicester Aerodrome to the north of the town. A £70m town centre redevelopment has been completed and Bicester is well-known for its designer outlet centre (Bicester Village). So while perceived primarily as a dormitory town to Oxford, with which it has a close economic relationship, Bicester does provide employment - mainly focused on retail, storage, defence, distribution, food processing and engineering,

within which there is a particular expertise in the automotive industry (taking advantage of the fact that Silverstone is only 15 miles away).

Bicester has a compact urban form, composed of historic town centre, ring road and radial roads with residential infill between these roads, which are mostly in the form of cul-de-sacs. There are some green spaces and corridors between some residential areas, for example Bure Park, and these already have established walking and cycling routes. In 2009, the town was designated as one of four locations in England with the potential to become an eco-town and there are significant development proposals for the town. Its population was 30,850 in 2011, an 8% increase since the previous census in 2001. This is predicted to rise to 32,620 by 2016; to approximately 40,000 by 2026; and 50,000 by 2034. In 2014, Bicester was identified as a Garden Town by the Government.

These factors combine to make Bicester one of the growth areas of the country. In addition to provision of housing and amenities, development is hoped to increase employment in the town itself, so more of its residents can live and work in the same place.
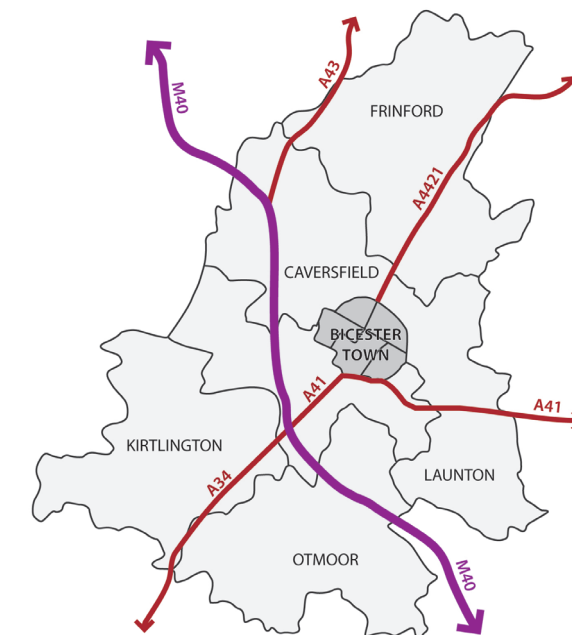

Figure 2.1 Oxfordshire County: Districts and Councils

Figure 2.2 Cherwell District: Main Urban Areas

Figure 2.3 Cherwelll District Wards

2.2 Regional Relationships

Within Bicester and its environs are a number of destinations of international, national and regional significance. These include:

- Tourism: Blenheim Palace, Oxford and Bicester Shopping Village (5.8 million visitors per year) are international tourism destinations.

- Motorsport: London Oxford Airport, used by Formula 1 teams due to its close proximity to Silverstone, is crucial to the UK's motorsport industry. Bicester and Oxford have a number of high precision engineering firms producing automotive parts, as well as the BMW production plant at Oxford.

- Education: Oxford provides exceptional third level education 15 miles by road from Bicester. Oxford University and Oxford Brookes University are internationally renowned. Oxford with Cambridge and London forms an unofficial 'Golden Triangle' of academia which receive substantial funding for research.

- Knowledge Spine: Science Vale (between Didcot and Wantage), along with Oxford and Bicester, form the Oxfordshire Knowledge Spine. Oxford University's Begbroke Science Park is located at Kidlington (9 miles south of Bicester) and is an internationally important centre for education, research and innovation.

- Bicester is located within two Local Enterprise Partnerships (LEPs): the Southeast Midlands LEP and Oxfordshire LEP. These LEPs influence local economic priorities to help drive economic growth and create local jobs.

- Arc of Economic Growth: Bicester sits within an arc of thriving urban areas stretching from Reading to Cambridge. These areas have overall experienced consistent economic growth and investment, with correspondingly high income levels and employment opportunities. They also enjoy close links to Oxford and Cambridge Universities.

- Road Network: Bicester is well connected to the strategic road network, connecting the town to Birmingham, Bristol, Reading and London.
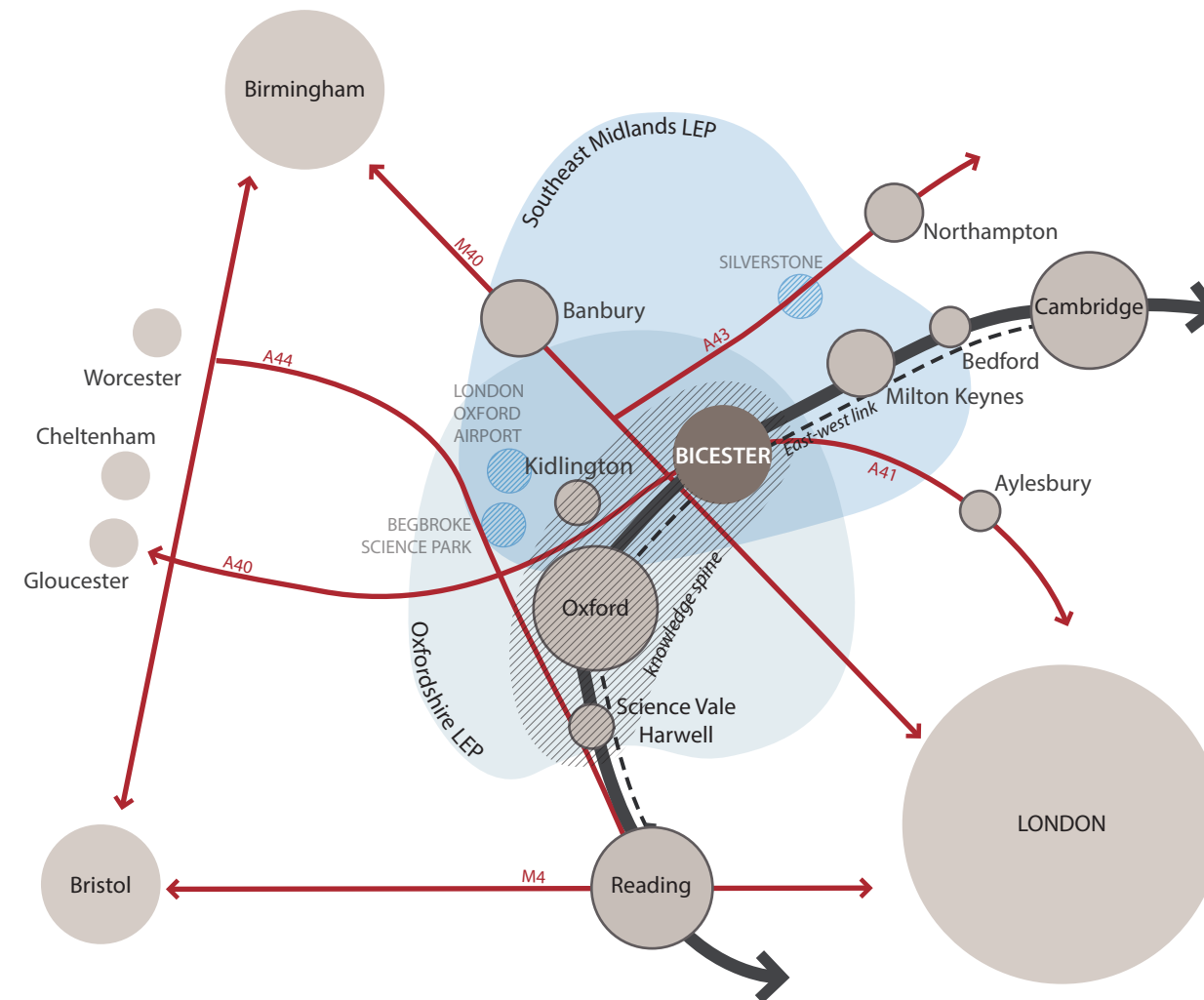

Figure 2.4 Regional Relationships

- Rail improvements – Evergreen 3 and the East-West rail link – will accentuate Bicester's already excellent rail facilities (two stations) and links (London Marylebone and Birmingham). This will further enhance Bicester's role as a commuter town to both London and Birmingham, but also bring in employees and visitors boosting the local economy.
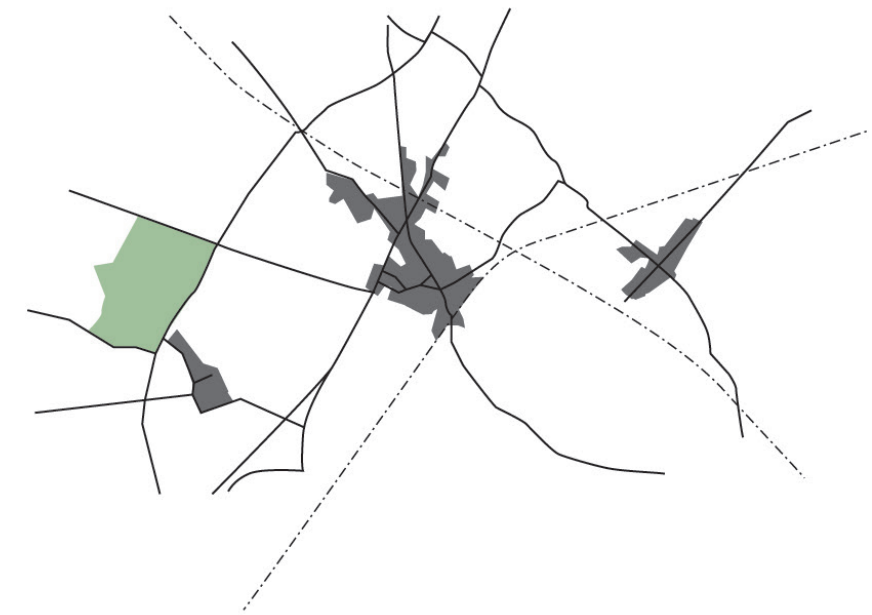
—— Roads
-·-·- Railways
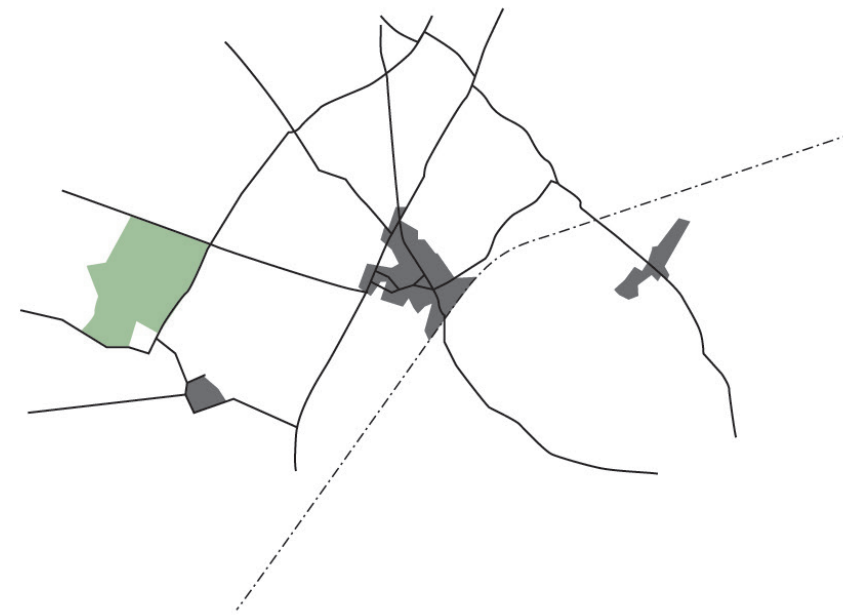
1885

1955

2.3   Historical Development

There has been a settlement at or near Bicester since Roman times (43AD - 409). A north-south Roman route, from Dorchester to Towcester, passed through the area, while an east-west Roman road from Cirencester to St. Albans lies 2 miles south of the town. There are also Roman ruins (of Alchester) 2 miles southwest of the town. Bicester, the town's name since the mid-17th century, was recorded in the Doomsday Book as Berencestra, with the two manors of Bicester and Wretchwick. Meanings of the name include "of Beorna" (a personal name), "The Fort of Warriors", or from the Latin Bi-cester meaning two forts.

The modern settlement evolved with Anglo-Saxon (5th century) farmers, settling on either side of the River Bure close to the Saxon Minster of St. Edburg's. The first group of farms were established in the area now known as King's End, while the later settlement to the east of the River Bure became Market End. St. Edburg's Church dates from 1104 and an Augustinian Priory, of which little now remains, was established in 1182 on land around Old Place Yard. In 1252, a licence was granted to hold an annual 3-day fair and this evolved into a very successful market. It was well-known for trading wool, leather, lace, chair making, straw-planting and printing.

At the start of the 17th century, Bicester was almost entirely dependent on agriculture with few tradesmen. It was at this time that the main shopping street, Sheep Street, was built. Sheep Street, King's End and Market Square form the core of today's historic town. While by 1850, agriculture was still the main source of employment, there were also labourers, carpenters, masons, lace makers, dress makers, tailors and milliners. By the 18th century, the town had established a reputation for rope, lace, baskets, sackcloth and combing wool.

1970

Present

Future
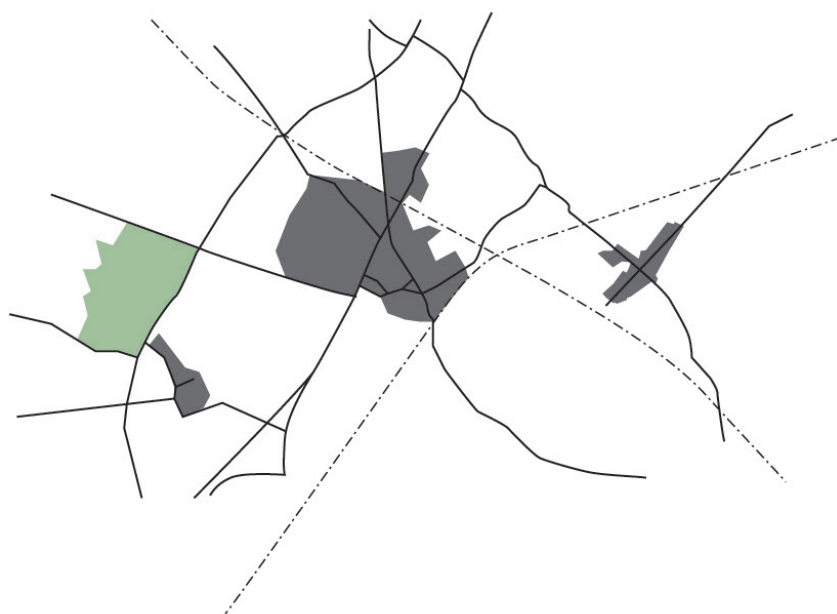
Through the 18th century, Bicester became well-known for horse racing and later for fox hunting, prompting the development of associated specialist trades. Bicester's military connection dates to the 16th century, when the town was used as the headquarters of parliamentary forces during the Civil War (1642-49). During the First World War, the RAF began construction of Bicester Airfield to the north of the town, and in 1941 the town became home to the Ordnance Depot (the Defence Distribution Hub for the British Army).
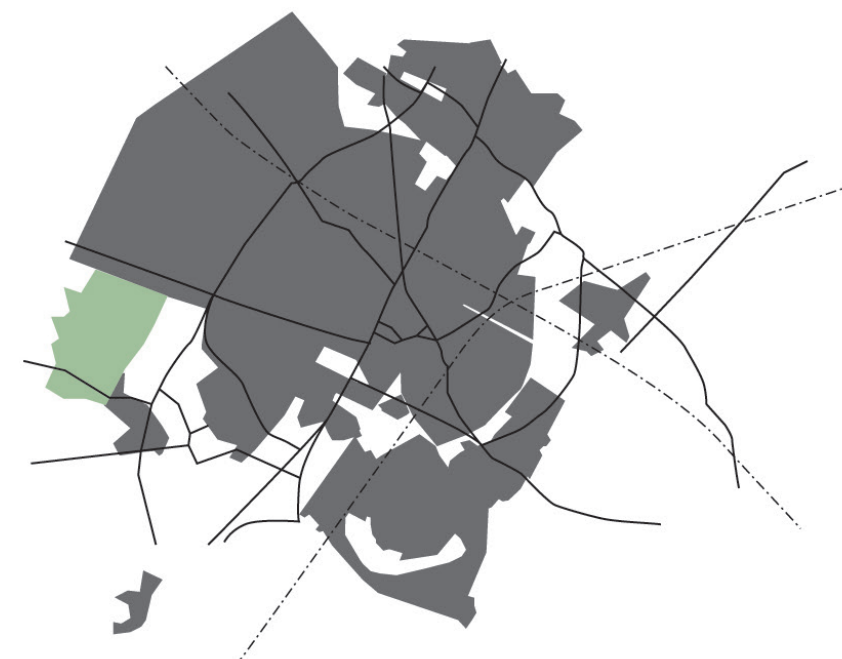
Communications improved with the construction of turnpikes (e.g. Bicester to Aylesbury was turnpiked in 1770), the Oxford Canal (late 1780s) and the railways. The Buckinghamshire Railway Company completed the railway between Bletchley and Oxford in 1851, and this is when Bicester Town station opened. In 1910, the Great Western Railway completed a fast new route between London and

Birmingham, opening a new station, now called Bicester North, on Buckingham Road.

Within the town centre, the closure of the old Roman road contributed to the early success of the market by pulling traffic into Market End via Causeway and Sheep Street. In the 19th century, the main route to London ran through King's End, Market Square, Sheep Street and London Road, but Queen's Avenue remained an informal path, and was still an unsurfaced lane until 1938. The primary street network of the town centre remained largely unchanged until recent years. The pedestrianisation of Sheep Street provides generous people space, (though the open character of the street has been lost by the insertion of planters). The recent closure of North Street has greatly improved the route for walking and cycling, while the development of Bure Place as a pedestrian area significantly improves the experience of the

town centre. The character of the Causeway - historically narrow and constricted - has remained remarkably constant.

The town's population remained constant (3,000-4,000) through the 19th and 20th centuries, and was still only 5,500 in 1961. Until the 20th century, building was restricted to the redevelopment of the town centre. Some areas were developed from 1923, but it wasn't until 1971 that a rapid rise in population occurred. Developments to the west, north and east of the town between 1980 and 2010 have raised the population to over 30,000. The historical development of the town is documented in the images above, with future development illustrated in the final diagram. This shows the significant expansion of the town, which is planned over the coming years.

2.4   Demography

It is anticipated that the population of Bicester will increase significantly – at a rate higher than the Oxfordshire average – in the coming years until 2030. While overall deprivation in the locality is low, three parts of Bicester are among the 20% most deprived areas nationally in terms of education skills and training. Although still below the county average, educational attainment in Bicester has improved in recent years. By Oxfordshire standards, a high proportion of the working age population has no qualification and a relatively low proportion have attained degree level or equivalent qualifications. Although overall training rates in the district fell in the period 2006-9, the town does provide excellent specialist training provision in some areas, notably in motorsport.
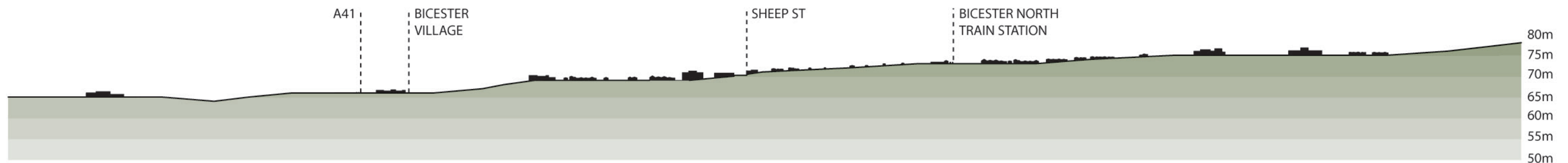
Unemployment in Bicester is relatively low compared to Banbury and Oxford, and is below the national and county averages, while unemployment in the Bicester hinterland is considerably below the Oxfordshire average. The Bicester locality has a relatively young population. It is one of the few areas in Oxfordshire, outside of Oxford City, that, even in the rural parts around Bicester town, has a relatively low percentage of persons over 65s.

House prices in Bicester (and in the more sparsely populated areas of Launton, Fringford, Caversfield) are relatively low compared to Oxford. In October 2010, the median asking price for a house in Bicester was £220,000, which was lower than the median asking price in Oxford, at £275,000.

2.5   Topography

Located in North Oxfordshire, the town is immediately surrounded with open countryside and farmland with a number of smaller villages. Much of the town is flat and relatively low lying (around 65-80m AOD). Southeast of the town, the land rises to form Graven Hill, whose highest point is at 115m AOD. The land gently falls from northwest to southeast, to the floodplain which runs through the southeastern quadrant of the town (Langford Village). There are also subtle slopes within the town, for example Church Street and Causeway run down into Market Square, which itself rises towards the north.

Figure 2.5 Section through Landscape and Town: vertical scale exaggerated x 10

A41

BICESTER VILLAGE

SHEEP ST

BICESTER NORTH TRAIN STATION

80m
75m
70m
65m
60m
55m
50m

Alan Baxter

Key:

115m
110m
105m
100m
95m
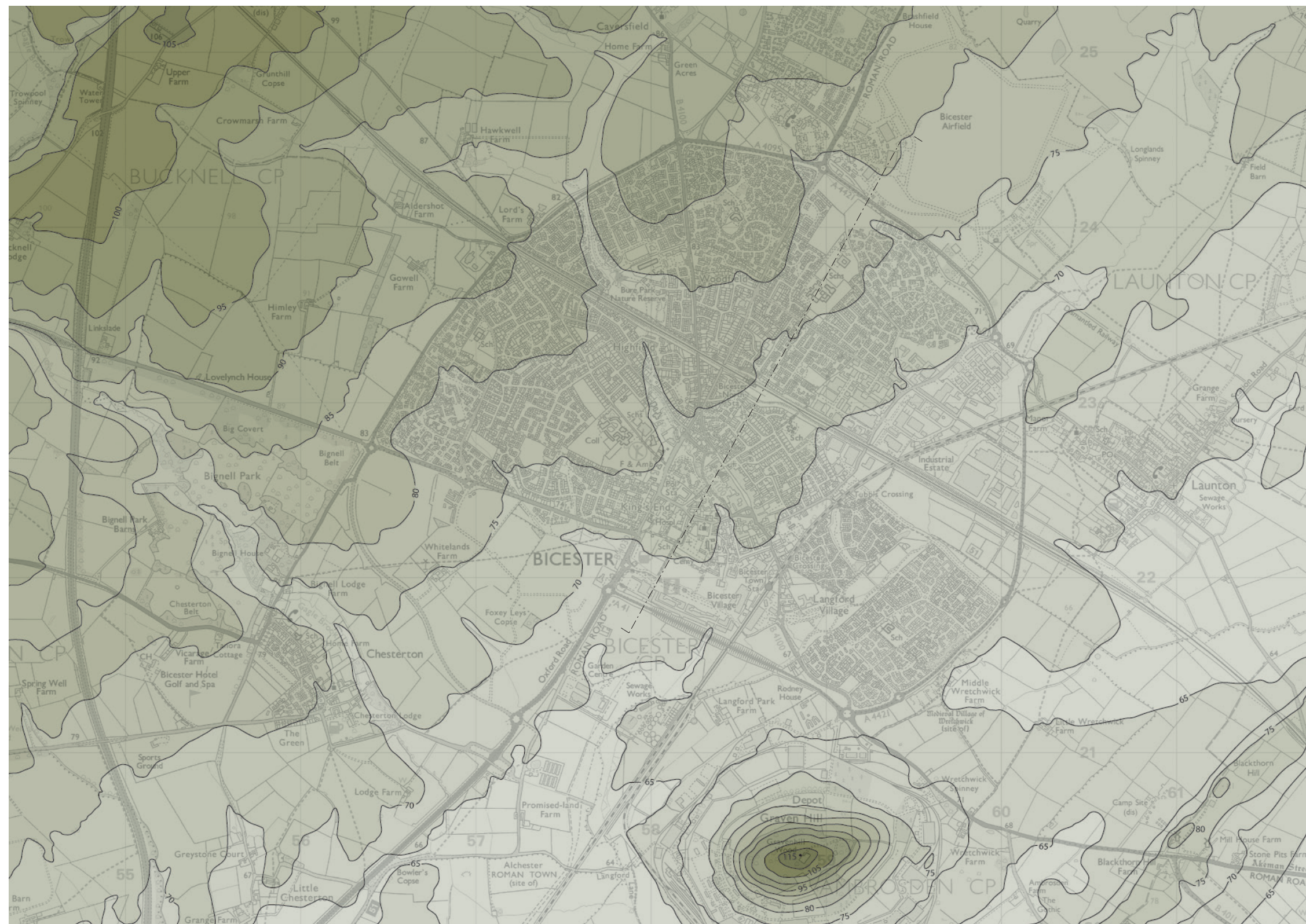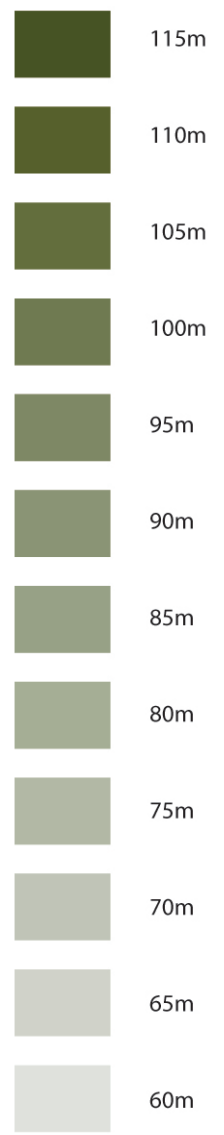90m
85m
80m
75m
70m
65m
60m

Figure .2.6 Topography of
Bicester Area

2.6   Air Quality

Cherwell District Council regularly monitor air quality at locations in the District, comparing harmful pollutant levels against national objectives. This forms the basis for Local Air Quality Management works (LAQM).

Air quality throughout the district is generally good but several areas along major traffic routes are being monitored closely. In Bicester, high concentrations of nitrogen dioxide, mainly from transport emissions have been identified on Kings End and Queens Avenue.   Pollutant levels are sufficiently high to declare an Air Quality Management Area (AQMA) but the effect of recent changes to the road network in the town centre are being monitored before this action is taken. Declaring an AQMA would then trigger the need for an air quality action plan to be developed with the aim of reducing the level of air pollution to below the air quality objective.

Congestion on King's End

2.7   Waterways and Flood Risk

While the land around Bicester is low-lying, flood risk is largely constrained to the area around the river flowing through the southeast quadrant of the town (through Langford Village and the industrial area), as shown on the flood risk map. This area is situated within the Environment Agency Flood Zone 3 (1:100 year or greater probability of flooding), and provides green space between residential developments. In the northwest quadrant of the town, Bure Park Nature Reserve is situated within the Environment Agency Flood Zone 2 (1:1000 year or greater probability of flooding), again providing green space and wildlife habitat. The River Bure (also known as Bure Brook, a tributary of the Ray, Cherwell, and ultimately the Thames), which is classified as an Environment Agency Main River, flows through the town centre.

In 1863 a drainage scheme was initiated starting in Market Square and Water Lane/Chapel Street, and the Causeway and Chapel Street were frequently flooded. Piped water arrived in 1905, and the River Bure was culverted and partially built over at the Causeway in the 1860s. The river was later (in the 1970s) diverted and canalised as part of the Manorsfield Road construction. In 2004, it was proposed to culvert a section of the main river in order to enable the development of a car park at Bure Place. However, due to concerns raised about flood risk and maintenance, two years were spent undertaking feasibility investigations, planning and developing a scheme. A Flood Risk Assessment (FRA) was carried out, including a ground investigation and hydraulic analysis and a decision was taken to realign a section of the river within the town. Construction started in 2010 and the project was completed in April 2011. This has both flood risk and new habitat benefits for the town.

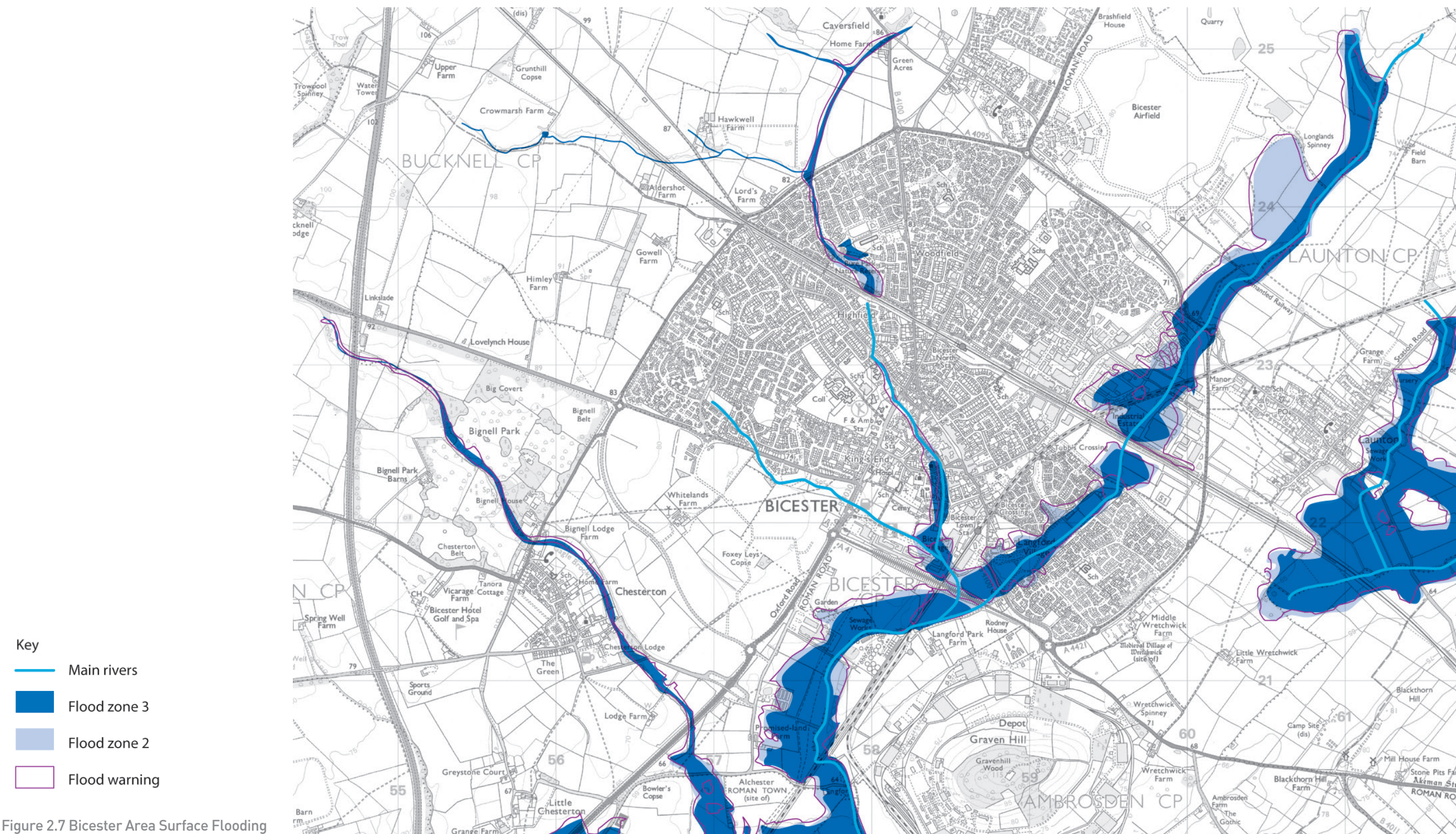The River Bure in Bicester town centre, and below green Space, Langford Village through which river runs

Alan Baxter

Figure 2.7 Bicester Area Surface Flooding

Key

— Main rivers

▬ Flood zone 3

▬ Flood zone 2

▢ Flood warning

2.8   Facilities and Amenities

The main industrial areas of Bicester are located to the east of the town, while the town centre has a stronger focus on retail. Thus the main movements are between the residential areas to the west of the town and the employment centres in the centre and to the east of the town, particularly the town centre and at Launton Road. Education-related trips are to Bicester's 9 primary schools, 2 secondary schools, 2 sixth form facilities and the Oxford & Cherwell Valley College Campus (OCVC). Retail destinations are the town centre, whose historic core sits within a conservation area, and Bicester Village. Sports and recreation facilities include Garth Park (which has a skate park and large children's playground), Langford Village, Bure Park including a Nature Reserve and Bicester Leisure Centre (Queen's Avenue). These are shown in Figure 2.8.

Green Infrastructure is a term used to describe networks of green spaces, habitats and waterways that support biodiversity and provide recreation and amenity. Bicester has a number of green open spaces, parks, recreation grounds, children's playgrounds and allotments. In the surrounding areas there are also woodland, farmland, wetlands, river (River Cherwell), which are important green infrastructure corridors for biodiversity and human movement.

Bicester Methodist Church, Sheep Street

St Edburg's Church

Garth House, Garth Park

Sheep Street

Bure Park School

Bure Nature Reserve

Alan Baxter

Key

- Green space
- Leisure centre/ Sports club
- Industrial
- Retail
- Schools
- Colleges
- Cemetery
- Civic (churches, town council, hospital, fire station, court house, library, police station)
- Conservation area
- Railway
- Train station

Figure 2.8 Bicester Locations of Facilities and Amenities

3.0
Transport and Planning Policy Context

Relevant national and local policy and guidance documents have been reviewed (see also Figure 3.3). This section lists the specific policy documents reviewed along with a summary each for national and local policy. The full reviews are contained in Appendix A.

3.1   National Policy and Guidance

Summary

The relevant national policies and guidance are set out in the following documents:

•   National Planning Policy Framework (2012)

•   Local Transport White Paper (2011)

•   Local Sustainable Transport Fund (2013)

•   Growth Deal: Initial Guidance for Local Partnerships (2013)

•   Sustainable Travel Towns Initiative (2010)

•   Manual for Streets (2007)

•   Manual for Streets 2 (2011)

•   Eco Towns Planning Policy Statement (2009)

•   Door to Door Strategy (2013)

•   Making the Connection: The Plug-In Vehicle Infrastructure Strategy (2011)

•   Driving the Future Today - A strategy for ultra low emission vehicles in the UK (2013)

•   National Institute of Clinical Excellence Guidance PH8 Physical Activity (2008)

•   National Institute of Clinical Excellence Guidance PH41 Promoting Walking and Cycling (2012)

•   Healthy Transport = Healthy Lives (2012)

For the last 15-20 years there has been a strong push by Government to achieve more sustainable patterns of movement within the wider context of the sustainable growth of the UK. This has been a response to a general acceptance of climate change realities and therefore commitments given to reductions in carbon emissions. The documents reviewed reflect this direction of travel.

The overarching aim of all these documents is to encourage a more sustainable approach to transport that reduces the negative environmental impacts associated with private car use. The NPPF provides an overarching framework for the future sustainable development of the UK and for movement focuses on reducing the need for travel and encouraging sustainable modes.   The Local Transport White Paper supports this approach whilst highlighting that transport is also the engine of economic growth. The Local Sustainable Transport Fund and Growth Deal documents set out the framework within which local authorities and LEPs can apply for capital and revenue funding for transport projects.   The Sustainable Towns Initiative is a report on three towns where sustainable travel was promoted (between 2000 and 2009) and the impact this had on modal share.

Manual for Streets is a design guide but the underlying objective is to encourage in particular, movement on foot and by bike both within residential areas and on more mixed use streets. The approach advocated is the integration of movement and urban design requirements to give greater attention to place making. The Eco Towns PPS sets out challenging and stretching targets for development in eco-towns and specifically for transport that 50-60% of all journeys should be by non-car means.

Currently, there is substantial funding and support available in the UK for the promotion of low emission vehicles - both for research and on the ground in the form of plug-in electric vehicle infrastructure, electric buses, grants for private electric cars and so forth. Door to Door is a strategy document by the DfT that sets out a vision and actions that facilitate and enhance door to door journeys by sustainable modes. This is about bringing together all modes that might make up a journey with a particular focus on information, seamless ticketing, straightforward connections between modes and safe and comfortable transport facilities.

The suite of documents produced by the health sector duplicate advice given elsewhere but do also acknowledge the role that health professionals can play in encouraging active movement generally within society.

3.2   Local Policy and Guidance

Summary

The relevant local policies and guidance are set out in the following documents:

•   Oxford and Oxfordshire City Deal (2014)

•   Strategic Economic Plan (2014)

•   The Cherwell Local Plan (2014)

•   Cherwell Sustainable Community Strategy (2010)

•   Eco Bicester – One Shared Vision (2010)

•   Local Transport Plan 2011-2030 (2012) and LTP4 Consultation

There is a substantial volume of policy that embraces Bicester at sub-regional, county, district and town level. Much of this sets a high level of aspiration for the future of the town generally and specifically in relation to the movement profile.

The policy document "EcoBicester One Shared Vision" (see Figure 1.1) refers to the town-wide programme including the Eco-Town at North West Bicester.

It is envisaged that the North West Bicester Eco-Town, will act as a trigger for a town-wide transition to a low carbon community. The development is designed to attract inward investment, particularly in the area of green technologies; to effect improvements in transport, health, education and leisure, and ensure that green infrastructure, historic landscapes, biodiversity, water, flood and waste issues are managed in a sustainable way. Integration of the development into the existing town in social, economic and transport terms is fundamental to the EcoBicester Vision. Key aspects are:

- Up to 6,000 new homes

- 50% of trips to be made by non-car means, with the potential for this to increase over time to at least 60%.

- 40% of the total area to be green space (half of this to be public).

Substantial housing and employment growth in the town provides a significant opportunity to provide investment in a sustainable transport network.

The level of out-commuting is high but planned development will provide more jobs in the town. A sustainable transport network is needed to support access to these jobs.

Major investment in rail infrastructure is underway. Investment in road infrastructure is planned for the peripheral routes. There is the opportunity to improve the sustainable transport network within the outer ring road and prioritise sustainable modes.

The City Deal introduces the concept of the Knowledge Spine and Oxford Transit. The Transit stops need to be highly accessible on foot and by bike.

40% of all journeys are less than 3.0km in length and therefore there is potential for a large proportion of local journeys to be on foot or by bike.

Sustainable movement should be prioritised in the town centre. An improved sense of place can be created in parts of the town centre by removing traffic and by improving the public realm.

A network of walking and cycling routes should be integral to green infrastructure

Vehicle congestion should be reduced on Kings End/Queens Avenue and there should be a stronger sense of place. This presents the opportunity to prioritise sustainable transport on this street.

New developments will promote permeability on foot and by bike. Priority needs to be given to linking these new areas to the existing urban area.
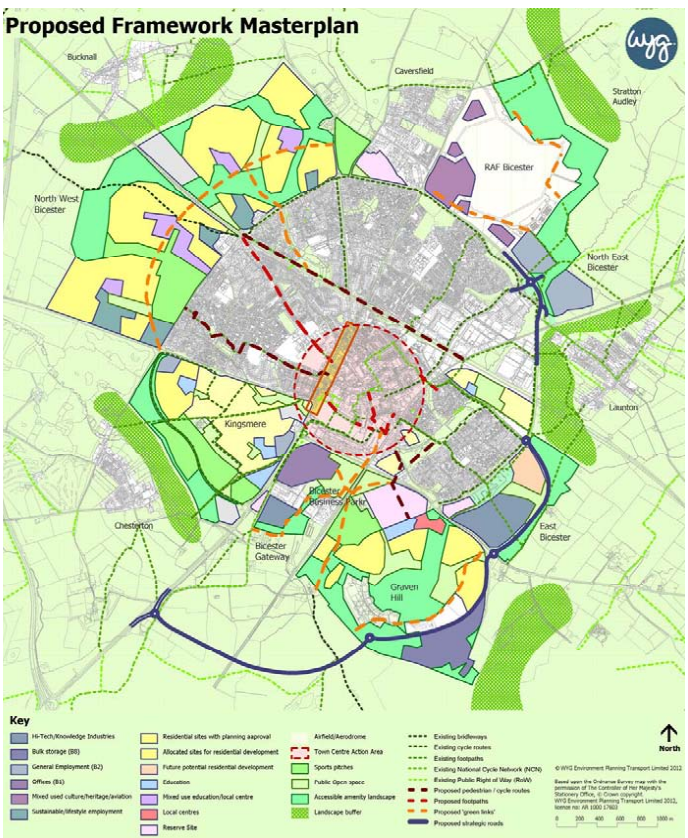

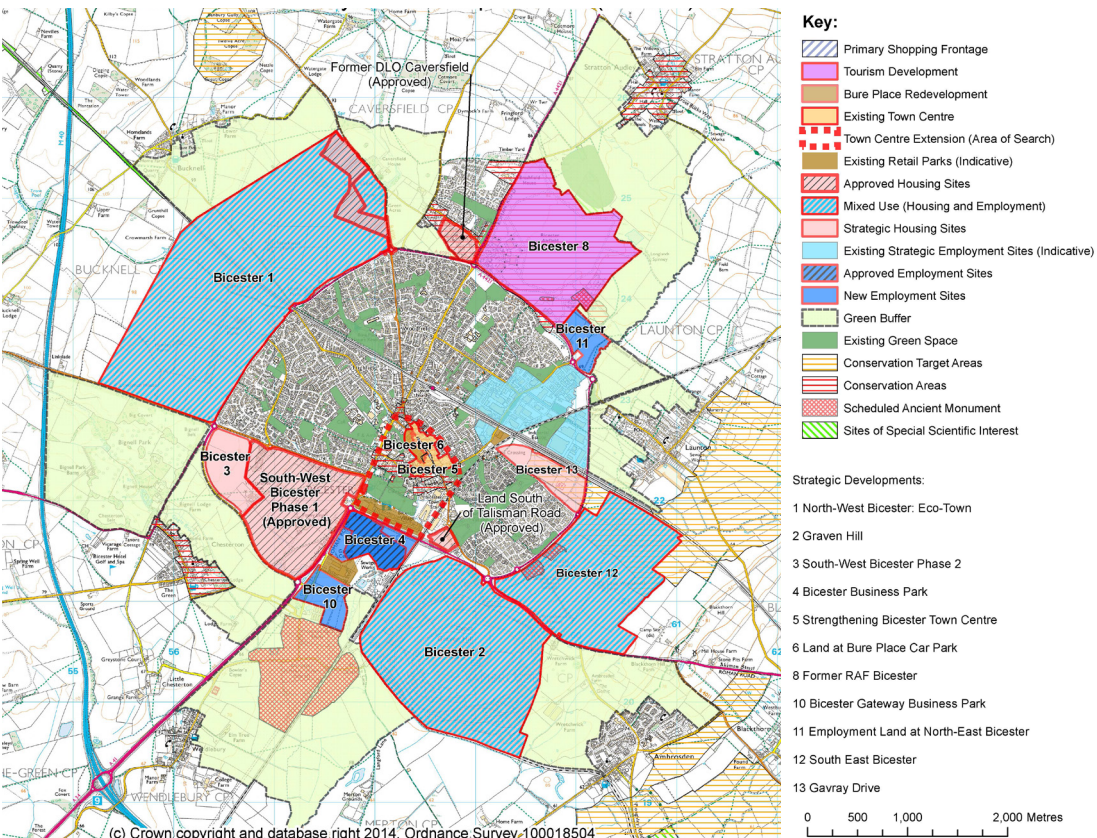Figure 3.1 Bicester Masterplan Framework

Figure 3.2 Bicester Key Proposals

New developments need to connect by public transport to the town centre and rail stations

Rail stations need to be highly accessible on foot and by bike.

Bicester's planned growth is set out in the Cherwell Local Plan, the Development Framework for Cherwell District. Following its recent Examination, the Plan has been found 'sound with modifications' (Inspectors Report 12th June 2014 at http://www.cherwell.gov.uk/ localplanexamination) and is now proceeding towards adoption. Adoption of the Cherwell Local Plan is to be considered by Full Council on 20 July 2015.

The Cherwell Local Plan proposes development totalling approximately 13,000 new homes for Bicester along with 138.5ha (gross) for employment creating an anticipated 18,500 jobs. The Cherwell Local Plan sets out a series of site allocations and thematic policies which will guide the growth of Bicester. The Local Plan is underpinned by a series of studies including those for considering the economy and the economic plans of the two LEPs.

Both the South East Midlands (SEMLEP) and Oxfordshire's (OxLEP) Strategic Economic Plans (2014) set out to drive accelerated economic growth placing the South East Midlands and Oxfordshire at the forefront of the UK's global growth ambitions. SEMLEP is now ranked third economically (joint with London) and Oxfordshire is ranked first for innovation, with SEMLEP third. Both LEPs have identified Bicester as a major focus for the growth in each SEP. Bicester is located in the north of what OxLEP calls the 'Oxfordshire Knowledge Spine', which links Bicester with the major innovation hotspots of Oxford and Harwell. Both LEPs regard Bicester as a priority location for their SEP and have identified improved infrastructure, population growth and increased land availability as key to unlocking the potential for significant increases in employment growth and low carbon development at this location.

Bicester's substantial planned growth is being delivered from a shared vision of Bicester as 'one place' where future developments and the existing town are planned and delivered in a comprehensive, holistic, integrated and sustainable way.

The intention is to build on Bicester's existing historic character so that it remains a town in terms of size and feel with a close connection to its rural hinterland, rather than a city. Cherwell District Council is also seeking the delivery of socially, economically and environmentally sustainable places and developments in Bicester – a remit established in the town's 'One Shared Vision'.

Through the Cherwell Local Plan a major release of employment land is planned to compliment the housing growth to reduce the high level of out commuting and will target new investment in knowledge based industries, performance engineering, off-site manufacturing and logistics.

The strategic sites detailed in the Local Plan include:

- Bicester 1 – North West Bicester Eco-Town (Mixed Use Development).

- Bicester 2 - Graven Hill (Mixed Use Development).

- Bicester 3 - South West Bicester Phase 2 (Housing Development).

- Bicester 4 - Bicester Business Park (Employment Development).

- Bicester 6 - Bure Place Town Centre Redevelopment Phase 2.

- Bicester 8 - RAF Bicester (Employment Development).

- Bicester 10 - Bicester Gateway (Employment Development).

- Bicester 11 - Employment Land at North East Bicester (Employment Development).

- Bicester 12 - East Bicester (Housing Development).

- Bicester 13 - Gavray Drive (Housing Development).

Alan Baxter

The draft Masterplan for Bicester is a Supplementary Planning Document to the Local Plan. This document sets forth ambitions for the growth of Bicester covering areas such as employment opportunities; provision of housing in accordance with the Local Plan requirements to 2031; provision of amenity and open space; a transport and movement strategy; as well as a Town Centre Action Area to ensure comprehensive coordination the retail, social, health and leisure development that will be needed in the town.

Upon adoption, the Bicester Masterplan will enable the delivery of:

- 15,000 - 20,000 new jobs on land allocated for economic growth including business, manufacturing, industrial and research employment.

- Increased town centre activity and new jobs.

- 10,300 new homes.

- 440 ha of land for green infrastructure, including 90 ha for sports pitches.

- Land identified as strategic landscape buffers between Bicester and surrounding villages.
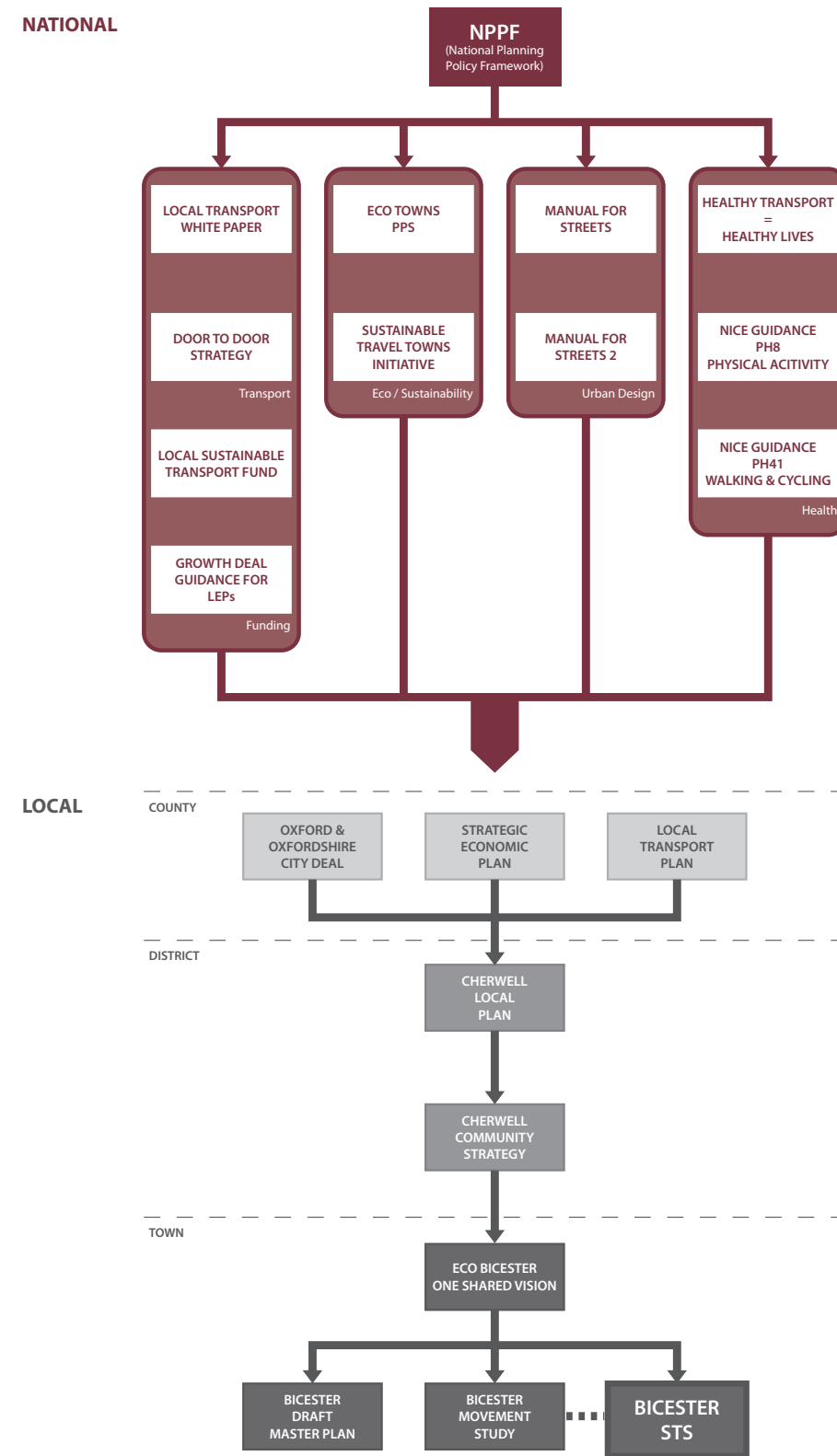
- Improved strategic transport network.

Figure 3.3 Relationship of the Bicester STS to national and local policy documents

4.0
Existing Transport Strategies and Proposals

4.1   Summary

The relevant existing transport strategies and proposals are:

- Bicester Integrated Transport and Land Use Study 2 (2009)

- Bicester Movement Study (2013)

- Bicester Masterplan Consultation Draft (August 2012)

- Travel Behaviour Demonstration Project (2011 & 2012)

- Transport Assessment for Whitelands Farm (Kingsmere) (2006)

- Transport Assessment for Graven Hill (September 2011)

- Transport Assessment for North West Bicester (November 2010)

- Transport Technical Notes for North West Bicester (2013 & 2014)

- OCC Transport Schemes

The Movement Study and Travel Behaviour Demonstration Project provide good background in terms understanding transport issues in the town. In terms of overall movement patterns it is identified that 69% of trips are undertaken by car and 48% originate and terminate within the town. A number of people have highlighted that walking and cycling is seen to be risky and public transport perceived as being slow.

The Movement Study sets out a transport strategy for the town and while this is multi-modal, the focus does seem to be on accommodating traffic growth. The Masterplan does address movement issues but the Movement Study produced more recently develops more fully the ideas in the Masterplan.

The Transport Assessment for Kingsmere was produced in 2006 prior to Bicester being designated as an eco-town and has a target of 60% of trips being undertaken by car.   There appears to be no investment in the walking and cycling infrastructure off the site and the bus service provision is two buses per hour to Oxford and four buses per hour to the town centre.

The Graven Hill redevelpment proposals were approved in August 2014. More ambitious improvements to the off-site walking and cycling network are proposed although the bus provision is similar to Kingsmere with a new shuttle to the town centre (3 or 4 buses per hour) and an existing route diverted into the site. It is not possible to determine the overall modal split for journeys to and from the site.

North West Bicester Exemplar Site is the first phase of the overall North West Bicester development. 50% of journeys are assumed to be by non-car modes and there is a reasonable level of investment in the off-site walking and cycling network. The bus provision is only a 30 minute frequency to the town centre and rail stations although this probably reflects the scale of the development and the revenue that is likely to be generated. In preparation for outline planning applications for the remainder of the development, a series of technical notes have been prepared. Of note is the target of ultimately achieving a 10 minute bus service to the town centre and rail stations. Considerable thought has been given in two of these notes as to how a target of 50% of trips by non-car mode can be achieved.

Bicester Integrated Transport and Land Use Study 2 (February 2009)

The purpose of BicITLUS 2 was to set out a comprehensive transport strategy for the Bicester area to support housing and employment growth to 2026. At the time of producing the report the intention was that it would be part of the evidence base to underpin the proposals for the Bicester area in the Cherwell Core Strategy together with the subsequent plans and site allocation documents. The report sets out strategies in relation to highways, public transport, cycling, road safety and demand management.

The content of BicITLUS 2 has informed the subsequent Bicester Movement Study and Area Strategy (LTP) and been superseded by these documents.

Bicester Movement Study (February 2013)

The Bicester Movement Study sets out an assessment of the main transport, traffic and movement issues and opportunities within Bicester to be developed alongside the emerging masterplan and Local Plan and in support of the County Council's transport objectives for the town as detailed within the third Oxfordshire Local Transport Plan. The documents set the scene for the growth of Bicester with a review of the policy context, previous reports and existing transport facilities. The common themes identified are as follows:

- Significant levels of out-commuting

- A large demand for retail and particularly leisure trips outside Bicester

- Strong potential demand for trips to the centre and eastern areas of the town

- Key networks for public transport within the town centre currently congested

- High potential for local trips by walking / cycling across the town with a high percentage of walking trips identified for non-work related journeys in particular

- A good base sustainable transport network, with a network of walking and cycling routes to the eastern and western edges of the town along with a circular route following the perimeter roads

Varying attitudes to sustainable modes of transport, with support for positive measures to encourage cycling and public transport, although demand management measures including parking controls are less popular.

In terms of the growth of the town, the focus of the study seems to have been mainly on the impact of the future growth in traffic. A modelling exercise has been undertaken to identify the effects in terms of demand and capacity.

In response to future demand a number of improvements to the strategic and local highway network are proposed. In relation to rail, the study identifies the need to improve access to the Bicester Town Rail Station and the potential impact on the road network of the closure of level crossings on Charbridge Lane and London Road. The proposals for buses services are a potential new route serving NW Bicester and Graven Hill (see Figure 4.1) and a park and ride south west of the town. In terms of walking and cycling a number of primary interventions are identified. Supporting measures are listed comprising public realm, traffic management, a parking strategy, a signage strategy and smarter choices measures.

Alan Baxter

The proposed highway network improvements have been tested using the Bicester Saturn model with the assumed package being:

- A new road to the south-east of Bicester with an indicative assumed route between a new junction onto the A41 south of the town and the existing A41 / A4421 junction to the east

- Speed Constraint measures within the Central Corridor to limit maximum speeds to 20mph

- Making St. John's Street two way for all traffic

- Replacing the current at-grade level crossing at Charbridge Lane with a new road bridge

- The provision of a new junction arrangement to the north of Launton Road, replacing the two current roundabouts at the junction of the A4421 with Launton Road and Bicester Road with a single larger roundabout and improved carriageway widths and alignment

- Increased capacity at the roundabout junction of Buckingham Road with Skimmingdish Lane.

The overall conclusion is that the highway capacity improvements on peripheral routes are expected to enable the delivery of improved sustainable linkages within the town and connecting new major residential and employment development sites with the existing urban areas, helping to reduce the currently high levels of out-commuting and car driver journey to work trips.
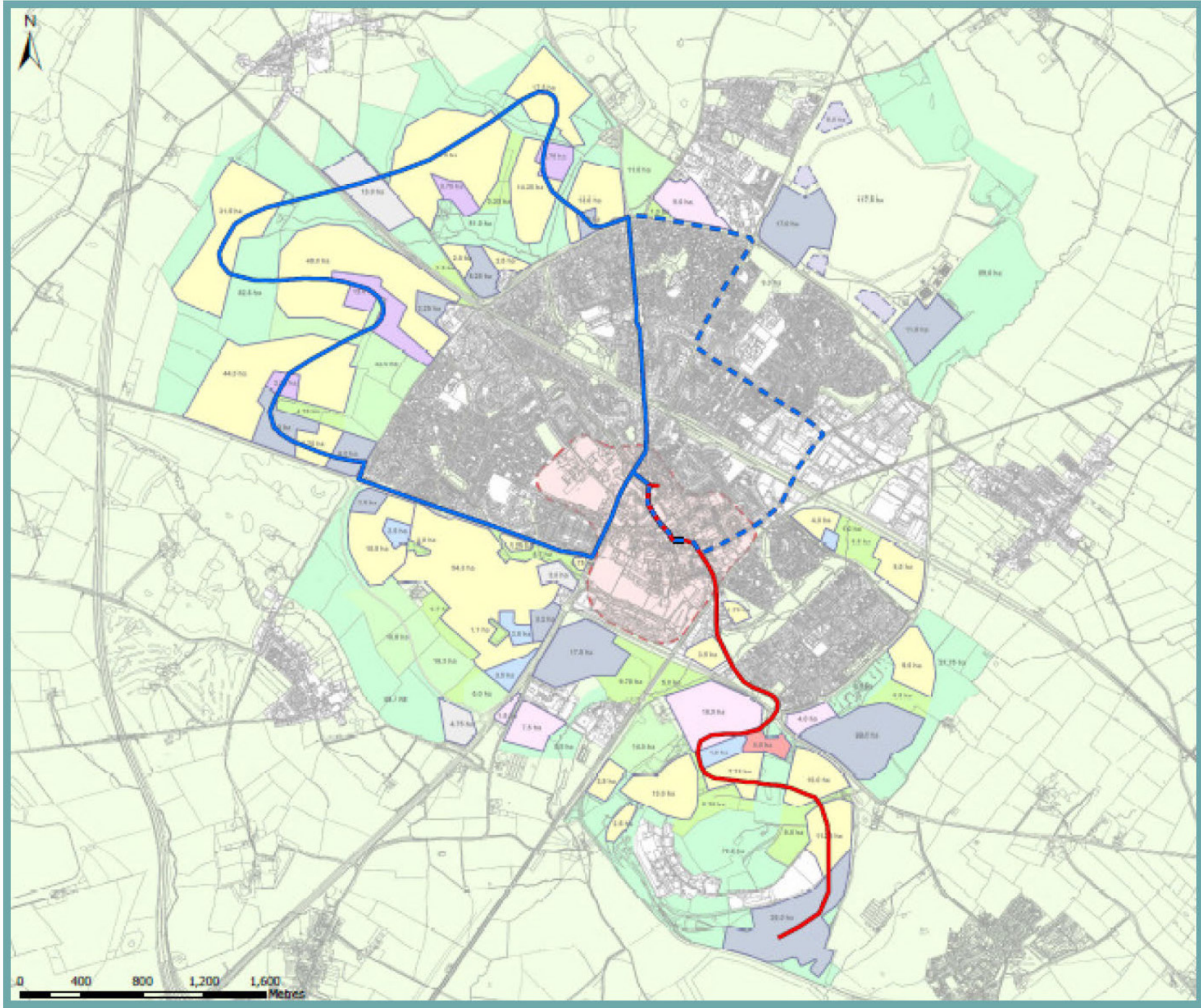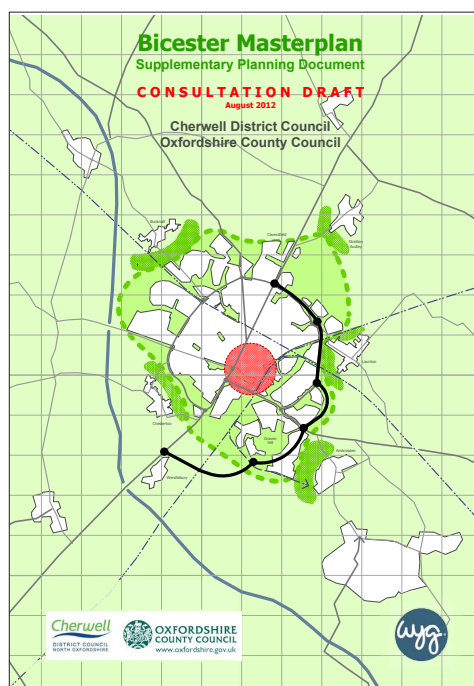

Figure 4.1: Proposed Bus Routes to serve north west Bicester and Graven Hill

Bicester Draft Masterplan (August 2012)

The draft Bicester Masterplan is an SPD (Supplementary Planning Document) to the Local Plan. This establishes the long term vision for the town of Bicester and integrates committed and planned schemes with new proposals to contribute to the creation of a sustainable town. The masterplan promotes an enlarged and vibrant town with a comprehensive range of employment opportunities and local facilities to complement the expanded role the town will play in the region. It is formed from: a set of strategic objectives to guide development; a series of masterplans to demonstrate how the objectives are achieved; and the key policies and actions to deliver the planned changes.

The long term strategic objectives that guide the development of the town are:

- To deliver sustainable growth for the area through new job opportunities and a growing population.

- Establish a desirable employment location that supports local distinctiveness and economic growth.

- Create a sustainable community with a comprehensive range of social, health, sports and community functions.

- Achieve a vibrant and attractive town centre with a full range of retail, community and leisure facilities.

- To become an exemplar 'eco-town', building upon Eco Bicester – One Shared Vision.

- To conserve and enhance the town's natural environment for its intrinsic value; the services it provides, the well-being and enjoyment of people; and the economic prosperity that it brings.

- A safe and caring community set within attractive landscaped spaces.

- Establish business and community networks to promote the town and the eco development principles.

- A continuing destination for international visitors to Bicester Village and other tourist destinations in the area.

The draft masterplan identifies the future broad shape of the town that is required to deliver these strategic objectives. It is formed in response to the physical constraints, the movement networks, landownership constraints, market forces and relationship to adjacent areas.

The draft masterplan identifies:

- A comprehensive range of employment opportunities that will reinforce the role of Bicester in the regional economy and assist in reducing out-commuting.

- Housing sites to deliver the Local Plan requirements to 2031 and up to 2040.

- A network of open spaces to improve the setting of the town and to address the shortfall of public open space, amenity and sports facilities.

- A limit to the future growth of the town and separation from the adjacent villages of Bucknell, Chesterton, Ambrosden, Launton and Stratton Audley from Bicester, through the creation of strategic landscape buffer.

- A transport and movement strategy that will provide a strategic road on the eastern side of town for through traffic and enable improved connectivity between the neighbourhoods and town centre.

- A Town Centre Action Area to ensure comprehensive coordination the retail, social, health and leisure development that will be needed in the town.

The draft Bicester Masterplan incorporates a detailed set of proposals that connects the transport and movement, housing, employment, green infrastructure and the town centre actions together. It also indicates where and what type of new development is proposed and the strategic linkages between them.

The Bicester Masterplan, upon adoption, will enable the following outputs to be delivered:

- Between 15,000 and 20,000 new jobs on land allocated for economic growth including business, manufacturing, industrial and research employment.

- Increased town centre activity and new jobs.

- A total of 10,300 new homes; approximately 6,500 new homes up to 2031 and a further 3,800 by 2040.

- 440 hectares of land allocated for green infrastructure including 90 hectares for sports pitches, 70 hectares for open space and 280 hectares for amenity areas.

- Land identified as strategic landscape buffers between Bicester and its surrounding villages.

- Improved strategic transport network.

Addressing the issues of transport, movement and access are crucial to support the large amount of expansion planned. Among these, there are a number of key priorities:

- Developing stronger east-west walking and cycling links, particularly to link new development with the existing town and to improve links to/from existing employment, as well as to better connect key areas of the town centre.

- Helping public transport to play an increasingly important role as the town expands and has a larger population more able to support routes.

- Improve the environment on the central route through the town to remove areas of congestion and address problem junctions, proposing changes to the Queens Avenue & Community College

junction, to St. John's Street to allow for two way traffic and improvements to the five arm junction at the northern end of Field Street.

• Through these measures to effectively reduce current and predicted congestion within the town centre.

• Promoting the eastern route around the town for longer distance and employment traffic by improving strategic road links including the delivery of a new link road to the south linking the A41 with the A4421.

The masterplan is currently under active revision with an updated version expected to be completed in early 2015. The sustainable transport strategy has informed the review of masterplan.
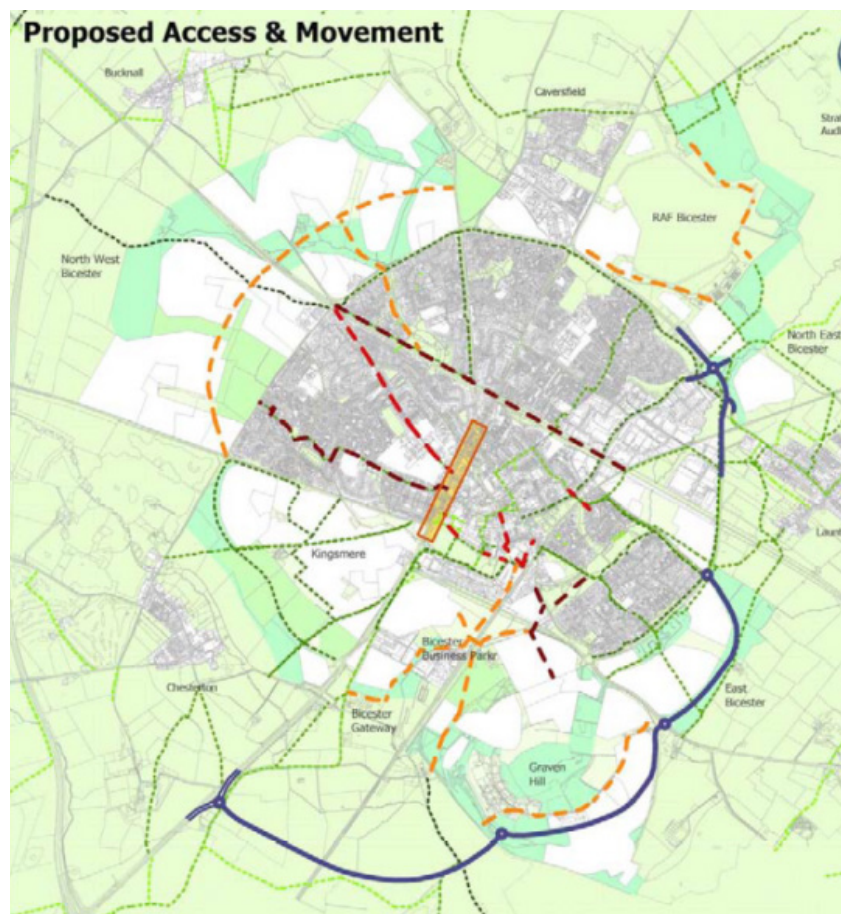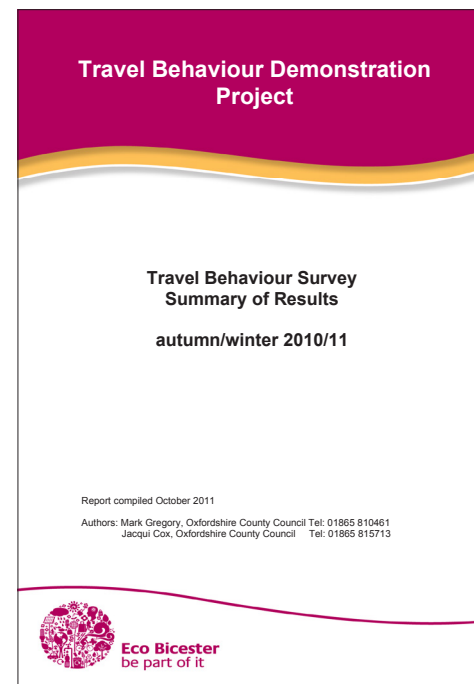

Figure 4.2: Bicester Masterplan Proposed Access and Movement Improvements

Travel Behaviour Demonstration Project (2011 & 2012)

In 2009 government (DCLG) announced NW Bicester as one of four locations which had the potential for an eco-town to be developed. Over the next year, the local authorities developed Eco Bicester – One Shared Vision in consultation with local businesses and local people. Eco Bicester is the future vision for the whole of Bicester. It is made up of numerous projects with the aim to make Bicester a better place to live and work. In support of this decision by DCLG, a fund was set up for projects that could illustrate the latest thinking in environmentally-friendly living. One of these projects was the Travel Demonstration Project with the aim of promoting transport by other means than the car with existing residents in the town. This was envisioned as a key project in delivering the transport elements of the Eco Bicester – One Shared Vision for the town.

Within the Bicester project, all methods of travel except single occupancy car journeys were promoted with the aim of maximising impact. The project took a comprehensive approach to the gathering of data in order to understand current levels of travel by alternative

methods. This enabled the measurement of the success of the project in the future and, in combination with a review of travel diary data, help determine whether the project was meeting its targets. A baseline of data was analysed from October 2011, with the intention of continuing the study with annual reports containing 6-monthly analysis. However, reports were only produced in January 2012 and August 2012, along with an update on the project status from April 2012.

In establishing the baseline of current travel patterns in Bicester, an in-depth household survey was carried out. This consisted of 2097 travel diaries filled out by randomly selected households in the Bicester area, as well as a smaller number of residents, who took part in face to face surveys. This survey established that car drivers and passengers combined made up 69% of trips. Within the eco-development this level was expected to drop to 50% and eventually 40%. The key results from the survey were:

• 86 percent of respondents said they liked living in Bicester.

• 53 percent of respondents owned 2 or more cars, which compares with 31 percent in the 2010 National Travel Survey. This high level of second car ownership will be challenging when trying to persuade more people to try alternative modes for some of their journeys.

• 24 percent of trips were work related, 17 percent were shopping trips and 30 percent were for leisure purposes. Transport policy often concentrates on commuter trips but this data shows how other trip purposes are just as important to consider.

• 22 percent of people walked, 4 percent used a bicycle, 48 percent were car drivers, 21 percent were car passengers, and 5 percent used public transport. Car passenger numbers increase a little at the weekends while public transport passenger numbers drop.

• Over 20 percent of trips of less than one kilometre were made by either car drivers or car passengers. The details of these trips need to be understood to see if this could be lowered, as well as looking at the trips made up to 3km and up to 5km.

• Around 75 percent of the leisure trips surveyed were made to destinations that were 10 kilometres or further away.

Understanding this type of finding highlights the need to link land use and transport planning.

- 48 percent of the trips surveyed were for journeys within the survey area. Increasing trips made by walking or cycling is more likely to be effective at the local level and this suggests good potential for this kind of change.

- Walking and cycling are seen as risky and public transport is perceived as slow and not delivering people to where they want to go. The project needs to understand these concerns and issues and look to address them.

- People support the need to invest and make improvements to public transport, cycling and walking networks and think these will have a more positive impact on travel behaviour than limiting car traffic and restrictions on parking.

- It was envisaged that there should be potential for increasing walking and cycling trips at the weekend, and that the issues causing the drop in public transport use needed to be understood. Data showed that the majority of employees travel out of Bicester for their workplace destination, while the majority of pupils and students travel within the town. Leisure trips made up a significant proportion of the overall and a number of these were made over a considerable distance. It was identified that there were a considerable number of trips of less than 3km in distance, which had potential for a switch to walking or cycling.

Further to this, the two annual monitoring reports collected data from a series of walking, cycling and vehicular counters installed at key locations across the town. The first report, compiled January 2012, used data for the month of October and also included bus data. The second report averages data over four months (January to April) and includes a comparison with the previously collected data. The locations of the traffic counters (which are almost identical to those for the first report) are shown in figure 4.3. Some interesting findings were:

- While numbers walking and cycling increased from January-March, there was a significant drop-off in April. This was thought to be due to unusually inclement weather during the month of April.

- Numbers walking and cycling decreased in most locations

between the two monitoring periods, with the magnitude of decrease ranging from 7-33%. In two locations, there was an increase in numbers walking and cycling (of 64% and 7%).

- The results from the walking and cycling counters indicate that in the majority of locations, the primary purpose of trips is leisure, while in others the primary purpose is as a school route (e.g. Love Alley).

The update on the Eco Bicester Travel Project from April 2012 detailed progress and the program of work for 2012-13. Progress included:

- A shared walking and cycling path being installed on Banbury Road north of Bure Park.

- Promotional activities including a challenge to people to replace one or more of their local short journeys usually undertaken by car with either walking or cycling. Incentives included access to a four week bike loan, free maintenance, cycle training and guided walks/rides.

- A map of walking and cycling routes.

- New bus stops on Boston Road, Middleton Stoney Road and Shakespeare Drive to serve the newly enhanced S5 service.

- The projected programme included:

- Target setting: to achieve a mode share ratio of non-car to car of 40:60 (from the baseline of 31:69), with a longer term aim of 50:50. Of the total number of trips per day (83,720), 57,767 are made by car. Thus, to achieve the 40:60 split the project would need to convert 7,534 car trips to sustainable modes per day, which could be achieved with a 2.25% change each year: a modal shift of 9% to sustainable modes over four years.

- Infrastructure improvements to include provision of walking and cycling facilities on the southern ends of Banbury and Buckingham Roads and on Churchill Road, linked in with a review of cycle parking and walking & cycling access to Bicester North Station. This work was to be followed with looking at walking and cycling provisions in the Highfield area (to tie in with work on access from the NW Bicester development) and between Langford Village and the town centre.

- Cycle parking was flagged up as an issue in the town with the long term aim of a cycle hub in the town centre and a short term aim of installing secure cycle parking at key destinations in the town.

- Improvements to routes to bring them up to standard needs to be undertaken by Oxfordshire County Council or Bicester Town Council, with additional maintenance carried out by local community groups, and possibly by Springfield Open Prison.

- Continuation of the promotional push including mapping, cycle loan scheme, cycle training, bike fix sessions, escorted walks and rides and the Cycle for Bicester Challenge System.

- Improvements to existing bus stops, including a review of stops requiring real time information.
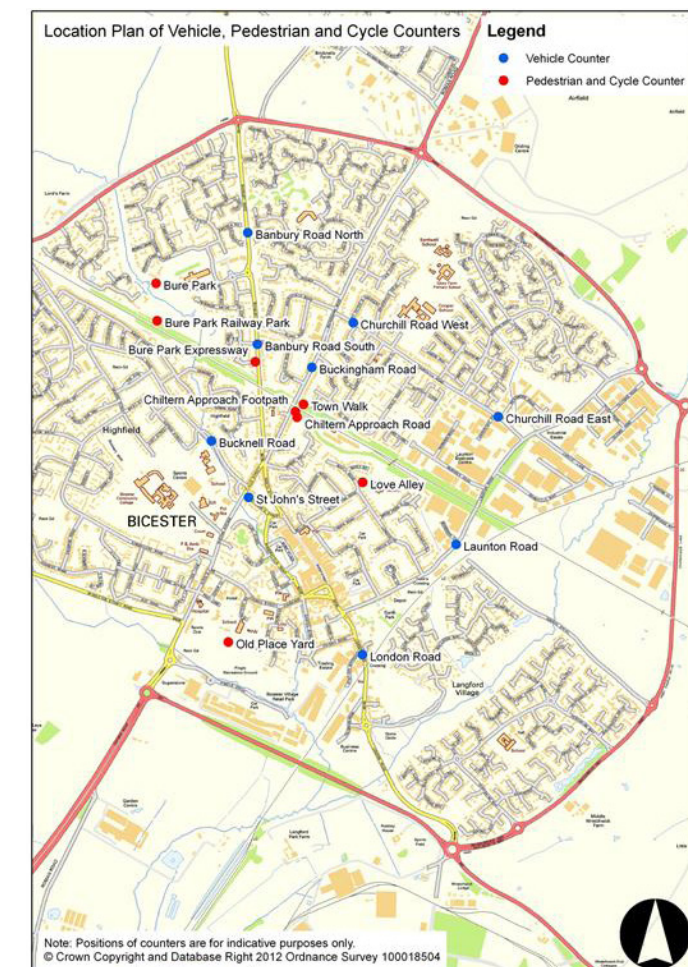

Figure 4.3: Locations of traffic counters, taken from TBDP Annual Monitoring Report January-April 2012

Alan Baxter

Transport Assessment for Whitelands Farm (Kingsmere) (October 2006)

A Transport Assessment (TA) was prepared for the Kingsmere development (currently under construction) which comprises 1,585 residential units, approximately 20,000sqm of B1 / B2 employment land, a hotel, a health village, a local centre (including 1,000sqm of employment) and associated amenities, a sports centre, open space and community facilities (including 2 primary schools and secondary school provision). This development is located on land at Whitelands Farm to the south west of Bicester, and is bounded by the A41 Oxford Road, the B4030 Middleton Stoney Road and the A4095.

As part of the development a new single carriageway link road (Vendee Drive) has been constructed between the A41 and the Middleton Stony Drive/A4095 junction. There are access points into the development from this link road as well as on Middleton Stony Drive (3 No.) and the A41 (1 No.). In terms of cycling there are a number of routes within the site and the intention is to connect these to previously identified improvements in the south west quarter of the town. The strategy for bus provision comprises the diversion of the existing local bus service 27 through the proposed development at a 30 minute frequency. In addition a stand-alone shuttle service between the site and central Bicester will be provided operating at a frequency of 30 minutes. This strategy will achieve 4 buses per hour to central Bicester and 2 trips per hour to Oxford in each direction. It is proposed that bus access to the proposed development would be from Middleton Stoney Road and the A41 Oxford Road with a route through the site via the local centre.

It is assumed in the TA that during peak hours 60% of trips will be by car mode and 40% by non-car mode. No wider highway improvements are considered necessary to mitigate the impact of traffic generated by the development.

Transport Assessment for Graven Hill (September 2011)

Graven Hill is an MOD development on the south east edge of the town directly adjacent to the A41. The development comprises 1,900 homes and a local centre containing a primary school, community hall, shops, foodstore, pub/restaurant and offices.

Access to the development will be via the existing A41/A4421 roundabout that will be subject to an improvement. In addition, the existing A41/Pioneer Road junction will be re-modelled as a roundabout to create a second site entrance. Wider walking and cycling connections will comprise toucan crossings as part of the signalisation of the A41/A4421 roundabout, a toucan crossing to the west towards Langford Park Farm and the upgrading of an existing underpass on the A41 even further to the west. The bus strategy is for the diversion of the existing S5 service into the northern part of the site providing a link to the retained MOD facility in Upper Arncott as well as a new 15-20 minute frequency service to the town centre and both rail stations.

The TA assumes that 73% of external trips would be by car mode in the peak hours. The number of internal trips is identified but a modal split is not applied so it is not possible to determine the overall proportion of car and no car mode trips.

Transport Assessment for North West Bicester – Exemplar Site (November 2010)

A Transport Assessment was prepared for the North West Bicester Exemplar Site which comprises 394 homes (30% of which will be affordable), land for a primary school, eco business centre, eco pub, local shops, children's nursery, community centre and energy centre. The site is located to the west of the B4100 Banbury Road, north west of the existing town.

In terms of access two new junctions are proposed on the B4100 (Banbury Road) one being south of Home Farm and the other to the north, south of the Banbury Road lay-by. A 3m wide walking and cycling route is proposed on both sides of the Banbury Roads, southwards from the southern access junction to the ring road. Toucan crossings are also proposed to link to the eastern side of Banbury Road and to Caversfield as well as a further connection on the ring road (A4095 Lord's Lane) to connect into the existing town cycle network. A bus service with a 30 minute frequency is proposed linking the development with Bicester North Rail Station, the town centre and Bicester Town Rail Station. Within the development the bus route will run one way anticlockwise entering through the northern access and exiting through the southern access (See Figures 4.4 and 4.5).

It has been assumed that in 2026 the movement patterns from the exemplar site will be 50% by car and 50% by non-car modes. To mitigate the impact of traffic generated by the development minor improvements to three existing junctions are proposed these being the A4095 Howes Ln/Bucknell Rd, the A4095/B4100 Banbury Rd and the A4095 / A4421 Skimmingdish Lane.

In conjunction with the Transport Assessment a draft Travel Plan has been prepared but this has not been reviewed.
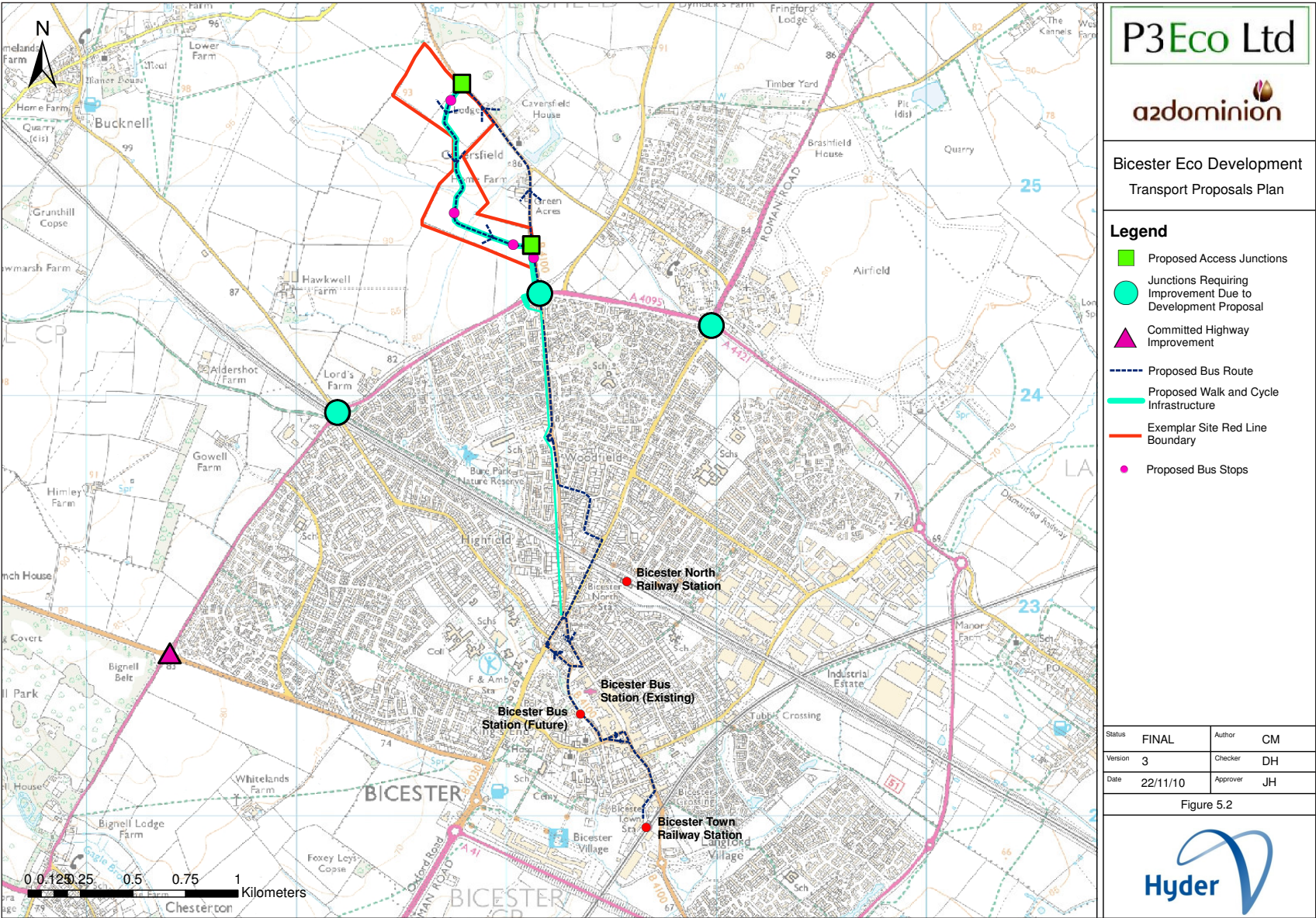
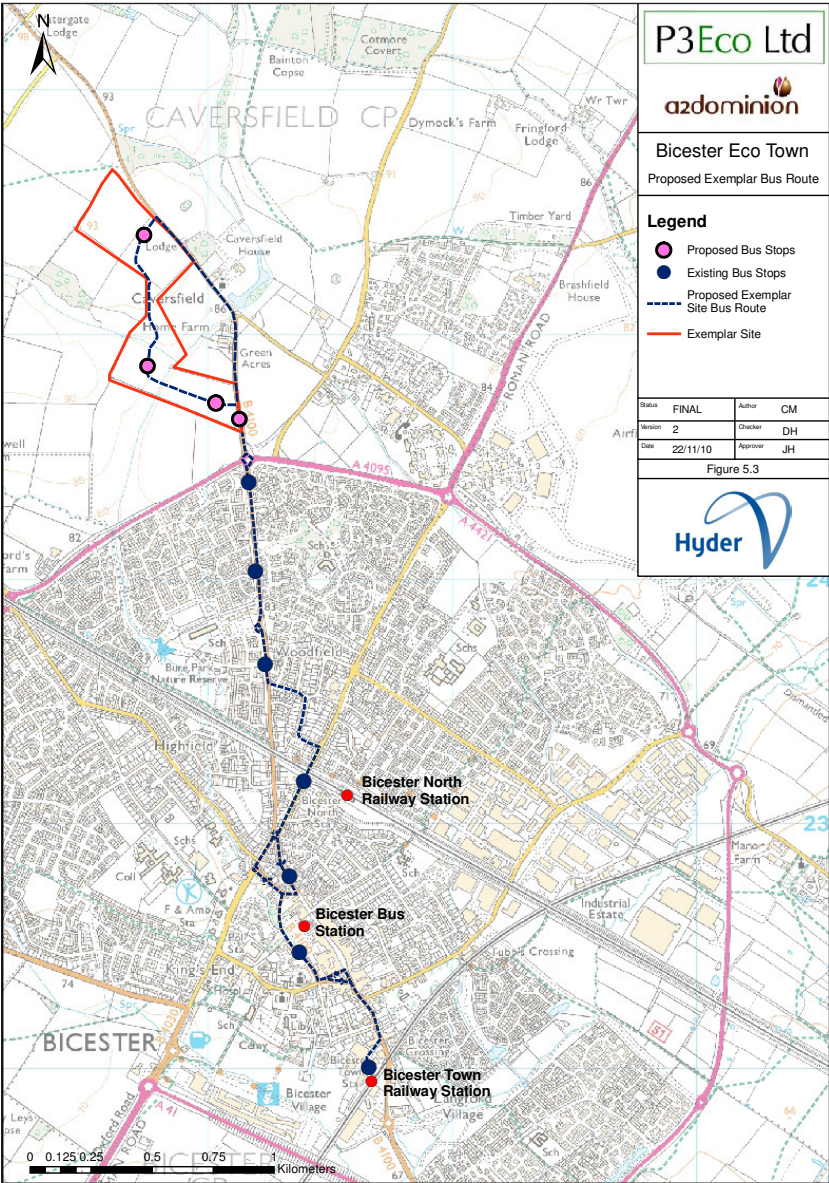Figure 4.4: NW Bicester Examplar Site - Transport Improvements

Figure 4.5: NW Bicester Examplar Site - New Bus Service

Alan Baxter

Technical Transport Notes for North West Bicester (2013 & 2014)

These Technical Notes were current at the time of the review (April 2014). Subsequently they have been incorporated into an overall Movement and Access Strategy prepared by A2 Dominion.

Technical Note 3 – Walking and Cycling Linkages (October 2013)

This technical note provides recommendations for future improvements in order to encourage walking and cycling to and from the North West Bicester development. As part of the work for the technical note a detailed cycling and walking audit was undertaken broadly for the area of the development, the western part of the town, the town centre and the areas around the existing rail stations. The main issues to emerge from the audit are:

• Infrastructure in the more recently constructed residential areas (Bure Park and Southwold) is of a higher standard than that in the older areas

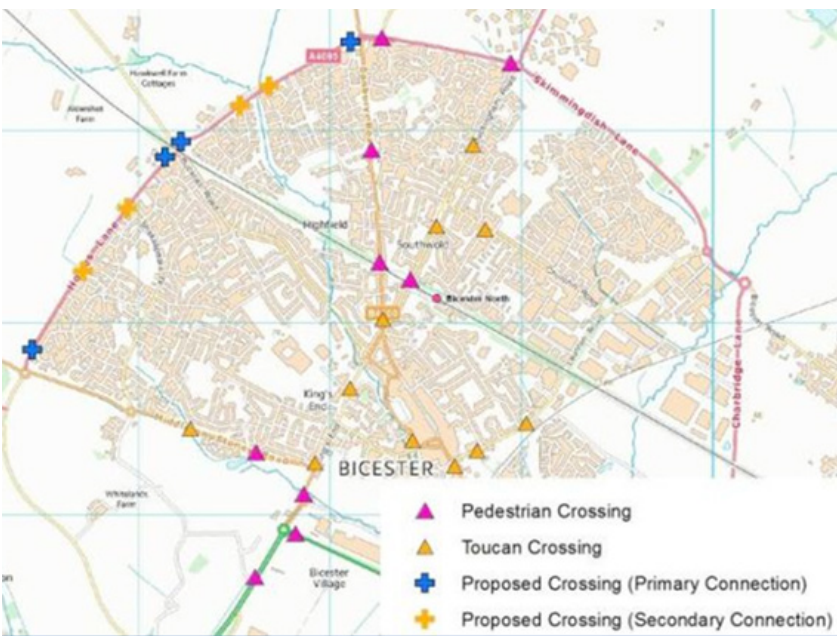• The quality of signage is generally an issue throughout the town

• Perception of personal safety is an important factor and in connection with this there are issues with the level of lighting and seclusion on certain routes

The technical note sets out a walking and cycling strategy formulated with regard to national guidance.   The following are identified as being the key principles for the strategy:

• Accessible and integrated

• High quality

• Safe

• Well signed and marketed

The overall recommendations for encouraging walking and cycling in the town are:

• Provide good quality signage to deliver information on routing, distances and times to key destinations

• Identify a network of primary and secondary walking and cycling routes. The primary routes are those which can best meet the criteria for a high quality network

• Prioritise improvements to the identified network to encourage walking and cycling to and from NW Bicester

The identified network and crossings of existing roads are illustrated on Figures 4.6 and 4.7. The principles for primary connections are segregation from traffic, having an all-weather surface, being well-lit and following a direct route. The principles for secondary routes are using quiet traffic streets and sympathetic design in environmentally sensitive areas. Recommendations for improvements to the primary and secondary network are made.

Technical Note 1 – Residential Car Parking Levels (June 2013)

This technical note sets out a number of options for varying car parking provision to inform the development of the masterplan. These options have been developed within the maximum parking standards in the OCC guide 'Parking Standards for New Residential Developments'. The note suggests that different parking zones could be established in response to density and accessibility. The following options are assessed:

• Option 1 – Minimum provision

• Option 2 – Low provision

Figure 4.6 Existing and Proposed Pedestrian Crossings

Figure 4.7 Proposed Primary and Secondary Cycling Network
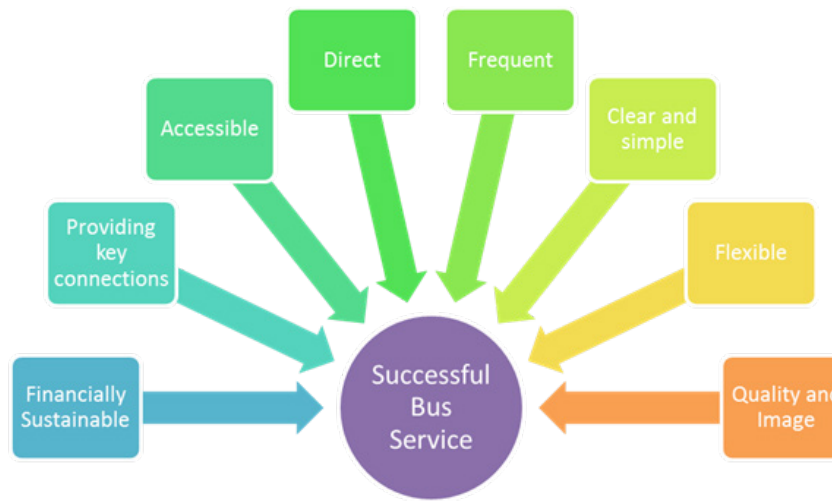
Figure 4.8 Components of a Successful Bus Service for NW Bicester

- Option 3 – Medium provision

- Option 4 – Provision similar to the Exemplar site

- Option 5 – Maximum provision

The technical note does not come to firm conclusions other than suggesting that at least two types of zones are created – one with a high level of accessibility/density and one with a lower level of accessibility/density.

Technical Note 6 – Bus Strategy (February 2014)

This technical note sets out the objectives and strategy for bus provision for the North West Bicester development. Background is provided in terms of policy context, existing services and existing levels of occupancy. Surveys were undertaken on a Friday (Market Day) 14th June 2013 and should therefore represent the busiest day of the week.   The average occupancy for buses arriving at Market Square were relatively low throughout the day with the average being 50%. The X5 services is the most well utilised with a maximum of 92% occupancy during the inter peak and peak periods. There was a similar pattern for buses leaving the Market Square.

The technical note establishes a series of aims for a bus service for the development but acknowledges that there is a potential for conflict and a need therefore for balance.

In terms of key connections reference is made to the need to connect origins and destinations more than 2km apart. Key connections are considered to be:

- The town centre

- Bicester Town Rail Station

- Launton Road industrial estate and Graven Hill

- Existing secondary schools (Bicester Community College and the Cooper School)

- Park and Ride site in SW Bicester

Bicester North Station is not included as the view is that its role will diminish once the Evergreen 3 proposal has been implemented.

Figure 4.9 – Preferred Bus Route Option 8

Figure 4.11 Phase 2 and 3 Bus Routes

Figure 4.10 – Phase 1 Bus Routes

Figure 4.12 Phase 4 Bus Routes – Full Service Development

Alan Baxter

In relation to frequency, the aspiration is for a turn up and go service with a minimum of a interpeak frequency of 15 minutes and peak frequency of 10 minutes.
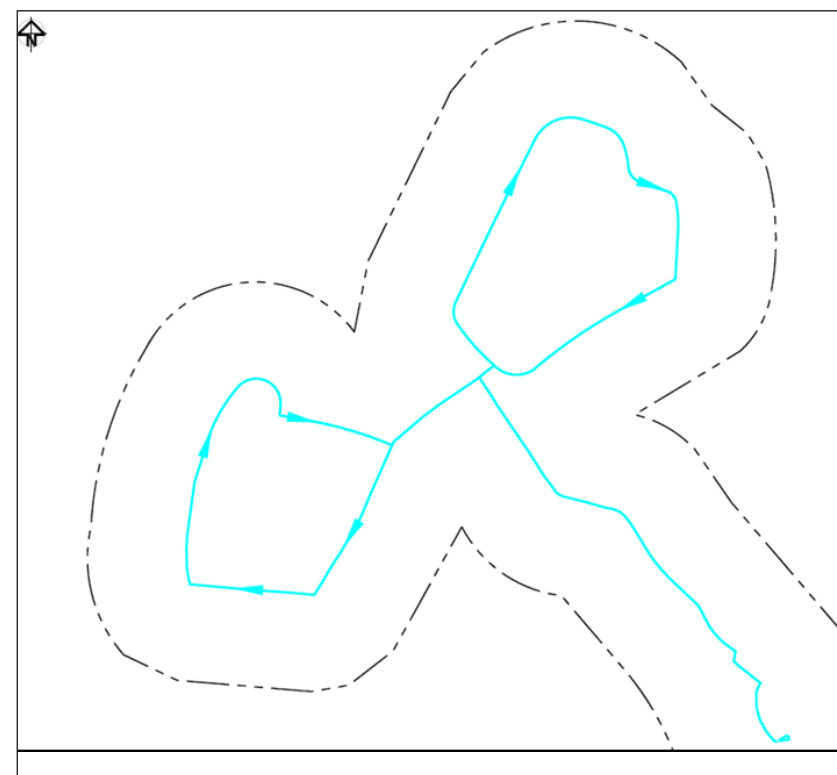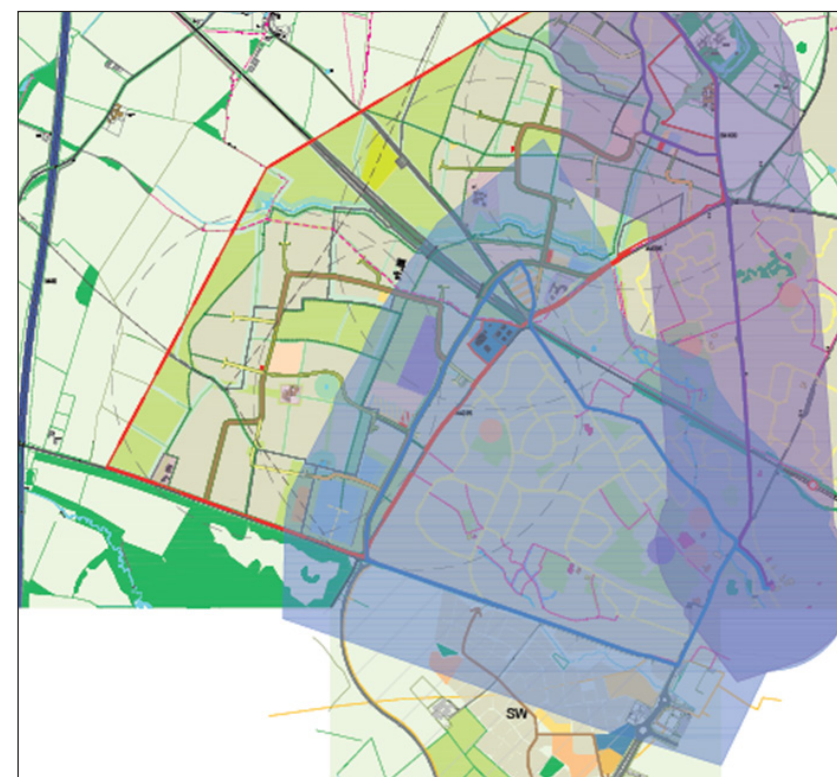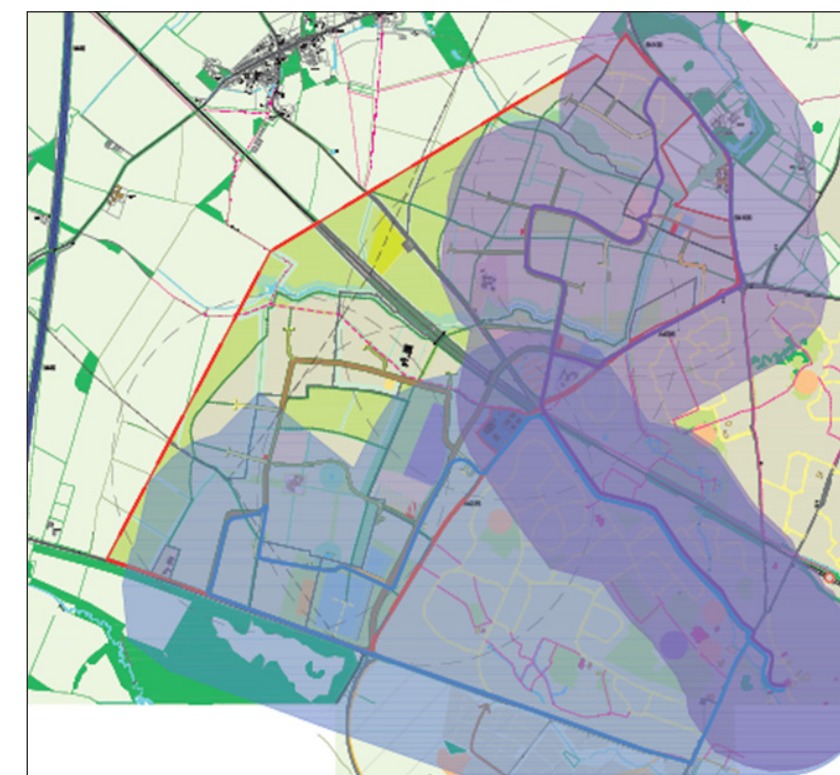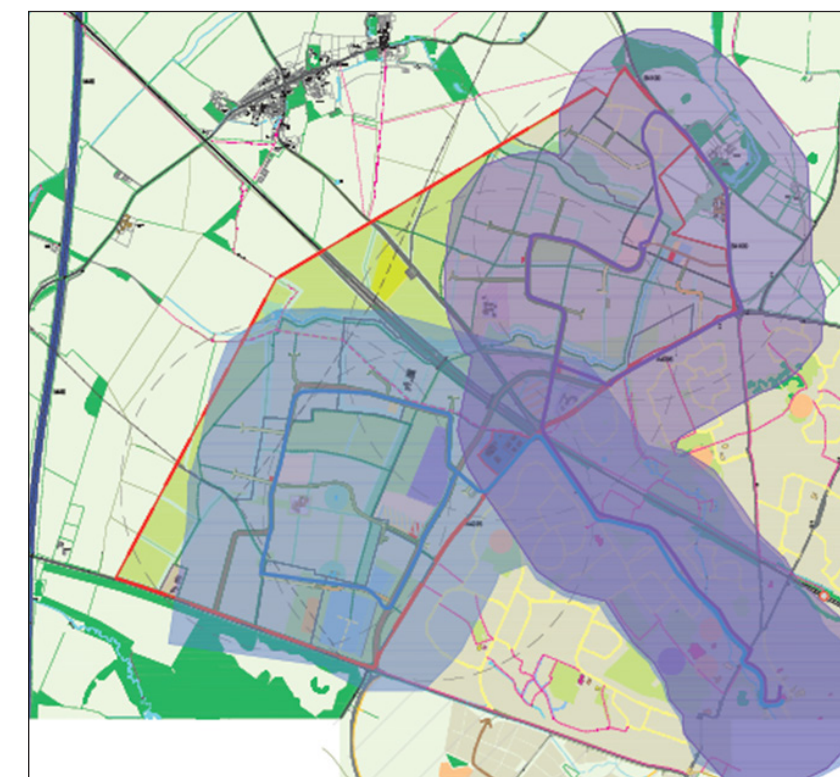
Eight bus routing options have been considered all with the initial assumption that these would terminate in the town centre. It is acknowledged that ultimately these would continue onto Bicester Town Rail Station and the employment areas. The development site is bisected by the railway line and reference is made to a bus only bridge giving benefits in terms of journey distances and significant disadvantages in terms of capital costs, flexibility and accessibility. Option 8 is identified as offering the best balanced solution for a bus provision giving a loop to the east and west with the town centre connection being via Bucknell Road. This option does appear to rely on a road connection across the railway line.

Further refinement of Option 8 (See Figure 4.9) has been undertaken alongside consideration of phasing. This has amended the proposals so that there are two separate loops north and south of the railway line. The desire to provide an attractive service to and from the town centre has been prioritised over the disadvantages in terms of connectivity with the development. The proposed phasing of the bus route is illustrated in Figure 4.10 - 4.12.

Various assumptions are made about operating costs and revenue and this indicates that subsidy would be needed until around 2035 when 5,000 units are completed.

Technical Note 7 – Trip Generation (January 2014)

This technical note sets out the proposed methodology for calculating the number of trips generated by each land use for the NW Bicester development. The target 2031 modal share for the development are set out in Figure 4.13.

Trip rate calculations have been undertaken for the following land uses:

• Residential

• Employment

• Education

• Community, Health and Care

• Retail and Leisure

Average trip rates have been used and various assumptions made about journey purpose, modal split and destinations within the development, within the town and outside of the town.

Figures 4.14 and 4.15 summarise the total trips generated by the development and the level of containment.

A sensitivity test has also been undertaken using 85th percentile person trips rates for residential land uses.

Mode	2031 PPS Target all trips		2031 Internal trips		2031 External trips within Bicester		2031 External trips outside of Bicester	
	% by mode	Total Car/ Non Car	% by mode	Total	% by mode	Total Car/ Non Car	% by mode	Total Car/ Non Car
Car driver	40%	50%	7%	14 %	35%	52%	57%	77%
Car passenger	10%		7%		17%		20%	
Bus passenger	10%	50%	1%	86%	5%	48%	11%	23%
Bicycle	10%		10%		10%		7%	
Walk	30%		75%		33%		5%	
Total	100%	100%	100%	100%	100%	100%	100%	100%

Figure 4.13 Target Model Split

Mode	AM peak (08:00 to 09:00)			PM Peak (17:00 to 18:00)			12 Hour (07:00 to 19:00)		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Car driver	955	1422	2377	1275	1021	2296	9604	10073	19677
Car passenger	398	636	1033	530	415	945	4047	4247	8294
Bus passenger	168	249	418	227	183	409	1697	1781	3478
Bicycle	213	409	622	287	213	499	2258	2376	4634
Walk	731	1860	2591	1014	682	1696	8393	8869	17262
Total	2464	4577	7041	3333	2513	5846	26000	27345	53345
Mode Share (% Car)			48%			55%			52%

Figure 4.14 Total Trips by Mode

Containment	AM peak (08:00 to 09:00)			PM Peak (17:00 to 18:00)			12 Hour (07:00 to 19:00)		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Within NWB	550	1906	2456	833	508	1342	7148	7604	14751
Within Bicester	794	1062	1856	944	715	1659	7463	7783	15247
Outside of Bicester	1120	1609	2729	1555	1290	2845	11389	11958	23347
Total	2464	4577	7041	3333	2513	5846	26000	27345	53345
Within NWB			35%			23%			28%
Within Bicester			26%			28%			29%
Total Containment			61%			51%			56%

Figure 4.15 Trip Containment

Scenario	Do Minimum Modal Share	Sustainable Travel Target Modal Share	PPS1 Target Modal Share
Do Minimum Containment	25% of trips contained within NW Bicester and 50% within Bicester No more than 69% of trips by car modes	25% of trips contained within NW Bicester and 50% within Bicester No more than 45% of trips by car drivers/ approximately 60% car modes	25% of trips contained within NW Bicester and 50% of trips within Bicester No more than 50% of trips by car modes
Medium Containment	35% of trips contained within NW Bicester and 60% within Bicester No more than 69% of trips by car	35% of trips contained within NW Bicester and 60% within Bicester No more than 45% of trips by car drivers/ approximately 60% car modes	35% of trips contained within NW Bicester and 60% within Bicester No more than 50% of trips by car modes
Maximum Containment	45% of trips contained within NW Bicester and 70% within Bicester No more than 69% of trips by car	45% of trips contained within NW Bicester and 70% within Bicester No more than 45% of trips by car drivers/ approximately 60% car modes	45% of trips contained within NW Bicester and 70% within Bicester No more than 50% of trips by car modes

Figure 4.16 Containment and model share

Technical Note 5 – Mode Share and Containment (August 2013)

This technical notes sets out some assumptions regarding mode share targets and the anticipated level of containment. The note sets out the policy context in relation to PPS 1 and the baseline position regarding existing movement patterns. Key characteristics of the existing situation are:

- Work related journeys account for 37% of all trips

- 69% of trips made by residents are by car modes (drivers and passengers) and 31% by no-car modes

- 56% of trips by residents are contained within Bicester

- 20% of work trips are contained within 3km of the town centre

- 48% of car trips are made within Bicester and 52% are to destinations outside

Three scenarios each for modal share and containment are identified. For modal share these are:

- **Do Minimum Modal Share** – this would involve maintaining modal share at current levels, i.e. 69% of all trips by car modes (driver and passenger) and 31% by non-car modes;

- **Sustainable Travel Target Modal Share** – achieving a maximum of 45% of all trips by car drivers for NW Bicester;

- **PPS1 Target Modal Share** – achieving a maximum of 50% of all trips by car modes, thus meeting the stringent targets of PPS1.

For containment these are identified as Do Minimum Containment, Medium Containment and Maximum Containment.

These are combined to create nine scenarios as summarised in Figure 4.16.

Oxfordshire County Council Transport Schemes

Oxfordshire County Council in their role as Highway Authority are progressing a number of transport schemes within Bicester.

Park and Ride – South West Bicester

OCC have been promoting a park and ride facility in south west Bicester adjacent to the A41/Vendee Drive junction. The purpose of the facility is primarily to act as a remote park and ride for Oxford and a local park and ride for Bicester Village. The scheme comprises 580 car parking spaces, 60 cycle spaces plus bus lay-bys and passenger waiting facilities.

Detailed planning consent was secured in early 2014. The intention is that, at least initially, parking would be free of charge and travel to and from Bicester Village would always be free. There maybe the need for a mechanism to reimburse Bicester Village visitors if charging is introduced. The development of the Park & Ride is partially dependent upon the Tesco store moving (currently Tesco occupies a site to the west of Bicester Village), which would allow Bicester Village to expand and thus anticipate larger customers numbers.

Peripheral Routes

A number of improvements to the existing highway network are being progressed in association with planning consents for various developments. These are:

• A new junction on the A41 south of the 'Esso' Roundabout to provide access to a business park and a new Tesco superstore. The Tesco store is being relocated to this site to facilitate expansion of the Bicester Village.

• Improvements to the 'Esso' roundabout on the A41 being promoted by Bicester Village.

• Improvements to the A41/A4421 roundabout as part of the Graven Hill development.

• Improvements to the B4100 and the A4095 as part of the NW Bicester Exemplar site.

Market Square Improvements

OCC have previously undertaken a consultation (2009/10) on improvements to the Market Place in the town centre – two options were presented for feedback. Further design work was commenced in 2014 but is now on hold. It is understood that there is some concern from local retailers about loss of parking associated with the improvements.

Town Centre Access Improvements Phase 2

In late 2013 OCC completed improvements to St John's Street and the southern end of North Street. There is an allocation in their capital programme to progress improvements of a similar nature on Bell Lane and the north western end of Sheep Street. Design work is expected to be undertaken in 2014/15 with implementation in 2015/16.

Southern Connectivity

This is a project to improve access for sustainable modes across the southern part of the town connecting the new residential areas of Graven Hill with existing and new employment areas. A particular issue in this part of the town is overcoming the barriers of the railway line, the A41 and small watercourses/rivers.

Cycle Network

OCC have identified the need to progress improvements to cycling facilities on Banbury Road, Buckingham Road and Churchill Road. This work is at feasibility stage only.

5.0
European and UK Best Practice

5.1 Summary

Information on European and UK Best Practice has been obtained from publically accessible sources, case study visits and as information produced for the Oxford Cycling Strategy.

Key messages from European best practice are:

• Commitment to policies favouring sustainable transport modes, implemented consistently over a sustained time period, both in terms of infrastructure and other measures.

• Integrate land use, development density and transport planning to manage travel demand and maximise the potential for journeys to be undertaken by sustainable modes.

• Invest in cycling infrastructure – this is a powerful way to market cycling and the priority being given to it as a mode.

• Create a coarse grid for vehicles and restrict or prevent traffic access to town centres. Restrict or prevent traffic movement across or through a town.

• Implement 20 mph zones in residential areas.

• Create a fine grain cycling grid. Cycling network to be comprehensive, continuous and consistent.

• Create cycle paths that are separated from trafficked carriageways. Allow unrestricted and direct movement on foot and by bike but make movement by car indirect. Ideally, segregate pedestrians and cyclists.

• Use filtered permeability to give sustainable modes an advantage.

• Provide sufficient cycle parking in town centres.

• Locate car parks on the edge of town centres.

• Introduce integrated and financially attractive public transport ticketing. Maximise frequency of buses – ideally a service every 10 minutes.

• Establish targets and monitor progress annually.

Key messages from UK Best Practice are:

• Establish a comprehensive governance structure that embeds cycling across a range of service areas for which a local authority is responsible.

• Reduce vehicle speeds.

• Establish targets and monitor progress annually.

• Invest at least £10 per head per annum and preferably more.

• Investment in cycling infrastructure and supporting measures have a proven benefit in terms of increasing cycling levels and in the broader financial return

• Segregated cycle facilities similar to those that are commonplace in Denmark and the Netherlands are feasible in the UK.

• Topography and infrastructure are genuine barriers to movement on foot and by bike. Investment in new infrastructure to overcome or break down these barriers have proven benefits in terms of increased levels of walking and cycling.

• Smarter Choices programmes have proven benefit in terms of increasing movement by sustainable modes

5.2 European Best Practice

Houten, Netherlands

Population: ~ 50,000 (2012)

City form: The town is built around two railway stations, each with a ring road, with distance 1km from the centre to the edge.

Modal split: Walk 27%; Cycle 28%; Public Transport 11%; Car 34%.

Houten in the Netherlands has many parallels with Bicester in terms of its demography, housing market, urban context, relationship to strategic infrastructure and scale of growth. Situated 8km southeast of the much larger conurbation of Utrecht (population 300,000), Houten is essentially a commuter town. Immediately to the west of the town is the A27 motorway, and Houten has two rail stations, which provide frequent and rapid connections to Utrecht (north west) and to Geldermalsen (south east).

Houten has grown rapidly over the last 40 years. In 1966 the government identified Houten (its population at this time was only 3,000) as a high growth area, planned to eventually accommodate a population of 100,000. This was followed in 1968 by a plan by Dutch architect Rob Derks, which focused strongly on filtered permeability: providing a dense network of direct routes for cyclists and a coarse network of general roads, meaning limited city centre access for cars.
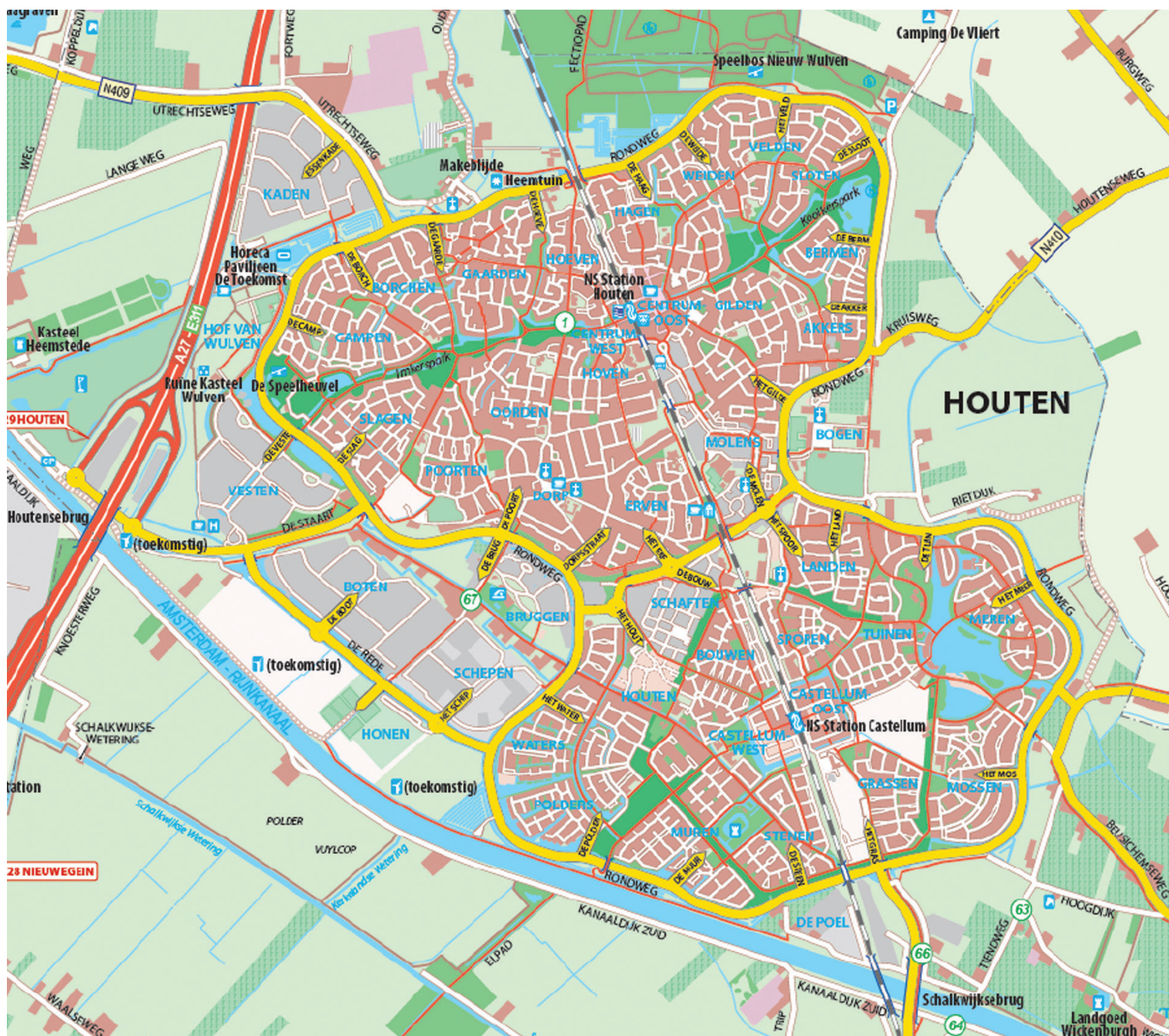
AlanBaxter

Figure 5.1: Houten Urban Structure

Principle Cycle Path

Principle Cycle Street

Principle Route Under Development

Cycle Path

Secondary Route

Red: free cycle paths, Orange: shared roads (fietsstraat / bicycle street) belonging to the cycle structure of Houten

Figure 5.2: Strategic Cycle Network

Construction on the first ring road began in 1978, and further infrastructure was also publicly funded. In 1994, Houten was again designated as a new growth area under the Dutch government's Vinex programme , which was the impetus for constructing Houten's second train station.

Houten's urban design does not neglect the car, but provides a spatial layout that gives priority to cyclists. The city is oriented around its two railway stations, each surrounded by a ring road (north and south ring roads) with an approximate radius of 1km. Thus, no one lives more than 2km away from a station. Rail services to Utrecht (10 minutes) and Geldermalsen run 4 times per hour, and Houten also has bus connections to Utrecht and other regional centres. Public transport users in Houten can use the OV-chipkaart, a contactless smartcard, which will eventually be used on all public transport in the Netherlands. A business park is located in South Houten close to the border between the two rings, providing employment; while the historic city centre is located in the southwestern part of the northern ring. This consists of a plaza surrounded by shops and restaurants as well as several historical buildings, including a church dating back to the 1500's. There are 31 residential districts, which are accessible for cars only via the peripheral ring roads – arranged like 'petals of a flower'. The city is covered by an extensive 129km network of bicycle paths. This bicycle network includes a thoroughfare that passes directly through the town centre, and along which the majority of schools and important buildings are located. As a result of this design, cycling is the most direct mode of transport, and often faster than travelling by car.

City policies consistently favour cyclists and pedestrians. The town's cycle paths are coloured brick-red and are completely separated from traffic in the city centre, although motorised scooters may use them. Only in residential areas do bikes share roads with cars, where speeds are limited; the streets are traffic calmed to maintain safety; and cars are required to give priority to cyclists. Bicycle tunnels and bridges have been built under or over the ring roads so that neither bicycle nor car traffic are interrupted. Urban design features are used to mark the transitions between ring road and residential areas: large buildings are located at these transition points and there is a change in road surface from asphalt pavement to bricks, plus a fork to slow down car speed. Additionally, no residential street is straight for more than 75 meters, helping to maintain safe vehicle speeds.

Cycle Infrastructure and Facilities in Houten

Alan Baxter

Other factors which support sustainable transport in Houten include:

- The OV-Fiets: public transport bicycle service which integrates bike rental with the Dutch public transport system – there are now over 160 rental points, mainly located at train stations. Bikes may be rented for up to 20 hours.

- Educational programs for children: in the health benefits of cycling & cycling safety, and

- Employer contributions: Dutch companies are required to compensate employees for their transport to work. The city of Houten goes beyond national policy by restricting companies to offering transport subsidies related to bikes and public transport.

Although many work trips are still made by car, the majority of Houten residents choose to travel by bike or on foot to the grocery store (53%), conduct other shopping (70%), run service related errands like visiting the bank (79%) and visit friends and family in Houten (79%). For trips of less than 7.5km in distance, 42% of journeys are made by bicycle and 21% of journeys are done on foot. The city has been so successful at promoting cycling and transit that over-crowding has become an issue. Bicycle parking facilities are currently being supplemented, and Houten Castellum station was recently renovated with additional track capacity added.

Houten Town Centre
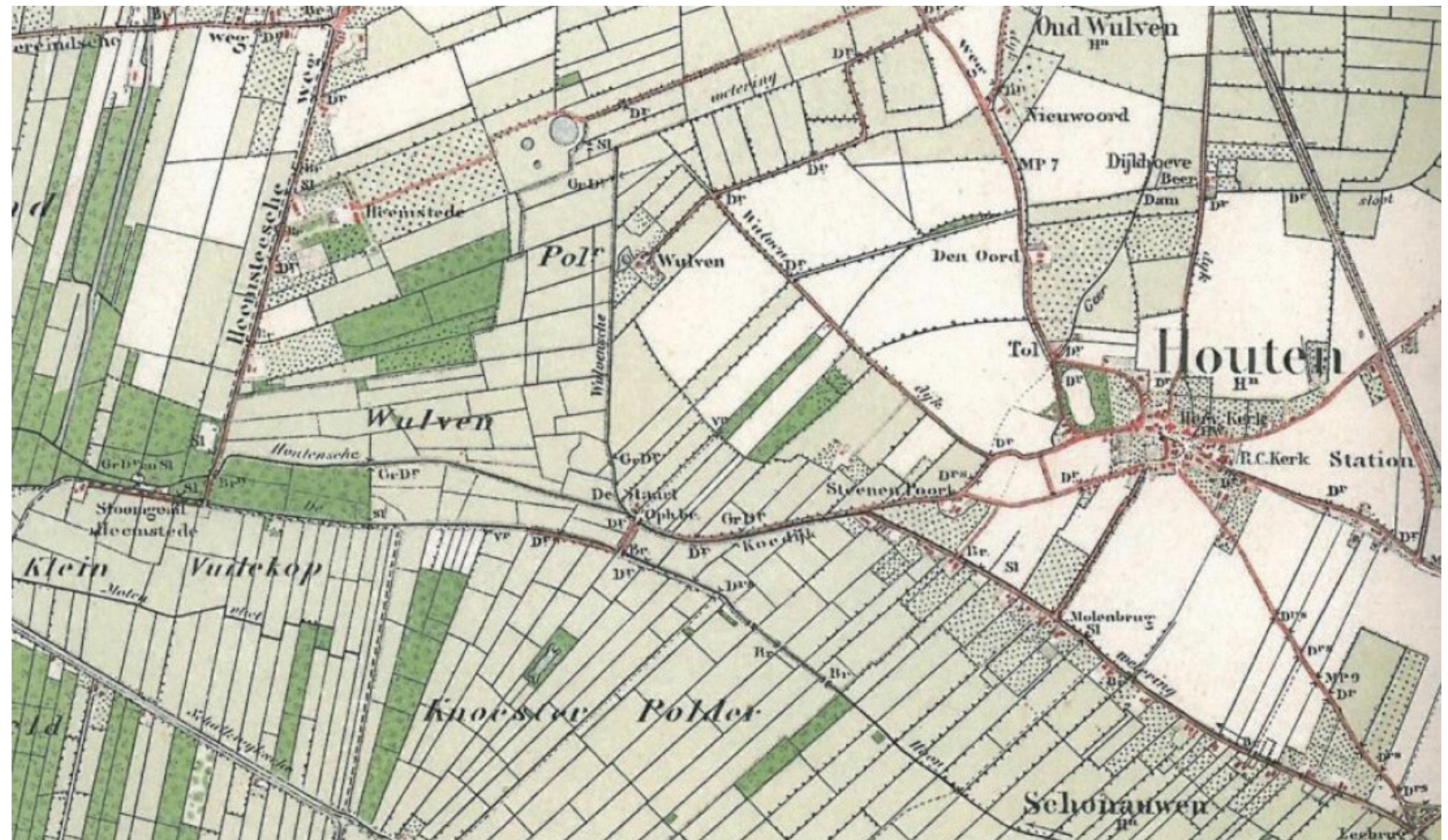
Houten prior to 20th Century expansion

Cycle Infrastructure and facilities in Houten

Alan Baxter

Freiburg, south west of Germany

Population: ~230,000 (2012)

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

Modal Split, commuting (2004): Walk 24%; Cycle 28%; Public Transport 18%; Car 29%
Vauban district, all trips (2010): Walk/Cycle 64%; Public Transport 19%; Car/Motorcycle 16%
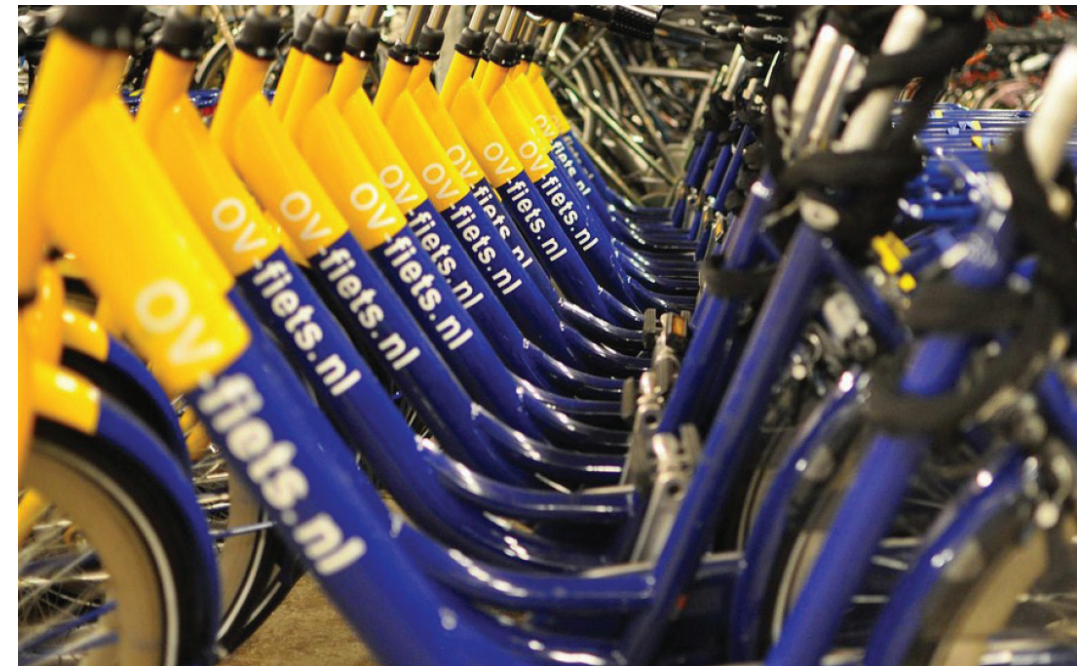
Freiburg, an oft-quoted example in the UK, is considered Germany's capital of sustainable living. It was not always so: in the 1950s and 1960s, Freiburg's land-use plan endorsed geographic expansion and the use of motorised vehicles grew rapidly in Freiburg (higher than Germany as whole). A shift in public opinion led to a policy change in the early 1970s, which reversed this trend. In the period 1982-2007, car use decreased from 38% to 32% of all trips, the modal share of bike trips almost doubled (15% to 27%) and public transport use rose by more than half (11% to 18%). The number of trips with walking as the main mode actually decreased (from 35% to 23%), thought to be due to the introduction of low-cost public transport passes in 1984, which are transferable within households (Umwelt Karte, extended in 1991 to surrounding region). Accordingly, transport CO_2 emissions in Freiburg in the period 1992-2005 fell by 13.4% and travel is safer than the German average (3.7 versus 6.5 fatalities per 100,000 inhabitants, 2005). Additionally, social equity and the viability of public transport are high (operating costs only require 10% subsidy by government funding, 2008). During this period, Freiburg also experienced significant growth in population and its economy, becoming for example, Germany's leader in green industries.

Radical but coherent policies implemented incrementally led to this success, and crucially, restrictions on motorised transport have been balanced by convenient, cost-effective and safe alternatives. Since 1973 the medieval city centre has been progressively pedestrianized (with a view to preservation), the light rail system has been maintained and in 1983 the first new tram route opened. Cars have been banned from the city centre, there are limited through routes for traffic, arterial routes have been widened or altered to increase

their capacity, the speed in residential areas is limited to 30kmph and parking has been provided at the edge of the car-free zone. 1970 saw the first bike network plan, with 29km of unconnected cycleways in 1972. Cycle infrastructure now comprises a fine grain network of 500km of cycleways which is characterised by its comprehensiveness, continuity and consistency. There are 5000 cycle parking spaces in the city centre as well provision at tram stops and 1000 spaces at the rail station. The overall approach is one of filtered permeability in which sustainable modes are separated from private motor traffic in order to give them an advantage in terms of speed, distance and convenience.

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

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

The city's land use planning policies have favoured concentration around public transport routes and appear to have encouraged development at relatively high densities compares to UK cities of a similar size. Neighbourhood shopping centres and local markets are favoured by planning policy with large retail outlets in the city centre. There are also some 'out of town' retail parks, particularly to the north west of the city.

The principles of the transport strategy for the city are:

• Extension of the public transport network

• Promotion of cycling

• Traffic restraint

• Channeling of motor traffic

• Parking space management

Two new districts of Freiburg are noted for their sustainable transport: the Rieselfeld neighbourhood (developed 1994-2010)

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

Groningen, north east of The Netherlands

Population: ~190,000 (2011)

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

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

In recent years Groningen has alternated with Zwolle as the city with
the highest proportion of bike trips in the Netherlands with up to
57% of all trips made by this mode. Much as with Freiburg, it was not
always such a successful city in terms of the quality of life brought
about by high levels of walking, cycling and public transport use. The
rise of the motorcar in the 1950s and 1960s lead to planning policies
that favoured motorised transport, with car ownership in Groningen
above the national average. However, a traffic plan for an inner
ring road around the city centre in 1969 met with much resistance,
ultimately leading to a change of emphasis in urban development.
The new vision was one of a 'compact and complete city', with the
historic centre conceived of as a 'living room' for the people, favouring
pedestrians, cyclists and an integrated public transport system.

In 1977 a new traffic system was introduced that divided the historic
core into four sectors, with an inner ring road built to encircle the
centre. In this way, access by car was severely restricted: the only way
to travel between sectors is by foot, bicycle or public transport. Car
traffic is not completely removed, but is directed towards nearby car
parks as efficiently as possible. The many traffic-free cycleways also
meant that cycling was often the quickest mode of transport. During
the 1980s traffic policy aimed to accommodate growing levels of
motorised transport through infrastructure investment, which in fact
led to ever higher levels of traffic: solving one congested junction
simply relocated the bottleneck. The futility of this was recognised,
as were the environmental and social consequences of excessive
motor traffic, leading to policies favouring sustainable transport. The
completion of the full ring road system in 1987 restricted car traffic
to main routes and made it possible to reserve the Lelieboulevard for

Cycle facilities in Gronginen

Alan Baxter

foot and cycle traffic in 1994. The emphasis on quality of life led to priority for journeys by foot, bicycle and public transport, motor traffic in the city centre was further restricted to goods and service vehicles. Car-drivers are provided for with 11 Park and Ride garages (3600 parking spaces). An important part of the policy is road safety: a speed limit of 30kmph was introduced in all residential areas. Further, there are restrictions on the location of shopping facilities e.g. supermarkets may not be built adjacent to motorways, maintaining focus on the city centre as the main shopping location with neighbourhood retail centres for daily shopping.

Filtered permeability is an explicit element of transport policy for the city described as creating a coarse grain for private motor vehicles and a fine grain for cycles. The policy has three related strands: creating shortcuts for bicycles (and buses in some places), channelling of through traffic onto a limited network of roads within minimal obstructions and the creation of artificial dead ends and other traffic-free areas to make car travel more circuitous, less convenient and more time consuming than bike travel. Various methods of achieving this filtered permeability are used including separate cycle paths, bridges, underpasses and bus/cycle gates.

Perhaps the most impressive area of progress is the cycle network. Already extensive in the 1970s, in the years 1989-2000, €23 million were invested in cycling infrastructure, investment that continues to grow. There are now 46 cycling routes in Groningen, forming a continuous and integral network. In common with most cities in the Netherlands there is a strong preference for segregation between cyclists and general traffic with separate paths preferred to on-road lanes wherever possible. Cycle lockers and shelters are provided at transport interchanges (e.g. 5000 parking spaces at the central rail station), cyclists have priority in traffic light signalling (e.g. green light twice per cycle) and cycling is allowed in both directions on many streets that are one-way for motor traffic. The net result of all of these policies is a high quality environment, an increase in people living in the city, an increase in visitors to the city and increased retail trade.

Levels of cycling in Groningen have followed national trends falling in the 1960s and early 1970s, then recovering and have been rising strongly in recent years. The initial fall was caused by rising car ownership and a planning policy which encouraged decentralisation. Factors influencing the recovery have included:

- A rise in the status of the bike

- Growing concern over health

- Traffic congestion

- Constraints on driving and parking

- The growing network of cycle infrastructure

- Planning policy orientated towards urban intensification

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

Malmö, south west Sweden

Population: ~300,000 (2011)

City form: City centre constrained to north and west by the sea. To the south east, a main thoroughfare, inner and outer ring roads lie approximately 1km intervals.

Modal Split, commuting (2004): Walk 6%; Cycle 24%; Public Transport 18%; Car 51%

Modal Split for all trips (2008): Walk 20%; Cycle 23%; Public Transport 17%; Car 41%

Västra Hamnen district, all trips: Walk/Cycle 60%; Public Transport 17%; Car Sharing 3%; Car 20%

Malmö, known as "Sweden's Cycle City" reinvented itself as a sustainable, multi-cultural European city following a period of economic recession in the 1980s and 1990s. This has included major developments such as Malmö University and state-of-the-art sustainable transport systems. Policies, particularly those encouraging cycling, have led to an impressive modal split, including a reduction in the number of car journeys from 52% to 41% in the period 2003-2008.

With up to 40% of work-related activities conducted by bicycle, Malmö's high cycling rates are a result of continuous investment in a continuous and well-linked cycle network. The network of 420km of cycleways includes cycle bridges, cycle tunnels and a major route of varying character running from south to north by the sea, past the old town, fashionable streets, and the city suburbs. The goal is to make cycling faster, safer and more pleasant: innovations include rest rails at traffic lights; large mirrors at crossings; different types of lighting being trialed; barometers monitoring cycling levels; radar sensors for signal priority; air pumps; and even mini-service stations.

Real-time information on public transport is available for web, mobile and at bus stops; and there is also an on-line comparison facility for travel by different modes (bike, bus, car etc.). About 29 million bus journeys are made annually on the green city buses, which run on biogas and benefit from signal priority at junctions (through electronic communication). The bus network is focused on 8 main routes, covering much of the city and running up to a frequency rate of 10 per hour during peak times.

Renewable biogas is produced in Malmö from organic waste composted at the city's sewage works. The biogas is pumped into Malmö's biogas network producing the equivalent of 2 million litres of petrol. Some electric cars also run on hydrogen gas from wind power and policies are in place to make driving environmentally-friendly vehicles easier and cheaper: for example the low-emissions zone for HGVs. Since 2001, there has also been continuous work to change travel attitudes and behaviour, such as the "Friendly Road to School" project to encourage parents and children to walk or cycle to school.

An example of sustainable urban planning in Malmö is the Västra Hamnen (the western harbour) brownfield development in Malmö harbour. Västra Hamnen is built on the former site of the Kockums Machine Halls (disused due to the decline of the shipping industry) and located 2km from the city centre. The total area of this mixed-use development is 76.5ha, with a projected population of 10,000 (currently 2558 units with a population of 4326) as well as businesses, parks, schools, the university and recreational facilities. Construction began in 1998 and is expected to complete in 2015, but Västra Hamnen has already received acclaim for its innovation in sustainability and for its striking architecture (over 20 architects have been involved). Cyclists and pedestrians have priority, the development boasts 8km of cycleways, is well-served by public transport (each apartment has a bus-stop within 300m with buses at 7 minute intervals) and is almost car-free.

Streets and Facilities in Malmo

Alan Baxter

UK and European Cities – Cycling Development

A high level of review of cycling development in selected cities in the UK and mainland Europe has been undertaken.

Governance

In many cities where cycling has been increased, cycling development is led by a relatively small team, but placed centrally within the organisation and focused on making cycling the business of other departments. Cycling teams are sometimes located in the central administrative departments but more typically in departments that are responsible for traffic management. Best practice is to have a strategically placed core cycling team with sophisticated organisational skills.

Making cycling common place is dependent on a bold provision that is the general public and clearly forms a major integral part of the transport infrastructure. There are a variety of mechanisms for achieving this:

- being considered as a substantial part of the review or creation of major strategic plans

- being a regular item on the agenda of high level meetings

- the existence of a strategic cycling co-ordination group, bringing together senior departmental leads who, importantly, meet quite frequently (weekly or fortnightly, rather than monthly or quarterly)

- working groups reporting to the strategic co-ordination group

- resolution of potential inter-departmental conflict built into the decision-making process at as early a stage as possible

- departmental leads developing cycling action plans, with guidance from the cycling team

Where a cycling champion is identified, essential characteristics include:

- Sufficient status and influence to achieve change at the highest level;

- Knowledge and experience of relevant issues, including being a regular cyclist;

- Sufficient capacity and support to deliver the role

- An individual motivated to achieve change

Transport for London (TfL) highlighted the importance of focused outputs. Since the election of Boris Johnson in 2008, investment in cycling has focused on the Barclays cycle hire scheme and the cycle 'superhighways'. These conspicuous and simple concepts, clearly identified with the city mayor, help to raise public consciousness of cycling.

The production of a biennial Bicycle Account by the City of Copenhagen is used to demonstrate progress. This is centred upon a representative survey of 1000 residents that quantifies attitudes to cycling in the city, avoiding the polarisation arising from consultations with self-selected respondents. The Account also provides an on-going indicator of satisfaction with the city as a whole as a place to cycle, rather than just with the quality of individual routes. The document continues with information on network growth, safety and the benefits of increased cycling. To justify further investment in cycling, the City of Copenhagen also recommends the use of surveys to show how many people would like to cycle more. Surveys in the UK have also shown public support for increased investment in cycling. This approach has been adopted by other places including Melbourne, Minneapolis, Örebro (Sweden) and Ljubljana.

Strategic integration of cycling with other modes is best assured by good governance processes which ensure that it is considered at the outset of new proposals. This may be supported by design standards and/or quality assurance processes that ensure consideration in the design of new facilities for other modes of transport (or buildings). This could happen through the routine presentation of cycling proposals to high level groups or directors responsible for other modes or by procedures that dictate automatic resolution of design conflicts by relevant departments.

The strategic integration of cycling with other modes is best guaranteed by establishing agreed written procedures which guarantee the opportunity for a core cycling team to input at the earliest possible stage of scheme design, and subsequent stages as appropriate. This should be embedded in wider governance structures.

Resourcing

Annual spend on cycling per person is £24 in the Netherlands, £14 in Copenhagen and £10 in both London and the Cycling Ambition cities. Other cities in the UK with a relatively large spend on cycling are at the level of £5 per year.

Normal practice in mainland Europe is for the majority of cycling expenditure to be on infrastructure: typically 95% in the cities examined. This is reflected in the balance of staffing and skills i.e. mainly design and planning staff. By contrast England's Local Sustainable Transport Fund programme is normally 60% revenue and 40% capital.

Copenhagen emphasises how good quality infrastructure markets itself. It is probably also true that infrastructure in more conspicuous places, for example alongside main roads, markets itself provided that it appears sufficiently safe, attractive and popular.

Infrastructure

Copenhagen has 84% kerb-separated cycle lanes alongside highways, 6% painted cycle lanes and 10% greenways. There are similarly high proportions of highway-based routes in cities that have a long history of providing for cycling. Greenways were often the first routes to be developed in the UK for cycling, but as opportunities to create them are exhausted and provision is made on-highway, the length of on-highway route typically outstrips that of greenways.

In Copenhagen, it is normal practice to create new cycle lanes by removing on-street parking, with alternative space being identified to park the cars.

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

Some early provision (1970s) for cycling in Germany included cycle tracks alongside, but physically separated from, the highway. More recently, painted lanes have become more common practice. In places where cycling has increased, original cycle lanes have become too narrow to accommodate the volume of cycle traffic. Dedicated cycling facilities are not normally provided on 20mph/30kph streets. In German cities the majority of one-way streets allow two-way movement of bicycles.

The newly created network of cycle routes in Seville consists mainly of two-way cycle tracks segregated from the traffic.

Leicester provides an example of experimental reallocation of road space, with temporary water-filled barriers and an Experimental traffic regulation order (TROs) to pilot a new cycle lane, in order to test how

traffic flow adjusts in reality to the new arrangement, rather than relying on traffic modelling alone.

All places studied have developed a system of radial routes to varying extents. Copenhagen and Leicester both emphasised that this element should be developed at an early stage. Edinburgh's radial cycle routes are based on shared bus lanes. Bristol and Düsseldorf both referred to the variable quality of their systems and ongoing efforts to improve them.

Most (if not all) residential streets in Copenhagen and in Düsseldorf are 30 kph. The percentage of streets at 30 kph in other German cities is approximately as follows: Munich 76%, Berlin 72%, Cologne 70% and Hamburg 56%. Across London boroughs, proportions of streets with a 20 mph limit range from 52% down to zero. Figures from elsewhere in the UK show a 20 mph limit in 90% of residential streets in Newcastle, 50% of residential streets in Edinburgh, 20% of all streets in Bristol and 8% in Leicester. Dozens of UK authorities are committed in principle to making 20 mph the normal speed limit on residential streets, including Sheffield and Liverpool. In Liverpool, Public Health has funded £665k of the total cost of £1,665,000 needed to implement a large 20 mph programme.

Traffic management initiatives can help to create better conditions for cyclists. Reducing vehicle speed is a particularly important tool as there is a direct correlation between reduced vehicle speeds in urban areas and increased levels of cycling. At least a third of the local authorities in England are in the process of implementing 20 mph limits and an estimated eight million people already live in authorities where these limits are in operation such as Liverpool, Bristol, York, Newcastle-upon-Tyne and parts of London.

In terms of integration of cycle lane and bus provision, best practice is generally agreed to be 'floating bus stops' where the stops are separated from the footway by the cycle lane. This avoids conflict

between buses and cyclists but risks conflict between cyclists and pedestrians.

On trains, cycle carriage varies between cities. Unrestricted cycle carriage is very rare, and exists in places with low rates of cycling. Copenhagen, Berlin, Düsseldorf and Frankfurt all have some degree of cycle hire facilities, enabling rail journeys to be completed by bike where the final destination is too far to walk from the station.

Cycling Levels and Targets

The highest level of cycling, in the cities studied, is in Copenhagen, and it makes up 33% of all journeys (36% of commuting trips are by bike). This has risen from under 30% in the 1990s. Increases in German cities include Berlin, from 7 to 13%, Düsseldorf from 8.5 to 11%, Hamburg from 9 to 12%, and Frankfurt from 6 to 15% (over varying periods of time. Cycling's modal share rose rapidly in Seville from 0.6 to 6% following construction of its new cycle route network between 2006 and 2010. In the UK, estimates of commuting to the city centre by bike are 7% in Edinburgh, 8% in Bristol and 4 to 8% in Leicester. All represent substantial recent increases.

Most of the cities studied have future targets for cycling, usually expressed as an overall modal share. London's target is 5% by 2026, Edinburgh's is 10% by 2020 and Leicester's is to double between now and 2017.

Copenhagen aims for 50% of all trips to work or education to be made by bike by 2015 (from 35% in 2010). German targets are as follows: 11% to 16% in Düsseldorf, 18% in Hamburg and 15% in Frankfurt (probably achieved now, and therefore a new target is to be discussed). Vienna aims to double its cycling mode share over the next five years. Seville interprets targets in terms of extending its infrastructure to serve the other municipalities that make up the wider metropolitan area, in conjunction with public transport.

Alan Baxter

5.3   UK Best Practice

Cycling Demonstration Towns

This programme was delivered from 2005 to 2009 and saw total investment equivalent to £10 per head to implement a range of infrastructure and network interventions alongside smarter choices initiatives to promote active travel and provide travel planning.

Across the six towns the health benefits alone are estimated to be £45 million, which gives a benefit cost ratio of 2.59 to 1. When including the additional benefits of amenity improvements, and reductions in congestion, accidents and absenteeism the benefit cost ratio rises to 3.5 to 1.

Looking at school travel for example, the percentage of children reporting that cycling is their usual mode of transport (as recorded by the Pupil Level Annual School Census) has increased in five of the six towns, with Lancaster/Morecambe being the exception:

- Aylesbury: 7% increase

- Brighton: 153% increase

- Darlington: 12% increase

- Derby: 50% increase

- Exeter: 19% increase

Figure 5.3: change in mode share between surveys performed at the beginning of the Bike It programme and ten months later at end of the first year of engagement (five towns, excluding Darlington)

Cycling levels have increased in the Cycling Demonstration Towns, for example, as in Aylesbury.

Furthermore, Exeter also saw workplace travel monitoring undertaken, with the number of employees stating cycling was their usual mode of travel to work increasing by 5%.

Aylesbury Cycling Demonstration Town

The initial three years of Aylesbury's Cycling Town programme focused on using 'soft measures' such as route signing and promotions to encourage people to get on their bikes. The team then expanded, named and coloured eight main cycle routes after gemstones to make them easily identifiable to the public (the Gemstone Cycleways), and pioneered a radical new approach to signage, obtaining Department for Transport permission to count down to destinations in minutes rather than miles. A town-wide promotional campaign, including a local radio partnership with a jingle and route-specific guides, was also launched to spur residents to action.

Following renewed funding in 2008, Aylesbury prioritised infrastructure measures and improvements. All Gemstone routes have had red surfacing installed on side road junctions to help ensure motorists look out for cyclists, and more signs have been put up to direct cyclists to the town centre. This has improved access for major

Baseline survey: n= 14,896: ex post survey: n=13,200 (pooled data from 60 schools surveyed in September 2006 and July 2007, or September 2007 and July 2008)

Figure 5.3: Change in Mode Share from Bike IT Programme

Figure 5.4: Changes to Cycling Trips in Aylesbury

employment centres and has been supported by the installation of additional cycle parking spaces.

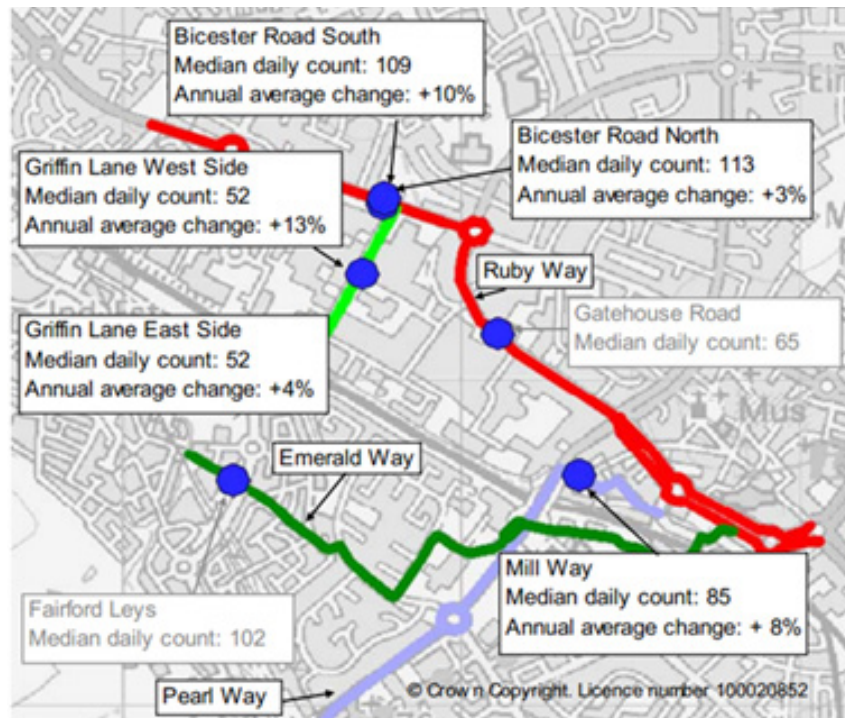The newest Gemstone Cycleway, the Jet Way, was completed in April 2009, providing a direct link from the town centre to Stoke Mandeville hospital. At the same time the Bourg Walk, a new 200 metre long shared use pedestrian/cycle bridge, was opened - providing easy access across the railway line, connecting the south side of Aylesbury to the town centre and linking the existing Pebble, Emerald and new Jet Way routes.

Aylesbury has benefited from a number of improvements to make it easier for people cycling to access the town centre. An element of this work is the introduction of a contraflow cycle lane. A close working relationship with the District Council has continued to ensure that cycling provision is an automatic consideration for all proposed housing developments.

To reflect all of the infrastructure improvements, the existing Gemstone route maps have had a facelift and a new Jet Way map has also been produced. Aylesbury has continued to support all infrastructure developments through promotional activity, most recently through the appointment of a promotions officer and a targeted advertising campaign encouraging commuters to cycle to work using the Gemstone Cycleways network.

Cycle Aylesbury works with 15 local businesses to promote cycling – accessing 11,000 employees. These workplaces can take advantage of a pool of 20 loan bikes, Dr Bike sessions, and cycle parking grants. The team also runs an annual 'Business Bike Challenge' – an inter-workplace competition between teams participating in the Tour de Vale bike ride. This has proven to be a good way of finding people who are enthusiastic about cycling, whom Cycle Aylesbury can then work with to promote cycling to these workplaces.

As well as encouraging commuters onto their bikes, the team continues to promote family cycling - where children and parents learn together - and cycling in local schools, working alongside the Bike It Officer. Events to support this have included Dr Bike sessions and activities for Bike to School Week, for example 'Recycle a Bike Day' where unwanted bikes were repaired and donated to schools for their pupils to learn to cycle. Over 100 people swapped bikes, giving many children the chance to get hold of better fitting bikes, and there are plans to repeat this activity at other schools.

Bike Week 2009 was celebrated with the annual Tour De Vale cycle ride, daily bike breakfasts at schools and businesses, a joint ride with neighbouring Cycle Town, Leighton Linslade, and the 'on 2 wheels' town centre event which promoted cycling.

Infrastructure improvements continued to be the focus in 2010, with plans to install raised crossings on the Pebble and Ruby Ways - aimed

at giving cyclists a degree of priority; extensions to the Emerald Way; and the introduction of the ninth Gemstone route, the Topaz Way. These improvements brought about further advantages for people choosing to cycle in Aylesbury, and ensured that more residents have access to a dedicated cycle route.

These infrastructure improvements were supported by continued investment in targeted marketing activity. This included tailored events, business and family cycle training and the launch of the bicycle project in April 2010 - a personalised cycle planning scheme providing expert advice, training, equipment and incentives aimed at all age groups to increase the numbers of people cycling in the town.

Old Shoreham Road, Brighton

June 2012 saw the opening of the first phase of an innovative cycle scheme along Old Shoreham Road in Brighton. This is a busy and fast road and the scheme provides segregated cycle lanes on each side of the road at an intermediate level between the carriageway and the footway. The average speed recorded between Dyke Road and The Drive along Old Shoreham Road before the new facilities were installed was 45mph on a 30mph road.

This is a bold and innovative scheme that aims to bring something of the level of provision that is commonplace in Denmark and The Netherlands. The vehicle running lanes have been kept at a maximum

Aylesbury: Typical Cycle Way Crossing of Side Road

Aylesbury: Typical Cycle Way Crossing of Side Road

Old Shoreham Road/Brighton

Alan Baxter

of 3.1 metres. The widest section of designated cycle lane is 2.6 metres, the narrowest 1.5 metres. The scheme has provided 2.22km of segregated cycle lanes. Key features of the scheme include:

- A smooth / wide surface on both sides of the road; 2m wide one-way cycle lanes

- Raised junctions at side-roads with priority for cyclists

- Pre-greens at traffic signals to give cyclists a 5 second head start

- Toucans

- Expeditious movement of all traffic – including cyclists, pedestrians and motor vehicles

- Raised zebra crossing

- Shared use areas at bus stops and at zebra crossing

- No centre line on some sections

- Automatic counters to monitor cycle users

- Scheme review and monitoring after 6 months

There are a number of design issues that the Council has had to work through and which will need to be monitored, notably the treatment of side road crossings, bus stops and zebra crossings. This scheme was funded through the Local Transport Plan with a contribution from the DfT Links to Schools programme. The budgeted total scheme cost was £720k.

Continuous Cycle Lanes on Lewes Road, Brighton

Brighton & Hove City Council has transformed the Lewes Road, a busy 4.5km dual carriageway carrying 25,000 vehicles per day, into a rapid transit style bus and cycle corridor by reallocating an entire lane in each direction from general traffic into a bus and cycle lane. The scheme, which took around 9 months to complete and cost in the region of £1.4million, includes a number of innovative features to maintain continuity for cyclists, such as a dedicated cycle bypass at traffic lights and 'floating' bus stops where cyclists can pass behind bus stops with no interference from stopping buses.

Construction was completed in September 2013 and initial monitoring (after 3 months) shows a 14% increase in daily cycling numbers, increasing from a baseline of 2,085 to 2,383. General traffic on Lewes Road has reduced by 13% and the number of passengers using buses on Lewes Road has increased from15.3 million in 2012 to 16.4 million in 2013 – an increase of 7%.

Connecting Leicester – Reallocating a Traffic Lane for Cyclists

Leicester has suffered from poor connectivity for cyclists and pedestrians for many years, with the city centre cut off by a multi lane inner ring road. The Cycle Safety Fund backed schemes on Southgates and Newark Street are associated with the City Mayor's Connecting Leicester vision. This seeks to address barriers to accessing the city caused primarily by the inner ring road.

Newarke Street runs between Southgates and Welford Place and forms part of the A594 inner ring road. Before the scheme, Newarke Street was formed of two footways approximately 3m wide and a three lane, one-way carriageway. No provision was made for cyclists who were expected to use the carriageway when heading east towards the city centre, and use an alternative route when heading west from the centre. Southgates was a two lane, one way link giving access to car parks between Newarke Street and Peacock Lane.

The scheme provides cycle facilities between De Montfort University and the city centre. On Newarke Street, this is achieved by constructing a two-way cycle track on one of the three lanes of the carriageway and converting the existing crossing over Oxford Street to a toucan crossing. The existing pedestrian crossing points at Welford Road and Welford Place have been converted to toucan crossings to provide access to further routes through the city centre.

Old Shoreham Road/Brighton

Lewes Road, Brighton

Lewes Road, Brighton

On Southgates, the existing Magazine Square Toucan Crossing is used to give access to a new two way cycle route constructed at the expense of one of the two previous traffic lanes.

New Infrastructure – Overcoming Barriers and Linking Communities

Physical barriers, whether natural or man-made, can strongly influence the extent to which people are willing and able to travel by bike. Local travel can be transformed by overcoming these barriers to enable cycling to become part of everyday cycling for more people. Infrastructure projects from recent years include bridges, tunnels and traffic free links and demonstrate the impacts of these interventions. The nature of these projects is such that they often require major levels of capital expenditure.

Gellings Greenway, Kirkby

This 2.6km route was delivered by the Department for Transport's Linking Communities 2012-13 programme. The scheme provides a traffic free alternative for cyclists travelling between Knowsley Business Park and the existing networks around Kirkby and Knowsley. The number of cycle trips on the network has increased 126% following the scheme, leading to a benefit cost ratio of 5.2 to 1.

Hockley Viaduct, Winchester

This 4.3km route was delivered by the Department for Transport's Linking Communities 2012-13 programme. The scheme provides a new shared use path from Winchester city centre to South Winchester Park and Ride. The route now carries over 50,000 cycle trips per year, compared to just over 4,000 previously. This had led to the equivalent of over 17,000 car trips being taken off the road and a benefit cost ratio of 3.9 to 1.

The route also attracts a high number of recreational cyclists, with an estimated £382,500 being spent per year by tourists and day-visitors, supporting 5.8 direct and 3.9 indirect jobs.

Weymouth

Weymouth already had a number of existing walking and cycling paths but many of these were fragmented and difficult to access.

The Connect2 programme delivered several interventions to fill in the gaps, most notably a new bridge over Newstead Road. Of people surveyed on the new bridge, 85% stated it feels safe compared to 77% of people previously using the existing crossing. The proportion of people saying the route is now the most convenient transport option has increased from 86% to 94%.

Across the Connect2 route as whole there has been a 13% growth in the number of cycle trips, with 375,000 trips a year now being made, leading to a benefit cost ratio of 6.8 to 1.

Thame Links to Schools

Located nine miles from Oxford, Thame is a local example of an infrastructure link designed to improve access to a local school which saw the estimated number of trips made by children on the route per year more than double from around 15,000 in 2004 to around 33,000 in 2005. Amongst adults (over 16 years) surveyed on the route following the intervention there was a broad range of journey purposes with 7.4% travelling to or from work, 9.0% for education and 5.3% for shopping.

Of the 114,000 trips made by all people on the route in 2005, 29,000 were by bike – double the 14,500 cycle trips made in 2004 and contributing to the benefit cost ratio of 3.8 to 1. This benefit cost ratio is calculated over a ten year appraisal period, compared to the other infrastructure schemes above which are appraised over a 30 year period.

Smarter Choices Programmes

Smarter choice programmes seek to encourage sustainable and active travel decisions through engagement with individuals and communities. Measures range from promotion of routes and events, through to behaviour change programmes that function through challenge, facilitation, encouragement or provision of information. The evaluation of a number of smarter choice programmes has revealed their impacts.

School-based projects

Sustrans' Bike It project works in schools to get more young people cycling (and walking), more often. The Bike It project in Crawley started in 2011. Over the period 2011-2013, pupils regularly cycling

to school increased by 18.2 percentage points (from 14.9% before to 33.1% after). The rise in active travel corresponds with a lowering in car travel to school. The percentage of pupils being regularly driven to school decreased by 10.1 percentage points (from 40.4% to 30.3%).

In Cambridge, the Cycle Cambridge Schools programme engaged 52 primary schools in 2011 totalling 13,224 pupils, and 10 secondary schools totalling 9,201 pupils. On average over 70% of children took up the Bikeability training that was offered. A total of 902 cycle parking spaces were provided at schools. Across all schools, the percentage of children cycling to school as measured by PLASC was 18.2% in 2010/11 compared to 10.0% in 2006/07. Bike It data indicates an increase in children cycling to school on the day of the survey from 37.8% in pre surveys to 51.6% in post surveys, and an increase in children cycling to school every day from 13.0% to 21.2%.

Sustrans' I Bike delivers an intensive pro-cycling educational programme to schools in Scotland. I Bike Edinburgh was involved in 5 schools across the city during 2012-2013, where the proportion of children stating they regularly cycle to school increased from 15.1% to 20.5%.

Personalised Travel Planning

The TravelSmart programme encourages people to use sustainable and active travel modes. TravelSmart Gloucester delivered personalised travel planning (PTP) across the areas of Barton, Tredworth and White City during 2005-2006. An Individualised Travel Marketing (ITM) campaign was targeted at 4,000 households. It comprised of information packs and home advice sessions predominantly. There were positive changes in travel behaviour, with a 16% increase in cycling, a 18% increase in walking and a 13% increase in public transport trips.

TravelSmart Watford aimed to encourage modal shift towards more sustainable modes of transport across a target population of 25,000 households during 2008-2009. A successful Individualised Travel Marketing campaign was rolled out, in which nearly 13,000 personalised information packs were sent to households. The project recorded a 33% increase in levels of cycling. A noticeable shift away from motorised transport was observed. The greatest modal shift occurred from car-as-driver trips (which decreased by 55 trips per person per year) to walking (which increased by 44 trips).

AlanBaxter

The Access to Stations project in Swindon has been running since 2013, addressing local barriers to increase walking and cycling access to stations. Personalised Travel Planning is being used to engage people using Swindon railway station in a conversation about their travel habits and what alternative sustainable transport options are possible. Early results indicate that cycling increased by 15 percentage points from baseline to follow up, while car use fell by 17 percentage points. 68% of respondents agreed or strongly agreed that information gained during PTP was useful for their day to day travel.

A reduction in car trips has been seen across areas where PTP has been delivered. This has been accompanied by modal shift to active modes such as walking, cycling together with public transport.

Challenge Projects

The My Journey Challenge South Hampshire was concluded in autumn 2013, with 1,999 taking part. Through this initiative 179 participants were tracked directly to assess behaviour change and

the impacts of these. As a result of taking part in the challenge these individuals burned over 900,000 calories, saved 1,875 kg of CO2, and saved over £3,600 in travel costs. The following impacts on travel behaviour were observed:

- 27% of participants increased the number of days per week on which they cycle

- 36% of participants increased the number of days per week on which they walk

- 30% of participants decreased the number of days per week on which they use a car

- 34% of participants decreased the number of hours per week they use a car

- The percentage of participants using the bus at least once per week increased from 19% to 21%

- The percentage of participants using the train at least once per week increased from 15% to 17%

People travelling by bike are doing so more frequently, with an increase in the percentage of participants cycling at least once a week.

Increased active travel was sustained following the Challenge:

- Participants walked on average 1.4 more miles per week 3 months later

- Participants cycled on average 4.82 more miles per week 3 months later

- 7% of participants were not cycling before the Challenge, but were 3 months afterwards

Across all participants surveyed following the project, self-reported behaviour change demonstrated the positive impact of the intervention:

- 42% said their level of cycling had increased to some degree

- 41% said their level of walking had increased to some degree

- 41% said they were using their cars less

The Big Pedal

The Big Pedal is a national schools-based competition where children cycle or scoot to school, and their journeys are logged online. It takes place on a yearly basis and has become a useful tool for widening participation in cycling. Over the 3 week period in 2013, a total of 717,000 journeys to school were made on bike. For example, across all 15 participating schools in York nearly 10,000 children cycled to school during the competition.
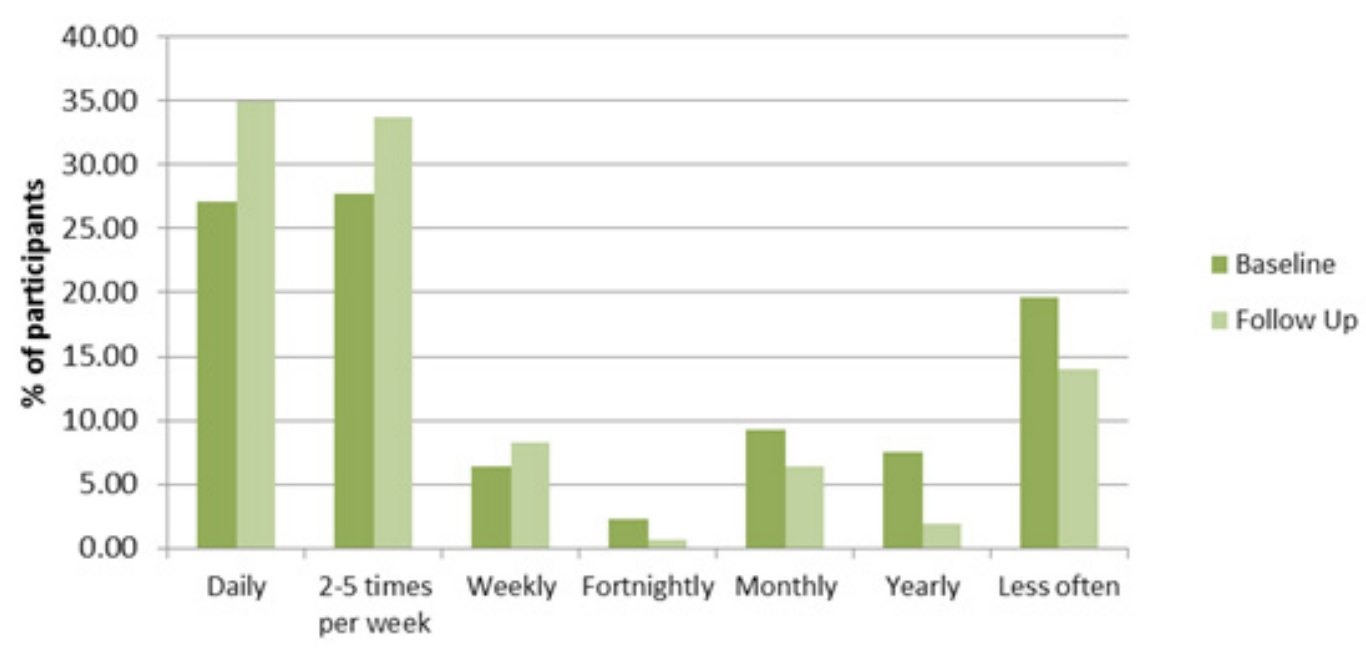

Figure 5.5 Change in frequency of cycling trips amongst My Journey Challenge South Hampshire Participants.

6.0
Sustainable Mobility and the Built Environment

6.1   Summary

Traditionally, interest in the relationship between the built environment and travel behaviour has been rooted in the field of urban planning and more specifically transportation planning. This is because of the interest in relation to changing travel behaviour to more sustainable travel. However, more recently there has been growing interest amongst academics in the field of health studies in the association between built environment and physical activity including 'active travel' (i.e. walking and cycling) because of the associated health benefits.

Meta-analyses reveal that these disciplines vary in their approach to understanding this relationship but are typically quantitative in nature; comprise mainly comparative cross-sectional studies comparing different areas or they hypothesize the relationship between a set of predictor variables and an outcome variable which is tested by performing correlation analysis. Several shortcomings of this approach have been highlighted and the general gaps in knowledge have been revealed. These relate to the focus of research on US based case studies; the focus on quantitative approaches that provide evidence of correlation but not necessarily direction of causality; and, issues surrounding self-selection of study participants and more specifically in relation to the choice of area in which they reside.

Despite these limitations, these studies generally reveal a clear association between walking and cycling (although the evidence for cycling is less emphatic) and the predictor variables density, land use mix, proximity and connectivity. There are less clear associations between transport system characteristics and design characteristics. There is also evidence that so called psychosocial variables mediate these associations. Attention has now turned to ecological models that posit that walking and cycling is dependent on demographic, psychosocial and physical environmental factors and that a multi-level approach is needed to encourage behaviour change towards active travel.

6.2   Introduction

The section provides a brief review of key studies investigating the role of the built environment in encouraging walking and cycling in order to inform the Bicester Sustainable Transport Strategy. Comprehensive meta-analyses investigating the relationship between the built environment and walking and cycling already exist. The objective of this paper, therefore, is not simply to repeat this process but simply to summarise the outcomes of the meta-analyses and to update these with more recent studies including findings from the UK Understanding Walking and Cycling Study.

Concerns over the impact of private car use and the need to encourage more sustainable travel for short journeys has led urban planning and transportation studies to investigate the effects of built environment on travel behaviour and specifically walking and cycling. The built environment is generally defined as that part of the physical environment created by human activity and consists of land use patterns, the distribution across space of activities and the buildings that house them; the transportation system, the physical infrastructure of roads, footways and bike paths (sic); and urban design which involves the arrangement and appearance of physicalelements in that environment (Saelens and Handy, 2008).

There is also a growing body of literature in the field of public health that focuses on the role of various characteristics of the built environment in promoting healthy physical activity. Walking and cycling for transport is of particular interest to health researchers as it offers the potential to build in moderate physical activity as part of everyday travel practices.

The Relationship between Built Environment and Walking and Cycling

A key paper by Saelens et al. (2003) informs researchers in the field of physical activity and health on how those in the field of transportation, urban design and planning conceptualise environmental (built environment) correlates and the methods that are typically used to investigate their significance. The paper also presents brief findings of the significance of the different environmental correlates of walking and cycling and an ecological model (See Figure 6.1).

Two key factors are highlighted as having an influence on the choice of walking and cycling namely proximity (distance) and connectivity (directness of travel). Proximity is directly determined by distance between trip origins and destinations and indirectly by two land use variables, density and land use mix. The authors note that it is generally suggested that an increase in density, or compactness of land uses, reduces distance between activities and that a more diverse land use mix increases the opportunities of accessing commercial premises such as shops and employment. Connectivity characterises the ease of moving between origins and destinations whereas proximity simply considers straight-line distances. A grid system is therefore considered a pattern of high connectivity as it offers almost direct travel between origins and destinations.

The key finding from the review of the transportation, urban design and planning literature is that neighbourhood comparison studies (i.e. typically quantitative quasi-experimental approaches that do not control for individual factors) have generally found higher rates of walking and cycling in 'high walkable' neighbourhoods compared to 'low-walkable neighbourhoods'. However, Saelens et al. warn that studies are small in number (and mainly US based) and differ in study design making it difficult to draw firm conclusions about the magnitude of walking and cycling related to environmental factors. Studies that have followed a correlation analysis approach and which have been able to control for confounding variables (e.g. either neighbourhood and/or socio-demographic) have generally highlighted that population density is the most consistent positive correlate of walking trips. Increased land-use mix (particularly the proximity of shops) also relates to increased rates of walking and cycling. Saelens et al. reveal that the effect of walking and cycling infrastructure on these travel behaviours is weak and that more research is required in this area (see Fig. 6.1). Overall, the authors suggest, physical walkability factors at the neighbourhood level have consistently been associated with higher levels of walking (and cycling) for transport and that these add to the variance beyond socio-demographic variables 'albeit with small magnitude increments'.

Handy (2005) also provides a useful review of the evidence on the relationship between travel behaviour and land use. The review revealed that measures of the built environment varied across different studies but essentially fell into five general categories: land use characteristics; transport system characteristics; accessibility

Neighbourhood Environment

Individual Factors

Walk/cycling purposes

Demographics

Car ownership

Income

Age, gender

Density Connectivity Land use Mixture

Safety (eg traffic, crime, animals)

Bike/walking trails, sidewalks, bike lanes

Parks community recreation centres, other physical activity facilities

Neighbourhood aesthetics and topography

Psychosocial correlates of physical activity
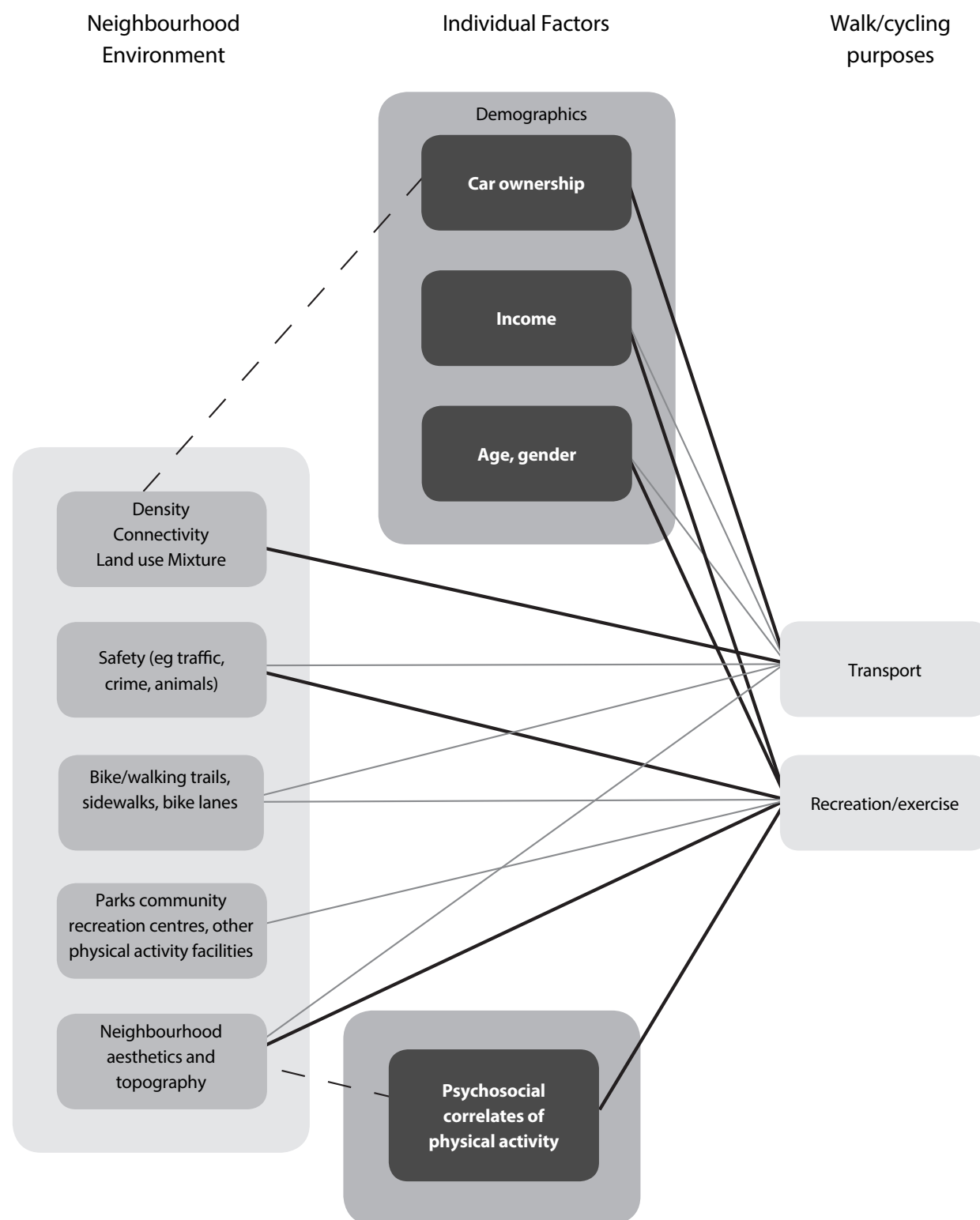
Transport

Recreation/exercise

Figure 6.1: Proposed Ecological Model of Neighbourhood Environmental Influence on Walking and Cycling. Source: Saelens et al., 2003.

characteristics; design characteristics and neighbourhood type. Variables having a positive effect on walking and cycling included the percentage of the street network that is grid and presence of footpaths, whilst presence of bicycle path and street density were found to have no significant effect. Measures of accessibility typically demonstrated that an increase in non-motorised travel was equated with higher levels of accessibility presumably because destinations located nearby made walking and cycling more feasible. Design variables were found to be largely insignificant but Handy notes that this may be due to inadequate measures of design than its insignificance. The effect of neighbourhood type was found to be hard to interpret although there was some evidence that historic neighbourhoods were found to have higher levels of walking and cycling than suburban neighbourhoods. Other factors that arose from qualitative studies that either promote or discourage walking included distance, lack of time, inability to carry things, fear of crime and lack of facilities (i.e. typically lack of sidewalks in the US). Impediments to cycling included distance, traffic safety and lack of routes. Pucher and Dijkstra (2003) highlight the key differences between walking and cycling in the US vis-à-vis Europe are attributed to longer travel distances in the US, ease of auto ownership and use, and the inconvenience, unpleasantness and lack of traffic safety for walking and cycling.

A review by Saelens and Handy (2008) summarised outcomes of studies investigating the characteristics of the built environment and transportation walking versus recreational walking. The review of prior reviews reveals a consistent set of conclusions on the significance of proximity, mixed land use, density as important correlates of walking. There was also sufficient evidence to suggest that aesthetic qualities, presence of footways, route connectivity and safety are associated with walking.

Public Health Research on the Relationship between Built Environment and Walking and Cycling

There is a growing body of public health research which aims to understand how built environment attributes can influence particular physical health behaviours including walking and cycling for transport and for recreational purposes.

An evidence based update by Badland and Schofield (2005) concludes that studies on transport, urban design and physical activity consistently demonstrate that mixed land use is the most important characteristic of the built environment in encouraging active travel because of the increased opportunities and convenience of accessing destinations. Connectivity has also been found to be 'convincingly' associated with active commuting in a review by Wendel-Vos et al. (2004).

Owen et al. (2004) examined the association between built environment variables and walking for transport and recreation. The variables most strongly or consistently associated with walking varied according to the type of walking under consideration. Aesthetic qualities were associated with walking for recreation or exercise but not with walking for transport. Access to and convenience of facilities was associated with walking for transport and for recreation. The authors, however, acknowledge that in many studies associations were not statistically significant but that the overall body of evidence was 'modest but consistent'.

The importance of perceived environmental characteristics has been investigated in a meta-analysis by Duncan et al. (2005). This concluded that perceptions about the presence of footways, shops and services, and the perception that traffic was not a problem, were all significantly associated with active travel. However, few studies have investigated the effects of less tangible urban design qualities. As Ewing et al. (2006) note, 'Urban designers presume that these qualities are important for active street life, but have little empirical evidence to back the claim'.

A US study by Forsyth et al. (2008) investigates how walking and total physical activity are affected by street pattern, 'pedestrian-oriented' infrastructure and amenities, and mixed use or destinations in order to address the question, 'Do people walk more, or less, depending on the physical character of their residential areas rather than merely their individual characteristics?' The study is US focused and examines associations between physical activity and the built environment in the Twin Cities in Minnesota. It also examines the relative importance of these constructs compared with other social and psychological variables. The study found that walking for specific purposes such as travel or leisure varies in relation to the physical characteristics of a neighbourhood. However, in relation to overall walking and physical

activity, socially similar people were found to do the same total amount of physical activity in different kinds of places and that level of activity is, on average, low.

The European based study by Van Dyk et al. (2008) investigated differences in physical activity between adults living in high versus low walkable neighbourhoods in two neighbourhoods in Sint-Niklaas, Belgium. Neighbourhood selection was based on connectivity (defined as 'number of intersections with three or more intersecting streets per kilometre') and residential density (number of households per square kilometre). The main finding of the study was that residents in high walkable neighbourhoods walked more than those in low walkable neighbourhoods. Neighbourhood walkability was found to be especially important to people with a less positive attitude to active transport and/or low intention to walk and cycle and this encourages them to use active transport.

The Understanding Walking and Cycling study (2008-2011: Lancaster University, Oxford

Brookes University, University of Leeds).

The Understanding Walking and Cycling (UWAC) study was a large UK Research Council funded project undertaken during the period 2008 to 2011 which aimed to investigate the ways in which households incorporate (or fail to incorporate) walking and cycling into routine everyday travel (e.g. to work, shops etc.) and the decision-making processes that lead to specific travel behavioural outcomes. The overall approach used departed from the dominant approach to travel behaviour research which typically apply micro-economic theory to travel choice modelling and instead used a mix of quantitative and qualitative methods to examine the micro-scale complexity of household decision making and associated travel strategies.

Four English case study cities were selected (Lancaster, Leeds, Leicester and Worcester) to represent a range of conditions in terms of geography and demography that exist across England. The mixed methods applied across these four areas included a social survey of a large sample of households probing experience of and attitudes towards walking and cycling; spatial analysis of the built environment using indices of connectivity and analysis of land uses; in-depth interviews with a selection of householders drawn from the survey probing attitudes to walking and cycling and the reasons why people chose particular modes of travel; interviews with participants whilst they were making a 'usual' journey on foot or by cycle (accompanied walk/ride-along interviews) focusing particularly on motivations, route selection and on the experience of the journey; and finally, more immersive ethnographic studies with a selection of households over an extended period of three months to observe and understand the nature of everyday journeys within a community using a combination of research tools including homebased interviews and interviews whilst moving around the city, mobility inventories, observations, mapping exercises and community participation.

The UWAC research, in relation to the built environment, highlighted that under current urban conditions in Britain, street pattern and land use factors have only a limited effect on the propensity to walk or cycle and that other constraints imposed by family and life-style, perceptions of safety and convenience, and expectations about what means of everyday travel are normal are primary factors. However, spatial organization is an important foundation and should ensure that access to common everyday facilities is easy and the environment is supportive. This can be achieved by dedicating space for cycling separated from both pedestrians and motor traffic along busier roads; improving the quality and maintenance of pavements; and introducing lower speed limits across residential streets and central areas of the city. To summarise, a multi-faceted approach is required if walking and cycling is to become more significant in everyday mobility. This is outlined more specifically in the attached policy briefing.

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7.0
Existing Movement Network

7.1   Baseline Movement Study

Cycling and Walking Network

Walking and cycling within most residential areas in the town is relatively easy as traffic speeds are low and distances are short. The newer developments at Langford Village, Bure Park and Southwold have a good network of traffic-free routes, which are easier to navigate than the road network. Most of the traffic-free paths are shared by pedestrians and cyclists, or segregated with a white line down the middle. There is a continuous peripheral shared path around three-quarters of the ring road, although it is compromised by the lack of good crossings of the main radial roads. There are three traffic-free crossings of the railway lines at Barry Avenue, Longfields and Tubbs Crossing, which offer shorter routes for some journeys than by car.

The main radial roads have very limited or poor quality provision for walking and cycling. The highest quality example is Banbury Road north of the railway, which has a shared path set back from the road. In contrast, Launton Road has a narrow shared footway with no priority at road crossings. Other main roads are intimidating for most cyclists at peak times. The town centre is easily accessible on foot and by bike from all parts of the town with several signal crossings of main roads. The pedestrianisation of Sheep Street and one-way traffic on Causeway present significant barriers to cycling through the town.

National Cycle Network Route 51 passes through the town, linking Launton village, Gavray Drive, Tubbs Crossing, Sheep Street, Bicester Village and Wendlebury. It uses the best available facilities, but is not a very direct route through the town and is longer than the most obvious routes by car, thus it is far from ideal, though may be more effective as a tourist route.

The existing network of walking and cycling routes for the town as a whole are illustrated in Figure 7.1. Town centre streets, town centre gateways and four quadrants of the town, have been assessed in terms of walking and cycling provision.

Town Centre Streets

St John's Street

Main route into the town centre for all traffic, including deliveries and buses. Not very cycle-friendly although traffic speeds are generally low, so confident cyclists can mix with traffic.

Manorsfield Road

Busy road with turning movements into car park and buses waiting on the street. The newly constructed shared footway on the west side is on the wrong side of the road for town centre access, which means that new cycle parking is not easy to reach. It would need a major redesign to accommodate cycles on the road. Traffic speeds are generally low, so confident cyclists can mix with traffic. Road could be closed to through traffic immediately south of Hanover Gardens.

King's End, Church Street and Causeway

Relatively quiet roads with local access traffic. Causeway is a narrow historic street with one-way traffic in an eastbound direction. The road could be closed to all traffic with a dramatic immediate impact on the pedestrian and cycling environment. The inability to cycle westbound makes this the only difficult section between the town centre and Bicester Village.

Market Square

Dominated by a car park, which may no longer be needed now that there is a new car park at Pioneer Square. There is a one-way system around the triangle of roads.

Sheep Street

Pedestrianised in 1994, but cycling is not permitted at any time.

North of Railway, Bure Park

Causeway

Pedestrianised area behind Pioneer Square

This is an important north-south link through the town, particularly for access to the two railway stations. The main alternative route is Manorsfield Road. Cycling could be permitted at quieter times of the day i.e 6pm to 10am.

London Road

London Road and in particular its junction with Launton Road is intimidating for pedestrians and cyclists

Launton Road

Busy road with turning movements to town centre car parks and HGVs associated with the town centre and industrial areas in NE Bicester. It provides a link to Tubbs Close railway crossing. The existing footway on the west side is designated for shared use but is much too narrow for pedestrians and cyclists to share. There is no priority at side road crossings. It is a barrier to accessing Garth Park.

Victoria Road

Dominated by car parks and commercial properties, but traffic flows and speed are relatively low and it is not considered an important part of the strategic cycle network.

Longfields, Withington Road and Bell Lane

Quiet residential streets and cyclists can safely use the carriageway, although reduction to 20mph would be of benefit. There may be some rat-running, which can be addressed by selective road closure.

Sheep Street

Pedestrian route off Sheep Street

Pedestrian route to Pioneer Square

Pedestrian area Bure Place/Cream Walk

Graveyard by St Edburgh's Church

Junction of Causeway, Church lane and Church Street

Figure 7.1 Existing Cycling and Walking Facilities

Key

┼┼┼┼┼	Railway
▪▪▪▪▪	Footpath: No cycling
▬▬▬	On-Road cycle Lane
▬ ▬ ▬	Cycle & Foot Path
▪▪▪▪▪	National cycling route 51
●	Foot or 'Toucan' (Foot & Cycle) Crossing
[51]	National Cycle Route

Alan Baxter
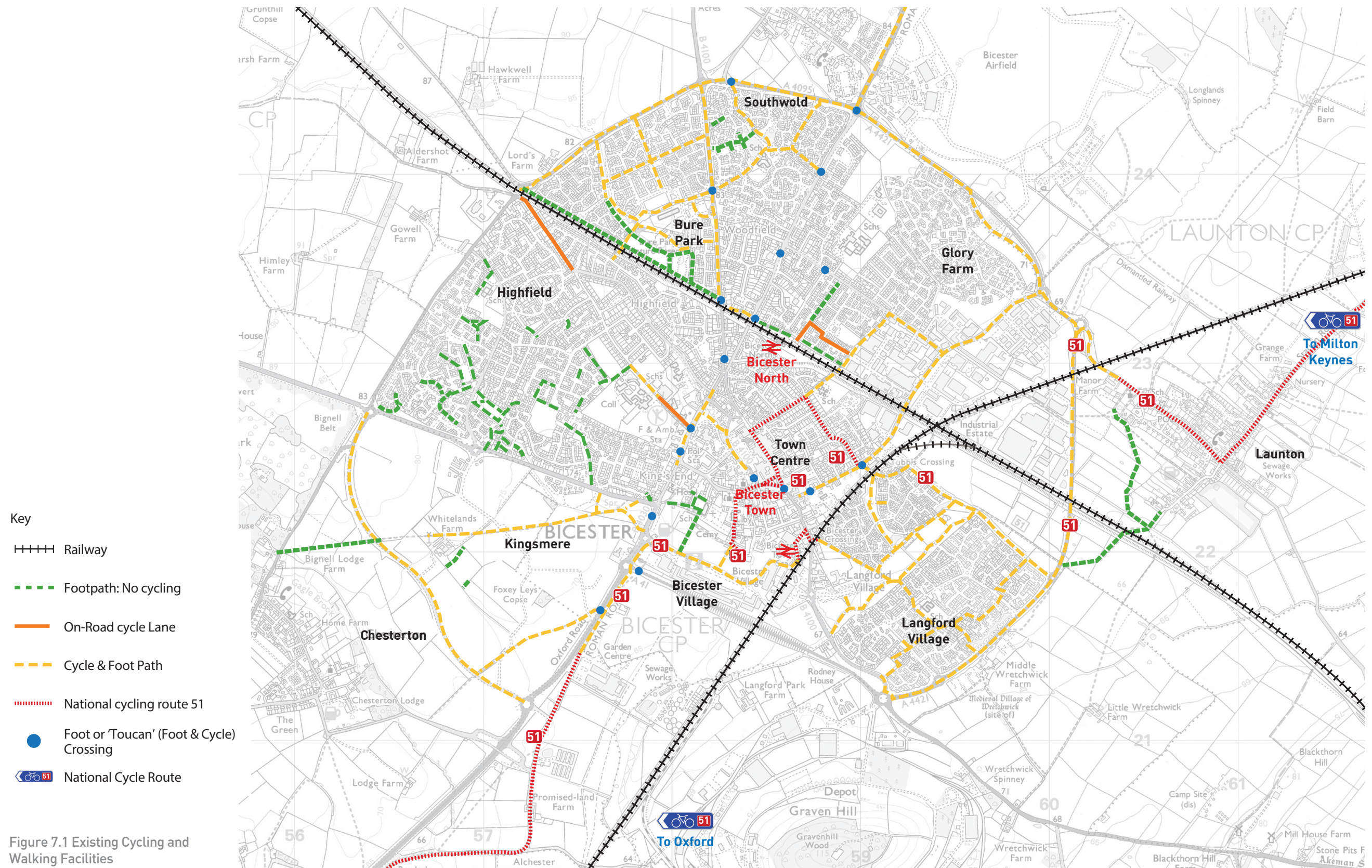
Description of Gateways and Links

Gateways are the key access points to the central core of the town which is defined by the two railway lines, the King's End / Queen's Avenue central corridor and Bicester Village. These gateways are typically defined by a crossing of a major railway or major road.

1. Bucknell Road/St John's Street

Bucknell Road is moderately busy and not ideal for cycling but nonetheless is an important route for some journeys, particularly to Bicester North station.

It is also an important pedestrian route to the town centre, with an existing Zebra crossing of Field Street. The transition from Bucknell Road to St John's Street for cyclists is awkward. Some cyclists choose the same route as pedestrians on the footways leading to potential conflicts.

2. Community College access/Hunt Close

An existing Zebra crossing of Queens Avenue links the Community College, Leisure Centre with Hunt Close and the town centre. The access road to the Community College is busy at peak times but generally quiet during the day. The Hunt Close link leads directly to a Toucan crossing of Manorsfield Road and the town centre. Overall this provides a high quality walking and cycling gateway into and out of the town centre.

Field Street

St John's Street

Link to Hunt Close

Queens Avenue

3. Kingsclere Road/King's End

An existing signal crossing of Queens Avenue links the quiet residential road Kingsclere Road with King's End and the town centre. The transition for cyclists west to east is adequate but east to west more awkward. There is no continuity in the cycle paths as they cross side streets.

Kingsclere Road

Queens Avenue

4. King's Avenue/Piggy Lane

An existing signal crossing of King's End links the quiet residential road King's Avenue with Piggy Lane, which is not a through route for motor vehicles. The crossing is located a few metres south of the junction, which diverts pedestrians and cyclists away from the desire line. The surface of Piggy Lane between Coker Close and Cemetery Road in in a poor state of repair.

King's End

Piggy Lane

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5. Middleton Stoney Road/King's End

This is a very busy junction with poor quality provision for pedestrians and no provision for cyclists. There is a splitter island on the northern arm of the roundabout with dropped kerbs but this is an uncontrolled crossing. Many journeys to the town centre can use Ray Road and Finchley Lane as an alternative connection to the Piggy Lane crossing. However, this gateway location is important for journeys to school (St Edburg's Primary School and Bicester Village. A wide surfaced track leads to the southern end of the school, the sports ground and public footpath 129/10 which links into Piggy Lane.

King's End

Oxford Road

6. Oxford Road/Pingle Drive

A controlled pedestrian crossing is located to the north of the roundabout.   The primary purpose of this appears to be to provide access to the northbound bus stop. Usage of this crossing is therefore relatively light but this is likely to change when Kingsmere is developed – a strategic walking route passes through this development and links directly to the crossing. There is evidence in the grass verge on the west side of Oxford Road of the need for a surfaced path beside the road, linking south to the roundabout and north to Middleton Stoney Road. The northern footway of Pingle Drive appears to be for shared cycle/pedestrian use but it is relatively narrow.   It forms part of NCN Route 51 and further east on Pingle Drive becomes a route segregated from pedestrians by a continuous white line.

Oxford Road

Pingle Drive

Key

┼┼┼┼┼	Existing Railway
┼┼┼┼┼	Proposed railways
○	Gateways
▦	Quadrants

Figure 7.2 Gateways and Quadrants

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7. Pingle Drive/Pingle Field

This is a good quality traffic-free link across Pingle Field between Bicester Village and the town centre, forming part of NCN Route 51. The shared path leads directly to a Zebra crossing of Pingle Drive and a priority walking and cycling route through the Bicester Village car park.

Pingle Field

Pingle Drive

8. Langford Village/London Road

An existing wide shared path links Mallards Way with the railway line but the last 50 metres beside the railway is around 1.7 metres wide. There are no crossing facilities of London Road and this is an issue for pedestrians and cyclists travelling to the station, Bicester Village or the town centre.

London Road

Footpath to Langford Village

9. Langford Village/Tubb's Crossing

This is one of two key pedestrian and cycle links between Langford Village and the town centre and also forms part of NCN Route 51. The former at grade crossing of the railway line but has been replaced with a footbridge as part of the Evergreen 3 project by Chiltern Railways. An existing controlled crossing (Toucan crossing) of Launton Road provide a connection to Longfields. The shared path on the west side of Launton Road comes to an end at 'The Courtyard Home of the Oxfordshire Youth Arts Project' and has no priority at side road crossings.

10. Launton Road

This busy road carries a high number of large vehicles associated with the industrial areas on the east side of the town. The road passes under the railway line with a high arched bridge. The footway on the west side of the road is designated for shared use, but it is narrow in places.

Link to Tubb's Crossing

Launton Road

Launton Road rail bridge

Launton Road

Alan Baxter

11. Longfields Subway

This tunnel under the railway links Hertford Close and Murdock Road with Longfields and Withington Road. Cyclists are asked to dismount as the tunnel is narrow with limited headroom. It is an important link between residential and industrial areas and the town centre, with a good quality shared path to Churchill Road.

Longfields subway

Town Walk West

12. Buckingham Road

This is a busy road under the railway, with a controlled crossing (Toucan crossing) to the north that links shared paths that run parallel to the railway between Banbury Road and Balliol Road. There are no cycling facilities between the railway bridge and Roman Way to the south. North Street has recently been closed at the roundabout and is now a quiet route into the town centre. Access to the railway station is from a signalised junction to the south of the railway bridge. There are pedestrian phases on the traffic lights but no specific provision for cyclists, who have to mix with general vehicles.

North Street/Buckingham Road

Town Walk East

13. Banbury Road

This is a busy road under the railway with a controlled crossing (Toucan crossing) to the north linking the footpath to/from Bure Park, the cycle path on the west side of Banbury Road with the combined path to Buckingham Road. At the entry/exit to the Bure Park footpath there are chicane barriers which it is assumed are to slow down cyclists. There no cycle facilities to the south of the bridge. The footways are currently too narrow for shared use and have relatively high pedestrian flows.

Banbury Road

Link to Bure Park

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Quadrants

South West Quadrant: Kingsmere (under development) and Highfield

Summary of current conditions for walking & cycling within the estates	
Pros	Cons
• 20mph speed limit on access road to new Kingsmere development (Whitelands Way) • Some good traffic-free paths under construction in Kingsmere - but see opposite • Good quality link from Highfield past the Community College	• Access road to Kingsmere (Whitelands Way) is poorly designed for cycling & walking • Some of Kingsmere paths are being built to sub-standard width (1.2m) • Lack of continuous, convenient cycling & walking routes throughout the Highfield area (apart from link past Community College) • 30mph speed limit in Highfield

Cycling & walking links between the estates and main destinations	
Routes to Industrial Estate	Issues (see Gateways)
• All routes involve crossing under the railway via Buckingham Road, the Barry Avenue or Longfields subways, or Launton Road (as well as crossing the A41-A421, see opposite)	Buckingham Road (Gateway 12): • Busy road with no provision for cyclists Barry Ave & Longfields (Gateway 11) via subways: • Cyclists advised to dismount through subways (low headroom) • Unsurfaced path on other side of railway from Barry Avenue Launton Road (Gateway 10): • Shared use footway less than ideal width, lacks priority, and stops short of London Road
Routes to Town Centre and other main destinations	Issues (see Gateways)
All approaches (Bucknell Road; George Street-Community College; Kingsclere Road; Kings Avenue; Middleton Stoney Road) involve crossing the A41-A421 main road	Bucknell Road-St John Street (Gateway 1): • No/poor provision for cyclists Community College-Hunt Close (Gateway 2): • No provision for cyclists between College and Queens Avenue Kingsclere Road-Kings End (Gateway 3): • Poor E-W access; one-way cycling only on Causeway Kings Avenue-Piggy Lane (Gateway 4): • Off-line crossing Middleton Stoney Rd-Kings End (Gateway 5): • No provision for cyclists; poor provision for pedestrians

New 3m wide path in Kingsmere

Whitelands Way (Kingsmere) is not cycle-friendly

Zebra to Bucknell Road also used by cyclists

No paved path on northbound approach to Middleton Stoney Road roundabout

North West Quadrant: Bure Park and Southwold

Summary of current conditions for walking & cycling within the estates	
Pros	**Cons**
• Good network of shared use paths • Generally 3m width available on main paths (but see comment on vegetation opposite) • Shared use paths & footways generally in good condition • Cul-de-sac layout on both estates with higher permeability for walking & cycling than for motor traffic Note: most shared paths are divided by a white line between pedestrians and cyclists	• Some shared paths need surfacing (Bure Park) or minor repairs and attention to vegetation – see detailed audit • Highly restrictive barriers at all path access points in Southwold (and at some accesses in Bure Park) • No provision for cyclists in the Woodfield area (to the south of Southwold) • Signing is sparse • Cobbled entry treatments on estate roads are uncomfortable for cyclists • 30mph limit on estate roads

Cycling & walking links between the estates and main destinations	
Routes to Industrial Estate	**Issues (see Gateways)**
• All routes involve crossing the Buckingham Road (and Banbury Road as well from Bure Park); key routes into the Industrial Estate east of Buckingham Road are Churchill Road and the path alongside the railway	Churchill Road: • No crossing at junction with Buckingham Road • No/poor provision for cyclists on Churchill Road itself Path alongside railway: • Unsurfaced west of Banbury Road (adjacent to Bure Park)
Routes to Town Centre and other main destinations	**Issues (see Gateways)**
All routes involve crossing under the railway via the Barry Avenue subway (west side of Bure Park) or via Banbury Road/ Buckingham Road	Bure Park-Barry Avenue: • Cyclists advised to dismount through subway (low headroom) • Path alongside railway unsurfaced west of Banbury Road Banbury Road/Buckingham Road (Gateways 12 & 13): • Busy roads with no provision for cyclists apart from shared use footway north of railway on Banbury Road

Gravel path at Bure Park

Unnecessary barriers in Southwold

Shared use footway on Churchill Road (east end)

No cycle provision at west end of Churchill Road

Bure Park access on Banbury Road

Cycle provision ends at Buckingham Road

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North East Quadrant: Glory Farm and Industrial Estate

Summary of current conditions for walking & cycling within the estates	
Pros	Cons
• Good standard traffic-free path along periphery (Skimmingdish Lane) • Advisory cycle lanes and cycle parking on part of Glory Farm distributor road (Boston Road)	• Limited/narrow links from/to peripheral path • Restrictive access gate to peripheral path (and guardrails/high kerbs on other links) • Traffic-free path network incomplete and sub-standard (e.g. path to schools) • Signing is sparse • No traffic calming/pedestrian crossings on Glory Farm distributor road (Boston Road) • Little provision for cyclists on and around Churchill Road (e.g. for Cooper School and Industrial Estate) • 30mph limit on estate roads

Cycling & walking links between the estates and main destinations	
Routes to Industrial Estate	Issues (see Gateways)
• The Industrial Estate is bisected by the railway: all routes to the area north of the railway involve crossing Launton Road; access to the area south of the railway is via the Ring Road (Charbridge Lane)	Launton Road (Gateway 10): • Lack of width/priority and wide side road crossing points on shared use footway • No crossings on Launton Road to reach Industrial Estate Charbridge Lane: • Shared use footway has no priority/dismount signs at side roads • Footway width reduced by overgrowing vegetation • No provision (apart from refuge islands) at roundabouts
Routes to Town Centre and other main destinations	Issues (see Gateways)
All routes involve crossing under the railway on Buckingham Road, Launton Road or via the traffic-free link between the two (Town Walk)	Buckingham Road (Gateway 12): • Busy road with no provision for cyclists Launton Road (Gateway 10): • Shared use footway less than ideal width, lacks priority, and stops short of London Road

Cycle lanes/parking on part of Boston Road only

Primary school path gets narrow and peters out

No cycle provision: Launton Road/Bessemer Close

Over-runnable islands on Launton Road

Untreated side road crossing: Launton Road

South East Quadrant: Langford Village and Fields Farm

Summary of current conditions for walking & cycling within the estates	
Pros	**Cons**
• Good network of shared use paths • Generally 3m width available on main paths (but see comment on vegetation opposite) • Shared use paths & footways generally in good condition (but see comment on surfaces opposite) • Cul-de-sac layout on both estates with higher permeability for walking & cycling than for motor traffic • Informal pedestrian crossing points with kerb build-outs on access road in Fields Farm (Mallards Way) • Note: most shared paths are divided by a white line between pedestrians and cyclists	• Two key shared use paths have poor (earth/gravel) surfaces and some tarmac paths need minor repairs – see detailed audit • Path width sometimes reduced by overgrowing vegetation – see audit • Restrictive barriers at virtually all path access points • Most links to the shared use paths less than ideal width for shared use • Signing is sparse • No traffic calming/pedestrian crossings on main distributor road (Peregrine Way) in Langford Village • Cobbled entry treatments on estate roads are uncomfortable for cyclists • 30mph limit on estate roads

Cycling & walking links between the estates and main destinations	
Routes to Industrial Estate	**Issues (see Gateways)**
• All routes involve crossing under the railway either at the intersection of the two railway lines via public footpath or using the Ring Road (Gavray Drive-Charbridge Lane)	Footpath under railway: • Currently closed for laying of new railway link Gavray Drive-Charbridge Lane: • Shared use footway has no priority/dismount signs at side roads • Footway width reduced by overgrowing vegetation • No provision (apart from refuge islands) at roundabouts
Routes to Town Centre and other main destinations	**Issues (see Gateways)**
All routes involve crossing over the railway (at Bicester Town station or Tubb's Crossing) and use of the London Road (B4100) - and Launton Road as well (when using Tubb's Crossing)	London Road (Gateway 8): • 30/40mph speed limit • No facilities for cyclists • Some sections have narrow footways • Crossings not provided at some roundabouts • Narrow access to London Road alongside the railway Tubb's Crossing (Gateway 9): • New footbridge (under construction) at Tubbs Crossing has lengthy ramps (rather than a more direct subway) • Off-line crossing at Longfields (from Tubb's Crossing to shared use footway on Launton Road) • Shared use footway less than ideal width, lacks priority, and stops short of London Road

Raised informal crossing: Mallards Way

Sub-standard earth/gravel path: Langford Village

No crossing at Langford Village local centre

Gavray Drive: 3m shared path (note vegetation)

Dismount signs at side road on Charbridge Lane

Launton Road shared use footway ends abruptly

Alan Baxter

Bicycle Hire

Cycle for Bicester was launched in 2012 as part of the Eco-Bicester travel demonstration project, and funded from the Communities and Local Government (CLG) eco town grant (held by Cherwell District Council and administered by Oxfordshire County Council). Bicester Green (centre for sustainability, skills and recycling) now run this successful scheme. Bicester Green's bike loan scheme offers cycles for periodic, one-off use, and on a subscription basis. They are located in an industrial unit on Station Approach.

Bicycle Shops

There are two bicycle shops in Bicester - Broadribbs Cycles on Sheep Street and Halfords at the retail park on Launton Road.

Cycle Parking

Transport surveys relating to cycle parking in Bicester report a lack of adequate facilities, particularly in the town centre, and include suggestions of a cycle hub.

Current cycle parking provision in the town centre is well-used. At the time of the survey, stands on Sheep Street in particular were at capacity. The new development at Pioneer Square provides cycle parking, including covered provision, as well as stands within Bure Place, most of which were empty at the time of the survey. Bicester North Station also provides ample provision of cycle parking with a total of 74 spaces.

Figure 7.4 is a table giving details of the provision - location, type of cycle parking and numbers of space - at all sites in the town centre. These are illustrated on the cycle parking map in Figure 7.3.
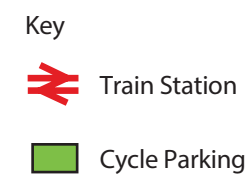

Key

⚡ Train Station

🟩 Cycle Parking

Figure 7.3 Town Centre Cycle Parking

Map Reference	Location	Type & No. of Cycle Parking	Number of Spaces	Comments
P1	Bicester North Station	Platform side of carpark: 5 Sheffield stands	10	Covered
		South side of carpark: 30 wheel racks / clamps 17 Sheffield stands	64	Wheel racks/clamps are insecure
P2	Garth Park	4 Sheffield stands	8	
P3	Bicester Town Station	5 Sheffield stands	10	Covered
P4	Bicester Village	4 Sheffield stands	8	
P5	Bicester Village	7 + 3 Sheffield stands	20	
P6	Bicester Library	4 Sheffield stands	8	
P7	Bus Stop, Oxford Road	10 Sheffield stands	20	Stands sited too close together, effective number of spaces = 10
P8	Montgomer House Surgery, Piggy Lane	1 Sheffield stand	2	
P9	Bicester Leisure Centre	11 Sheffield stands 10 wheel slots	32	Cover has been removed, wheel slots are insecure and cause damage
P10	Sainsbury's & Vue, Pioneer Square	4 + 7 + 5 + 4 + 5 + 5 Sheffield stands	60	
P11	Sheep Street (north)	10 Sheffield stands	20	
P12	Sheep Street (Tesco)	3 Sheffield stands	6	
P13	Sheep Street (south)	5 Sheffield stands parallel parking 5 stands right angle parking hoops	20	Damage to some right angle parking hoops

Figure 7.4 Town Centre Cycle Parking Details

Cycle Parking: Bicester North Station and Sheep Street

Rail Network

Bicester is well connected to the wider UK rail network (see Figures 7.6 and 7.7), with two railway stations. Both managed by Chiltern Railways, these are Bicester Town (on the original Bletchley-Oxford line) and Bicester North (on the original Great Western Mainline).

Bicester Town station is currently closed, but will in the near future provide access to Oxford and London Marylebone (Evergreen 3); and in the long term will link to Milton Keynes, Bedford, and eventually Cambridge (East-West Rail, Figure 7.6). Bicester North station lies on the rail line between London Marylebone and Birmingham, providing a direct link to places such as High Wycombe, Banbury and Leamington Spa, and an indirect link to, for example, Aylesbury (necessitating a change at Princes Risborough). The main rail destinations and frequency of service are shown in the table in Figure 7.8.

Bicester Town station is located 1km by road to the south east of the town centre, and is currently closed during the construction of the Chiltern Railways Evergreen 3 railway improvement scheme. The scheme will provide a passenger train service between Oxford and London Marylebone via Bicester, offering an alternative to travel by road using the M40 and the A34. The new route will be created by upgrading the existing route between Oxford and Bicester Town and by building a short connecting line (Chiltern chord line) south east of Bicester linking the Oxford to Bicester and London Marylebone to Birmingham lines. The new station (Figure 7.5), which is due to open in summer 2015, will have level access, two new platforms, a rebuilt car park, an improved station approach road and integrated transport facilities with cycle parking and bus stops. It is expected that the line as far as Oxford (Water Eaton) Parkway should open in summer 2015, and the full line to Oxford in spring 2016.

It is anticipated that two trains per hour will run between Oxford and London Marylebone, providing a 15 minute rail link between Bicester and Oxford, with stops at Islip and Oxford (Water Eaton) Parkway. In the meantime, since February 15th 2014, a replacement bus service is being provided to and from Bicester Town station, calling at Islip (15-20minutes) and Oxford (38-50 minutes).

Figure 7.5 Visual of Proposed Bicester Town Station

Proposed New Passenger Services on East West Rail Western Section
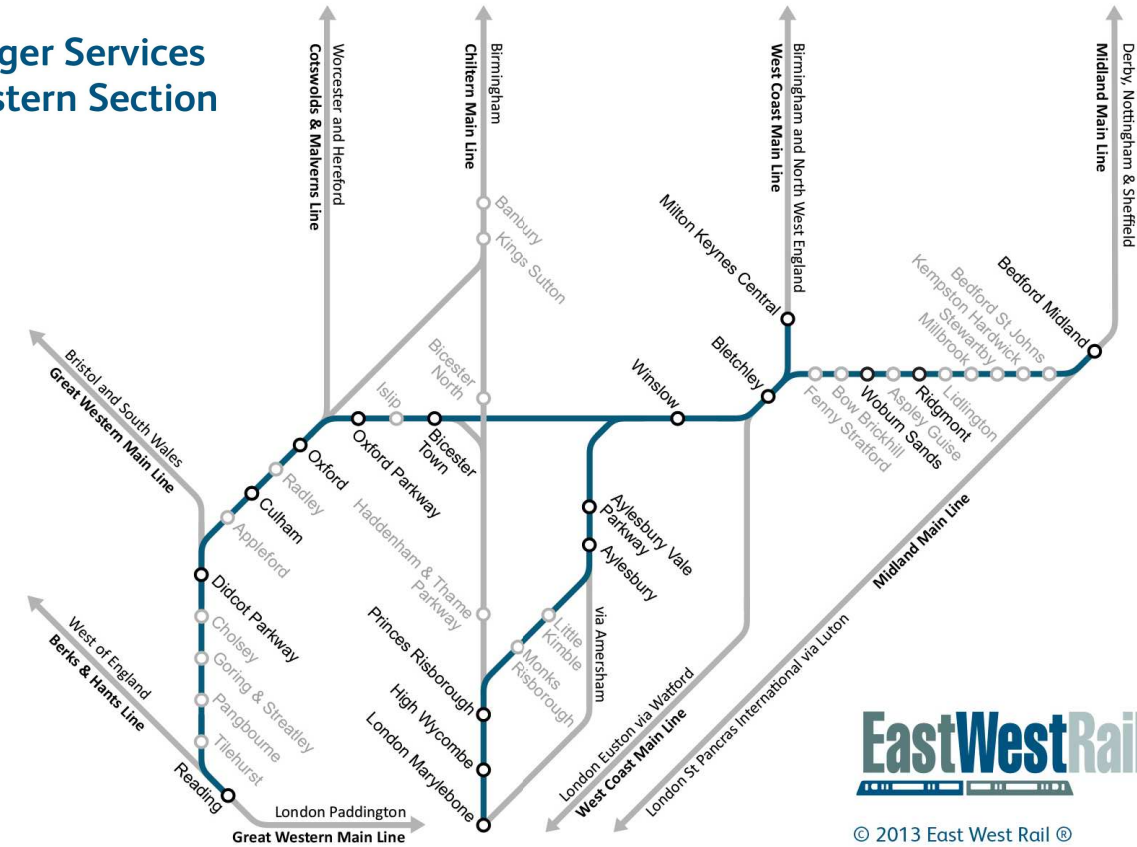
Figure 7.6 Destinations for East-West Rail

To Birmingham

Banbury

Kings Sutton

East-West Rail (Under Construction)

Future East-West line
to Milton
Keynes, Bedford &
Ultimately Cambridge

Heyford

Bicester North

Tackley

Bicester Town

Islip

Kidlington

(Water Eaton) Oxford Parkway

Haddenham
&
Thame Parkway

Haddenham

Thame

Oxford

To High
Wycombe &
London
Marylebone

To Didcot & London
Paddington

Key

╫╫╫╫╫   Rail Lines

╫╫╫╫╫   Rail Line Under construction

≷   Railway Stations
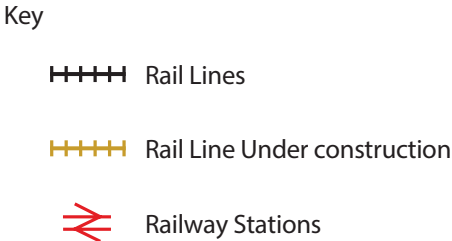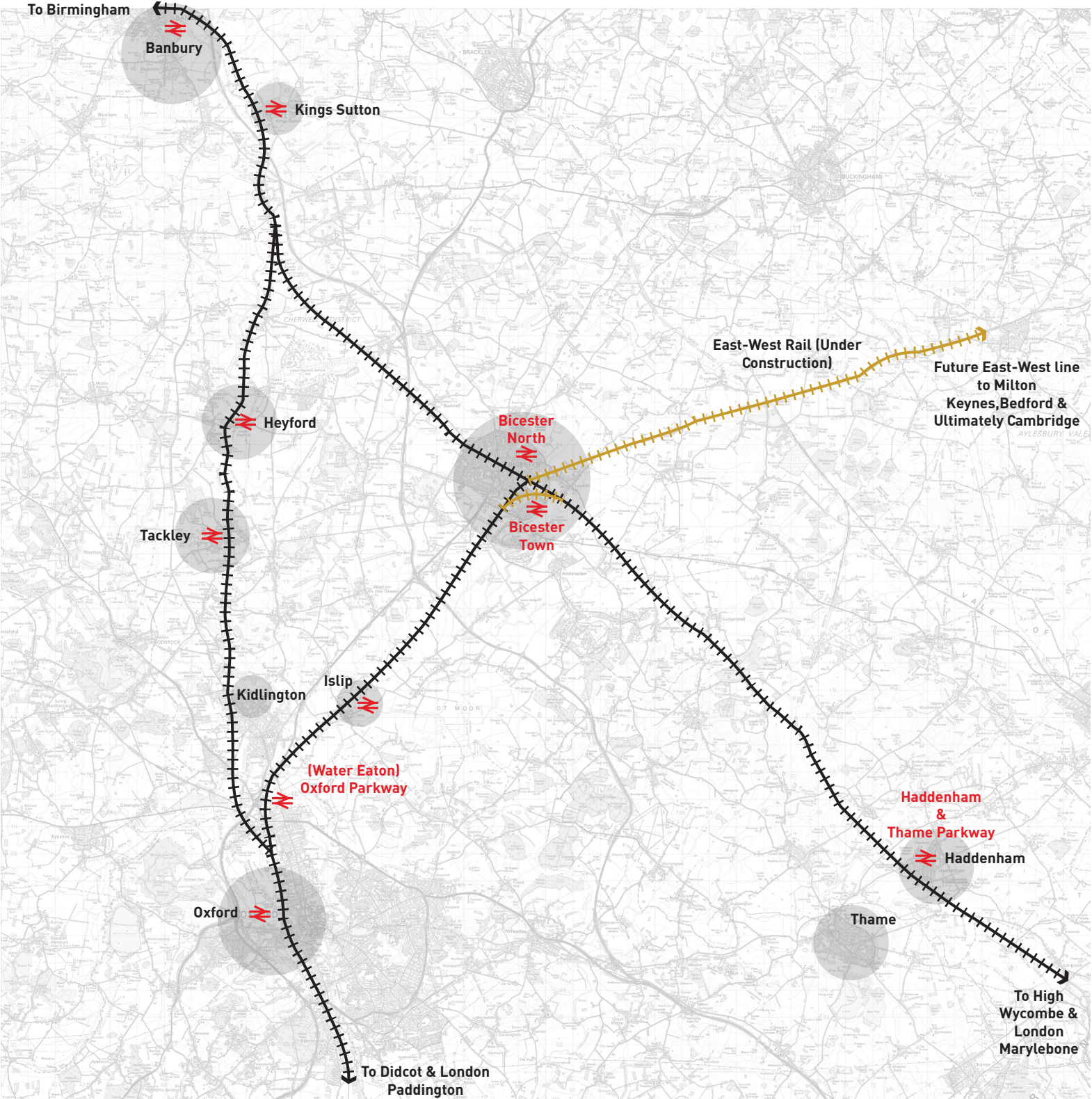
Figure 7.7 Bicester Rail Connections

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The western section of the East-West Rail project is now a committed, funded scheme to re-introduce passenger and freight services between Bedford and Oxford, Milton Keynes and Aylesbury. An hourly service is proposed, between Didcot Parkway and Bedford, calling at Oxford and Bicester Town. The East-West Rail Consortium is further working to develop a business case to re-establish a rail link between Bedford and Cambridge.

Bicester North station, shown in the images to the right, is located 800m by road from the centre of town and provides links to all destinations between Birmingham and London Marylebone on the Chiltern Rail line. Two Birmingham city centre rail stations are served from Bicester: Birmingham Snow Hill and Birmingham Moor Street. Birmingham New Street is also accessible but requires a change at Banbury or Leamington Spa. This station is at the heart of the UK rail network with direct links to all other major cities in the UK. Approximate fastest journey times and service frequencies to the following main destinations are as summarised in Figure 7.8.

In terms of accessing the station, Bicester North is served by a number of bus routes and other services. The shuttle bus to Bicester Village and the Bicester Taxibus service stop on the station forecourt, and many other bus services stop on Buckingham Road, a few minutes' walk from the station. The station also has 74 cycle parking stands.

Destination	Time	Frequency
Birmingham New Street (change at Banbury)	1hour 10minutes	
Birmingham Moor Street	1hour	15minutes – 1hour
Leamington Spa	30minutes	15minutes – 1hour
Banbury	12minutes	15-30 minutes
Princes Risborough	20minutes	5minutes – 1hour
Aylesbury (change at Princes Risborough)	50 minutes	
High Wycombe	20minutes	15minutes – 1hour
London Marylebone	45minutes	15-30 minutes

Figure 7.8 Rail destinations and frequency

Bicester North rail station

Bus Network

Bicester has a reasonable provision of bus services, both within the town and to destinations further afield, which are provided by a number of different operators. While there are quite a number of bus routes, some of the services are infrequent – such as the Heyfordian route 81A to Somerton, on which two buses run on Tuesdays only, or the Charlton Services route 30 to Oakley, on which one bus runs on Fridays only. The S5, which runs every 15 minutes, is the most frequent bus route serving the town, this route also serves Kidlington and Oxford.

There is also a commuter bus service: the Bicester Taxibus is a rail link service designed to be easier and cheaper than driving to Bicester North Station. It runs Monday to Friday following a set route between Bure Park, Greenwood and Langford Village, meeting departures in the am peak; and arrivals in the pm peak; of key trains to London Marylebone. The Taxibus can be hailed along the street, and can also be called during off peak times.

The main bus interchange in Bicester is on Manorsfield Road in the town centre, by the Pioneer Square shopping centre. There are seven bus stops here, all of which are new and of good quality. The three northern stops are sheltered by common structure providing seating, route and timetable information. The footway is of sufficient width that the bus stops do not cause obstruction. The four stops further south are sheltered by the (Pioneer Square) building overhang – the ground floor being set back relative to the upper storey – with seating set against the building's ground floor wall. Additional seating is provided by two pieces of art - Rodney Harris's Chesterfield-style clay sofas.

Figure 7.11 shows routes that buses take through the town of Bicester, while Figure 7.12 shows the location of the bus interchange and which routes stop at each bus stand.

All the bus routes (17 routes) serve Bicester town centre, most stopping at the interchange on Manorsfield Road. These routes provide service to the residential areas of the town, to the two railway stations, to Bicester Village, as well as to further destinations, such as:

- Cambridge: X5 (3 hours, £12.50) – up to 2 buses per hour

- Oxford: X5 (30-35 minutes, £4), S5 (40 minutes – 1 hour), 25 – providing up to 7 buses per hour

- Northampton: 8 (every 2 hours)

- Banbury: 81 (2 buses on Thursdays, Fridays, Saturdays)

The Taxibus serves Bicester North Station, and there is also a Bicester Village shuttle bus. Typical fares for travelling within the town of Bicester are £1 for an adult single and £1.50 for a return journey (fare for Thames Travel, which run routes 22, 23, 24, 25). Fares for the Taxibus are £2.20 for a single, £3.50 for a day return. The Bicester Village shuttle bus costs £4.50 for a day return.

The residential areas of Bicester are served by bus routes as follows:

- Langford Village: served by the S5, the Taxibus (am and pm peak), and routes 22 and 23. The latter two follow an almost identical route and each run hourly, thus effectively providing a half hourly service to the town centre, Bure Park, Southwold and Caversfield.

Monday - Friday	Oxford → Bicester	14 buses (15 on Fridays)	05:20 - 23:15
	Bicester → Oxford	16 buses (17 on Fridays)	06:00 - 23:55
Saturday	Oxford → Bicester	16 buses	06:15 - 22:30
	Bicester → Oxford	16 buses	07:00 - 23:15
Sunday	Oxford → Bicester	8 buses	09:20 - 22:00
	Bicester → Oxford	8 buses	10:05 - 22:45

Figure 7.9 Frequency of bus services to Oxford

Town bus services and facilities

Alan Baxter

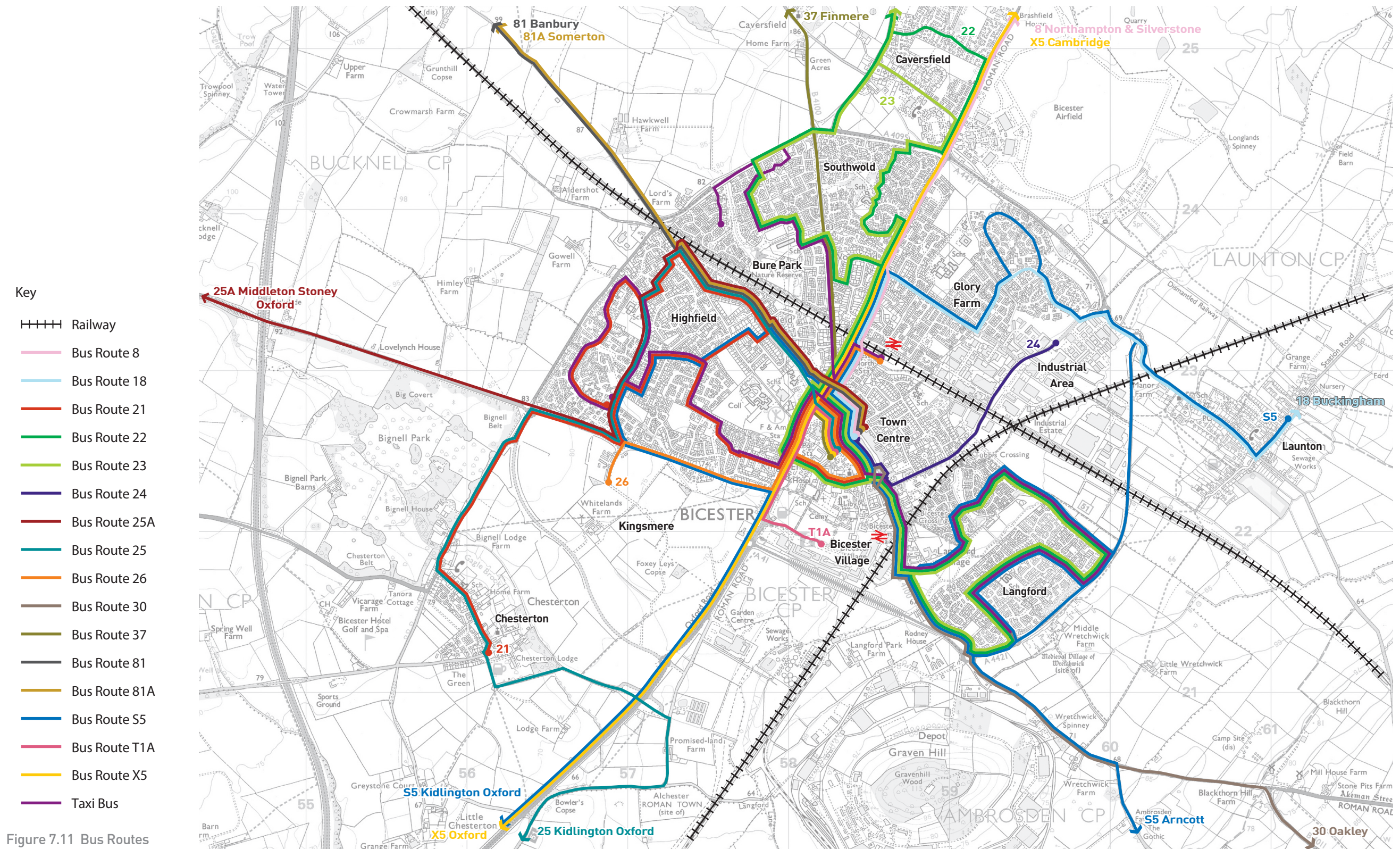| Service	Operator	Route	First	Last	Frequency
8	Stagecoach	Bicester - Brackley - Towcester - Northampton	07:16	16:20	every 2 hours
8	Northants	Northampton - Towcester - Brackley - Bicester	05:40	14:19	
18	Arriva	Bicester - Steeple Claydon - Buckingham - Aylesbury	08:35	18:00	every 2 hours
18		Aylesbury - Buckingham - Steeple Claydon - Bicester	07:15	16:50	
21	Grayline	Bicester - Chesterton - Bicester (Circular)	07:55	17:55	every 30 minutes
21		Bicester - Chesterton - Bicester (Circular) arrivals	07:50	18:20	
22	Thames	Bicester - Langford - Caversfield - Bicester (Circular)	07:35	18:25	hourly
22	Travel	Bicester - Caversfield - Langford - Bicester (Circular) arrivals	07:55	19:00	
23	Thames	Bicester - Langford - Caversfield - Bicester (Circular)	08:45	17:45	hourly
23	Travel	Bicester - Caversfield - Langford - Bicester (Circular) arrivals	09:30	18:30	
24	Thames	Bicester - Churchill Road - Bicester (Circular)	08:00	18:30	every 30 minutes
24	Travel	Bicester - Churchill Road - Bicester (Circular) arrivals	08:12	18:42	
25	Thames	Bicester - Oxford/Kidlington	06:25	19:10	hourly
25	Travel	Kidlington / Oxford - Bicester	06:52	19:05	
25A	Thames	Bicester - Middleton Stoney - Heyford - Kidlington - Oxford	06:25	19:57	every 30 minutes
25A	Travel	Oxford - Kidlington - Heyford - Middleton Stoney - Bicester	07:00	00:16	to one hour
26	Stagecoach	Bicester - Kingsmere	07:20	18:35	every 30 minutes
26	Oxfordshire	Kingsmere - Bicester	07:00	18:16	
30	Charlton	Bicester - Oakley	12:00		1 bus
30	Services	Oakley - Bicester	09:10		Friday only
37	Heyfordian	Bicester - Hardwick -Finmere	11:30	14:30	2 buses
37		Finmere - Hardwick - Bicester	09:45	12:45	Tuesday only
81	Heyfordian	Bicester - Ardley - Souldern - Banbury	10:00	12:00	2 buses
		Banbury - Souldern - Ardley - Bicester	11:10	13:00	Thurs, Fri, Sat
81A	Heyfordian	Bicester - Ardley - Souldern - Somerton	10:30	13:30	2 buses
		Somerton - Souldern - Ardley - Bicester	11:00	14:00	Tuesday only
T94	Thames	Bicester - Ambrosden - Islip - Oxford	12:00		1 bus Mon-Sat
	Travel	Oxford - Islip - Ambrosden - Bicester	11:00	13:30	2 buses Mon-Sat
S5	Stagecoach Oxfordshire	Oxford - Gosford - Bicester - Glory Farm / Launton / Arncott / Langford	06:45	23:40	every 15 minutes
S5		Glory Farm / Launton / Arncott / Langford - Bicester - Gosford - Oxford	05:43	23:03	
NS5	Stagecoach	Oxford - Gosford - Bicester - Langford	00:10	03:10	3 buses Sat, Sun
	Oxfordshire	Langford - Bicester - Gosford - Oxford	00:25	02:15	2 buses Sat, Sun
X5	Stagecoach	Cambridge - Bedford - Milton Keynes - Oxford	06:10	23:20	every 30 minutes
X5	Bedford	Oxford - Milton Keynes - Bedford - Cambridge	07:40	22:30	
Bicester		Bure Park - Greenwood - Langford Village - Bicester North	06:01	08:08	5 buses
Taxibus		Bicester North - Langford Village - Greenwood - Bure Park	16:40	18:38	6 buses

Figure 7.10 Bus provision

The S5 provides a quarter hourly service through the town and on to Kidlington and Oxford, while the Taxibus runs during the morning and evening peak. In total, there are up to 9 buses per hour serving this neighbourhood.

· Glory Farm: served by the S5 and the number 18. The latter runs every 2 hours during the daytime, running from the town centre through the Glory Farm area of town and on to Buckingham. In total, there are up to 5 buses per hour serving this neighbourhood.

· Bure Park and Southwold: served by the Bicester Taxibus (am and pm peak) and the numbers 22 and 23. The latter two additionally serve Caversfield, north of the town. In total, there are up to 5 buses per hour serving this neighbourhood.

· Highfield is served by the S5 (every 15 minutes), the Taxibus (am and pm peak) and the numbers 21 (every 30 minutes) and 25 (hourly). The number 21 runs from the town centre, through Highfield and on to Chesterton, south of the town. The number 25 takes a similar route but continues beyond Chesterton to Kidlington and Oxford. In total, there are up to 10 buses per hour serving this neighbourhood.

· Kingsmere is served by the number 26, which runs every 30 minutes. The S5 (every 15 minutes) and numbers 21 (every 30 minutes) and 25 (hourly) also run along Middleton Stoney Road, giving access to the edge of Kingsmere. In total, there are up to 9 buses per hour serving this neighbourhood.

The Travel Line South East website is very useful for planning journeys using public transport, walking and cycling(www.travellinesoutheast.org.uk). It provides maps of routes and timetables as well as journey planning.

Key

┼┼┼┼ Railway

━━ Bus Route 8
━━ Bus Route 18
━━ Bus Route 21
━━ Bus Route 22
━━ Bus Route 23
━━ Bus Route 24
━━ Bus Route 25A
━━ Bus Route 25
━━ Bus Route 26
━━ Bus Route 30
━━ Bus Route 37
━━ Bus Route 81
━━ Bus Route 81A
━━ Bus Route S5
━━ Bus Route T1A
━━ Bus Route X5
━━ Taxi Bus

Figure 7.11 Bus Routes

81 Banbury
81A Somerton

37 Finmere

22

23

Caversfield

8 Northampton & Silverstone
X5 Cambridge

Southwold

25A Middleton Stoney
Oxford

Bure Park
Nature Reserve

Highfield

Glory
Farm

24
Industrial
Area

18 Buckingham

S5

Launton

26

Town
Centre

BICESTER

Kingsmere

T1A

Bicester
Village

Chesterton

21

Langford

60

S5 Kidlington Oxford

X5 Oxford

25 Kidlington Oxford

S5 Arncott

30 Oakley

Town Centre Bus Interchange

Typical bus stop outside of town centre

Bus stop at Bicester Village

Town Centre Bus Interchange

Stand 1

Community Transport

Stand 2

S5/NS5 to Bicester Suburbs
X5 to Milton Keynes & Cambridge

Stand 3

S5/NS5 to Oxford
X5 to Oxford

Stand 4

25A to Oxford

Stand 5

21 to King's End/Highfield
22 to Southwold/Caversfield
23 to Caversfield/Southwold
25 to Kidlington

Stand 6

22 to Langford
23 to Langford
24 to Launton Road

Stand 7

8 to Towcester
18 to Buckingham/Alyesbury
30 to Oakley
37 to Finmere
81/81A to Souldern/Banbury
94 to Oxford
95 to Charlton
118 to Oxford
T1A to Bicester Village/Banbury

Figure 7.12 Location of bus interchange in town centre

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Road Network

Bicester is well connected to the strategic road network, as shown in Figure 7.13. It is located to the east of the M40, which runs north-south: north towards Banbury and Birmingham; and south towards High Wycombe, the M25 and London. South of the town and running east-west is the A41. The A41 west of Bicester connects with the M40 at junction 9, and, crossing the M40, becomes the A34, leading south to Oxford and beyond (to the M4 and Southampton). Travelling along the A41 to the east brings one to Aylesbury and beyond, to the M25 and London. The distances to travel by road are as below:

·   Oxford   15 miles
·   Banbury   17 miles
·   Birmingham   65 miles
·   High Wycombe   34 miles
·   London   64 miles (M40
                                   62 miles (A41)
·   Aylesbury   17 miles

The closest airport to Bicester is the regional airport Oxford airport (10 miles by road, to the south-west of Bicester). The closest international airports are Luton airport (47 miles, to the east), Heathrow (53 miles, to the south-east), and Birmingham International (54 miles, to the north-west).
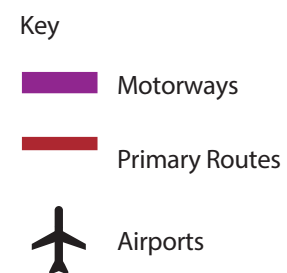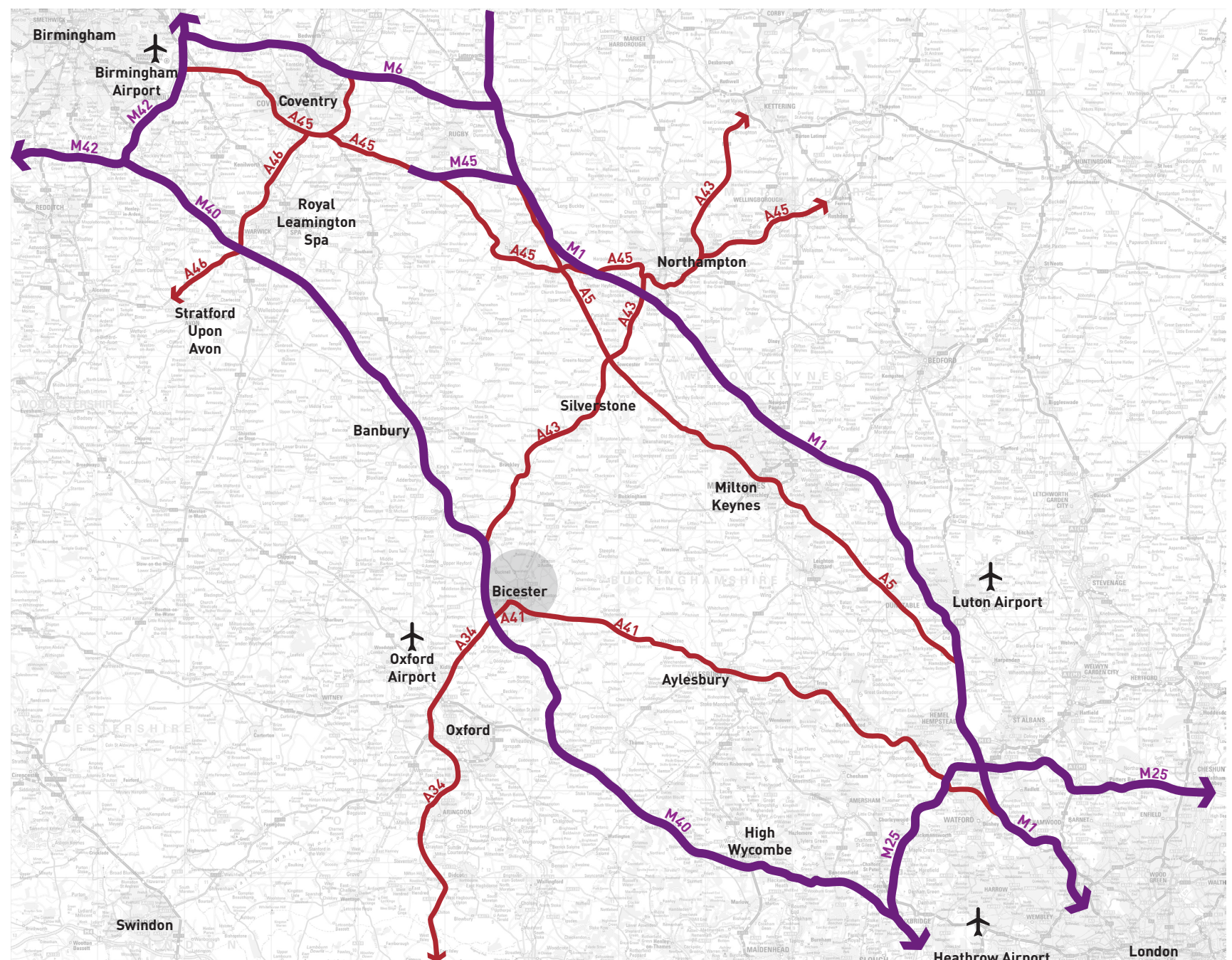
Key

Motorways

Primary Routes

Airports

Figure 7.13 Wider Road Network

Key

━━━ Motorways

━━━ Primary Routes

━━━ Secondary Routes

━━━ Tertiary Routes

Figure 7.14 Town Road
Network

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Town Centre

Bicester town centre is focused on the area between B4100 Manorsfield Road, Market Square and Sheep Street, but is broadly bounded by Queen's Avenue and Buckingham Road to the west, the railway to the north, Launton Road to the east, and King's End, Church Street and Causeway to the south (see Figure 7.14). Sheep Street is pedestrianised, thus Manorsfield Road and Market Square form the main vehicular movement spine through the centre. These have daily motor vehicle flows of 9,300 vehicles (Manorsfield Road) and 10,900 vehicles (Market Square). (Data: base flows 2007 from the Bicester Movement Strategy).

· The speed limit within the town is 30mph.

· Manorsfield Road is generally single carriageway, however the road widens at junctions (including two roundabouts); and to accommodate bus stops (this is the location of the main bus interchange for the town).

· The eastern edge of Manorsfield Road is bounded by Pioneer Square, a large shopping complex; while the western edge has a green border, beyond which are houses.

· There are a number of pedestrian crossing points: both signalled and with dropped kerbs & tactile paving.

· At its southern end, Manorsfield Road is bounded by older buildings and joins Market Square, which also forms part of the historic core.

· There is a one-way system around Market Square, which is a wide single carriageway with no designated pedestrian crossings.

Within the town centre, there is generally unhindered movement of vehicles. While Sheep Street and Bure Place are pedestrianised and there are some one-way streets, there is a general feeling of vehicle dominance. Street layouts prioritise the need of vehicles, making areas uncomfortable for pedestrians. For example, there is a one-way system right around Market Square and no official pedestrian crossing points, and while in theory traffic is not traveling particularly quickly, it can be quite difficult for pedestrians to cross. Recent town centre improvements have included the closure of North Street at the Buckingham Road end, making this a quiet street friendly to

pedestrians; and the conversion of John's Street from one- to two-way along with the replacement of junctions with roundabouts at either end of John's Street.

Peripheral Route

The town is surrounded to the west, north and east by a peripheral route (the A4095 and the A4421), and bounded to the south by the B4030 (Middleton Stoney Road) and the A41. These roads are generally single carriageway (widening for slip roads and junctions) and have a speed limit of 40mph (with the exception of Middleton Stoney Road, which has a speed limit of 30mph). While wider and narrower at various points, the peripheral route has a similar character right around. Junctions with the radial roads are formed with roundabouts, thus the ring road is free from traffic signals. There is one T-junction, between Howes Lane (A4095), which also passes under the railway. The ring road is generally bounded by green space, favours faster travelling vehicles and in some parts also has cycling provision. Daily flows are (at their busiest points):

· A4095 (to the north, west of junction with Banbury Road) - 19,000 vehicles

· A4421 Skimmingdish Lane - 7,600 vehicles

· Middleton Stoney Road (by junction with King's End) - 8,400 vehicles

· A41 - 22,300 vehicles

Radial roads connect these bounding roads to the centre. These radial roads are Banbury Road, Buckingham Road, King's End, Queen's Avenue & Field Street, Bucknell Road, Launton Road and London Road (B4100). The speed limit on these roads is 30mph, with the exception of small sections of the roads with a speed limit of 40mph before they join the ring road. Daily flows are (at their busiest points):

· Banbury Road   8,950 vehicles

· Buckingham Road   11,670 vehicles

· King's End   15,900 vehicles

· Queen's Avenue   15,100 vehicles

· Field Street   15,200 vehicles

Causeway

Market Square

Junction Priory road with London Road

Key

+++++ Railway

⎯⎯ 5,000 - 10,000 veh/day

⎯⎯ 10,000 - 15,000 veh/day

⎯⎯ 15,000 - 20,000 veh/day

⎯⎯ > 20,000 veh/day

Note: Measurements given are the highest flow intensities along links
Source: Bicester Movement Strategy 2007

Figure 7.15 Traffic Intensity

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- Bucknell Road   7,030 vehicles

- Launton Road   11,400 vehicles

- London Road   11,900 vehicles

The main north-south route through the town is formed by Buckingham Road, Queens Avenue, Field Street, Kings End and the Oxford Road. Daily flows vary as above from approximately 11,000 – 16,000 vehicles.

- This route has a speed limit of 30mph.

- It is generally single carriageway, with widenings for junctions, slip lanes, parking and bus stops.

- There is a double mini-roundabout at the junction of Churchill Road, Buckingham Road and Brashfield Road, and a three-arm roundabout where Buckingham Road joins Banbury Road, Field Street, as well as Roman Way and North Street (newly closed off using a strip and cycle lane).

- The character of the road changes somewhat over its length. Buckingham Road is bounded by relatively new residential properties set back from the road by their gardens. The route dips in the centre to pass under the railway by Bicester North Station. Field Street has slightly older and more characterful properties, which are closer to the road and give it a better sense of enclosure. There are a number of industrial units further south with parking in front, while towards the A41, King's End has a mixture of residential properties and more trees.

Buckingham Road looking south

Mallards Way, Langford

Field Street looking north

Southwold

Ring Road roundabout

Ring Road

There is a plentiful supply of car parking in Bicester town centre. There are six council-run car parks in the town centre, as well as car parks at Pioneer Square Shopping Centre, Bicester Village, Bicester Town and Bicester North Railway Stations, giving a total of over 4,000 parking spaces. Figure 7.16 summarises information regarding capacity, length of stay and charging.

It should be noted that Shopmobility is a scheme which lends manual wheelchairs, powered wheelchairs and powered scooters to members of the public with limited mobility to shop and to visit leisure and commercial facilities within the town, city or shopping centre.

Name	Capacity	Disabled Spaces	Monday - Saturday	Sunday and Bank Holiday
Council Ultra Short Stay				
Market Square	34 (includes 2 x shopmobility)	4	Maximum stay 3 hours no return within 1 hour Charges 8am - 7pm 0 - 30 minutes £0.60 30 - 60 minutes £1.10 Free after 7pm	Stay not limited Charges 8am - 7pm 0 - 1 hour £0.60 Over 1 hour £1.00 flat rate Free after 7pm
Council Short Stay				
Claremount Chapel Brook Franklins Yard Victoria Road	171 40 72 28	12 2 4 1	Maximum stay 3 hours no return within 1 hour Charges 8am - 7pm 0 - 1 hour £0.60 1 - 2 hours £1.20 2 - 3 hours £1.70 Free after 7pm	Stay not limited Charges 8am - 7pm 0 - 1 hour £0.60 Over 1 hour £1.00 flat rate Free after 7pm
Council Long Stay				
Cattle Market	278	8	Stay not limited Charges 8am - 7pm 0 - 1 hour £0.60 1 - 2 hours £1.20 2 - 3 hours £1.70 3 - 4 hours £2.20 Day rate up to 7pm £2.50 Free after 7pm	Stay not limited Charges 8am - 7pm 0 - 1 hour £0.60 Over 1 hour £1.00 flat rate Free after 7pm
Euro Car Parks				
Pioneer Square	485	31	Maximum stay 3 hours no return within 1 hour Mon-Sun 8am - 7pm 0 - 2 hours free up to 3 hours £1.70 (free with Vue cinema ticket) Free after 7pm	Maximum stay 3 hours Bank Holidays 8am - 7pm 0 - 2 hours free up to 3 hours £1.00 (free with Vue cinema ticket) Free after 7pm
Bicester Village				
Bicester Village	3,000		free	free
Chiltern Railways			Time period	Charge
Bicester North Station	575		Daily Rate Monday - Friday Weekends & Bank Holidays Weekly Monthly Annual	Peak £7.00 Off-peak (after 10am) £4.50 £4.50 £26.00 £99.00 £1,040.00
Chiltern Railway				
Bicester Town Station	29		free 24 hours	free 24 hours

Figure 7.16 Summary table of car parking information

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There has been some contention over the provision of free car parking at Pioneer Square shopping centre, (where Sainsbury's and Vue are the principle tenants). As motorists must pay at the council car parks, the possibility of parking for free at Pioneer Square is very popular. Its popularity has caused traffic issues at the car park entrance and exit, for example on a busy Saturday. The Bicester Advertiser of September 19th 2013 reported that "police have been called to the Sainsbury's car park three times to deal with backed-up traffic", leading to a call for the council to offer free parking at their car parks.

There is limited public on-street parking available in the town centre, for example on Church Street. Most on-street parking is for residents and is covered by a permit parking system. There is also widespread use of double and single yellow lines (operational 8am – 6pm) in the town centre, hence car parking is mostly provided in car parks as shown in Figure 7.17.

There is a plentiful supply of car parking in Bicester town centre, to the extent that these car parks are rarely full. Based on surveys conducted in the morning and afternoon for one week of each month in the year July 2013 - June 2014, the lowest occupancy is at Chapel Brook carpark (10%, disabled 5%), while the highest occupancies are at Sainsburys (65%), Market Square (63%, disabled 74%) and Bell Lane (disabled 82%). The car parks are on average 50% full, with basic levels on a weekday at 47% and on a Saturday at 57%. Overall occupancy levels in December are higher, 58% on a weekday and 78% on a Saturday.

Chapel Brook carpark

Victoria Road, town centre

Church Street

Church Street

Pioneer Square carpark

Bicester Village carpark

Bicester Village covered carparking

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BICESTER NORTH STATION
528 SPACES

FRANKLIN YARD
72 SPACES

BELL LANE
5 DISABLED
SAPCES

PIONEER SQUARE
485 SPACES

VICTORIA ROAD
28 SPACES

CATTLE
MARKET
278 SPACES

Buckingham Road

Field Street

North Street

Queens
Avenue

Sheep Street

CLAREMOUNT
171 SPACES

Kings End

Kings End

MARKET SQUARE
34 SPACES

Church Street   Causeway

CHAPEL
BROOK
40 SPACES

Kings End

BICESTER TOWN
STATION
29 SPACES

BICESTER VILLAGE
400 SPACES

Key

⇄   Train Station

▶   Entrance/Exit

▨   Covered Car Parking

▨   Surface Car Parking

Figure 7.17 Car Parking facilities in the town centre
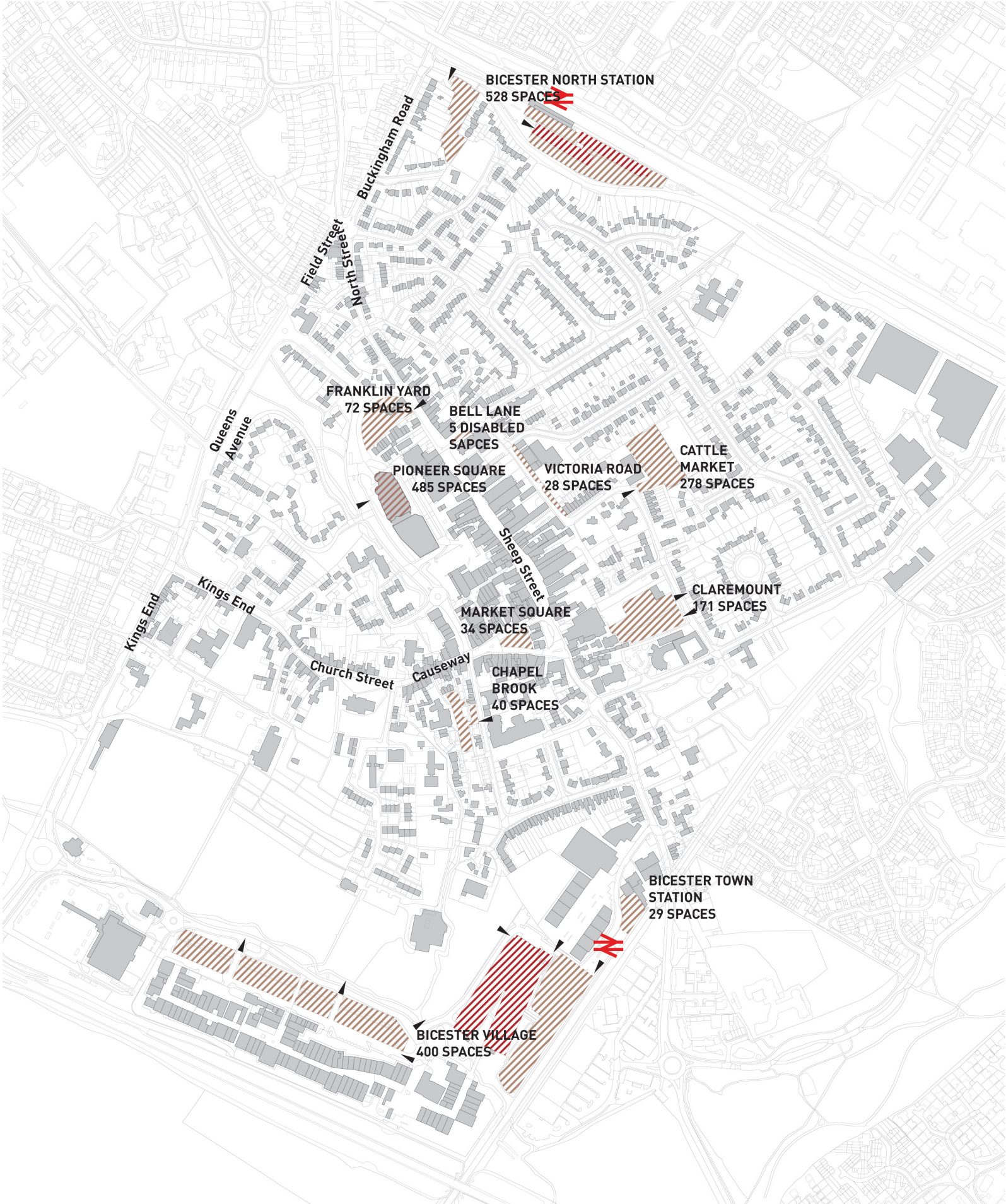
Glory Farm

Southwold

Double roundabout on Buckingham Road

Buckingham Road north of Railway

Bluebell Close, Bure Park

Bure Park

Neighbourhood Access and Connectivity

Figure 7.18 illustrates the vehicular access points for the different neighbourhoods of the town together with the level of vehicle connectivity within each neighbourhood.

In general the urban structure of the neighbourhoods is reflective of the period within which they were built. Highfield, one of the first areas of significant residential expansion in the town, has numerous access points and a high level of internal permeability. This allows vehicles to move through the neighbourhood and access the town centre without using the radial routes of Bucknell Road and Middleton Stony Road. In contrast to this, the neighbourhoods of South Wold and Langford Village have few access points and a much lower level of internal permeability, being dominated by cul-de-sacs. Vehicle movement between different parts of Langford Village is focussed on two internal distributor roads and in South Wold is all but impossible. For both neighbourhoods vehicle access into the town is via adjacent radial routes.

It should be noted that the industrial area on the east of the town is in the form of seven cul-de-sacs with no vehicle connectivity between them. This is likely to be reflective of the incremental manner in which this area has grown together with the severance effect of the railway lines.

Key

╤╤╤╤╤╤   Railway

——→   Neighbourhood
vehicle access

- - - →   Vehicle permeability
within neighbourhood

———   Primary Street/
Distributor Road

Figure 7.18 Neighbourhood
Access and Connectivity

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7.2   Movement Profile

Existing

An appraisal has been undertaken of the existing movement profile of the town in 2014. This appraisal draws heavily from information in the Travel Behaviour Demonstration Project in terms of number of trips per day per resident, journey purpose, modal split for different journey purposes and modal split for different journey lengths. The key baseline data relevant to this appraisal is as follows:

• Population: 30,854

• Dwellings: 12,574

• Jobs: 13,500

The diagram below summarises the existing movement profile of the town.   Key issues are as follows:

• Residents in Bicester generate a total of 86,500 trips per day, of which around 56% are contained within the town.

• Of the 48,450 trips contained within the town, a significant number (27,500) are undertaken by private motor vehicle.

• Around 30% of trips made by residents are work related and 65% of these are external to the town.

• Overall, 31% of trips by residents are undertaken by sustainable modes and 69% by private motor vehicle.

• Around 72% of trips related to jobs in the town come from outside.

Trips Related to Residents

86,500

48,500
(27,500 by car)

38,050

Trips related to Education
5,800

Internal employment trips included in residential element

Trips related to Employment
7,850

Trips related to Shopping
10,600

Trips related to Leisure/Personal
24,200

Walking   22% - 19,030
Cycling   4% -   3,460
Car   69% - 59,685
Public Transport   5% -   4,325

Jobs in Bicester - 13,500
Trips Related to
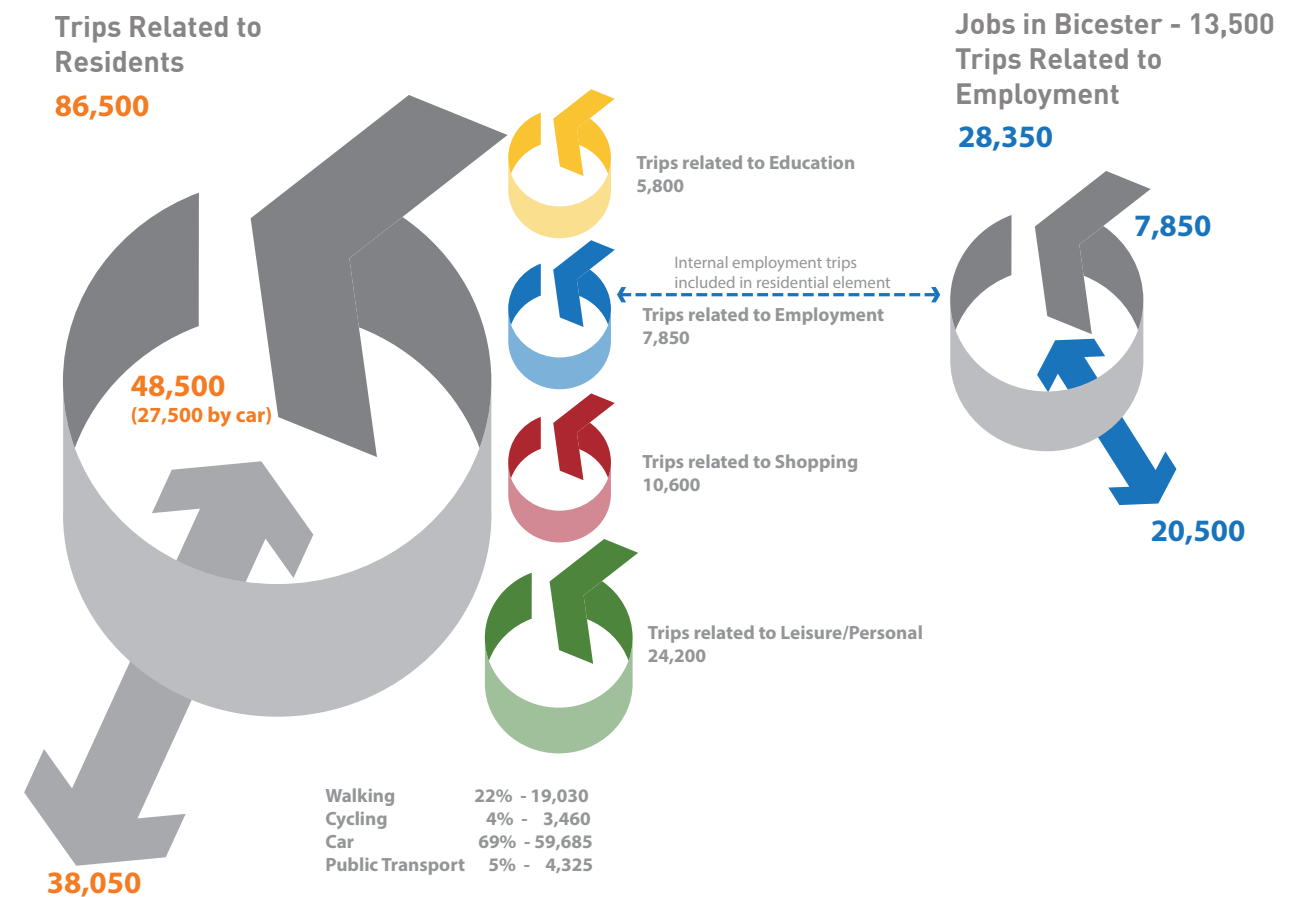Employment

28,350

7,850

20,500

Figure 7.19 Bicester - Existing Movement Profile

7.3   Assessment of Accessibility and Connectivity

Key destinations within Bicester Town have been analysed for walking and cycling accessibility using Basemap TRACC software (see Appendix 4). The analysis establishes isochrones, using the actual road network – streets, lanes, alleyways and paths – rather than measuring by distance as the crow flies. This establishes contours showing areas within 5, 10, 15 and 20 minute walking and cycling distance of the destination. The speeds used are a walking speed of 4.8kmph and a cycling speed of 14kmph. The destinations chosen are as follows:

- **Education: Colleges (including 6th form colleges):** Bardwell School; The Cooper School; Bicester Community College; Bicester and Banbury College

- **Leisure:** Bure Park; Bicester Leisure Centre; Garth Park

- **Health:** Bicester Community Hospital

- **Employment:** Industrial areas of Bicester – using five location points, one at Bicester Town Station and four in the main industrial area in the North East quadrant of the town; Town Centre – using three location points: Manorsfield Road, Sheep Street and Market Square; Bicester Village outlet shopping centre

- **Retail:** Town Centre; Bicester Village

- **Railway Stations:** Bicester Town Station; Bicester North Station

Key conclusions

Walking accessibility is geographically tight. This is particularly true in residential areas where there is lower permeability. Nonetheless, as the town of Bicester is quite compact, and as there is good permeability in the older parts of the town, the town centre is accessible on foot within 20 minutes from most areas of the town.

Bicester is very accessible by bike: most parts of town are accessible within 10 minutes of the town centre, with all of the existing development accessible within a 15 minute cycle. Bicester Town and Bicester North stations are also very accessible by bike - again with much of the town within a 10 minute cycle and almost all of the existing development accessible within a 15 minute cycle.

Alan Baxter

8.0
Setting the Scene

This chapter sets out the broader context for future movement in Bicester, setting the scene for the vision, principles, detail and delivery of the Sustainable Transport Strategy (STS).

8.1   Movement Trends in the UK

The government has been collecting information on travel patterns in the UK since the early 1950s. The information collected has become broader and more in depth over this time with the National Travel Survey of households (since 1988) now being a key component. The Department for Transport produces an annual report which summarises the key findings and trends.

The period 1950 to the current day has seen substantial population and economic growth. As both of these have risen, so has the level of movement in vehicle and passenger kilometres per year. The level of movement in the UK is now four times what it was in the early 1950s. For the majority of this period movement has been closely linked to economic prosperity. However, shortly after the recession in the early 1990s this relationship changed – whilst the level of movement continued to rise, it did not increase at the same rate as the economy was growing. Furthermore, in around 2002 the level of movement plateaued while the economy continued to expand.

On an individual basis the number of trips made per year has remained relatively static at just over 1,000 between 1980 and 2004. Since 2004 there has been a general downward trend to a level of 954 trips in 2012. Distance travelled per year reached a peak of 7135 miles in 2002 and again there has been a downward trend to a level of 6,691 in 2012.

Access to a car is the most important factor affecting travel. Household car ownership has been increasing steadily for a number of years but stabilised in around 2005. A further trend of note includes men driving less (particularly those under 40 years of age) and women driving more. In addition, younger people are driving less and older people more.
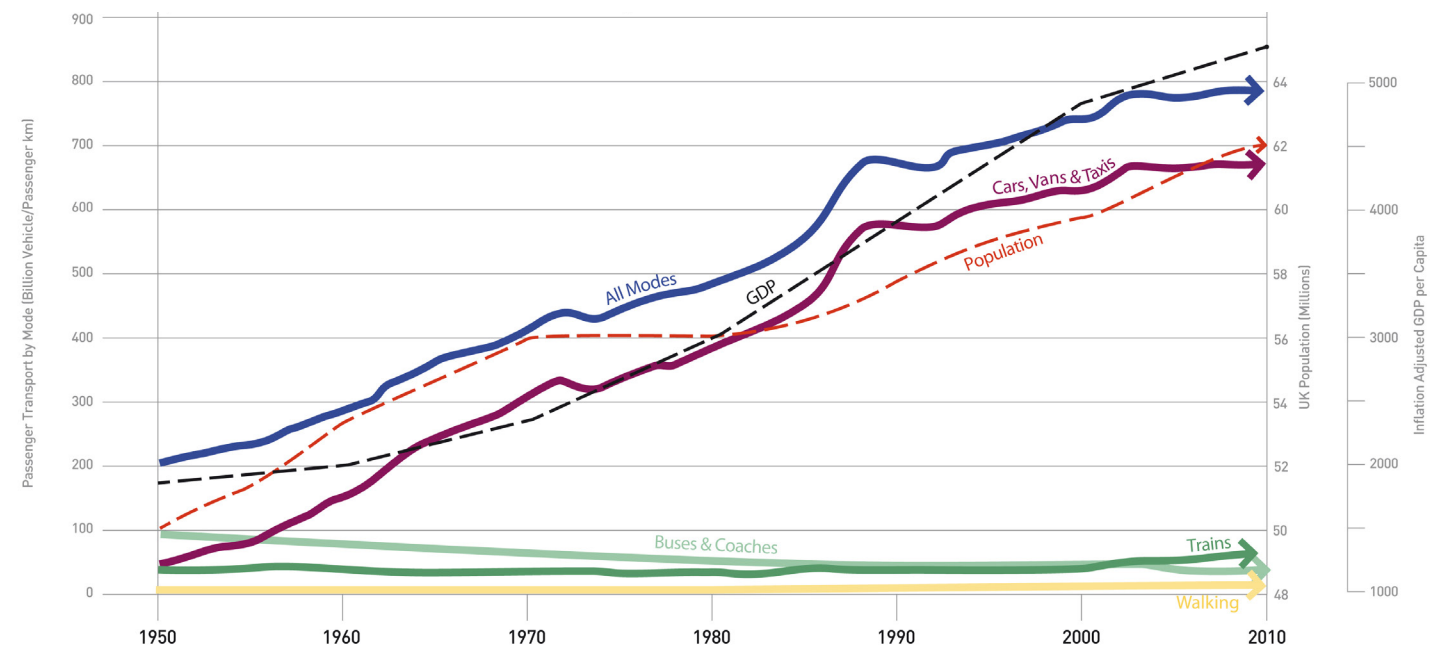

Figure 8.1 Movement, Population and GDP

Overall, the information available indicates that the UK is in a period of change with individuals travelling less often and shorter distances then they have done previously. The reasons for this change are complex and inter-related but are likely to be influenced by the level of employment, retail and leisure opportunities within a smaller geographical area, increasing urbanisation of the population, levels of road congestion, the attractiveness of sustainable transport modes and the impact of technology and the internet.

It is of course impossible to be certain of the future.   However, for the residents of Bicester it seems likely that the downward trend in annual movement will continue or will stabilise at around 2012/2013 levels. An increase in movement in terms of trips and miles per person despite rising economic prosperity seems very unlikely.

8.2   Considerations for the Future

The STS is by its very nature forward looking as it prepares the town generally for the period up to 2031 and specifically for major housing and employment growth during this period. In this context there are a number of issues that are important considerations.

Whilst movement on a per person basis is likely to either stabilise or continue to decrease, overall the population of the UK is set to increase to around 73 million in 2040 and this means that there will be more movement to accommodate overall. Added to this is that people are living longer and this creates particular demands on the transport system.

Change is a constant feature of our world and the rate of change seems to be accelerating, largely driven by technology. One only has to look back over the last two decades as evidence of this constant. Changes that we can see in the near future include the increasingly widespread use of 'smart' phones, high streets discovering a new role, the ever expanding role of the internet in our lives and even the introduction of autonomous vehicles. There will of course be changes that take us by surprise but this highlights the need for a transport system to be flexible and adaptable.
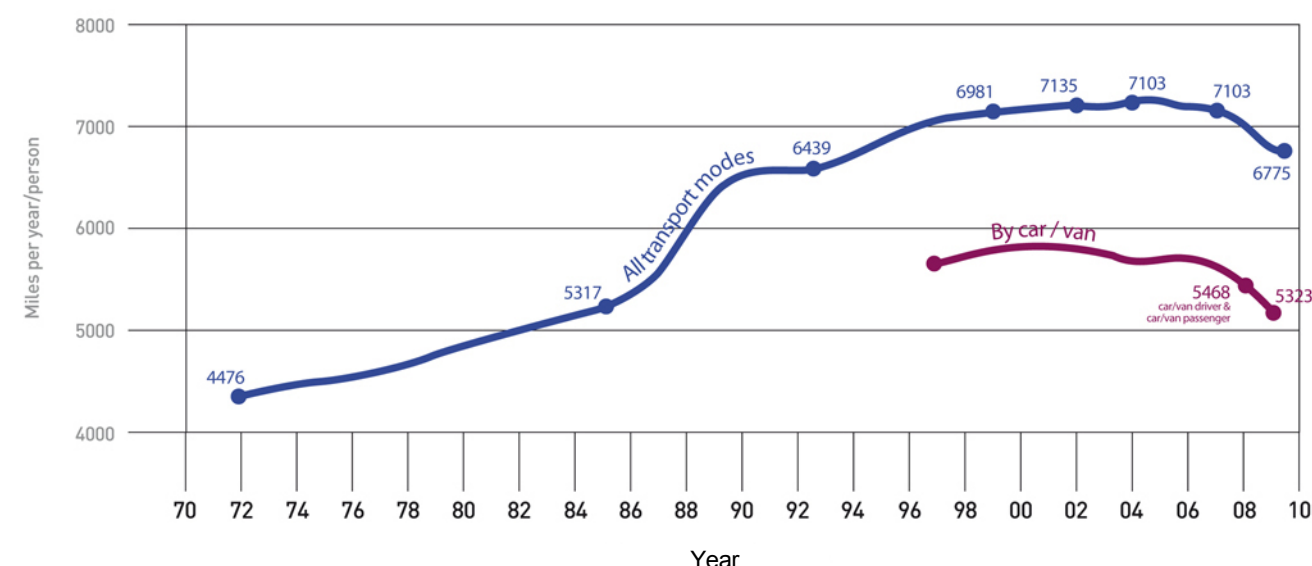

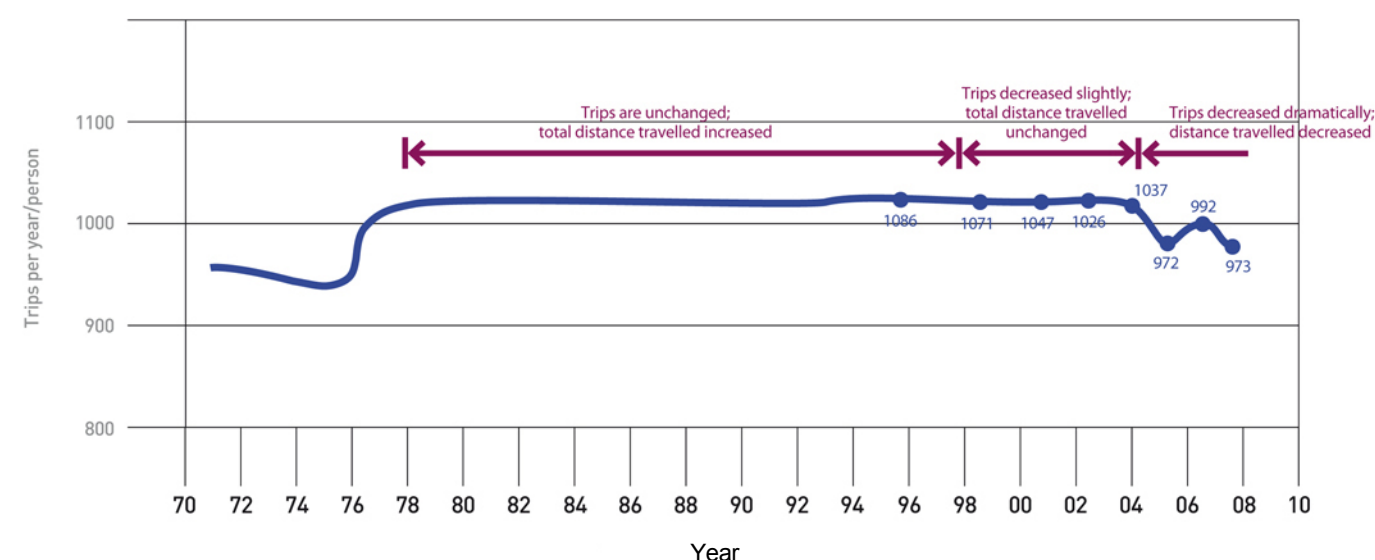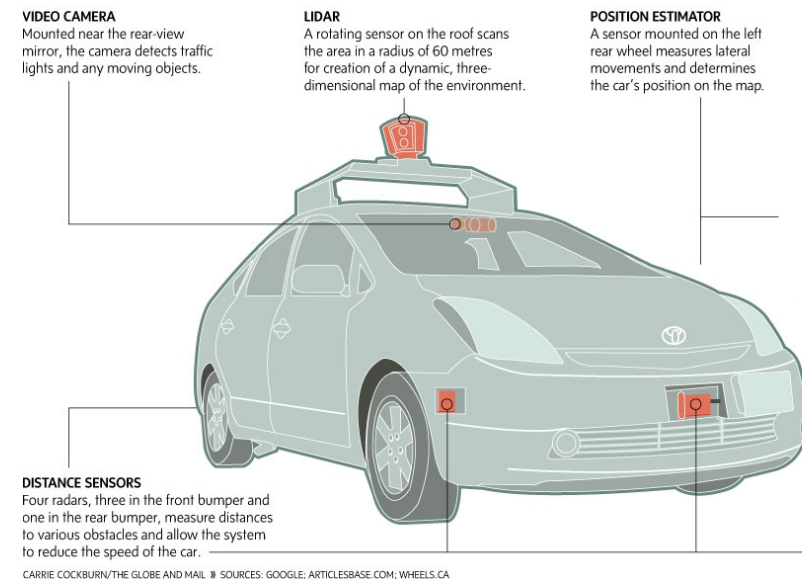Figure 8.2 Annual Distance Travelled per Person

Figure 8.3 Annual Trips per Person

The future of our high streets   (source: The Portas Review)


VIDEO CAMERA
Mounted near the rear-view mirror, the camera detects traffic lights and any moving objects.

LIDAR
A rotating sensor on the roof scans the area in a radius of 60 metres for creation of a dynamic, three-dimensional map of the environment.

POSITION ESTIMATOR
A sensor mounted on the left rear wheel measures lateral movements and determines the car's position on the map.

DISTANCE SENSORS
Four radars, three in the front bumper and one in the rear bumper, measure distances to various obstacles and allow the system to reduce the speed of the car.

CARRIE COCKBURN/THE GLOBE AND MAIL ■ SOURCES: GOOGLE; ARTICLESBASE.COM; WHEELS.CA

Autonomous vehicle: Google self-driving car   (source: autoblog.com)

Extreme weather events: flooded railway   (photo: thetimes.co.uk)

1996   2012

S-TRAIN
WALKING
BUS
CAR
METRO
BICYCLE
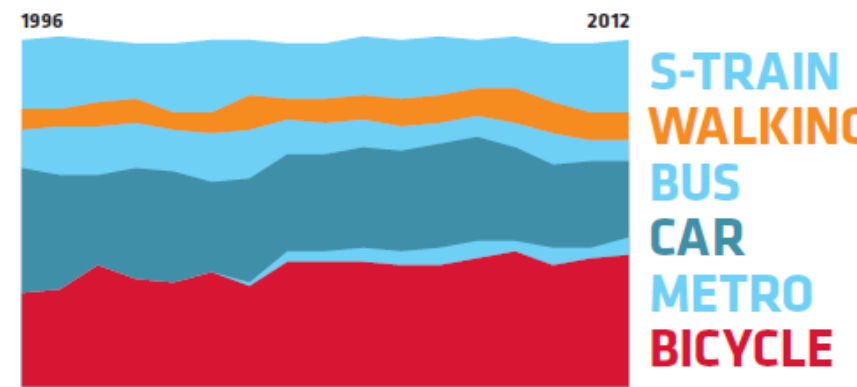
Primary mode of transport for trips to work or education in the City of Copenhagen, 1996-2012

Copenhagen: consistent sustained policy and consistency in transport strategy delivers results   (source: Copenhagen Cycling Account 2012)

The transport system is often seen as a means to an end, serving us in our daily lives; allowing us to do what we want. To an extent it is true that we shape our transport system but we should not underestimate how much it impacts on us. This is applicable on an individual basis, affecting our emotions and sense of well-being, but also affects the form and quality of our towns and cities. Transport in Bicester has and will continue to affect the character, identity and sense of place of the town.

The climate of our planet is changing. In the last decade we have seen evidence of this in our weather with unpredictable seasonal patterns and extreme events, mainly rainfall resulting in dramatic flooding. This has in some areas had a major impact on the transport network, severing strategic rail and road connections. Our future transport network needs to become more resilient with increased redundancy built in, in order to cope with these unpredictable weather events. Bicester is already in a good position in this regard having multiple rail connections and an orbital road route, but this position needs to be protected and enhanced for the future.

With transport strategies there can be the temptation to propose significant new infrastructure. These are high profile symbols of where money has been spent but because of their scale often take many years to fund and deliver. They also concentrate resources and attention often resulting in neglect elsewhere. The STS for Bicester needs to be in a form that means it can be delivered in manageable portions in a way that spreads the benefits across the entire town.

Finally, like the Local Plan, the STS will be delivered over ten to fifteen years and will potentially cross a number of political cycles. It is important that there is consistency in delivery of the strategy in order to fully realise the benefit of what has already been implemented and to create a climate of stability for both residents and businesses and in the town.

Part 2 - Strategy   8.0   Setting the Scene

8.3   Policy Context

The need and indeed requirement for a sustainable movement strategy to support the growth of Bicester is already enshrined in national and local policy.

The sustainability, in social, economic and environmental terms, of future development in the UK is underpinned by national policy. Encouraging more sustainable patterns of movement is an essential element of this, and both minimising and mitigating the adverse environmental impact of transport is critical in terms of reducing carbon emissions as agreed under the Kyoto Protocol (adopted in 1997 and brought into force in 2005). Alongside this the importance of transport as an engine of economic growth is recognised, together with the necessity of integrating movement and urban design requirements to give greater attention to place-making. Guidance towards achieving more sustainable movement patterns includes how to facilitate and enhance door-to-door journeys by provision of information, seamless ticketing, straightforward modal connections and safe and comfortable transport facilities. Further, the contribution that active movement can make for national health is high on the agenda.

At a local level, policy is ambitious in its approach to sustainable transport. The vision for EcoBicester is one of a low-carbon community, where 50% of journeys from new development are made by sustainable modes, rising to 60% over time. It is envisaged that this will act as a catalyst for increasing travel by sustainable modes across the entire town through using this as an opportunity to provide investment in a sustainable transport network. There is a stated intention to improve the sustainable transport network within the outer ring road and prioritise sustainable modes, noting that 40% of all journeys are of less than 3km in distance and could be made by these modes. Major investment in rail infrastructure is underway and there are plans for a bus based Oxford Transit serving the Knowledge Spine between the town and the Science Vale (between Didcot and Wantage). There is an intention to prioritise sustainable movement in the town centre – creating an improved sense of place by removing traffic and improving the public realm – as well as reducing vehicular congestion on King's End/Queen's Avenue to prioritise sustainable transport along and across this street. It is recognised that a network

of walking and cycling routes is integral to the provision of green infrastructure. As regards new developments, policy requires these to promote permeability by foot and by bike, to be linked into the existing networks and to be connected by public transport to the town centre and railway stations.

Policy has created the notion of EcoBicester and this sits alongside the entities of the overall town and Bicester Village as a very major destination. These three aspects of Bicester have a lot to offer one another: the potential to create a whole that is greater than the sum of its parts, with the STS offering an innovative and dynamic means of achieving this aspiration. A succinct, clear and coherent vision of sustainable transport for the whole of Bicester has the potential to unify the town, the new development sites and Bicester Village and guide the process of change.

A strong vision for sustainable movement in the town is set out in policy, but as yet there is very little evidence of this having been delivered on the ground. It is also unclear to what extent the town's residents appreciate what the advent of EcoBicester might mean for them in terms of changing travel patterns. The STS provides the
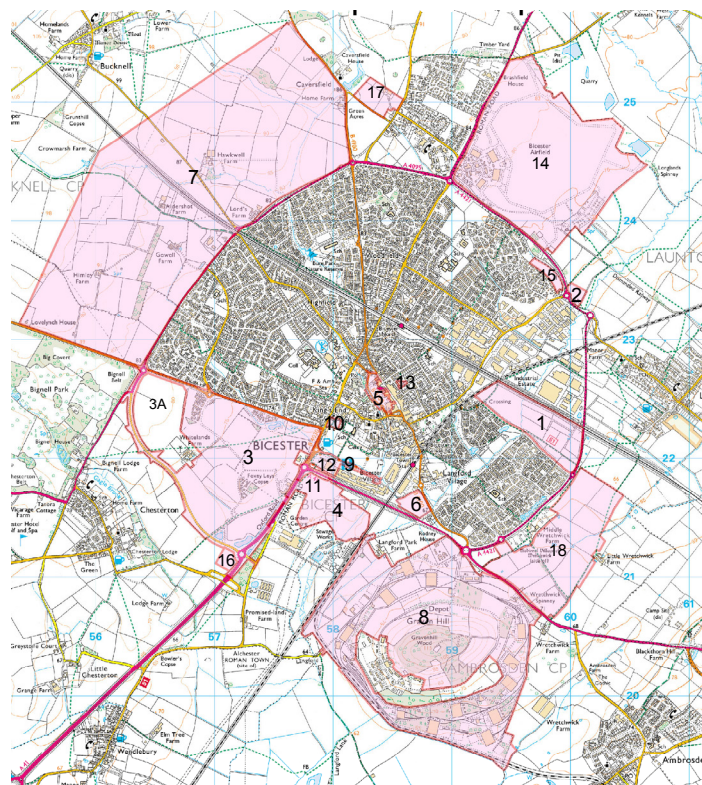
opportunity to provide more substance to the vision and set out a framework for delivery.

8.4   Learning from other Places

In the course of preparing the STS a review of best practice mainly from mainland Europe but also the UK has been undertaken.

European Best Practice

Key messages from European best practice are:

- Commitment to policies favouring sustainable transport modes, implemented consistently over a sustained time period, both in terms of infrastructure and other measures.

- Integrate land use and transport planning to manage travel demand and maximise the potential for journeys to be undertaken by sustainable modes.

- Invest in infrastructure – this is a powerful way to market cycling and the priority being given to it as a mode.

- Create a coarse grid for vehicles and restrict or prevent traffic access to town centres. Restrict or prevent traffic movement across or through a town.

- Implement 20 mph zones in residential areas.

- Create a fine grain cycling grid. Cycling network to be comprehensive, continuous and consistent.

- Segregate cycle paths from traffic lanes. Ideally, segregate pedestrians and cyclists.

- Use filtered permeability to give sustainable modes an advantage.

- Provide sufficient cycle parking in town centres.

- Locate vehicle car parks on the edge of town centres.

- Introduce integrated and financially attractive public transport ticketing. Maximise frequency of buses – ideally a service every 10 minutes.

- Establish targets and monitor progress annually.

UK Best Practice

Key messages from UK Best Practice are:

- Establish a comprehensive governance structure that embeds cycling across a range of service areas for which a local authority is responsible.

- Reduce vehicle speeds.

- Establish targets and monitor progress annually.

- Invest at least £10 per head per annum and preferably more.

- Investment in cycling infrastructure and supporting measures have a proven benefit in terms of increasing cycling levels and in the broader financial return

- Segregated cycle facilities similar to those that are commonplace in Denmark and the Netherlands are feasible in the UK.

- Topography and infrastructure are genuine barriers to movement on foot and by bike. Investment in new infrastructure to overcome or break down these barriers have proven benefits in terms of increased levels of walking and cycling.

Smarter Choices programmes have proven benefit in terms of increasing movement by sustainable modes.

Retrofitting of Towns and Cities

Houten in the Netherlands is a relevant example for Bicester in terms of encouraging sustainable movement because of its size, form and urban situation, although it was planned and built specifically with cycling and walking in mind. Bicester in contrast will need to be retrofitted with a walking and cycling network but this approach has been done in many medium to large cities and of late, is increasingly being achieved even in very large cities such as New York and Seville. There are good examples among mainland European cities, where sustainable transport and cycling networks in particular were integrated into existing street and road patterns. For example, Groningen, Copenhagen and Freiburg offer lessons that are pertinent to Bicester. Key aspects of successful retrofitting have proven to be:

- Clear policies, sustained and implemented consistently over an extended period of time (20+ years)

- Priority measures for cyclists and pedestrians

- Filtered permeability, giving sustainable modes an advantage in terms of speed, distance and convenience

- Pedestrianisation of the town/city centre

- Integrated ticketing for transport

- Park and ride facilities

- Growing a cycling network incrementally

- Provision of cycle parking facilities and cycling hubs

- Favouring development around public transport routes

Encouraging a Cycling Culture

It is often noted in discussion of transport in the UK, and of cycling in particular, that a culture of radical change is necessary in order to fully embrace sustainable modes of transport. For cycling, there is frequent allusion to the MAMIL (middle aged man in lycra), when in fact this activity should be seen as a normal part of everyday life – meaning that we should have more people cycling, and on regular upright bicycles at a civilised pace. To achieve this a fundamental shift must occur at every level - from vision and policy right down to the reality on the ground.

In the UK, cycling is not recognised as a mode of transport in its own right. It is either considered to be a vehicle, and must share the road with motor vehicles, or cyclists are expected to use footways, sharing with pedestrians. Unfortunately, both drivers and pedestrians resent the intrusion of cyclists on their territory; and the speed differential between cyclists and motor traffic, and between cyclists and pedestrians, means that this is often dangerous as well as creating conflict.

By contrast, enshrined in Danish law is the principle that one must give way to the 'softer' mode – meaning that cyclists must give way to pedestrians, car drivers must give way to buses, etc. – paying due consideration to the slowest and most vulnerable users. In the Netherlands, specific allocated space is dedicated to each of the three modes – motor vehicles, cyclists and pedestrians – and the principles upon which the Dutch road is designed, prevent situations where mistakes, conflict or collisions might occur.

Sustainable Safety

Dutch Sustainable Safety is based on five principles - functionality, homogeneity of mass and/or speed and direction, predictability, forgiving-ness and awareness. Underlying this is the objective of creating a road environment which caters for all users, and where users understand how they are expected to behave, and where they can predict how others will behave.

Roads are divided by function into access, distributor and through roads (with a further urban/rural division within those) and with road design following function. Due to the application of principles of functionality and predictability, a road user for example entering a street paved with bricks with parked cars and which cars and cyclists share; instinctively knows that this is a local access street where the speed limit is 30kmph (19mph).

The principle of homogeneity leads to Dutch road designs which separate buses from other motorised traffic, motorised traffic moving at high speeds in opposite directions, and cyclists from motorised traffic. Roundabouts are favoured over signalled junctions, as traffic flowing uniformly is less conflicting than crossing movements are. The principle of forgiving-ness results in designs with, for example, a shoulder with a semi-hard pavement, so that a road user who makes an error coming off the main road will not immediately crash, but rather has a chance to get back onto the main carriageway. This is enhanced when road users' behaviour is predictable: for example, motorists can anticipate what cyclists want to do and give them more space than they are legally obliged to.

Additionally, in Dutch bicycle provision, three terms are used for safety:

- Actual safety: how many km one can expect to travel before being injured

- Subjective (or perceived) safety: concerns aspects such as proximity to fast moving traffic, level of segregation from the road, junction design and ease of turning across traffic etc.

- Social safety: the likelihood of being mugged or attacked.

In terms of Bicester, one of the five principles, functionality, can reasonably be implemented in the short term with the other four being long term goals.

8.5   Influences on Travel Choices

Achieving the EcoBicester goal of a modal share of 50% for sustainable transport implies a shift in culture for Bicester, where currently almost 70% of trips are made by car. Walking, cycling and public transport must become more attractive as options – both in reality and in people's perception. In order to effect change in travel behaviour, some understanding of the complexity of how we make transport decisions is necessary. The conditions of the built environment – density of housing, land use mix, how restricted the car system is, walking and cycling infrastructure, permeability and connectivity – are critical to the use of sustainable modes of transport, but creating these conditions is not sufficient to ensure high modal share. Cultural factors, society and perception, also significantly influence human behaviour and how we make choices.

At a fundamental level, distance is a limiting factor for choice of mode of travel. In terms of practicality, cost, comfort and convenience, particular modes are likely to be most suitable. As shown in Figure 8.4, travel by car is very flexible and is a particularly attractive option in an environment like Bicester, which has good provision of road infrastructure and car parking. Nonetheless, for longer distance journeys, rail may present a more comfortable and cost-effective option; and within the town, dependent on location and service levels, travel by bus may prove most convenient. Setting a goal of walking being the mode of choice for distances of less than 800m – 10 minute walk (at a speed of 4.8kmph) – is reasonable and should be attainable. Further, for slightly longer distances (up to 5km, or a 20minute cycle), cycling is a very convenient door-to-door transport option.

In very broad terms, when considering how to influence people's travel choice, society can be divided into three segments. One third of people are by nature inclined to use sustainable modes, one third of people will never consider anything other than travel by car and there is a a remaining third who may be persuaded either way.

It must be noted that people are easily dissuaded from using the more sustainable option. There are many barriers, some of which exist primarily in people's perception, but must nonetheless be addressed. Barriers may be thought of collectively as the 'hassle factor' as people will want to avoid stress and inconvenience. This occurs on every level: from the initial choice of travel mode, perhaps dissuaded from using
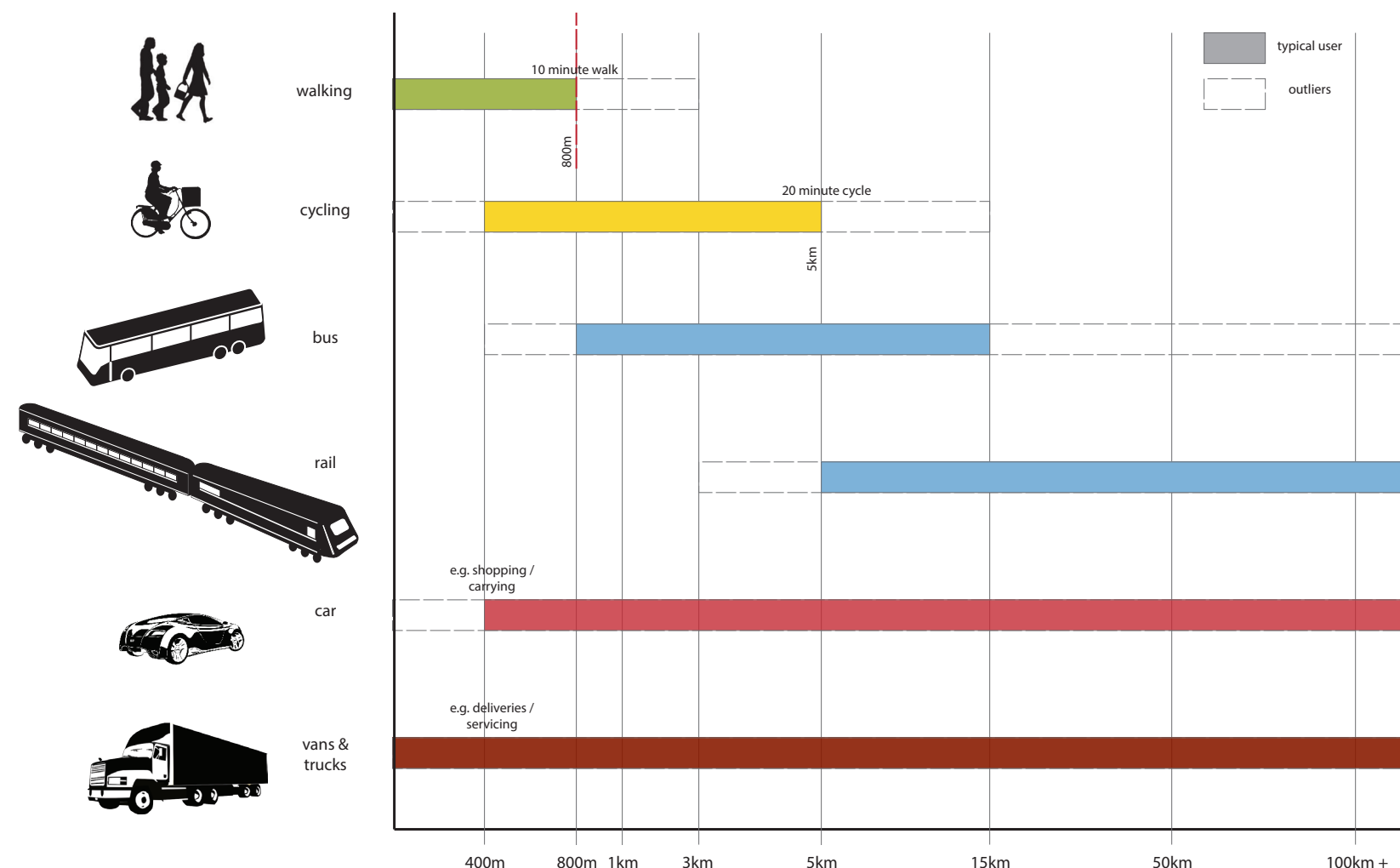

Figure 8.4 Likely Choice of Travel Mode by Distance

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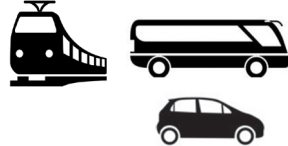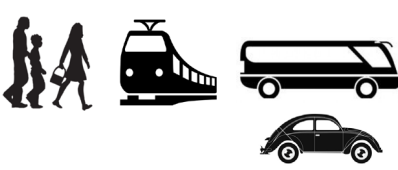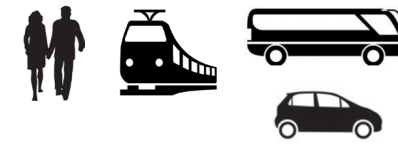the train due to the perceived risk of delay in multiple connections, or, once having chosen to cycle, walking their bike through difficult sections. Barriers (and, ultimately, opportunities) include:

- Infrastructure provision

- Subjective safety (the perceived safety of e.g. walking and cycling routes/infrastructure, train and bus stations)

- Weather

- Age

- Whether travelling alone or accompanied, and if accompanied, the age and number of people in the group

- Activities before and after the journey – this can effect e.g. the form of dress: there may be discomfort or a risk in cycling to a business meeting

- Transporting items – purchases, equipment

- Skill level and confidence (for cycling)

- Accessibility (e.g. access and egress from stations/interchanges)

- Peer behaviour

- Dignity of experience – what is the cycling equivalent of the comfort of travelling in an SUV or executive car?

- Comfort

- Expense

- Delays / reliability (of services, connections viewed as lost time)

- Congestion (roads) or crowding (trains/buses)

Figure 8.5 Bicester contour distances from town centre (via road and path network)

Most scope for influencing mode

May be possible to influence mode for part of journey

Unlikely to influence mode

Trip Purpose	Time of Day	Who?	Doing what?	Mode	+ Considerations
Leisure	Day & evening, weekdays & weekends	People from Bicester	Library, Sports, Dog-walking, Playground, Cinema, Dining, Pubs etc.		Age Weather Alone or Accompanied Congestion Trip Chaining
Education	AM peak & mid-afternoon peak Monday - Friday	People from Bicester	Learning		Alone or Accompanied Congestion Weather Trip Chaining
Retail Town Centre	Typically 9am – 6pm Monday - Sunday	People from Bicester	Shopping, walking, people-watching, talking, coffee, eating		Age, Weather Trip Chaining Alone or Accompanied Congestion Transporting purchases
Work within Bicester	AM & PM peak Monday - Friday	People from Bicester	Work		Age Congestion Weather Trip Chaining Before & after work Activities
Work outside Bicester	early AM & late PM peak Monday - Friday	People from Bicester	Work		
Retail Bicester Village	9am - 9pm Monday - Saturday 10am - 7pm Sunday	Visitors to Bicester: from abroad & from the UK, and people from Bicester	Shopping, people-watching, meeting people, coffee, eating		Age Weather Alone or Accompanied Congestion Transporting purchases, Equipment
Tourism	All day weekdays & weekends	Visitors to Bicester	Sightseeing, shopping		Age Weather Alone or Accompanied Equipment
Deliveries & Servicing	Daytime, but primarily Monday - Friday 8-11am	Could be from within Bicester (e.g. servicing) or outside (e.g. national chain store deliveries)	Work		

Figure 8.6 Table showing Mode by Trip Purpose for Bicester

Sustainable modes offer much in environmental (air quality, green infrastructure), social (better public realm, opportunities to engage with others) and health terms (for an aging population). Hence, overcoming these barriers, and/or turning them around (using the expense of parking and congestion to encourage a switch to walking/cycling/public transport) is very worthwhile – not only on a national scale, in terms of achieving agreed carbon targets, but also on an individual and community scale, in terms of quality of life.

Viewing these barriers as opportunities to influence behaviour, measures might include:

- Cost – making public transport more attractive than car travel in terms of value for money

- Smart ticketing – making public transport more attractive in terms of convenience, providing a single ticket for the entire journey, across modes

- Choice – of available modes, services and facilities, such as electric car provision and for example for cycling, the availability – to rent or to buy – not only of hybrid-, mountain- or race-bikes, but also of bikes that overcome the issues of age, ability, carrying items and travelling with people:

  - Electric bikes

  - Dutch bikes

  - Cargo bikes

  - Tandems

  - Tag-alongs etc.

- Enjoyment

- Quality of routes, this is particularly important for walking e.g. green infrastructure

- Maximising enjoyment of connection time – e.g. interchange hubs as civic spaces with e.g. library or internet facilities

- Educational programs

8.6   Potential for Bicester

Bicester has a compact urban form and this can be taken advantage of in encouraging walking for distances of less than 800m (a 10 minute journey) and cycling for distances of up to 5km (a 20 minute cycle). Figure 8.5 illustrates how these distances relate to the town of Bicester, showing distance contours from the town centre, in terms of access via the road network. Thus, even if travelling from one edge to the other, currently no within-town journey is longer than 6km. This presents opportunities in terms of encouraging walking and cycling, as the distances are manageable for most people. However, the Travel Behaviour Survey found that 'walking and cycling are seen as risky', and that public transport is perceived as slow and not delivering people to where they want to go. There is potential to encourage a modal shift as long as these issues are addressed.

In terms of trip purpose, the areas that offer most opportunity for influencing travel behaviour are summarised in Figure 8.6. The only area where no influence is likely is for trips where the purpose is deliveries and servicing.

For trips involving travel to work outside Bicester, retail trips to Bicester Village and tourist trips, it may be possible to influence the mode of transport for part of the journey.

The urban layout of Bicester – composed of historical town centre, ring road, and radial roads with residential infill largely in the form of cul-de-sacs – presents opportunities for encouraging sustainable modes. The town of Houten in the Netherlands has a similar fundamental layout – where all residential areas are accessible by car only from the ring road, but the entire town is highly accessible by foot and by bicycle. This presents an infrastructural opportunity for Bicester, exploited by the STS, to constrain the movement of cars and employ filtered permeability for other modes.

The demographic of Bicester also presents opportunities – the town has a low (relative to the rest of the county) percentage of persons over 65 and unemployment levels are considerably below the Oxfordshire average. Younger people may be more amenable to active travel and in the long term this will have beneficial effects on future generations. The fact that many people are employed creates demand for commuting trips, which will only increase with

the anticipated increase in population. While levels of educational attainment are below the county average, the town provides specialist training provision in some areas that have significance for sustainable transport, for example automotive/motorsport and environmental technologies.

On a high level, particular opportunities for Bicester include:

1.   Place-making

- Historical Market Town – opportunity for hugely improved public realm with the pedestrianisation of Market Square elevating the place status of the town centre

- Importance within the district, as the second largest town in Cherwell

2.   Innovation – opportunity to become an exemplar for sustainable transport with the UK

- Automotive / Motorsport – Silverstone nearby and OCVC course emphasis

- Technology and Research – Green technologies (supporting EcoBicester Vision) at OCVC, as well as proximity to Oxford and forming part of the Knowledge Spine

3.   Branding – selling the 'Bicester Lifestyle'

- EcoBicester – green, healthy, innovative and socially aware

- Bicester Village – exemplar quality, designer, international reputation

8.7   Future Movement Profile in 2031

Based on the potential of the town for making a major shift towards sustainable modes, an assessment has been undertaken of the movement future profile of the town at the end of the Local Plan period in 2031. This key baseline data for this appraisal is as follows:

- Population: 54,830

- Dwellings: 22,360

- Jobs: 32,000

In undertaking this appraisal assumptions in the Transport Assessments for the new development areas have been used in relation to modal split and the level of containment. In terms of the movement profile of existing residents assumptions have been made about changes to the level of containment as a result of the expansion of the town and the modal split for different journey lengths that reflects a move towards greater use of sustainable modes. This assessement differs from the traffic modelling of the Local Plan, which is conservative in its approach. The Local Plan assumes a higher level of car use, consistent with current movement patterns.

Key issues from this assessment are as follows:

- Residents in Bicester in 2031 will generate a total of 153,336 trips per day, of which around 59% are contained within the town.

- Around 30% of trips made by residents will be work related and 60% of these will be external to the town.

- Overall, 40% of trips by residents will be undertaken by sustainable modes and 60% by private motor vehicle.

The key changes from the current profile are an increase of 18,500 jobs within the town (meaning more movement is contained within Bicester); an increase of 66,800 trips within the town per day and an increase of 9% in the use of sustainable modes. While the development of EcoBicester will act as a catalyst for changing travel habits town-wide, measures must be taken in a coherent and integrated way across the whole town, including development sites, to ensure an ambitious increase in the use of sustainable modes is achieved in reality.
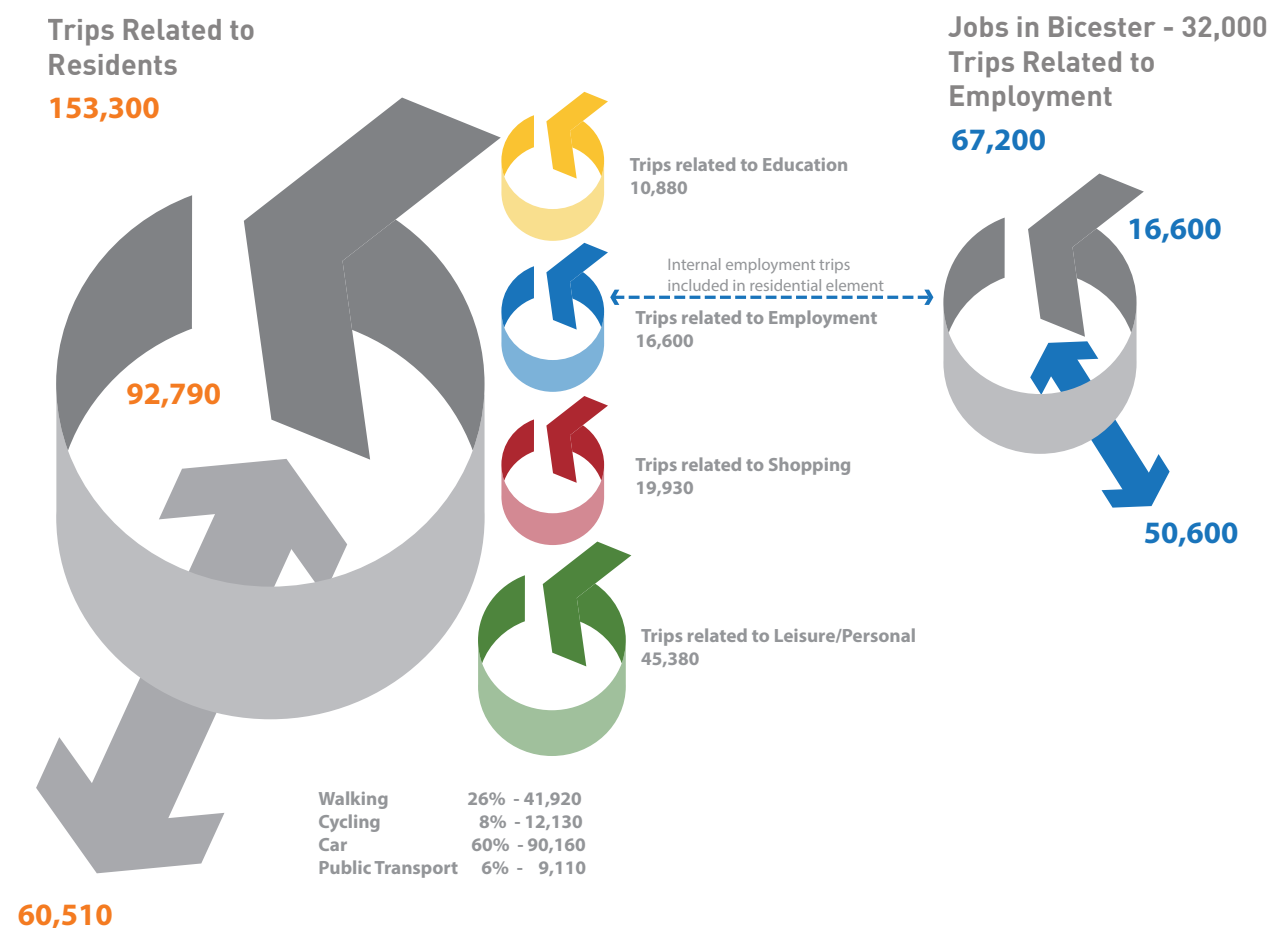

Trips Related to Residents
153,300

92,790

60,510

Jobs in Bicester – 32,000 Trips Related to Employment
67,200

16,600

50,600

Trips related to Education
10,880

Internal employment trips included in residential element

Trips related to Employment
16,600

Trips related to Shopping
19,930

Trips related to Leisure/Personal
45,380

Walking	26%	- 41,920
Cycling	8%	- 12,130
Car	60%	- 90,160
Public Transport	6%	- 9,110

Figure 8.7 Bicester - Movement Profile
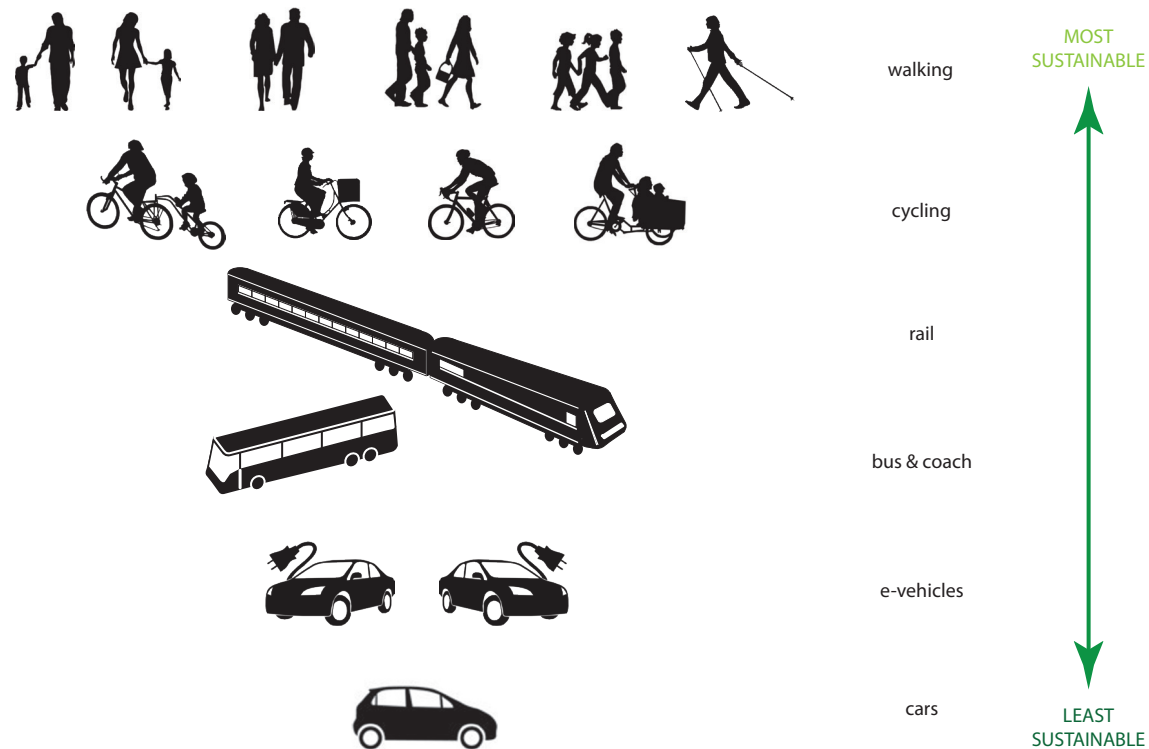
Alan Baxter

9.0
Vision and Principles

Figure 9.1 Sustainable Ideal Hierarchy of Modes

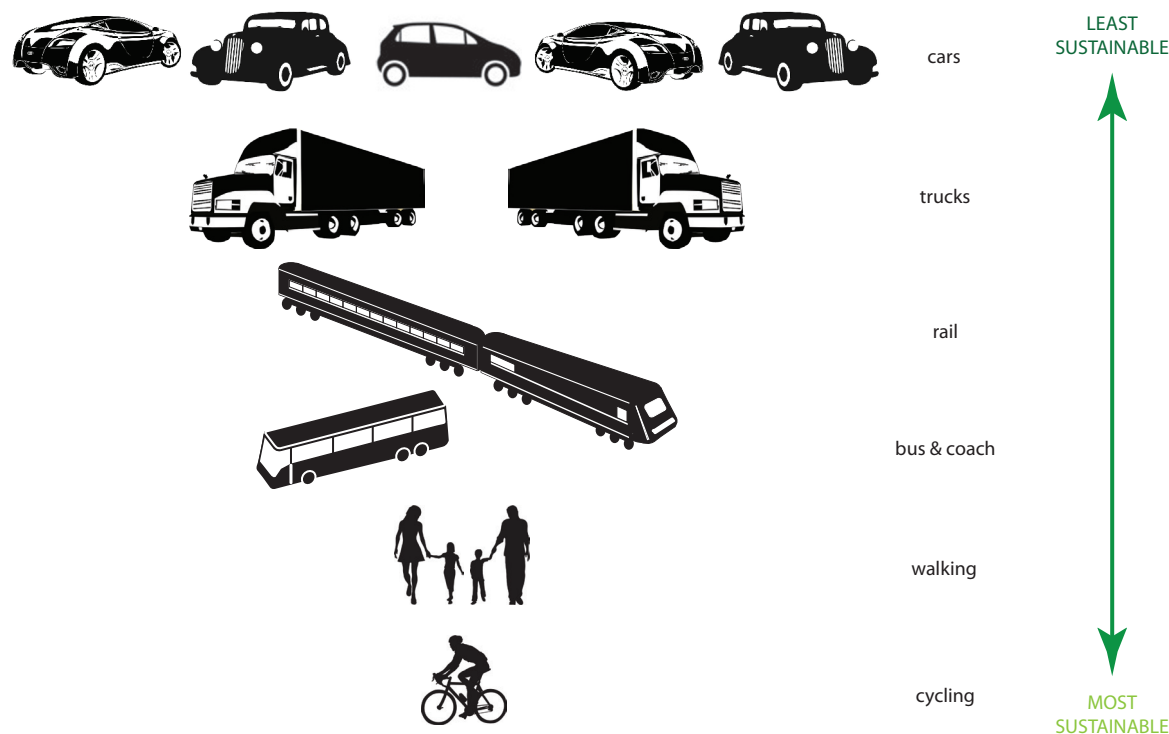
Figure 9.2 Tradional Hierarchy of Modes in the UK

Vision

The vision for transport in Bicester is taken from the EcoBicseter – One Shared Vision. It is to create a transport infrastructure network and transport services that encourages walking and cycling as the first choice of mode for travel within Bicester and through this and the resulting modal split, to become an exemplar of sustainable movement in the UK.

Realising the vision requires a major re-balancing of the priority given to different transport modes. Traditionally the least sustainable modes, motorised vehicles, have often been given the highest priority in the overall structure of urban areas and in the layout of streets. To encourage movement by the most sustainable modes, walking and cycling, there needs to be a re-balancing of priorities. The new approach needs to prioritise people, and by extension, place.

The only way that walking, cycling and public transport can compete with cars, is to make them more attractive as modes. As pedestrians and cyclists are given greater priority, streets and urban spaces become more animated and interesting. This becomes a self-perpetuating story of success – as streets and spaces become more animated with human scale activity this improves the experience of a place which in turn attracts even more people.

A high level framework for the strategy has been derived in the form of seven core principles covering physical, perceptual and temporal aspects, which have been applied in outline to the specifics of Bicester. The seven principles are that the strategy be:

•   Sustainable

•   Resilient

•   Incremental

•   Prioritise Modes

•   Spatial Route Hierarchy

•   High Quality

•   Integrated

9.1   Sustainable

The principle of sustainability encompasses economic, environmental and social aspects. Transport is critical to economic development –in terms of the movement of goods, and in terms of access to employment opportunities, education, facilities and services. However, unless transport is sustainable in environmental and social terms, in the long term it has a detrimental impact upon the economy.

Providing a transport network is a major cost for government and for households in terms of public transport fares and owning a car. A safe, comprehensive, coherent and attractive walking and cycling network is relatively cheap to implement compared to a highway scheme, and presents the opportunity for residents in Bicester to access employment and education without the need to own a car. This frees up financial resources for government and for households in Bicester, potentially allowing more spending on goods and services in the town, strengthening its economy. This approach also supports economic growth without traffic gridlock and the quality of place that follows often attracts skilled labour, which is of benefit to the local economy. It could also be argued that implementation of a cycling and walking network is more likely to be undertaken by a local contractor (with local economic benefits) compared to a major highway scheme built by a national contractor.

Transport is a major contributor to carbon emissions. This is an international and national concern – climate change is acknowledged as reality and the UK has signed up to the Kyoto Protocol, making commitments to reduce carbon emissions. Currently the government is providing a large amount of funding and investment for low emission vehicles, which Bicester can tap into. This would supplement an increase in the use of sustainable modes of travel to reduce the town's carbon footprint. To conserve the earth's resources, it is necessary to consider the whole life carbon footprint for transport modes – manufacturing, use and disposal. In this, Bicester is well-placed to be a UK exemplar in its approach to sustainable transportation - Silverstone is nearby, specialist automotive and environmental design courses are run at Bicester and Banbury College, and the town forms part of the technologically innovative

Knowledge Spine.

At a more immediate and local level, air quality is a concern in terms of health and well-being. In England in 2010, 25000 deaths were attributable to air pollution, this being 5.6% of all deaths in adults over 25 years of age. Most towns and cities around the world suffer from air quality issues, the major urban pollutants being carbon monoxide (CO), nitrogen oxides (NOx), volatile organic ompounds (VOCs), sulphur dioxides (SO2) and particulate matter. The primary sources of these pollutants are vehicle emissions, industry and aviation. Given the lack of heavy industry around Bicester, pollutant levels in the town are primarily caused by transport. Particular areas of Bicester – such as King's End and Queen's Avenue – are noted for air quality issues, which is a result of relatively high traffic flows and congestion. Reducing traffic volume in the town centre, and congestion, would help improve air quality, as well as greatly improving the quality of the experience of movement in the town centre. Green infrastructure also helps mitigate the effects of air pollution and CO2 gases – presenting the opportunity for greater investment and management of green corridors, as well as provision of urban trees, which can absorb significant quantities of gaseous pollutants, as well as having the ability to capture pollutant particles.

In terms of social sustainability, travel by sustainable modes has an important role to play. The benefits of active travel include people staying healthier for longer, reducing the burden on the health system and on wider family support network; a safer environment, and thus fewer accidents, through reduced traffic flows in the town centre and reduced speeds generally; and a more attractive urban environment. Cars are impersonal – there is a certain anonymity and lack of engagement when driving at speed protected by a robust metal shell. Public transport, which by its very nature is a shared mode of travel, presents opportunities to meet people, and walking and cycling, because of the speed of movement, allow people to engage more fully with their environment. This creates a greater sense of ownership, and allows interaction and social exchange with others, particularly important considerations in a society where households are becoming smaller and in caring for the physical and mental health of an aging population. Such an environment - one of active social

exchange and interaction - also contributes greatly to the economic vitality and viability of a town centre.
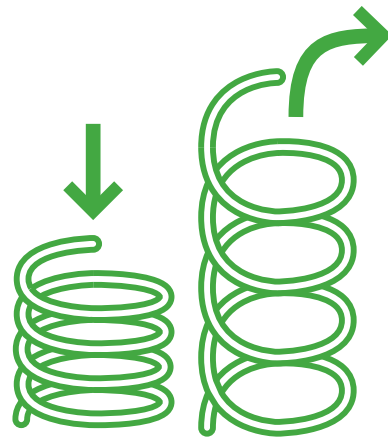
9.2 Resilient

Change is inevitable, but with the advance of technology and the accelerated flow of information, the rate of change has been increasing. There is a need for towns and cities to be more resilient in the face of unexpected events and more adaptable to change. Urban resilience, a term now commonly used in disaster risk reduction, is not exclusive to such extremes as earthquakes. Resilience is the ability to properly adapt to stress and adversity, and in urban terms has been defined by attributes such as:

- Redundancy – diverse alternatives of sources, systems, roles or strategies that are able to back one another up and increase the capacity of the whole system.

- Capacity to learn – an education plan to mitigate and adapt, where communities learn from past situations either in their own urban area or other places.

- Flexibility – the ability to change and adopt alternative pathways when faced with external pressures.

- Resourcefulness – the ability to act collectively in visualising problems, priorities and solutions; and to coordinate/mobilise assets (people, information, financial, technology).

- Safe Failure – systems designed to avoid catastrophic failure.

- Responsiveness – the ability to rapidly re-organise and re-establish functions following failures.

Some changes we know about – climate change, population increase and an aging population, and the impact of these is partially understood. Other changes we can see on the horizon - declining oil reserves, new technology, driverless vehicles, declining car ownership per household, reduced number and distance of trips. We have less understanding of the impact these changes will bring. Regardless of

our current level of understanding, we need to do the best we can in preparing for an uncertain future by creating resilience.

Resilience requires action and systemic change across all four key components of an urban system – infrastructure, institutions, knowledge and ecosystems – considered on a collective basis. Equally, the effect of events or future changes on wider urban systems, such as transport infrastructure, waste management or food supply, should be considered in terms of their interactions. For example, the relationship between land use and flood risk. Systems do not operate in isolation, they interact.

For Bicester, this means creating room for the transport strategy to adapt in response to changing circumstances and to cope with unexpected effects. This could mean:

- Being flexible over time as to how streets are used, in terms of allocation of space should the modal share, for instance, shift significantly.

- Preserving flood risk areas as green infrastructure, which both facilitates comprehensive walking & cycling infrastructure, and protects the wider town from floods.

- Building redundancy into the transport system, for example varying energy sources for the propulsion of vehicles between fossil fuels, electricity, hydrogen and biofuels.

- Not investing in road infrastructure that might be underused in the future because of declining motor vehicle trips.
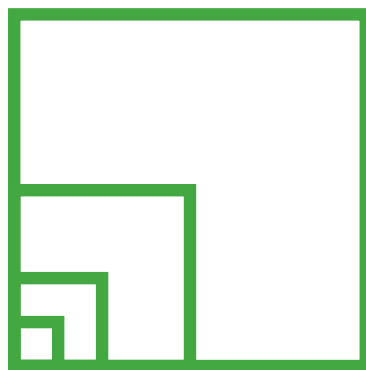
9.3   Incremental

People, despite being extremely capable of adapting to change, are typically quite resistant to the prospect of change. Change in established urban environments where the agreement of many parties must be reached, can therefore often only be implemented slowly. People's habits are also difficult to change and hence behaviour change will only be achieved gradually. In established towns and cities the most effective change and retrofitting has been achieved through consistent and sustained policies and action, implemented over substantial time periods.

An overarching vision – much like a lighthouse – sets the direction for the sustainable transport strategy, but the strategy does not rely on one major scheme for success. Rather, it breaks the long-term goal into achievable steps, which can be implemented in the short- to medium-term.

Hence, the strategy should be phased over time in terms of:

- Ambition – from the UK reality to the Dutch/Danish ideal.

- Infrastructure – quick wins are identified (e.g. the removal of barriers on cycling routes), as well as construction which can be achieved in the short-, medium- and long- term.

- Service provision – as the population of Bicester increases, demand for public transport services will increase, and hence it will become viable for services to run more frequently, and not

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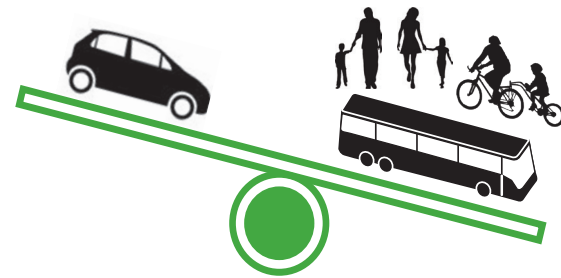
only during the day but into the evening.

Figure 9.3a Modal Priorities in Town Centre & Residential Areas
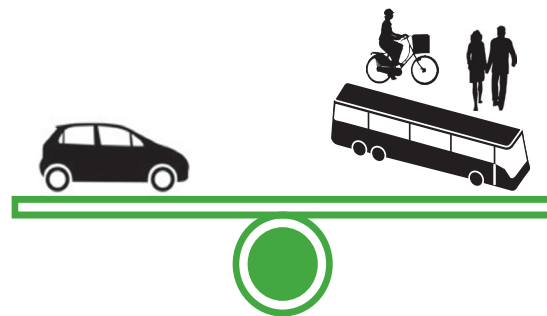

Figure 9.3b Balance of Modal Priorities on Radial Routes
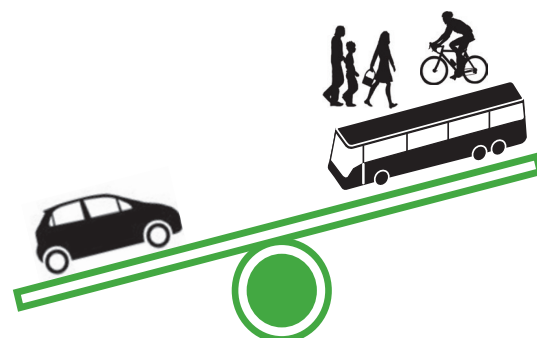

Figure 9.3c Balance of Modal Priorities on Orbital Route

9.4   Prioritise Modes

This principle requires that overall there is a re-balancing of priorities in favour of sustainable modes. This is necessary to make these modes more attractive than motor vehicles.

At a strategic level, the concept of filtered permeability should be adopted for both existing and new areas. This is the implementation of a network across the town that provides direct routes from the edge to the centre for those walking, cycling and on buses, but more indirect routes for vehicles. In the central area of the town, the street network and traffic restrictions would be altered so that vehicles, excluding buses, are not able to travel across the centre for much of the day. Vehicles would use the radial routes and the orbital route to travel from one part of town to the other. Some residential streets would also be permanently closed to the through movement of vehicles.

When bringing forward improvements for a particular area or street, conscious decisions will made regarding the balance of modal priorities. There should not be a presumption that motorised vehicles are prioritised, the approach that traditionally has prevailed in UK towns and cities.

There will be the need to tailor the approach to different locations and contexts in Bicester. In the town centre there is the need to have the balance of priorities in favour of walking, cycling and buses and a similar approach should generally apply to residential areas. On radial routes, the existing situation is to give priority to motor vehicles but a more balanced approach is now needed, improving conditions for those walking and cycling. On the orbital route, whilst there are existing walking and cycling facilities, motor vehicles dominate and this situation is unlikely to change except where new roads are created that will in the future form part of the orbital route.
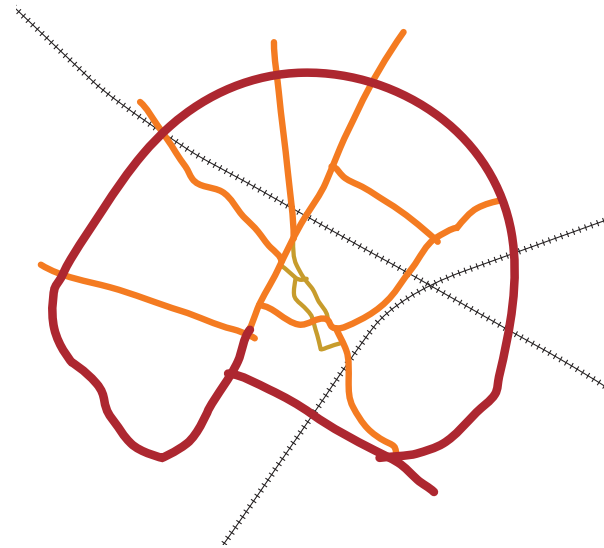
Figure 9.5 Orbital Route and Radial Routes

Figure 9.6 High Quality Green Corridors

9.5   Spatial Route Hierarchy

This principle establishes a clear hierarchy of function, particularly for cycling and vehicles, and defines an approach to the allocation of space. The hierarchy of routes for Bicester is as illustrated in Figure 9.5:

Orbital routes, for through traffic distribution and internal distribution of town traffic.

Radial routes, to provide access to residential and commercial areas, as well as access to the town centre. Radial routes do not, however, facilitate cross-town movement or through traffic.

A hierarchy of routes also applies for cycling and walking providing radial, peripheral and orbital routes. Segregation is employed, as far possible along main routes, green corridors (full segregation for walking and cycling), and underpasses/bridges where possible and necessary. Filtered permeability provides access to the town centre for sustainable modes.

This approach in the long term, sets up a system, within which users understand how they should behave and where they can predict how other road users will behave. The ultimate goal is conflict avoidance and the harmonious co-existence of modes and users.

Alan Baxter

9.6   High Quality

The quality of the journey is critical to the enjoyment, and therefore to some extent to the uptake, of sustainable transport options. The human aspects are particularly important for walking and cycling, and spending time in pleasant surroundings, such as green space, is proven to be beneficial to health. Following on from the principle of Hierarchy of Modes, the approach that would be taken is the slower the rate of travel, the higher the quality of route necessary. At walking pace, one takes in more of the surroundings visually, acoustically, and in terms of touch and air quality. The principle of high quality provision equally applies to place-making, for example the attractiveness of the town centre. Infrastructure and facilities should be pleasant and comfortable to use, and provide high levels of safety.

On the ground, for walking and cycling this means: the development of high quality green corridors; a consistent, high quality palette of surface treatment, materials and widths across cycling and walking facilities on orbital, peripheral and radial routes; and the creation of high quality people spaces within the town centre. The conservation area of this historic market town presents a great opportunity – particularly the areas of Market Square, Causeway and St. Edburg's Church.

In terms of the quality of public transport facilities, Bicester Town station is already undergoing a transformation.   For bus services, further facilities, interchanges and services would be designed in a consistent, legible and high quality manner – celebrating points of confluence of different modes. This should take account of way-finding, safety and accessibility as well as service provision.

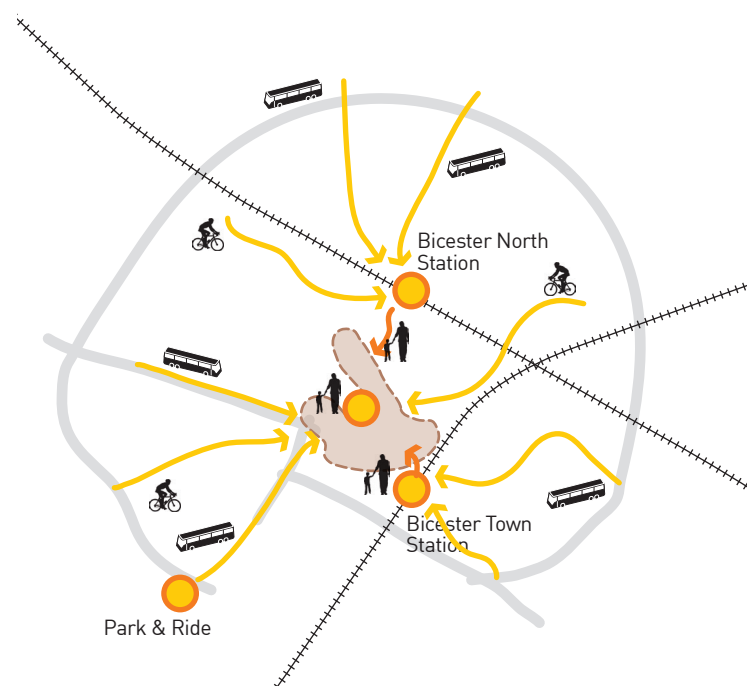Part 2 - Strategy   9.0   Vision and Principles

9.7   Integrated

Figure 9.7 Confluence and Interchange

For sustainable transport modes to compete against the car, journeys must be convenient, straightforward and efficient. The vision for Bicester is multi-modal, considering the entire journey and integration of modes. The goal set in national policy guidance of seamless door to door journeys is composed of four core areas:

• Accurate, accessible and reliable information about the different transport options for journeys.

• Convenient and affordable tickets for an entire journey: making use of smart ticketing and emerging technologies.

• Regular, straightforward connections at all stages of the journey and between different modes of transport.

• Safe, comfortable transport facilities.

For Bicester, this would translate into the creation of interchange hubs, smart ticketing across modes and integration of modes. Main hubs –points of confluence of different modal movement and interchange between modes – would be located at the two train stations, the new park and ride facility, and the town centre bus interchange. A main hub might provide some or all of the following facilities: secure bicycle parking, travel information, electric bikes, bicycle rental, repair and retail, showers, lockers, refreshment and taxi ranks (providing passive surveillance). Mini-hubs would be created at key bus stops, providing travel information and bicycle parking. Integrated ticketing should provide convenient and affordable tickets for an entire journey, while integration of modes would entail bicycle racks on buses and taxis, and more generous provision of bicycle spaces on trains.

There is a useful website for information on journeys in Bicester and its wider area at www.travelinesoutheast.org.uk. This provides comprehensive and integrated travel information, such as bus maps and timetables, along with a journey planner for the south east of England, which incorporates trains, buses, coaches, underground, tram, ferry and DRT (demand responsive transport), and walking and cycling routes. Real time travel information is available through

NextBuses. This is a service which provides times of next departures from any bus stop as a text message link sent to a mobile browser, and which is also available as an app for iPhone, iPod Touch and Android. These services could be expanded upon in terms of branding and marketing, or supplemented by services specific to Bicester. This offers the opportunity to establish a brand that unites various aspects of the transport strategy – website, apps, ticketing, advertising boards and leaflets, as well as signage, wayfinding, interchanges and other physical features on the ground.

10.0
Future Movement Network

10.1 Overview

The planned growth of Bicester, and the public and private funding that flows from this, presents an opportunity to implement a sustainable transport strategy that will reduce the carbon footprint of the town whilst at the same time improve the quality of the physical environment and enhance its identity on a regional and national scale.

The Strategy

The physical form of the town is ideal for achieving high levels of walking and cycling. It is flat and compact with all existing residential areas within a 10 minute cycle and all proposed residential areas within a 15 minute cycle of the town centre. A future primary and secondary network is identified based on the core principles of coherence, directness, safety, comfort and attractiveness. Improvements to the existing infrastructure to create the future primary network are identified. This represents a substantial investment but is necessary in order to deliver the potential that exists.

Rail improvements are well underway and will be of great benefit to the town. Improved interchanges at the two stations will encourage greater levels of sustainable multi-modal journeys.

The bus network will have strong connections to the town centre, rail stations and employment areas. Important links to the surrounding villages will be maintained and a town retail relay route established on the main spine. The existing facility on Manorsfield Road will be enhanced to form a major interchange hub with town, village and longer distance services being more legible. Changes to the bus network will be phased and all new bus stock will be accessible, low carbon and have ITSO (smart card)

compliant readers. The possible closure by Network Rail of the London Road level crossing is of major concern - it will effectively severe bus links between the town centre and Langford Village, Graven Hill and East Bicester.

The centre of Bicester will need to grow in size and diversity of offer so that it is effective in serving an enlarged town. Changes to streets and

the movement of vehicles in the centre will create the opportunity for this growth. The pedestrian priority area will be extended to Causeway and parts of Market Square. Vehicle movement through Market Place will be restricted to buses, taxis and cycles between 7am and 7pm. Other streets will also have vehicle restrictions with the overall objective to create a more comfortable environment for those walking and cycling in the town centre.

Future levels of car parking will need to be appropriate for the enlarged town and retail offer. However, the level of car parking will need to be mediated within the overall vision for high levels of sustainable movement. There will be two principle car parks – at the existing Claremont car park as part of a new retail anchor and at the existing Pioneer Square development.

The future modal share for car journeys will be 60% as some trips cannot be made by bus, train, on foot or by bike. These car trips would be more sustainable in terms of energy use if they were made by electric or low emission vehicles. There would also be local air quality benefits. A network of charging points together with electric vehicle car clubs will encourage increased use of these vehicle types.

A change in movement patterns will not be achieved through physical transport infrastructure and services alone. A Smarter Choices and Active Travel programme will be used with residents, employers and schools to facilitate and encourage this change.

Consultation

A consultation on the emerging Strategy took place with town, district and county councillors in September 2014. The overall response was positive, particularly with regard to the walking and cycling network. Concerns were raised such as the importance of maintaining accessibility from the surrounding villages to the town, the need not to completely exclude car drivers and that the strategy should be phased over time to allow the changes to bed in successfully. In addition, the proposal for traffic restrictions on the central corridor and town centre and the implications for access to car parks met with some resistance. These concerns have all been addressed in the Strategy.

Transport Accessibility and Retail Vitality

Concerns are often raised about the impact of pedestrianisation and traffic restrictions on the commercial vitality of town centres. Retailers are often fearful about the loss of business that might arise but typically after implementation these schemes prove popular.

Sheep Street was historically a busy through route for traffic and there was opposition to pedestrianisation. Now many people cannot imagine Sheep Street as anything other than the preserve of those strolling, sitting and browsing. Nobody would now propose that traffic should be reintroduced as this would be seen as a backward step.

Research has been undertaken on the link between traffic restraint and retail vitality and this demonstrates that reducing traffic volumes and speeds is good for business. More specifically there is a strong positive relationship between percentage vacancy rates and motorised traffic flow i.e. shop vacancy rates increase as the level of traffic increases.

A parking study of six Midlands towns showed that "parking provision does not have an influence on whether shops close or remain trading. The overall quality and attractiveness of the centres had more impact on trade."

Further studies in Leicester and Edinburgh also indicate that the quality of shopping, and of the shopping environment is more important in generating trade - walking past shops is a strong element of trade generation. In Edinburgh, shoppers' chief concern was found to be a good range of shops in an attractive, comfortable environment. Retailers tended to overestimate the number of customers arriving by car and underestimate the number arriving on foot.

The recommendations from this research in relation to sustainable modes include:

- Bus access is important, stops may need to be moved

- Pedestrian routes to shopping streets must be good, with clear signing and priority over motor traffic

- Cycle parking needs to be "little and often" and very close to popular retail destinations

- It is worth losing some car parking slots to create an attractive streetscape.

While not always successful (a critical mass is required to justify pedestrianisation - otherwise the area is simply bereft of people), there are many examples of popular and economically lucrative pedestrianisation of town centres. Here, three examples are presented:

Bury St. Edmunds

Bury St. Edmunds is a market town with a population of approximately 42,000 in the county of Suffolk. The town was one of four schemes in The Historic Towns Forum's Historic Core Zones Project (1999), which advocated design sensitivity in the implementation of traffic measures. Improvements were implemented to address a number of issues, including: pedestrian/ vehicle conflict, through traffic, on-street parking, town centre servicing, excessive visual intrusion of traffic signs and vehicle speeds. The improvements involved included a 20mph zone with minimum physical traffic calming measures, sensitive use of materials (e.g. brass tactile studs to indicate crossings, rather than large areas of tacile paving or line markings) and more space for pedestrians. In surveys it was found that the majority of people now find the streetscape more attractive (85% and 70% in the two improvement areas), and less than one quarter of people were unhappy with the scheme. Traffic flows were found to have dropped by 13% and 16%, and speeds were found to decrease by between 1 and 2mph.

Horsham

Horsham is a market town with a population of approximately 55,000 in the county of Sussex. Much of the town centre is pedestrianised and during 2010, East Street was converted into a shared space scheme: while vehicles are still permitted to move through, it does not look like a 'road'. However, there were considerable problems with vehicles not obeying the restrictions, and so the council has implemented a full closure between the hours of of 10:30am and 4pm. The council yielded to pressure from restaurants and the wishes of the majority (29 of 32) of the shops on the street, such is its success with shoppers and pedestrians.

York

York is a city with a population of approximately 200,000. Lord Esher, president of the Royal Institute of British Architects in his 1967 report, recognised the danger that cars and lorries presented to the historic fabric of the city of York. He recommended that Bootham Bar be closed to traffic, and residents' cars only be allowed through Walmgate and Monk Bars. He also advocated the building of 4 multi-storey car parks outside the city's walls. In 1971, Stonegate became York's first 'foot-street'. In the 1980s, the city's other main shopping streets were pedestrianised in the face of fierce opposition from traders, who thought they would lose business. The footstreets scheme, considered a large area for a city the size of York, officially opened in 1987 and has been highly successful.

The area and hours were extended in 2012. This extension met with some resistance to change during consultation - with approximately 75% of respondents anticipating a negative affect on their business. Hence, the extension was implemented as an 18 month Experimental Traffic Regulation Order, which commenced in March 2013. Now, from 10:30am until 5pm seven days per week, 16 streets in the city centre are closed to traffic aside from emergency vehicles. In addition, Deansgate/Minster Yard is closed to traffic 24 hours a day, 7 days a week with only cyclists and pedestrians admitted. While the footstreets are pedestrian priority, the streetscape does not always reflect this - still with asphalt carriageway and footway - paving the streets has been advocated in order that the landscape design accurately reflects use.

East Street Horsham before and after   Horsham: unruly cars eventually removed   York Footstreet before and after

Alan Baxter

10.2 Walking and Cycling

Future Network

There is a major opportunity in Bicester for journeys to shift from car to cycling and walking. The compact nature of the town and the relatively flat topography mean that cycling is a viable mode for the vast majority of journeys within the boundary of the town. For example, all the existing housing in the town is within a 10 minute cycle of the town centre. The areas of housing growth will be within a 15 minute cycle of the town centre.

Currently the walking and cycling network is mainly on streets but also includes some segregated and shared use paths adjacent to railway lines, watercourses and through green spaces. Based on the audit of the existing network and within the context of the expansion of the town and other measures to constrain traffic movement, a primary and secondary walking and cycling network is defined – this is illustrated in Figure 10.1. This comprises a comprehensive network of primary routes that connects up key areas of the town with a fine grain of secondary routes to feed into the primary ones.
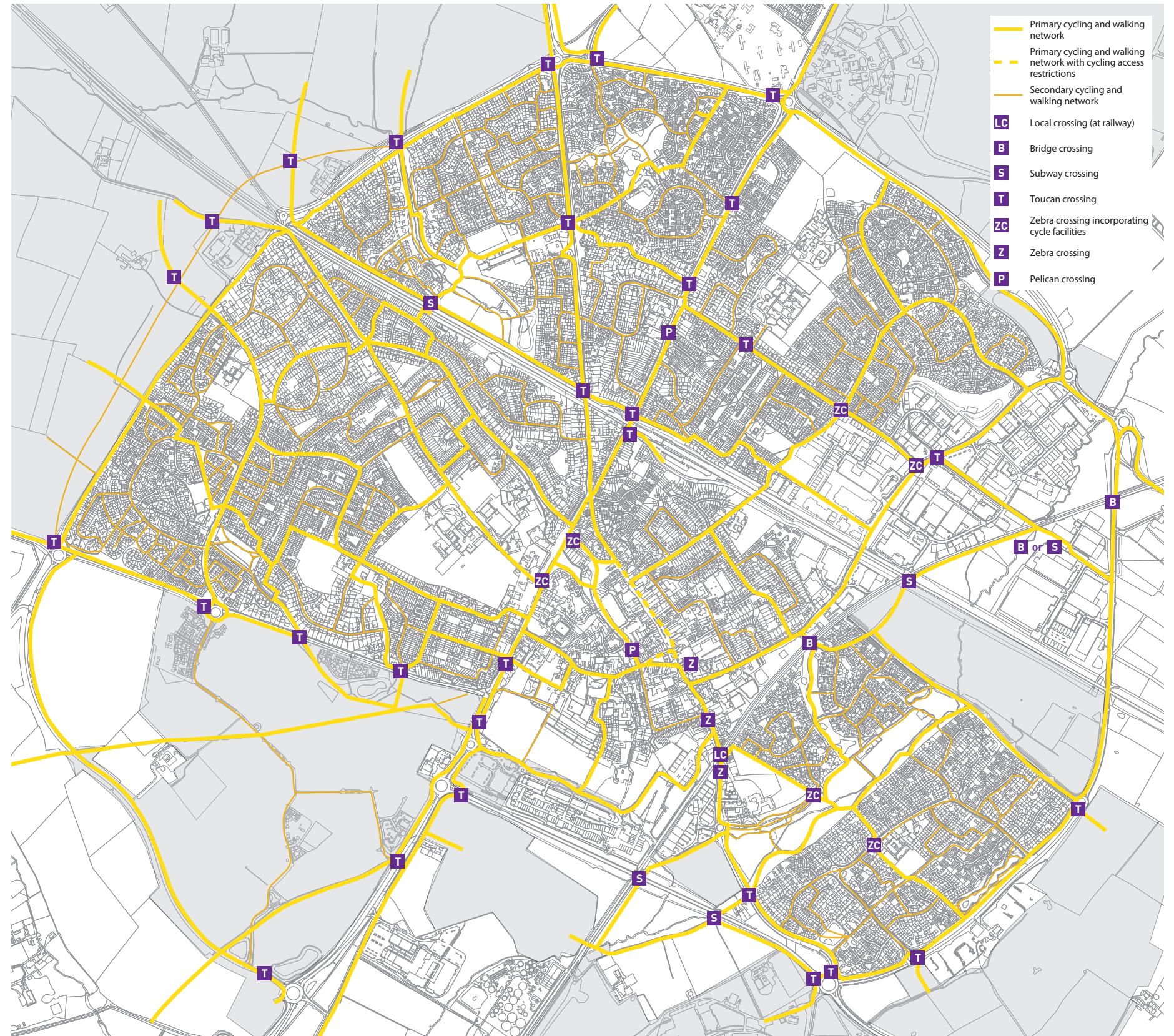

Figure 10.1 Primary and Secondary Walking and Cycling Network

Legend:
- Primary cycling and walking network
- Primary cycling and walking network with cycling access restrictions
- Secondary cycling and walking network
- LC Local crossing (at railway)
- B Bridge crossing
- S Subway crossing
- T Toucan crossing
- ZC Zebra crossing incorporating cycle facilities
- Z Zebra crossing
- P Pelican crossing

The overall intention of the strategy is to capitalise on the potential of Bicester as a cycling town by giving this mode a time advantage over motor vehicles.   Major changes are proposed to the distributor and primary road network in the town which will complement the existing system of filtered permeability that is in place in many of the existing residential areas.

The overall approach to defining, designing and implementing the network is based on guidance contained in the 'Handbook for Cycle Friendly Design' (April 2014) published by Sustrans. The core principles for the network in Bicester are as follows:

Coherence

• link all potential origins and destinations, with well located cycle lanes

• continuous, recognisable and properly signed

• offer consistent standard of protection throughout

Directness

• based on desire lines

• result in minimal detours or delays

• provide a positive advantage in terms of directness and priority over motor traffic

Safety

• safe and perceived as safe

• provide personal security

• limit conflict between cyclists and pedestrians and other vehicles

Comfort

• smooth, non-slip surfaces, well maintained, drained and free of debris

• sufficient width for the level of use

• enable cyclists to maintain momentum, with easy gradients

Attractiveness

• attractive and interesting

• integrate with and complement their surroundings

• contribute to good urban design

The physical form of the infrastructure for cyclists is guided by the expected road conditions as illustrated in Figure 10.2 below. Where traffic speeds and volumes are high, there would be a segregated provision for walking and cycling. Where speeds and volumes are low, pedestrians would be segregated but cyclists we would share carriageway space with motor vehicles.
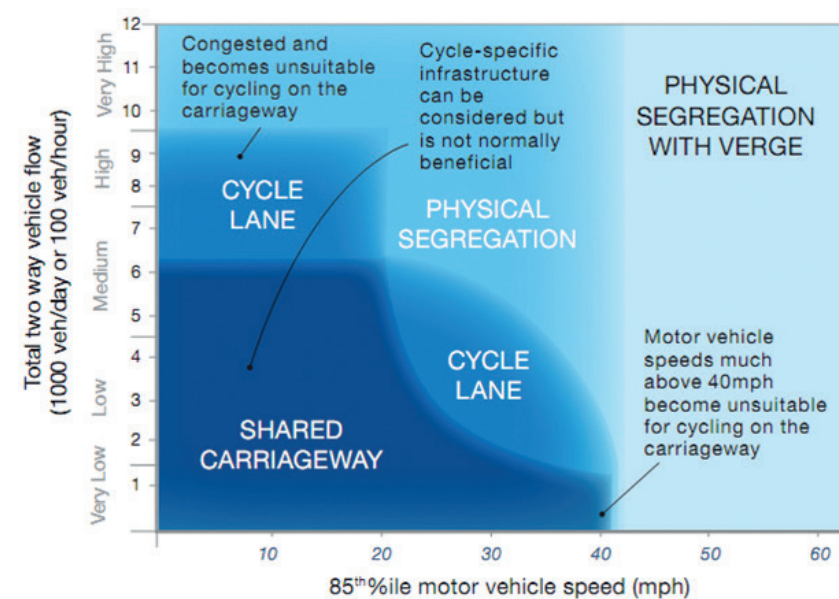

Figure 10.2 Choice Basis for Cycle Infrastructure Provision

In Bicester the approach, as far as practical is for segregation on the distributor routes within the town. Buckingham Road, Launton Road, London Road and the "Central Corridor" all accommodate flows of between 10,000 and 15,000 vehicles per day. Whilst measures to constrain traffic movement should result in a decrease in flows initially this will to a certain extent be offset by the increased population which will result in additional movement overall. These will continue

to be busy trafficked streets with vehicle speeds of between 25mph and 35mph and segregation is fully justified.

The other distributor routes roads in the town are Banbury Road, Churchill Road, Middleton Stoney Road and Bucknell Road. Banbury Road already has segregated provision for most of its length, but the section south of the railway bridge has a constrained cross section. Segregation is not possible so an on-carriageway provision is the only option. Traffic flows on Bucknell Road are less than on other distributor roads so an on carriageway provision will be used. This approach may need to be modified in response to increases in flows as a result of the NW Bicester development. Segregation will also be used on Middleton Stoney Road and Churchill Road where future flows are likely to exceed 10,000 vehicles per day.

The starting point for the approach to designing for segregation was to have one way cycle tracks on each side of a carriageway with a level difference used to separate cyclists from pedestrians.   This approach is common in mainland Europe and has been used in places in the UK. However, an assessment of the distributor roads identified that whilst it would be possible in some locations it was not practical everywhere due to the limits of the street cross section. Consistency of provision is viewed as being important and therefore a shared cycle pedestrian path allowing two way movement for both modes will be used on one side of a carriageway.

Most existing pedestrian cycle paths in the town are 3m wide with a white dividing line separating the two modes.   This gives a width of 1.5m for cyclists, which is not sufficient to allow passing. A fully shared and unsegregated path is therefore the approach to be used in residential areas outside of the town centre where pedestrian activity is relatively light.   In and on the approaches to the town centre pedestrian flows will be higher and therefore there is greater potential for conflict between those walking and those cycling.   A path of 3.5m width is the right approach in these areas with 2m allocated for cyclists and 1.5m for pedestrians. A white dividing line will not be used but rather high quality, contrasting materials to designate the allocation of width and to address the needs of the visually impaired.

Bicester has a primary orbital route that disperses through and town traffic to radial routes providing connections to longer distance

destinations. The majority of these orbital routes have 3m wide shared cycle paths. Pedestrian movement on these will always be low so cyclists and pedestrians can share these paths without any issues. The focus for these orbital connections will be improvements to the crossing facilities at radial distributor roads and more minor residential access roads.

In the town centre there will continue to be access for motor vehicles to car parks but there will be no through movement of vehicles. The historic streets do not have the space for physical segregation, so the approach will be on bringing traffic speeds down to less than 20mph to create an environment where cyclists will be relatively comfortable sharing space with motor vehicles. This approach to prioritising walking and cycling will have benefits for the quality of town centre as a making it a more attractive destination increasing vibrancy and vitality.
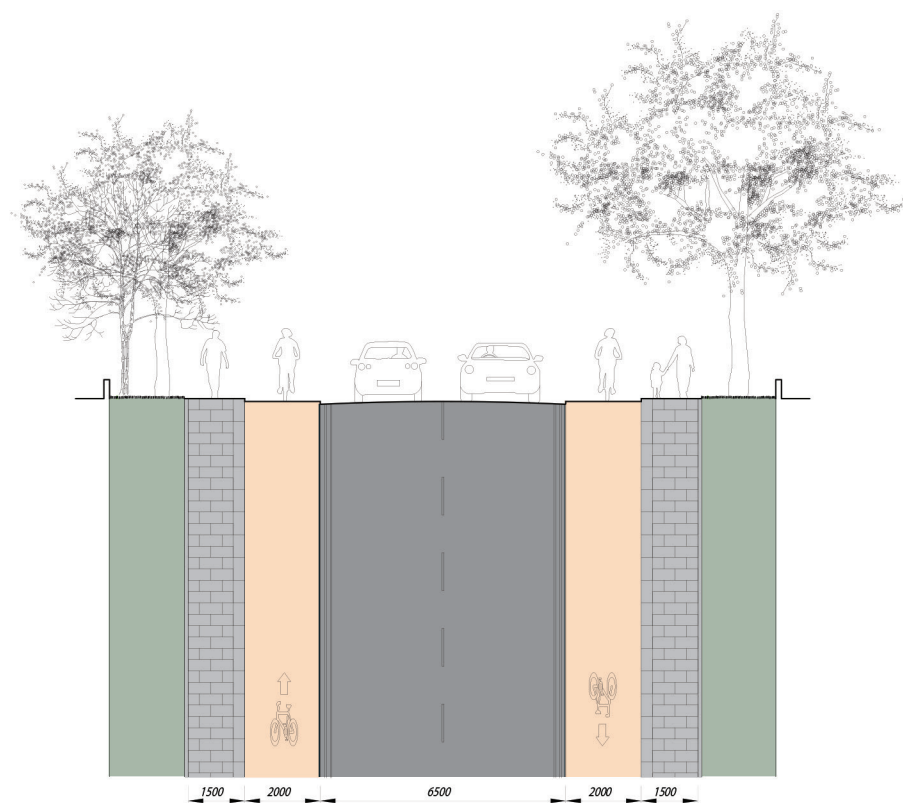
Design Guide for New Residential Streets

In housing growth areas there is the potential to build in a high quality cycle network from the outset. This should be led by a straightforward design guide, to ensure consistency across developments and to ensure that new developments link seamlessly into existing infrastructure. The basic design guide is illustrated in Figure 10.3.

In terms of streets the following principles should be adopted:

* Primary: grade separated or segregated cycle paths on both sides

* Secondary: two-way grade separated or segregated cycle path on one side

* Tertiary: cyclists use carriageway, mixing with vehicles travelling at low speed (10mph to 15mph).

This gives the basic options / guidelines - which would be developed to accommodate on-street parking, junctions and vehicle accesses. It is expected that there will also be a network of green corridors within which there will be combined walking and cycling paths.

An important aspect of the design guide in terms of overall coherence of the network is that materials should also be consistent: across new residentail areas, new sections of cycle and pedestrian infrastructure within the town, and on upgrades to existing cycling infrastructure. Suggested materials are as shown in Figures 10.3a to 10.3c below. Minimal or subtle use of road markings will make the movement environment gentler, encouraging drivers to drive carefully.

On cycleways and cycle priority streets (e.g. Figure 10.3c), beige mastertint asphalt should be used. Beige is a more gentle colour than black asphalt and conveys an entirely different effect - letting drivers know that they are no longer in a motor vehicle-only realm.

Footways should be of high quality materials to promote walking: for example, the use of granite paving (as opposed to e.g. asphalt with kerbing) conveys to users of footways that they are important - that money has been invested in them and, fundamentally, that their experience of walking should be pleasant. This is aided by planting of green verges and trees, and provision of swales, improving air quality and the level of enjoyment of being outdoors through a stronger connection with the natural environment.
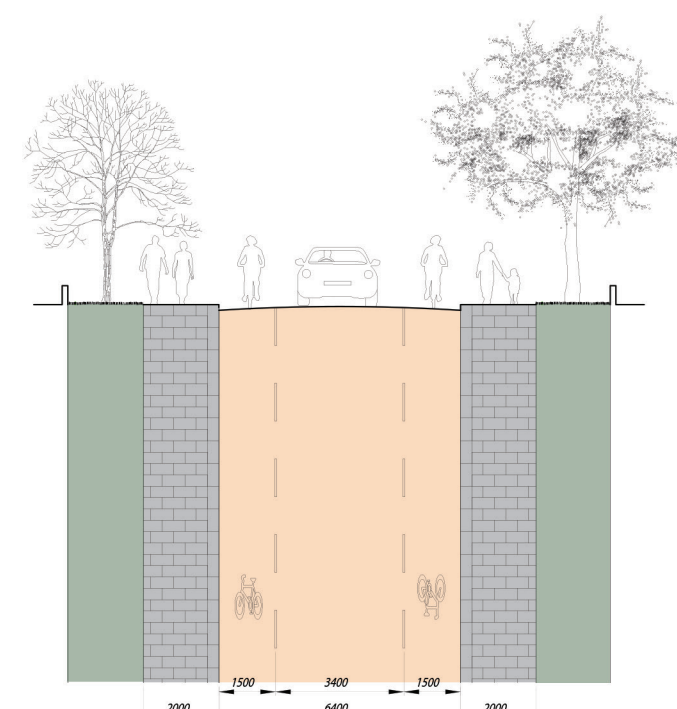
Figure 10.3a Design Guide Sections: Primary Residential Street

Figure 10.3b Secondary Residential Street

Figure 10.3c Tertiary Residential Street

Short Term Cycle Infrastructure Improvements

Cycle infrastructure improvements for the Central Corridor and Churchill Road have been developed to outline design stage. These drawings are contained in Appendix 2, with 3D views of the proposal shown in Figure 10.4. In the figures, areas of red surfacing indicate shared use paths. These improvements articulate the overall approach of the Sustainable Transport Strategy and the principles that underlay the encouragement of walking and cycling.

The outline designs build upon recent improvements implemented by Oxfordshire County Council on Field Street/Buckingham Road and also seek to reduce capacity into and along the Central Corridor. This aligns with the overall approach of the STS in terms of managing traffic in the town. The measure that will have the most significant impact on capacity will be at the access to Bicester North rail station and the nearby railway overbridge. The existing bridge abutments limit the cross section at this location and in order to implement a shared cycle pedestrian path it will be necessary to narrow the carriageway to one lane. Vehicle movement will be controlled using a traffic signal system that will encompass the single lane section of Buckingham Road and the station access, Chiltern Approach.
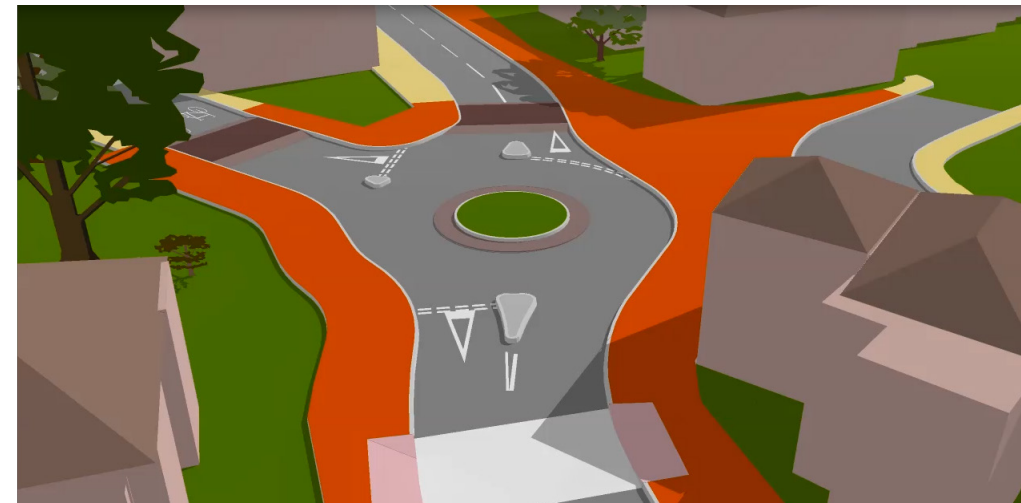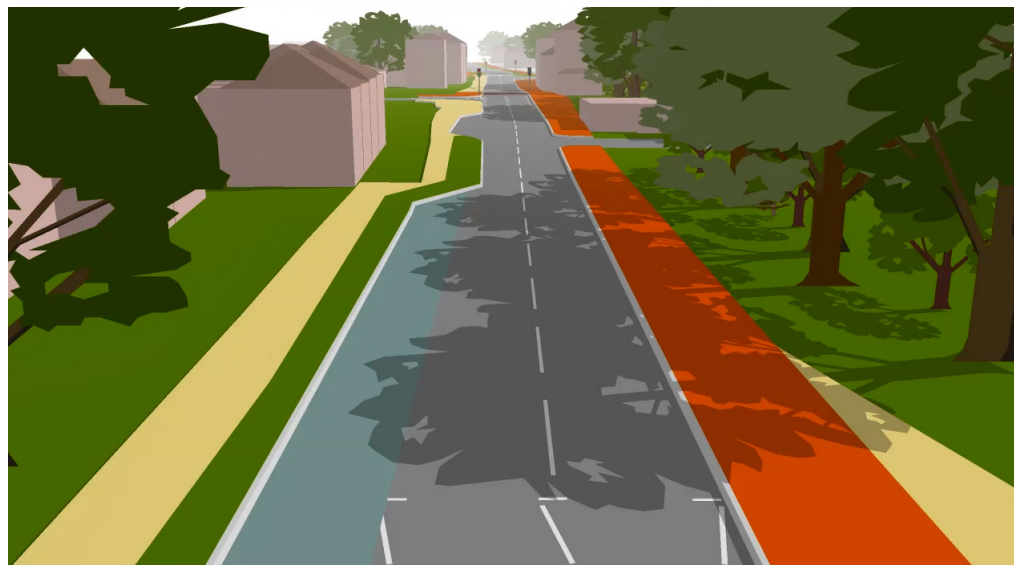
Figure 10.4 3D Views of Cycle Infrastructure Proposal: Typical layout, Central Corridor

Alan Baxter

Primary Network Improvements

Whilst the basis of the designated walking and cycling network already exists, substantial resources are needed to upgrade this to a standard at which the town's commitment to these modes as a viable alternative to the motor vehicle is evident.

The primary network is divided into a series of links classified as radial, orbital, peripheral and connecting – see Figure 10.5. Each is then sub-divided into sub links and nodes and for each of these the necessary improvement is identified and is assigned a high level capital cost. (It should be noted that the costs are high level only and are based on experience of implementing similar improvement elsewhere in the UK. The high level costs do not have the level of robustness that a cost consultant would be able to provide). These are construction costs only and do not include design, supervision and any changes to statutory undertakers plant.

The table in Appendix 3, sets out the improvements required to the network together with a priority assigned to each. Priority classifications are as follows:

Quick Win – 0 to 2 years

High – 1 to 5 years

Medium – 5 to 10 years

Low – 10 – 15 years

The total cost of the improvements to the primary network is £7.5m. This is an expenditure of £16 per resident over the next 15 years. Alternatively it is a cost of £1,580 per new home expected to be built on the strategic sites up to 2031.

Figure 10.5 Primary Walking and Cycling Network

10.3 Rail

As elaborated upon in Part 1, in the near future, Bicester Town station will reopen following the construction of the Chiltern Railways Evergreen 3 improvement scheme. The scheme will provide a train service between Oxford and London Marylebone via Bicester. Expected to be fully operational in spring 2016, the frequency of service between Bicester and Oxford will be quarter hourly. Further into the future, the East-West Rail project will re-introduce passenger and freight services between Bedford and Oxford, Milton Keynes and Aylesbury, with long-term intentions of re-establishing a rail link between Bedford and Cambridge. The realisation of this rail infrastructure will augment current services between London and Birmingham via Bicester North station, and contribute significantly to the resilience and sustainability of the transport network in Bicester, by offering increased choice, and encouraging people to travel & transport goods by rail rather than by road.

The route of the proposed High Speed 2 (HS2) rail line between London, Birmingham and the North passes approximately 1km to the north east of Bicester. HS2 crosses the East-West rail line and there is the potential to make a junction between the two lines. This would open up multiple new destinations that could be accessed directly from Bicester.

The opening of the railway between Bicester Town and Oxford has the potential to reduce vehicular journeys on the A34 and may reduce demand for the S5 bus service. However, these changing movement patterns need to be seen in the context of an increasing population, which will increase travel demand overall. Additionally, due to its proximity to Bicester Village, it is likely that people travelling by train to the retail village, particularly from London, will choose to travel to Bicester Town station rather than to Bicester North station. Bicester Town station is within walking distance of Bicester Village, and this walk is far shorter than making the same journey by taxi for example. Thus, demand for the Bicester Village shuttle bus between Bicester North station and Bicester Village is likely to be reduced, and there should be little demand for an equivalent shuttle bus to and from Bicester Town station.

The two railway stations, as significant gateways to the town, form two important hubs and are critical in realising the goal of truly integrated, multi-modal, sustainable transport for Bicester.   The proposal for Bicester Town includes new platforms; a new station to the west of the railway line; drop-off areas, car & cycle parking on both west and east sides; and a pedestrian & cycle link to Bicester Village. Bicester North station already has the core ingredients as a point of interchange – with bus stands, taxi rank, as well as generous provision of car- and cycle-parking. These facilities would be made more coherent, attractive and comfortable, through good design, space planning and wayfinding.

The goal is to make the experience of changing trains or modes here inviting and pleasant. These hubs offer an opportunity for consistent branding and design across Bicester, creating a distinct identity which would make them attractive, recognisable and more easily marketable. In order to encourage the use of sustainable modes, it is essential that people perceive rail as comfortable, convenient and cost-effective. In functional terms, the hubs should offer accurate, accessible and reliable information about the different transport options for journeys (not only real-time rail information, but also bus information); convenient and affordable tickets for an entire journey (a smart ticketing scheme for Bicester and environs); regular, straightforward connections (in terms of timetabling and wayfinding) and safe, comfortable transport facilities.

Further, it is important to integrate modes effectively. With the increase in cycling uptake, on UK trains there is often a shortage of on-train spaces for bicycles, particularly during the summer months. Train operators would need to ensure there are cycle spaces on all trains, and also provide additional spaces. Current provision, if provided, is usually only 2-4 bicycles per train. It is more space-efficient, and the bicycles incur less damage in transit, if hung vertically rather than stored horizontally.

London Road Level Crossing

It should be noted that many of the existing and future bus services use London Road level crossing to the north of Bicester Town rail station. With the opening of the Oxford to London Marylebone rail service the frequency of closures will increase the level crossing barriers down for at least 30 minutes in every hour. This will increase journey times for bus passengers, unless services can be co-ordinated with the train timetable. Increased closure of the level crossing will also have an impact on pedestrians and cyclists.

Discussions have commenced between OCC and Network Rail regarding the future of the level crossing and there is a strong possibility that Network Rail will want it closed permanently. This is consistent with their general policy of closing level crossings on the grounds of safety.

The removal of bus access east west along London Road will have a very significant negative impact on current and future bus services in the town. Langford Village currently, and Graven Hill and East Bicester in the future, are reliant on this connection for providing the most direct route into and out of the town centre. Alternatives do exist via Charbridge Lane/Launton Road and the A41/Central Corridor although both will substantially increase journey times and therefore erode the attractiveness of bus services. The feasibility of constructing an underpass beneath the railway line should be explored as this is the only way of providing the most direct connection to the town centre. It is acknowledged that this will be a major engineering undertaking and will have significant implications for the quality of the urban environment in this part of the town. However, losing the ability to make a direct bus connection between Langford Village, Graven Hill and East Bicester will also have a major impact on the overall sustainability of the town.

10.4 Buses

Current bus service provision is somewhat confusing, the routes are often indirect, many routes run only infrequently and, currently, only the S5 provides an evening service. The Travel Behaviour Demonstration Project from autumn 2010/11 found that public transport in Bicester was perceived as slow and not delivering people to where they want to go, and other studies note that many services are under used. In order to address these issues, the strategy aims to rationalise this existing bus service provision and integrate the proposed new developments, as well as Bicester Village, fully into the public transport provision for the town.

Whilst a bus network is proposed it must be recognised that this is an ideal provision for the town. The reality is that a bus network is not fixed and has the advantage of being flexible and adaptable. Periodically, the network in the town will need to respond to changing circumstances, patronage, operating costs, the building out of development areas and strategic changes to the road network.

The bus strategy makes a number of assumptions. It is expected that patronage from the development areas will be proportionally higher than for existing residential areas, due to the distance from the town centre where the bus interchange is located.   This might support higher frequencies on these routes but certainly initially, subsidy will be needed for routes serving development areas.   Over time as areas are built out and demand increases, the magnitude of subsidy needed will reduce. The S5 is currently an important bus route for the town, but its importance may diminish with the improved connection to Oxford by rail. Equally, it is thought that demand for the Bicester Village shuttle bus to and from Bicester North station will reduce, as visitors from London are likely to choose to travel by train via Bicester Town station instead. The opportunity to integrate Bicester Village more fully into the town, through the standard bus network, is also recognised.

Bicester has an important relationship to its rural hinterland and surrounding villages. Bus services already exist to the villages, and the strategy will continue to facilitate these bus links.

Referring to Figure 10.7, the bus strategy is shaped in the following way,

- Longer distance (sub-regional e.g. to towns and surrounding villages) and local (town) services are separated out, giving greater clarity. Long distance connectivity to other key areas of economic growth is improved through the provision of premium and connecter transit routes.

- All standard local routes, and the majority of the longer distance routes, serve the town centre bus interchange, the major hub

- The town centre bus interchange becomes two sided (illustrated in Figure 10.8), facilitating buses running in both directions

- All residential areas have a standard bus link to the town centre (see Figure 10.10)

- All residential areas have a standard bus or taxi bus service to either Bicester North rail station or Bicester Town rail station (see Figure 10.11)

- Subject to consideration of walking times and bus journey times, all standard local routes that serve a station will drop off / pick up at the station forecourt

- Hubs are also formed at the two train stations and at the Park and Ride to the south of the town

- Mini-hubs are formed at key bus stops, providing high quality bicycle parking, onward travel information etc.

- A local 'retail relay' bus route is established, which runs along the main spine of the town and links, for example, the Park & Ride, Bicester Village, the town centre, Bicester North station and Bicester Airfield

- All other local bus routes run loops either side of the town centre through residential neighbourhoods, linking through the town centre bus interchange (thus minimising turning movements in the town centre)

- Phasing and frequency: over time as the population, and uptake of bus services increase, frequency of service correspondingly increases from half-hourly to quarter hourly; routes start to loop alternately clockwise and anti-clockwise; and services run later into the evening

The bus interchange on Manorsfield Road would be increased in size and established as the major integrated transport hub (Figure 10.8). Its primary purpose is still to facilitate bus connections – all of the standard local bus routes in Bicester, and the majority of the longer distance routes, pass through the interchange. Buses would now pass in both directions with three additional bus stops opposite the existing facility, which would also have timetables and screens with real-time bus information, as the existing bus stands do. Given the importance of its rural hinterland to Bicester, and the connections to the surrounding villages, there would also be the potential to develop connections beyond existing bus services (some of which run very infrequently) through provision of community transport or promotion of car sharing.

As the main point of confluence, this main transport hub would also provide onward travel information in a formal way: in the form of a Travel Information shop or kiosk, located in a prominent position. This would provide information about all modes – walking, cycling, rail, bus etc. – assistance in planning multi-modal journeys, and the ability to buy integrated tickets for trips. This could also provide tourist information (currently, Bicester's only tourist office is located at Bicester Village) to promote destinations within the town, particularly the historic core. The hub would provide bicycle parking (a portion of the cycle parking to be secure) and facilities for cyclists to maintain their bicycles, potentially including a vending machine with spare tubes etc. Close by in the town centre, there is also a bicycle shop (at the northern end of Sheep Street) offering cycle advice, retail and repair. Although by necessity these facilities – bus stands, information kiosk, cycle facilities – would not be located in one integrated hub building, they need to be within people's frame of vision or otherwise easily located upon arrival at the interchange. A common design concept, which could be applied across the whole town, would also be beneficial.

The Department for Transport's vision, set out in the 'Green Light for Better Buses' paper (March 2012) is for a 'better bus' with more of the attributes that passengers want: more punctual, inter-connected services, an even greener and more fully wheelchair and buggy-accessible fleet, and the widespread availability of smart ticketing. As Bicester's buses are upgraded over time, they should start to install ITSO compliant readers. This will enable the use of contactless
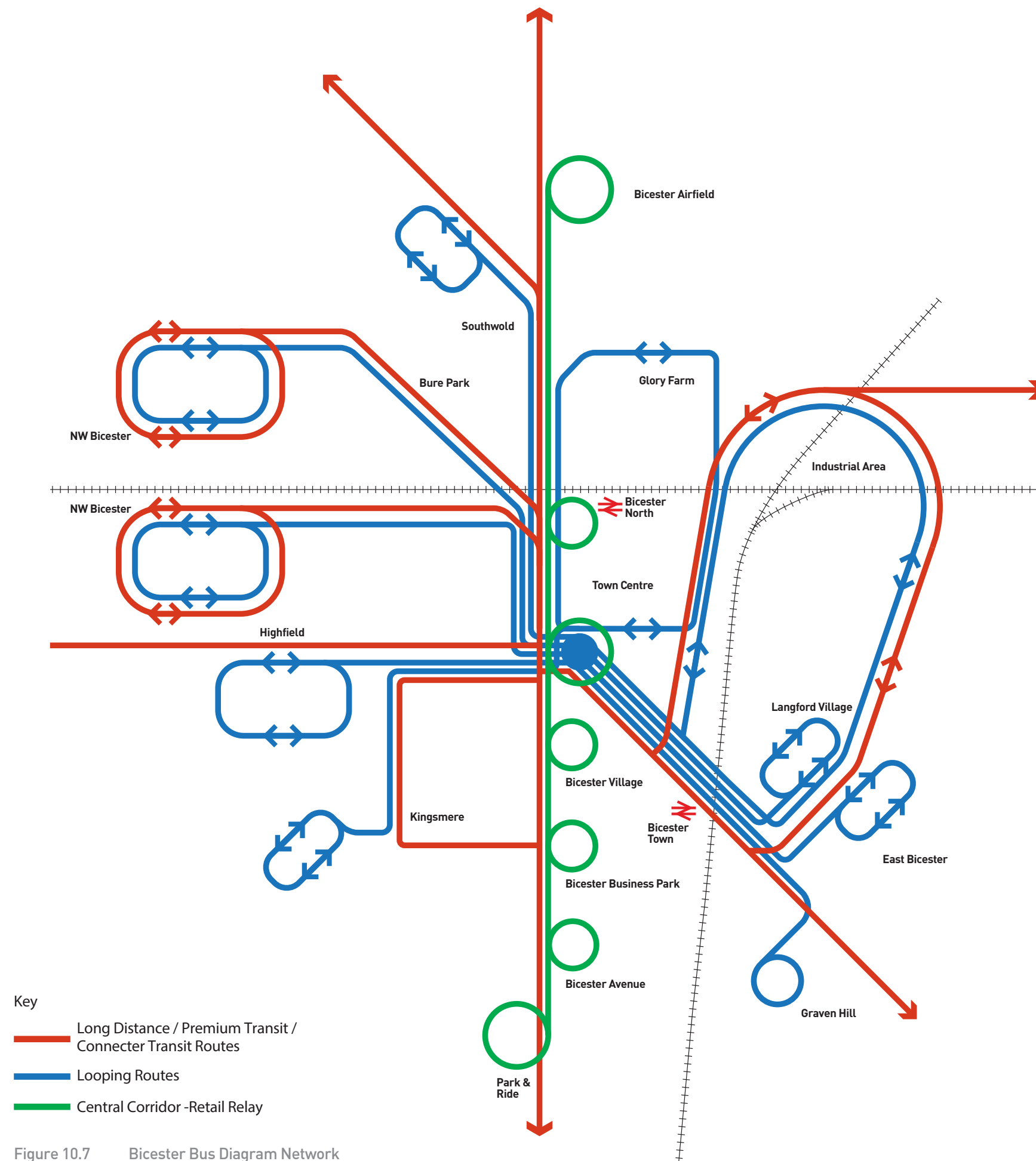
bank cards for paying bus fares and ensure forward compatibility for future integrated ticketing (for more detail, see the following section on Smart Ticketing). In order to integrate modes, it would also be forward-thinking to provide buses with bicycle racks.

Any additions to the bus fleet should be accessible, low carbon or electric vehicles and be fitted with automatic vehicle location equipment that can be used to provide real-time information to passengers and help fleet management. For existing buses, the Clean Bus Technology Fund is a £5 million scheme to support upgrading buses with pollution-reducing technology on routes where air quality does not meet European Commission standards. For example, the retrofitting of exhaust emission reduction technology e.g. selective catalytic reduction (SCR) systems can see an 88% reduction in Nitrogen Oxides (NOx). For new buses, the government provides funding and incentives for low carbon and electric buses through its Green Bus fund. This has already gone through four rounds of funding to the value of £88 million, with the largest single grant going to Transport for London for 244 hybrid buses (£18 million). It could be possible to have distinctive BicesterBus branding to tie in with EcoBicester and Bicester Village: for example, a fleet of electric buses.

Bicester Airfield

Southwold

Bure Park

NW Bicester

Glory Farm

NW Bicester

Bicester North

Industrial Area

Town Centre

Highfield

Langford Village

Bicester Village

East Bicester

Kingsmere

Bicester Town

Bicester Business Park

Bicester Avenue

Graven Hill

Key

Long Distance / Premium Transit / Connecter Transit Routes

Looping Routes

Central Corridor -Retail Relay

Park & Ride

Figure 10.7   Bicester Bus Diagram Network

LONGER DISTANCE ROUTES

BROMPTON DOCK BIKE HIRE

SECURE BICYCLE STORAGE

INTEGRATED TICKETING
MACHINES

INFORMATION KIOSK

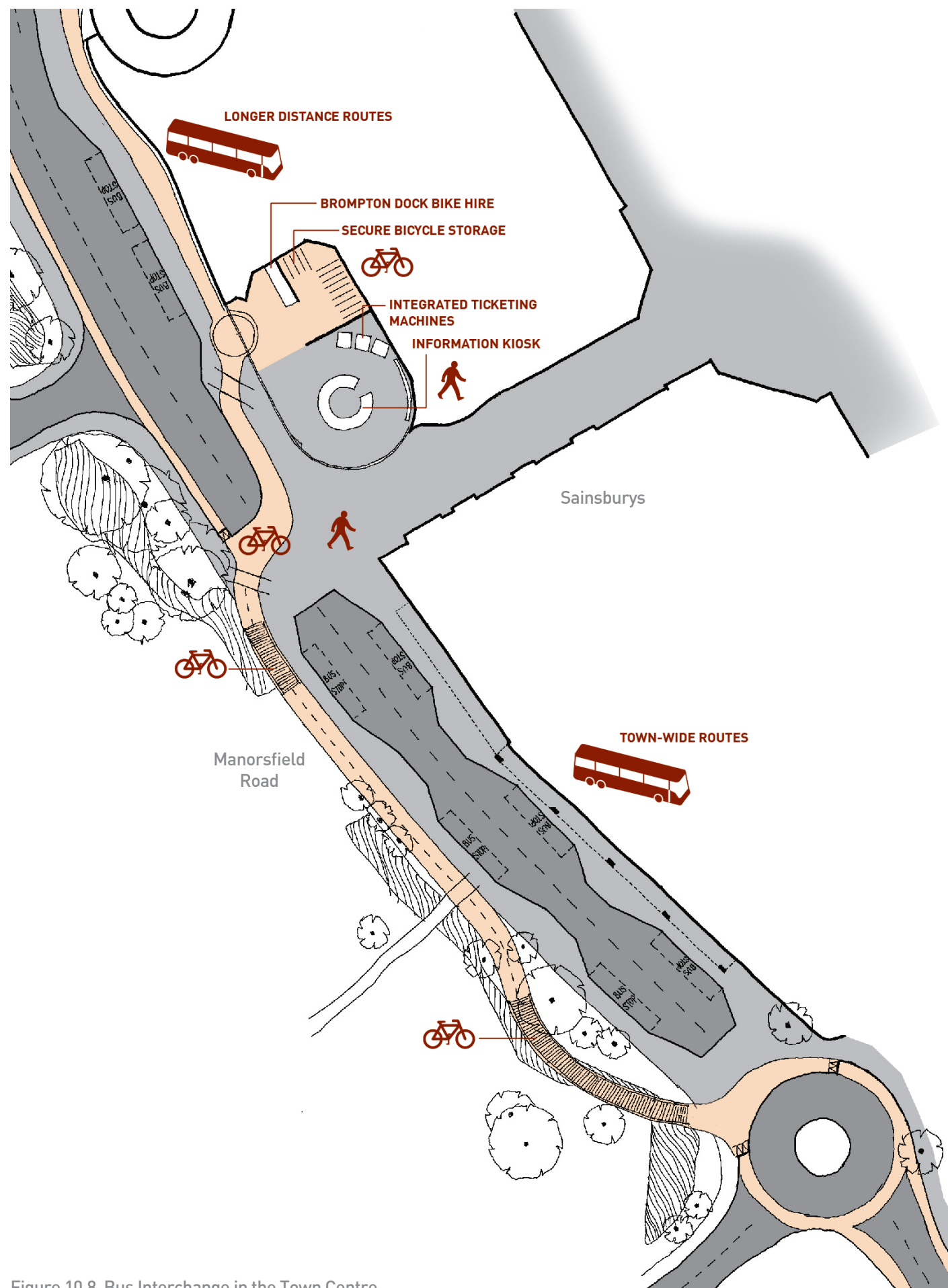Sainsburys

TOWN-WIDE ROUTES

Manorsfield
Road

Figure 10.8 Bus Interchange in the Town Centre

Pure electric buses are a relatively recent innovation, but there are trials underway in the UK. Transport for London introduced two pure electric buses in December 2013. These single decker Chinese-built BYD electric buses are reported to reduce running costs by 75% with the benefit of zero tailpipe emissions. They require 4-5 hours to charge fully and provide up to 250km of journey distance, which is sufficient for a full day's operation. These trials will help TfL develop plans for greater use of electric buses in the future. Milton Keynes recently introduced eight electric buses which can be charged wirelessly. Built by Wrightbus Ltd., they will replace diesel buses, and are the first of their kind in the UK. The new electric buses, like conventional electric buses, will be charged overnight at a depot. However, they will receive additional charging (through inductive charging) at the start and the end of the route through plates which are fitted in the road. A ten minute charge replenishes two-thirds of the energy required for the bus route. It is also possible (demonstrated in South Korea) to recharge electric buses through inductive charging while the buses are in motion. This is done via electric power cables, buried within the ground and aligned with the bus route; eliminates the need to carry large and heavy batteries; and reduces the stationary recharge time. This 5-year trial is anticipated to provide data which will assess the economic viability of electric buses on busy urban routes.

It would be possible for Bicester to be an early adopter of this technology, demonstrating what can be achieved in a small to medium sized town. An electric bus fleet very strongly supports that EcoBicester strategy and brings a distinct branding to the town's bus network.

As the town grows and new residential areas are created, bus services to serve these areas will be initiated with developer funded subsidies. In terms of the existing town, the Launton Road Industrial Estate is poorly served by bus routes. With the opening of Bicester Town station in 2016 this would be an opportune time to better serve this area by initiating the Highfield-Industrial loop (see Figure 10.10). In the early years this service is likely to require financial support. The opening of Bicester Town will also result in a change in the movement patterns to and from Bicester Village. At this stage it is not known how long the current shuttle bus from Bicester North will continue to run. However, this change maybe an appropriate point to initiate the Central Corridor-Retail Route to connect key destinations on this key spine.

Note:
Shows existing long distance routes only. Routing of premium and connector transit routes and their effect on existing routes subject to further study.

Figure 10.9 Longer Distance Bus Routes Map

Key

	Railway
	Bus Route 8
	Bus Route 18
	Bus Route 25
	Bus Route 30
	Bus Route 37
	Bus Route 81 & 81A
	Bus Route S5
	Bus Route X5
	Bus Route 25A

Key

⊦⊦⊦⊦⊦ Railway

▬ Central Corridor -
Retail relay route

▬ Kingsmere-Glory
Farm Loop

▬ Highfield-Industrial
Loop

▬ Caversfield-Langford
Loop

▬ Ecobicester North-
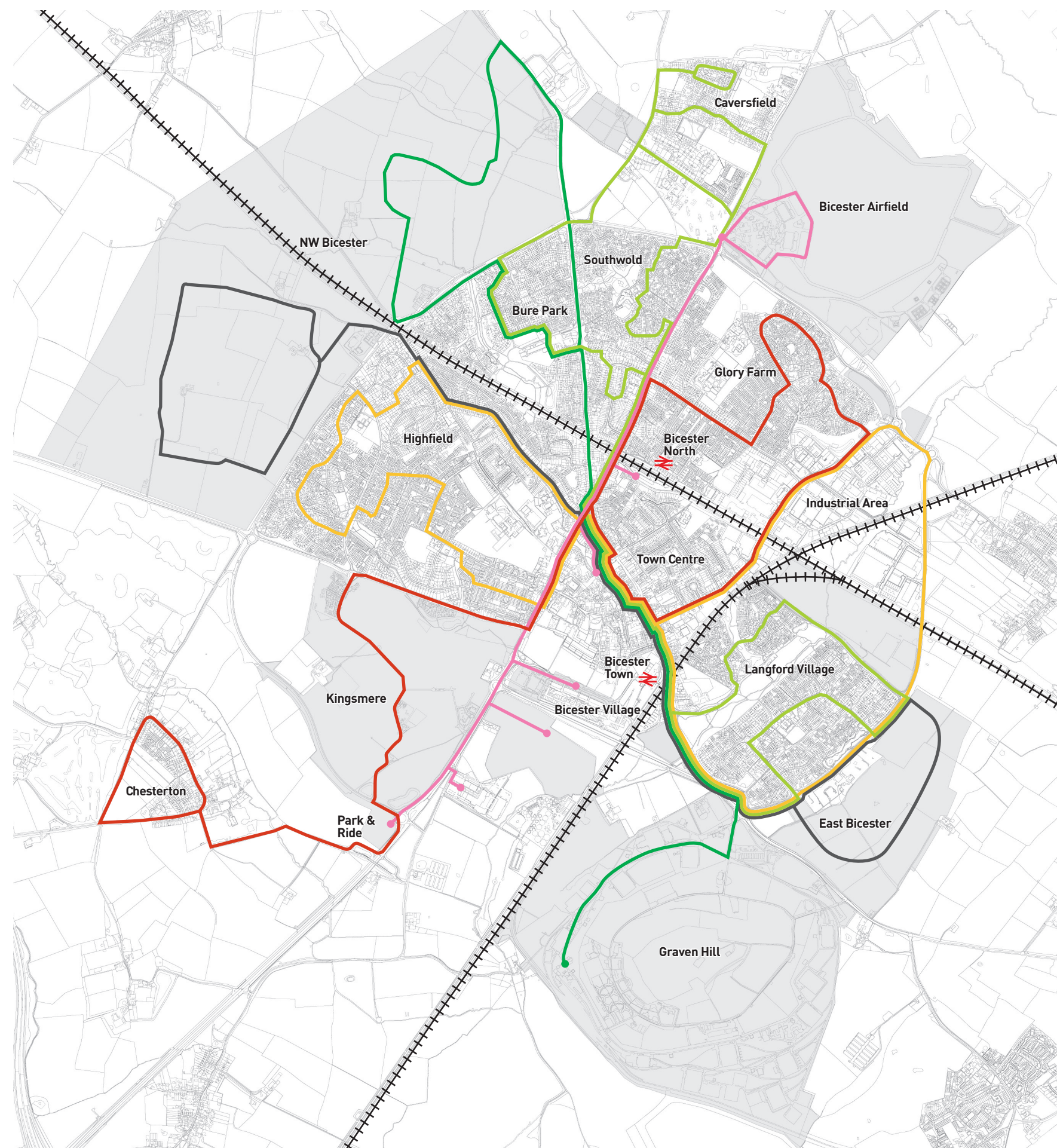Graven Hill

▬ Ecobicester South-
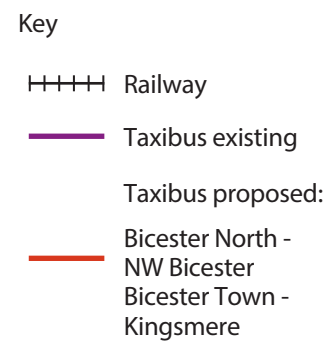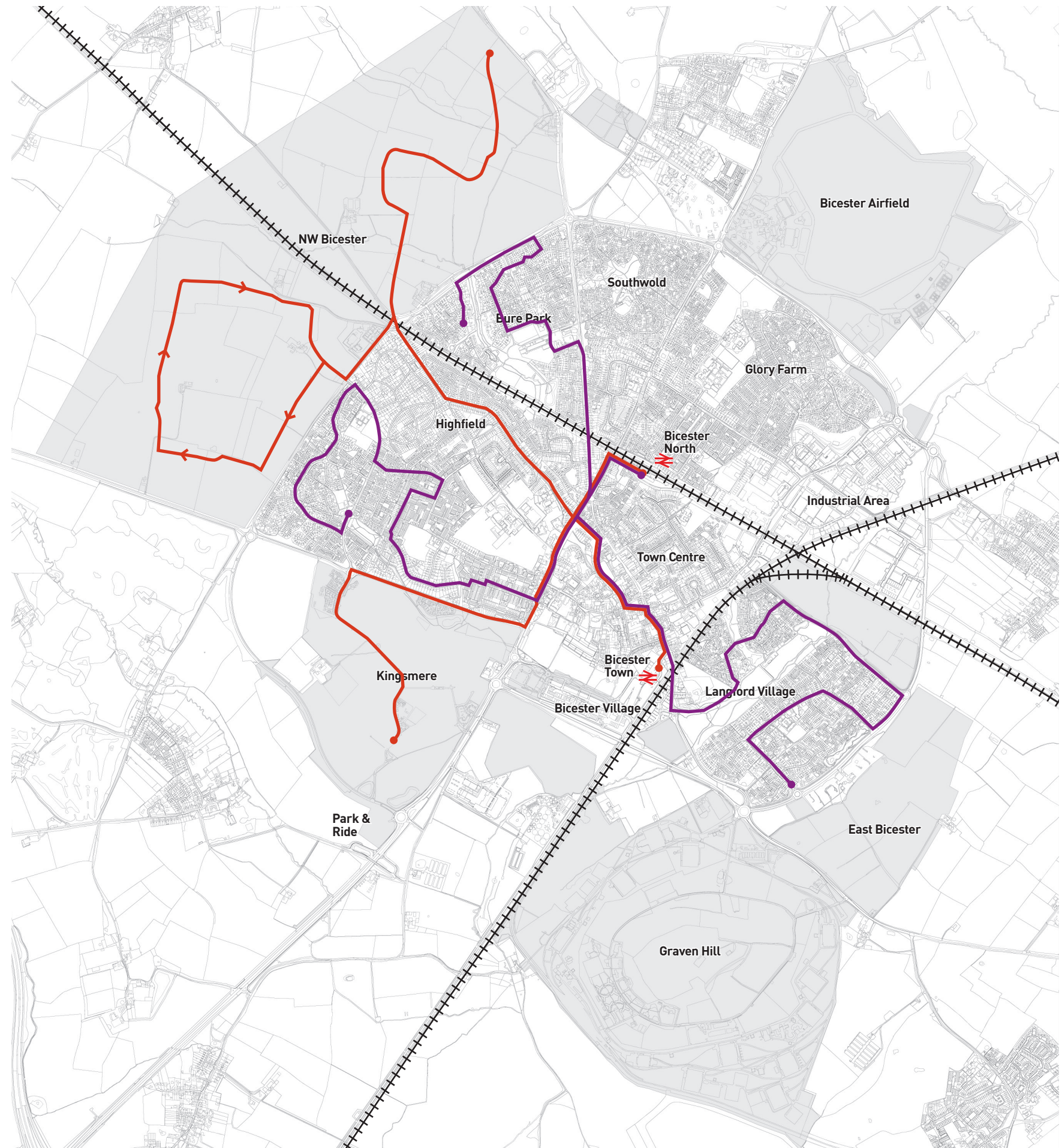East Bicester Loop

Figure 10.10 Local Town Bus Routes

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Key

H+H+H   Railway

━━━   Taxibus existing

Taxibus proposed:

━━━   Bicester North –
NW Bicester
Bicester Town –
Kingsmere

Figure 10.11 Taxibus map

Alan Baxter

Smart Ticketing & Integrated Ticketing

The Government's Green Buses initiative sets a goal for the majority of public transport journeys to be undertaken using smart ticketing technology by December 2014 (DfT's 'Green Light for Better Buses', March 2012). The Local Transport White Paper 'Creating Growth, Cutting Carbon' sets out the benefits of smart ticketing, which can play a crucial role in the coordination of public transport: improving boarding speeds; facilitating seamless journeys; and also being beneficial for operators and local authorities in terms of data and information gathering and sharing as well as demand management.

Currently, travel by public transport modes in Bicester requires the user to buy separate tickets for different modes – either online, at a ticket machine or ticket office or on the bus itself. There is an existing (bus-rail) integrated ticketing scheme called PlusBus, which covers almost 300 towns and cities in the UK. PlusBus is a cheap bus pass which can be bought when buying train tickets (at National Rail stations or online) and allows unlimited bus and tram travel for the start and/or the end of the train journey around the whole urban area of the rail-served town or city. For online purchase, rail ticket retailing websites automatically offer PlusBus if it is available for the origin and/or destination town of the train journey. PlusBus costs from £2 per day. Railcard holders get a discount of 33% and children a discount of 50%. PlusBus can also be bought as a season ticket when renewing a rail season ticket. Although the PlusBus scheme currently operates in Banbury and Oxford, it is not yet available in Bicester, but as part of this strategy should be implemented in the town.

A highly successful example of a comprehensive and customer-friendly integrated ticketing system in the UK is the Oyster card in London (which among other features allows storage of credit as period travelcards, bus passes or pay-as-you-go). Manchester is also currently introducing an integrated smart ticketing scheme called Get Me There (which allows use of contactless bank cards, and whose smart ticketing will also apply to bicycle rental at TfGM's new cycle hubs). Due to the size of Bicester's population and its geographical area, a dedicated smart ticketing scheme is very unlikely to be a viable option for integrated ticketing in the town. However, incorporating Bicester into the wider PlusBus scheme would greatly enhance the door-to-door journey, and the attractiveness of sustainable multi-modal trips in terms of cost and convenience. The success of

PlusBus in Bicester will require measures such as better provision of information about PlusBus including a more customer-friendly website, or perhaps, a dedicated website for travel in Bicester.

If a smart ticketing scheme were to be pursued for Bicester, it would probably be necessary to encompass a larger region. The technology behind smart ticketing in the UK is governed by the ITSO Specification, which defines the key technical items and interfaces that are required to deliver interoperability between the components of a smart ticketing system (smart media, point-of-service terminals and back offices), and between separate ticketing systems. The Department for Transport provides funding and incentives to support bus operators and local transport authorities in increasing the number of journeys that can be undertaken using ITSO-compliant smart ticketing technology. For example, operators are offered an additional 8% in BSOG (Bus Service Operators Grant) for buses that are equipped with operational ITSO smart ticketing hardware, and the DfT created a new fund of £15 million for this purpose in 2012 ('Green Light for Better Buses'). Currently, over a quarter of buses outside London are fitted with ITSO-compliant smartcard equipment. Introducing such technology in Bicester would allow contactless bank cards to be used to pay for bus fares in the short term, and would also ensure forward compatibility with future smart ticketing developments in the immediate region and throughout the country.

Figure 10.13 Get me there logo

Figure 10.14 ITSO logo

Figure 10.12 Oyster card and reader

Park and Ride

A new Park & Ride facility is due to be completed by the end of 2015 on land to the north-west of the A41 and adjacent to Vendee Drive. It is intended that this interchange facility would act as a 'remote' park and ride for Oxford and a 'local' park and ride for the Bicester Shopping Village. The facility will provide 580 car parking spaces, of which 14 spaces would be for disabled use; 60 cycle parking spaces; 36 motor cycle parking spaces should demand be sufficient; and three bus stops. Though flexible, the bus stops are initially planned to serve:

1. The S5 Stagecoach which links Bicester with Oxford via the A41/ A34 (serving commuters and shoppers travelling from the Bicester area to Oxford)

2. Shuttle buses for Bicester Shopping Village, which would run on weekends and at busy holiday periods when the existing car park at Bicester Village is at capacity (effectively acting as an overflow facility)

3. Buses returning from Oxford and setting down passengers before returning to Bicester

As part of the future bus network, the park and ride would also be served by the retail relay bus route which runs along the central spine of Bicester

The park & ride has a role in facilitating access to bus services to Kidlington and Oxford for residents of Bicester. Some residents may choose to use the S5 bus service in preference to the train for economic reasons or because of quicker travel times to their particular destination. The facility allows them to drive or cycle to access the S5 more easily than if they were boarding or alighting in the town centre. For people working in Bicester and living outside, the facility would provide access to bus services that would provide an onward connection to the town centre and employment areas. With vehicular movement constrained in the centre and the orbital route becoming busier, this may be a more efficient way of reaching employment areas.

There are further ways in which this site might be made more effective – for example, use of the facility for courier drop, concierge service for car parking, or shopping collection (e.g. click & collect or delivery of large goods purchased in the town centre). Online shopping is on the increase, but frequently people are not at home during the day and so miss their deliveries, meaning extra journeys are made. A collection point could reduce the number of journeys necessary for shopping collection / package delivery. The cycle parking provision could also be expanded to include secure, covered cycle parking with bicycle retail, repair and rental: making it a cycle destination, services such as valeting of cars could also be offered, a café could be provided.

Alan Baxter

10.5 Roads and Streets

Future Network

There are a range of different roads and streets within the town including residential estate roads, residential distributor roads, mixed use streets and strategic distributor highways. This diversity of street and road types will continue into the future as the town expands but in accordance with the modal priorities principle there will be a re-balancing of priorities and the allocation of space in order to favour sustainable modes.

There is the need to allow vehicle movement to residential areas, industrial estates, the town centre, town amenities as well as outwards to wider destinations in the District. This accessibility will be maintained into the future but in order to encourage sustainable modes some movements will not be as direct or easy as they are currently. Drawing on examples of towns and cities that have the majority of movement by sustainable modes, the intention is that gradually over time, some existing connections within and on the edge of the town centre will be closed. The purpose of this is threefold: firstly to restrict external traffic travelling north-south from using the central corridor; secondly to restrict the movement of vehicles through the town centre; and thirdly to ensure that the radial streets only are used for traffic travelling to and from the town centre.

A town's growth is limited to an extent by the size of its town centre. Currently, the active town centre of Bicester is small relative to the proposed scale of growth, however the historic core is attractive and the street layout offers the potential for increased levels of activity. It is proposed that over time the extent of pedestrianisation in the town centre would increase. This creates the opportunity for Bicester's active town centre to expand, serving the wider growth of the town, and exploiting place-making and economic opportunities.

Street and Road Network

Figure10.15 illustrates the future street and road network for the whole town. Figure 10.16 shows more detail for the town centre.

Locations where changes are proposed are as follows:

- Central Corridor (King Street/Queen Street/Field Street/ Buckingham Road) – implementation of a high quality north-south cycle path with east west connections to the town centre and residential area. Scheme will include signal controlled shuttle working system at the rail over–bridge which is required to provide sufficient width beneath the bridge for cyclists and pedestrians.

- Bell Lane – closed at its junction with Sheep Street

- Chapel Street – closed at its junction with Market Square

- Causeway - to become a pedestrian zone with disabled access and servicing permitted outside the core shopping times of 9am to 4pm. Cycling to be permitted at all times as this is part of NCN Route 51.

- Market Square - south side to be restricted to buses, taxis and cycles between 7am and 7pm.

- Market Square - north and east side to be a pedestrian zone with disabled access and servicing permitted outside the core shopping times of 9am to 4pm. Cycling to be permitted 6pm to 10am.

- Sheep Street – existing pedestrian zone to be extended north east to St John's Street/North Street. Disabled access and servicing permitted outside the core shopping times of 9am to 4pm. Cycling to be permitted 6pm to 10am.

- Field Street - between Bucknell Road and Banbury Road to be restricted to buses, taxis and cycles between 7am and 7pm

- Residential streets – Kingsclere Road and Kings Avenue to be closed at their junctions with Kings End. Rowan Road to be closed at its junction with Kings End.

The central corridor and the town centre streets of Manorsfield Road, Market Square and London Road will continue to be a focus for bus routes. Buses will therefore be exempt from any restrictions.

The form of the restrictions on Field Street and in Market Place requires further development but is likely to be an 'open' closure created through treatment of the public realm accompanied by clear signage. Enforcement will be through use of CCTV and automatic number plate recognition technology. An alternative is the use of hydraulic bollards although these require vehicles to have a transponder or something similar to activate the bollard. Signing in advance of the restriction will also be used and potentially this could be of the variable message type. The design of the 'open' closure in Market Square in particular will be to a high standard in order not to detract from the quality of this important town centre space.

Permanent closure of some town centre streets (Bell Lane and Chapel Street) would be necessary in order to prevent vehicles from avoiding the restrictions and affecting the amenity of residential properties. Similarly, closure of some residential streets (Kingsclere Road, Kings Avenue & Rowan Road) would be required to prevent vehicles from filtering through residential areas, avoiding the primary radial streets. Whilst these streets will all be closed to vehicles at a specific location they will be completely permeable for cycle movement and walking.

Street and Road Network Phasing

Implementation of the future street and road network will take place gradually over a number of years. Traffic modelling is required to understand the impacts of each phase and to ensure that appropriate mitigation measures are in place. Restrictions and closures also need to be seen with the wider context of changes and developments outside of the town centre.

There is a need for a major improvement to cycling infrastructure in the town and the central corridor has been identified as the location for the first stage of these works. Aspects of the cycle scheme such as carriageway narrowing and pedestrian/cycling crossings will have a minor effect on the traffic capacity of the central corridor. However, the element of the scheme that will have the most impact on traffic capacity is the implementation of a signal controlled shuttle working system beneath the rail over- bridge near to Bicester North station (See Section 10.2). This is necessary in order to provide a 4m wide shared cycle/pedestrian path beneath the bridge. The access to the station (Chiltern Approach) forms a signal controlled junction with Buckingham Road so the cycle scheme would essentially extend the length of Buckingham Road over which the signals operate.

The revised signal staging and the changed inter-green times as a result of the increase distance between the stop lines will reduce the traffic capacity of Buckingham Road. However, this should be seen as Phase 1 of changes to the street and road network with the objective of generally re-balancing modal priorities and specifically discouraging through traffic on the central corridor.

Key

┼┼┼┼┼	Railway
──	Primary street/ distributor road
········	Potential distributor road
→	Vehicle access point
-----	Neighbourhood connecting street
········	Street with access restrictions
⊐⊏	Bridge crossing railway line at Charbridge Lane
╪	Street with permanent closure

Figure 10.15 Future Street and Road Network – Town Wide

NW Bicester
Bicester Airfield
Southwold
Bure Park
Glory Farm
Highfield
Bicester North
Industrial Area
Town Centre
Bicester Town
Kingsmere
Langford Village
Bicester Village
Park & Ride
East Bicester
Graven Hill

Alan Baxter

1 Central Corridor & Cycle Improvements

2 Bell Lane closed

3 Chapel Street closed

4 Causeway pedestrian zone

5 Market Square restrictions

6 Market Square pedestrian zone

7 Sheep Street extended pedestrian zone

8 Field Street restrictions

9a Kings Avenue closed

9b Kingsclere Road closed

9c Rowan Road closed

Key

―――― Primary street

·········· Neighbourhood connecting street

▪ ▪ ▪ ▪ ▪ Street with access restrictions

⊢ Street with permanent closure
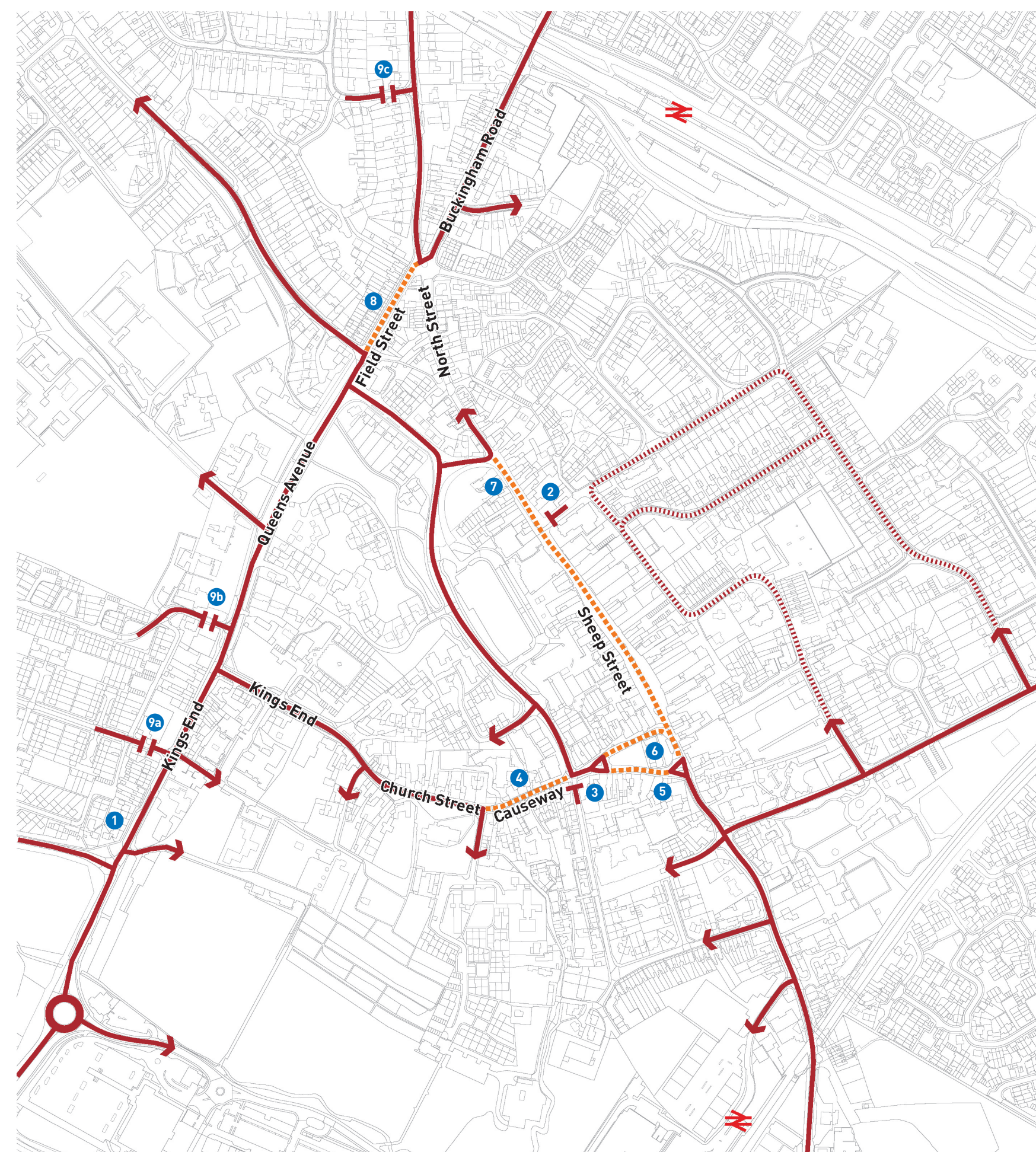
Figure 10.16 Future Street and Road Network - Town Centre

Alan Baxter

Town Centre Deliveries and Servicing

The proposals increase the level of vehicle restrictions in the town centre, necessitating an approach towards deliveries and servicing to cater for thriving town centre businesses. This is illustrated in Figure 10.17. Insofar as possible, deliveries and servicing would be done at the rear of business premises. For those businesses without rear access - for example on Market Square and Sheep Street - time-restricted servicing (typically outside of the period 9am-4pm) would be implemented. Along Sheep Street this would be from north to south route along the historic route of Sheep Street, Market Square and on to London Road. Loading bays would be provided on Manorsfield Road and Market Square.

20 mph Zones

In order to create an environment that is comfortable for pedestrians and cyclists, 20mph zones will be implemented across all residential neighbourhoods, in the town centre and on radial routes where it is not possible to achieve segregation of cyclists. Where necessary, traffic calming will be used to encourage compliance with the 20mph limit
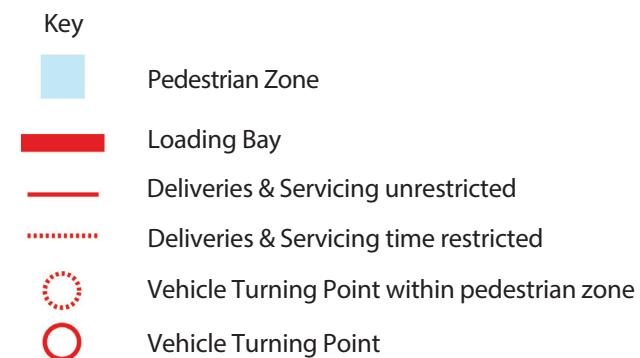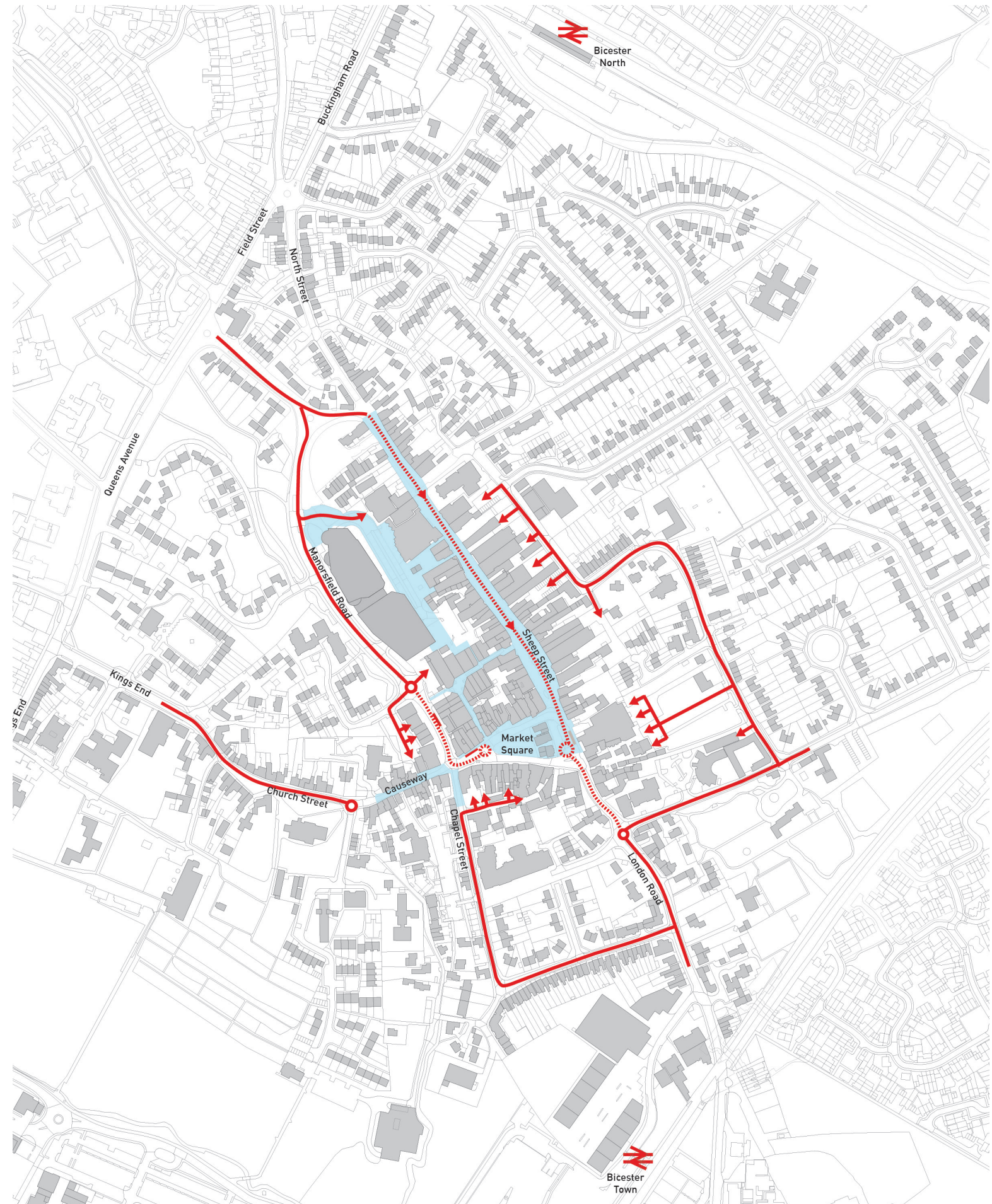
Key

Pedestrian Zone

Loading Bay

Deliveries & Servicing unrestricted

Deliveries & Servicing time restricted

Vehicle Turning Point within pedestrian zone

Vehicle Turning Point

Figure 10.17 Market Square Deliveries and Servicing 1:5000

Alan Baxter

Market Square

Market Square is of historical significance for the town as place of commercial exchange and social interaction. Currently it is dominated by parking and a one way system. In conjunction with the restriction of traffic moving through this space there is the potential for Market Square to find a new role in supporting the increased population of the town.

The northern and eastern sides of the Square would become a pedestrian zone along with Causeway to the west. This would create an attractive, interesting and historic pedestrian and cycle route between the core retail area and St. Edburg's Church.

Movement and activity in the space, and key desire lines, are shown in Figure 10.19. In keeping with the Hierarchy of Modes principle, pedestrian and cyclist movement will be prioritised but buses and taxis will also be permitted to move through the Square at all times. Vehicles will be able to enter the Square but between 7am and 7pm will not be able to travel through the space – eastern and western turning points are provided that also facilitate drop-off in the evening. The taxi rank, cafes and movement will animate the large space, meaning it is overlooked (in terms of subjective safety) and also attracts business.

Increased footfall along Causeway, and the adjacent sections of Manorsfield Road and London Road is likely to attract businesses to units along these streets, so expanding the capacity and animation of the town centre. Enhancement of the historic core of this significant market town should also entice Bicester Village visitors to explore the town centre. The use of a pedestrian zone on Causeway firmly establishes an attractive route between Bicester Village and Bicester's historic market town centre.

Suggested high quality landscaping surfaces are illustrated in Figure 10.18. Cobblestones gives acoustic warning of approaching vehicles, while granite paving welcomes and gives due respect to the most important users of this space, creating a very human environment.

Key

▨ Cobblestones

▨ Granite Paving

Figure 10.18 Market Square Landscaping Plan

TIME-LIMITED LOADING

LOADING

CAFES

PEOPLE WATCHING

CAFES

WANDERING

TAXIS

LOADING

Key

- Pedestrian Movement
- Cyclist Movement
- Bus Movement
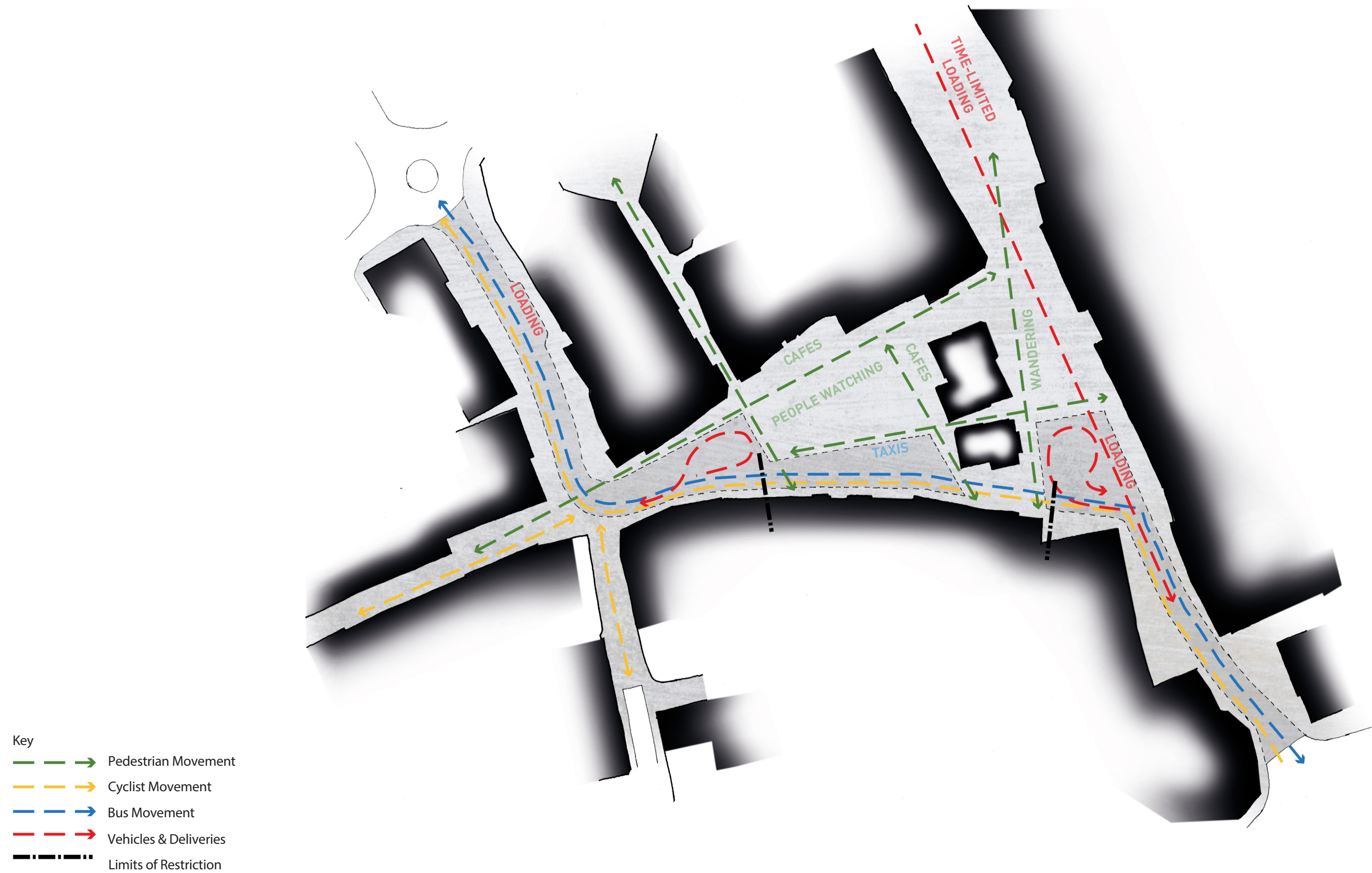- Vehicles & Deliveries
- Limits of Restriction

Figure 10.19 Market Square Desire Lines and Activity 1:1000

AlanBaxter

The Peripheral Route

The majority of growth in the town will occur on the existing urban edge. New streets, roads and connections will be made for access to these new areas. Some proposals, such as for NW Bicester, are already well developed and others (such as for East Bicester) will emerge in the next few years.

Previous work has identified the potential for a new south east bypass to the town around Graven Hill and the indicative location of East Bicester. The bypass is required to support growth identified in the modifications to the Local Plan.

Other required significant improvements are on the northern and eastern sections of the peripheral route as well as a bridge over the Oxford to Milton Keynes railway line on Charbridge Lane.

The approach within this Strategy of restricting vehicle movement through the town will result in an increase in traffic on the peripheral route. The increase in flows on the peripheral route and the effect on congestion has not been quantified as part of this Strategy – a further more detailed modelling exercise is required. It is possible that some existing single carriageway highway links will need upgrading to dual carriageway although decisions regarding this need to be viewed in the context of the potential for a south eastern bypass. Certainly the capacity of many roundabouts will need to be increased and this can be achieved by major approach arms having three lane approaches complemented by the circulatory carriageway accommodating three lanes of traffic. In general, this will involve increasing the diameter of all the roundabouts to at least 60m and the circulatory carriageway to 12m. An alternative is to work within the existing footprint of the roundabouts and reduce the scale of the central circular island but this may create safety issues that need to be addressed. Further assessment work in conjunction with the modelling is needed to identify exactly what upgrades are required.

10.6 Public Parking Provision

Bicester town centre currently has more than adequate car parking provision, however some rationalisation of the provision would ensure that the journey by foot between parking and retail destination is convenient and pleasant. This also creates opportunities in terms of further retail development and new residential sites in the town centre. Over time, iteration and revision will also be necessary in terms of sufficient retail provision to support the growth of the town, balance the need for sufficient car parking to serve the town and the urban design desire to reserve the town centre for people.

Bicester town centre currently has 1,160 spaces (including the car park at Pioneer Square) and estimated retail floor space of around 35,000m^2 (again, including the Pioneer Square development). This equates to a provision of one car parking space per 30m^2 of retail space. This level of provision is broadly consistent with that in Banbury, and is below the maximum standard that would be permitted for new development in the town (1 space per 15m^2 of retail space). Evidence indicates that the majority of the time, there is plenty of car parking in the town - Bicester's car parks are on average 50% full.

Going forward, there are particular issues that this strategy will need to address.

There is clear evidence that availability and pricing of car parking at a destination is a major influence upon the decision to make a journey by car. Therefore, in order to encourage sustainable movement in the town, it is important not to overprovide or make pricing too cheap. That said, increased population is likely to increase demand and this is likely to lead to increased retail capacity. There is a need to balance parking restraint with fostering the vitality and viability of the town centre.

The population of Bicester is due to rise to around 50,000 within the local plan period. Towns of this size typically have parking in the range of 1250 to 1750 spaces, although, if they are a major retail centre with a large catchment from their hinterland (such as Banbury), they could have up to 2500 spaces. Given the future growth of the town, along with the vision for sustainable movement, it is likely that future provision should be between 1000 and 1250 spaces. This is effectively a decrease in real terms on the basis that retail space will increase.

The location of, and access to, car parks is important, particularly given the intended restrictions on car access through the town centre. Cattle Market car park is remote from Sheep Street / Market Square and access to Sheep Street is indirect, making it a less than ideal location for car parking for the town centre. This large car park is surrounded by residential properties and would seem to have the potential for residential infill. This car parking would then need to be replaced. There is potential for this on Claremount by the provision of car parking in a decked format. Ideally, a major car park should be located to the east and to the west of Sheep Street, forming anchors with excellent access to the pedestrian area. Currently these would be Pioneer Square to the north west and Claremount to the south east. Chapel Brook is a small car park and is not significant in terms of the overall provision. It is accessed off a narrow street, which is primarily lined by housing. There is the potential for excellently-located residential infill here, which would strengthen the urban character of the street and provide much needed housing.

As the town increases in size, there will be an increased demand for retail of 10000-15000m^2 to give a total provision of 45000m^2 in retail space. This could be in the form of an additional retail development incorporating car parking. Pioneer Square is easily accessed by car due to its proximity to the central spine through the town, and it is well connected by foot to the town centre, opening directly onto the pedestrianised area of Bure Place. It effectively forms a north western anchor to Sheep Street, which could be complemented by a second retail anchor at the far end of the Street. Claremount car park is reasonably well located in terms of forming a south western anchor to Sheep Street in terms of parking provision. The distance between Claremount car park and Sheep Street is short, but access by foot currently is not attractive or easily found. This connection could be made far stronger by the addition of a retail development to the north west of the existing car park, incorporating the current Wilkinsons supermarket, and providing decked car parking. The route between car park and pedestrian area can then become more coherent, while the additional retail space and parking provision address the concerns of sufficient retail to support the town's expansion and sufficient car parking to serve the town centre.

The provision of car parking in the town needs to be reviewed regularly and the following process is suggested:

1. Undertake occupancy surveys to establish current demand at critical times in the year. This should be repeated every three years.

2. Use information from surveys to identify if any car parks can be closed in the short term i.e. Cattle Market and Chapel Brook, with an eye to the future regarding increased demand and the potential to increase capacity at other locations.

3. Review charges and length of stay restrictions every two years with a view to using this as a way to discourage car journeys into the town centre. A consistent approach is important for all car parks across the town centre.

4. Engage with Euro carparks (who manage the car parking at Pioneer Square) with a view to introducing charging of the hours that are currently free (the first two hours of parking at Pioneer Square are free of charge, whereas the public car parks require payment) in order to establish a consistent approach to the pricing of car parking across the town centre.

The locations of car parks and associated walking connections, including the proposed new retail anchor south west of Market Square, are shown in Figure 10.20. This drawing elaborates upon the public realm proposals in the town centre by illustrating the various routes that vehicles could take into the centre to park, along with the onward pedestrian connections into the shopping area, once all of the vehicular restrictions and pedestrian improvements are implemented.

Key

Retail Anchor

Car park

Car park potentially removed

Vehicular Route

Walking Route

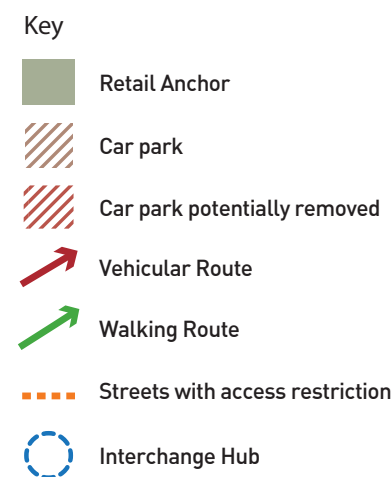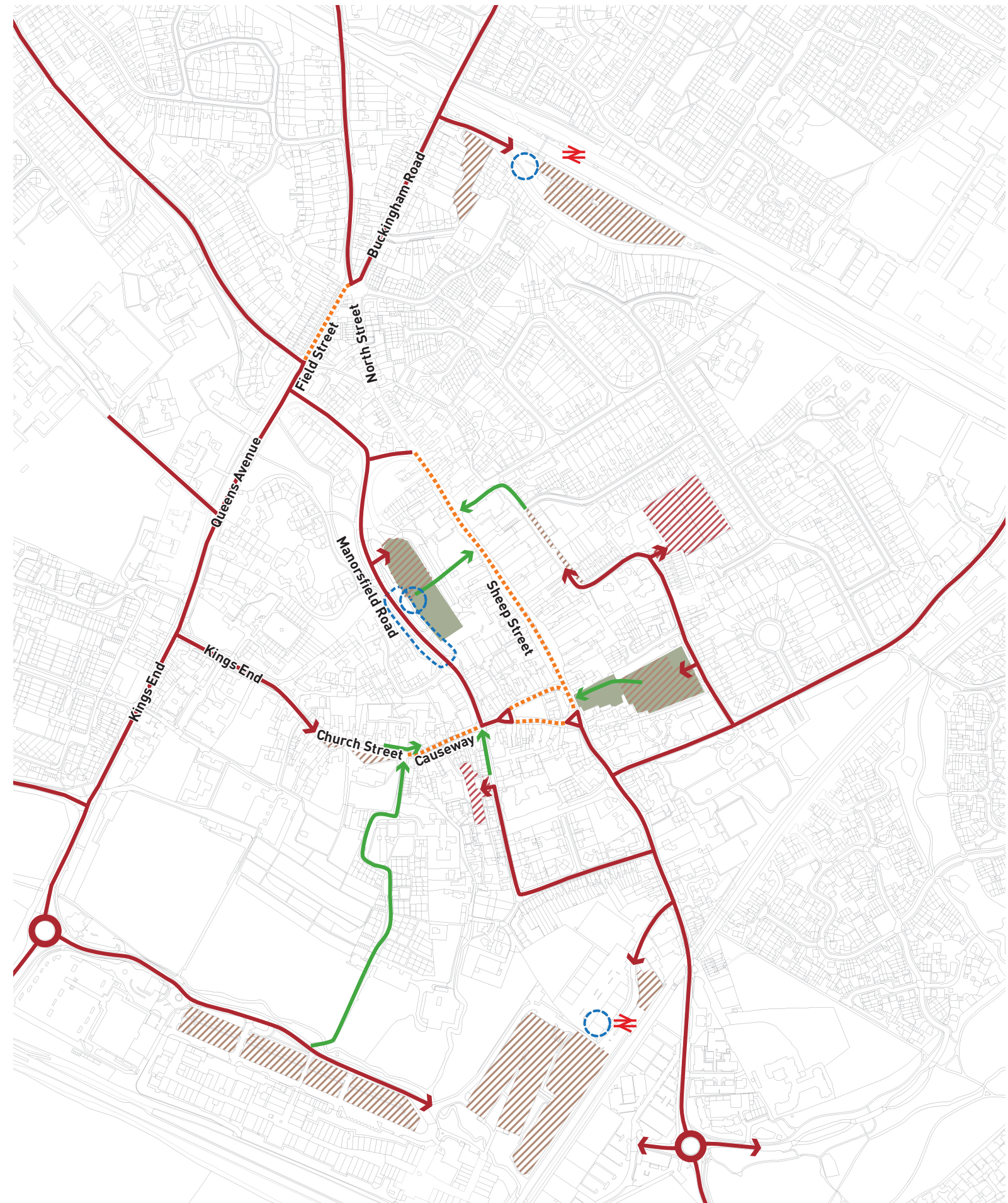Streets with access restriction

Interchange Hub

Figure 10.20 Future Car parking and Pedestrian Routes in Town Centre

10.7 Electric and Low Emission Vehicles

The UK, with its strong history of engineering innovation, is in a unique position to take advantage of the opportunity that low emission automotive technology presents. As set out in the section on national policy regarding electric & low emission vehicles, this is reflected in the government's current £500 million funding commitment. The investment aims to capitalise on this singular moment in time, along with its attendant economic and environmental benefits. Bicester is well-placed to be central to this – with Silverstone close by, the automotive focus of courses at OVCV in Bicester and automotive innovation in the surrounding area. The Government has a number of funding schemes and incentives in place to encourage innovation (in the form of research and development, including the £1 billion Advanced Propulsion Centre), as well as physical infrastructure (the Plugged-in Places (PIP) scheme) and encouragement for individual purchase of low emission vehicles (the Plug-in Car & Van grant schemes).

Other incentives would also help encourage the transition to low emission vehicles – e.g. advantaged car parking for electric vehicles (closer to the entrances of car parks and provided with charge points), tax or policy advantages for businesses who switch their fleet to electric, promotion of these businesses on a Bicester travel website etc.

Ultra Low Emission Technology

This technology is currently undergoing rapid development, and the mass market transition to ULEVs will happen through industry developing and bringing products to market and consumers deciding which products they wish to buy. It is likely that a portfolio of solutions will be required to decarbonise road transport. Figure 10.24 shows the projected road map for the various technologies. Figure 10.25 shows the conventional internal combustion engine and compares the various types of electric car available – ranging from hybrid to full electric (plug-in) and also the hydrogen fuel cell EV.

Electric cars have generally been more expensive than their conventional gas/diesel equivalents mainly due to the cost of their battery, but once purchased, they have lower running costs. There has been a gradual reduction in purchase prices as technology improves

and car makers strive to produce affordable electric cars. The Plug-in Car grant, which also includes hydrogen-fuelled cars, assists individual owners in overcoming the price differential. Provided the electric car satisfies the criteria set out by the Government, the subsidy covers 25% of the car's initial value up to a maximum of £5,000. In addition, to help car buyers, manufacturers offer leasing as an attractive option for buyers as electric cars have high upfront capital costs and lower running costs than conventional vehicles. For example, the new Nissan Leaf released in June 2013 offers the opportunity for battery leasing. The standard price of a Nissan Leaf is £23,490, however if the buyers opt for a battery lease, the price is lowered to £18,490 with a leasing contract of £70 per month for a minimum of 36 months.

The Significance of ULEVs for Bicester

As established in Chapter 8, there is a lot of potential for increasing modal share to sustainable modes for walking and cycling in Bicester, due to its compact form and as it is flat. Chapter 8 also established the trips where there is the highest probability of encouraging a modal shift in terms of purpose. There were a number of areas, however, where it is unlikely that people will make the shift from motor vehicle travel – for example commuting trips out of Bicester or for deliveries and servicing. And in the future movement profile, the modal share for motor vehicle is still at 60%, comprising 79,100 trips. Electric and low emission vehicles offer the possibility of making some, and into the future, many, of these trips more sustainable. Due to the magnitude of the number of trips made by motor vehicle, a major
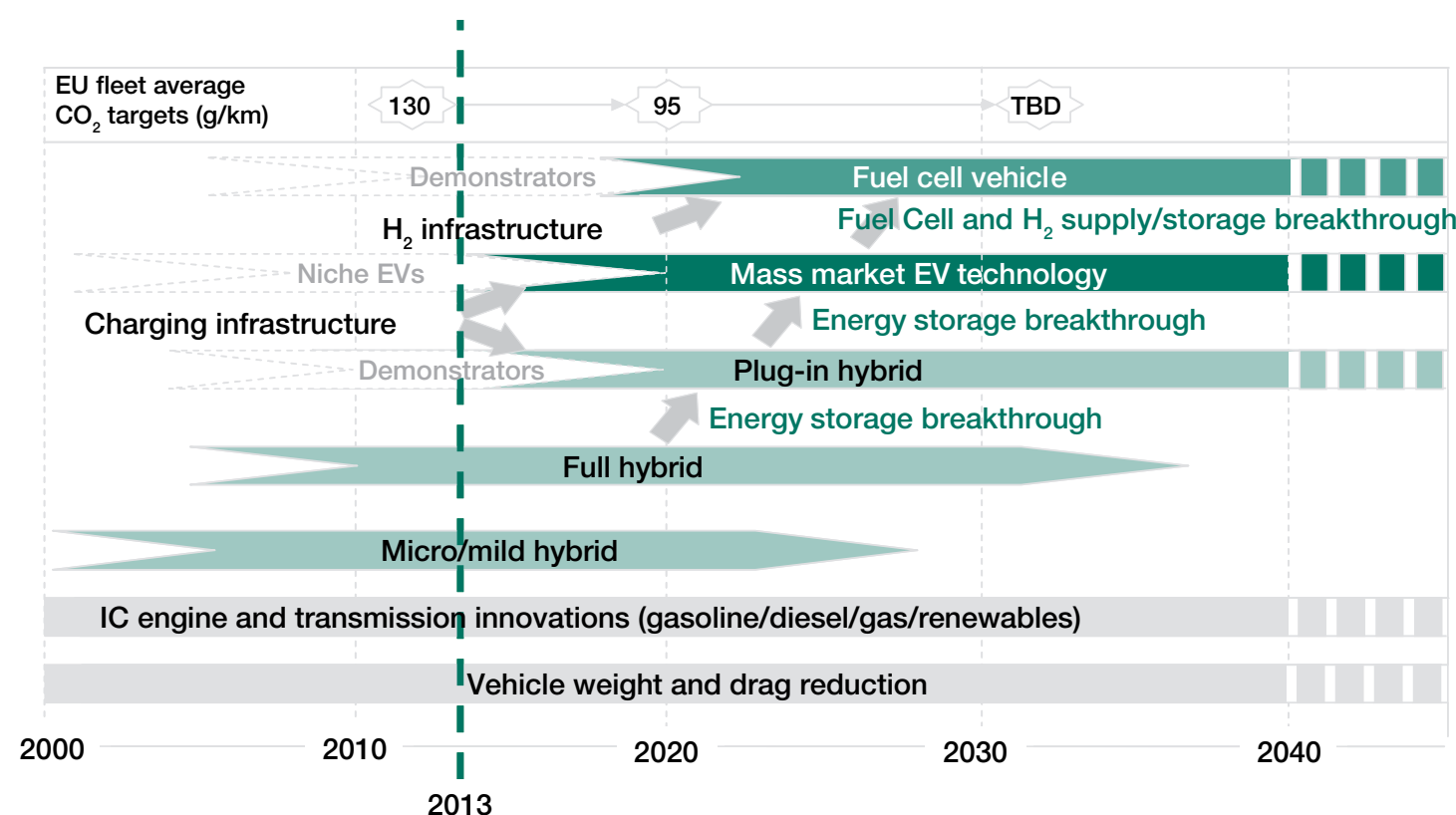
Source: NAIGT

Figure 10.24 The Technology Road Map for ULEV Cars and Vans

switch to ULEV could mark a significant move towards sustainable movement in Bicester. While in urban terms, this would still mean many vehicles in the town, ULEV are far friendlier and more humane in terms of air pollution and noise levels than conventional fossil-fuelled vehicles.

Electric Charge Point Locations

Range is an issue for people with electric cars, this being the principal concern behind the Government's Plugged-in Places scheme. Most vehicular trips in the UK are short and well within the range of an electric car (typical range is 100 miles) and electric car drivers tend to use their car for routine, carefully planned journeys. In order for the technology to become more widespread, people need the security of knowing where they will find available charge points. In Bicester currently, electric charge points are provided at Bicester North Station, in the town centre by Sainbury's (provided by POD Point Ltd, a British-based company which provides 'smart' networked charge points) and at Bicester Village. To start addressing the EV range concern, additional, strategically-located charge points should be introduced. As take-up of the technology increases, electric vehicle charging bays will become a well-recognised aspect of the urban landscape.

Most charging is likely to take place at home at night, when electricity is less expensive, so individual owners of ULEVs would install charge points at their properties. A large amount of charging is also likely to take place during the work day, at the work place, so businesses in Bicester must be encouraged to provide charge points. Some on-street charge points should be provided in residential areas, perhaps aligned with locations of electric car club vehicles. Charge points should be provided at all car parks, including by businesses with parking facilities – for example supermarkets – as well as at public buildings where it is feasible: at the council offices in Garth Park / the new civic building in the town centre, the leisure centre, schools and colleges.

If a single charge point supplier was tendered for and selected for Bicester, encouragement might be possible through negotiating a price agreement for the town as a whole, or as a form of sponsorship. This has the advantage of a common design concept for all electric charge points across the town. Thus, what risks becoming another piece of street clutter could instead become part of the coherent

overall sustainable transport strategy, tying in with designs for the interchange hubs, information provision, website etc. Individuals and businesses with these charge points at their homes then also become part of the unified whole, aspiring to more sustainable transport for their town.

Electric Car Club

Car clubs provide vehicles (usually cars and vans) to members on a pay-as-you-drive basis. These can be organised in various ways. A scheme may have one or a number of car stations with multiple cars, or have single parking spots dotted around a neighbourhood. People usually join the car club and then pay per use with various time tariffs. Ideally, cars will be located as close to a cluster of members as possible

and members tend to live within 10 minutes walk from the nearest car station. Vehicles are usually owned by the company 'service provider', but may also be owned by members of the club. Another model is that of peer-to-peer sharing.

Car clubs are most suitable for drivers who need to use a car or van on an occasional basis, without the expense and responsibility of owning their own vehicle. There are a lot of advantages for the user of a car club versus owning their own car - no insurance, repairs, cleaning, breakdown cover, road tax to be concerned about. Because one only has a car when necessary, this saves money and also reduces one's carbon footprint. Financially, being a member of a car club tends to make most sense for motorists who drive less than ~ 8,000 miles per year, households whose second or third car is used in a non-essential
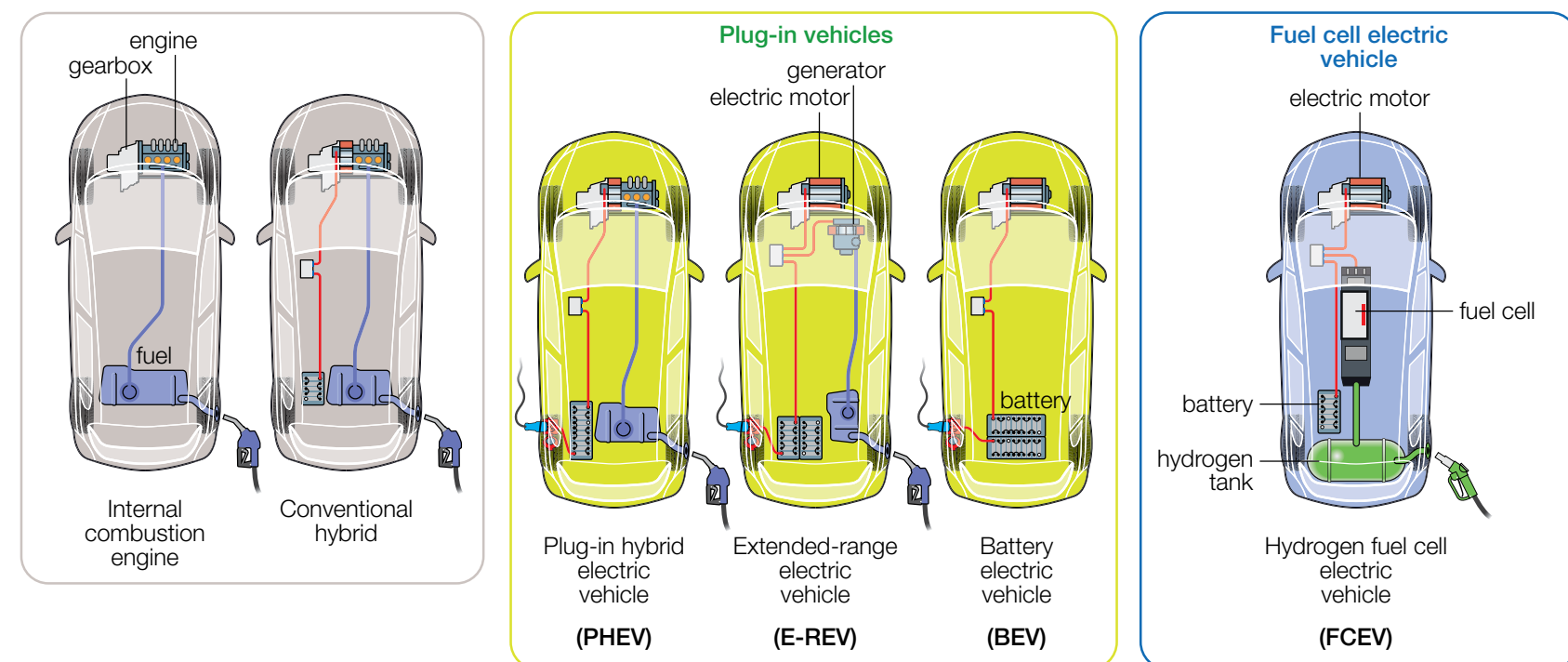

Figure 10.25 Ultra Low Emission Technology Portfolio – types of vehicle

way, and businesses that can use a car club vehicle to replace pool cars and/or staff's own vehicles for business trips. Although car clubs operate in both urban and rural areas, the majority of service providers operate the major part of their fleet in highly populated urban areas.

There are six main Car club operators in the UK, these are City Car Club (the first UK car club), Zipcar (also operate in the US and Canada), Co-Wheels (a community interest car club operating in many UK cities), Hertz 24/7 (which operates in London, Paris, Berlin, Madrid and New York), E-Car Club (the UK's first entirely electric pay-per-use car club) and Easy Car Club (the UK's largest peer-to-peer car sharing network – allows car owners to make money by renting out their cars). Further information can be found at: http://www.carplus.org.uk/car-sharing-clubs/list-ofcar-clubs/

E-car operate in Oxford and Milton Keynes, and it is realistic to imagine that this could be introduced in Bicester. The exact number of cars would need to be determined, and periodically revised as the profile and popularity of the scheme increases. While the business model for the scheme would need to be established to determine numbers and viability, it is envisaged that cars would initially be located:

- Two on-street cars in each existing residential quadrant (=8)

- One on-street car in each of Chesterton, Caversfield, Kingsmere, Graven Hill and East Bicester (=5)

- Four on-street cars in North West Bicester (=4)

- One car at each of the Park & Ride, Bicester Village, the town centre, Bicester North Station and Bicester Town Station (=5), but increasing this number based on demand

This is a total of 23 cars, which would be available 24 hours a day, 7 days a week, 365 days a year. Operationally, people join the car club, paying subscriptions and then book to use them as needed. Advance booking would be possible for a minimum period of one hour up to a maximum of a couple of weeks. Typically, car clubs require the car to be returned to the same street or parking space. Building into the model an ability to collect the car from one location and return to another could be useful. The viability of this, however, would need to be determined in terms of logistics.

Additionally, there would be an option for businesses to participate in the scheme. Businesses might decide to have their own provision for the use of employees during the day which then become available for use by residents in the evenings and at weekends. This might make a large network of vehicles more viable to the benefit of all.

Provision of Information

Provision and availability of information will be crucial to the success of electric vehicles in Bicester – people need to know for example about the grants that are available, and once they own an electric car, how to find an available charge point. Part of the Government's strategy included setting up the National Chargepoint Registry (nationalchargepointregistry.com). This information is currently incomplete, however the government's Office for Low Emission Vehicles is in the process of addressing the issue. Individual providers such as Pod Point and Charge Master have their own mapping on websites, the former for example provides 'smart' networked charge points. There is a need for a more joined-up system. For Bicester, complete and comprehensive information for all charge points should be established, including details such as location, provider, contact in case of problems, specifics of the device, as well as real-time information as to availability / whether is it in use or not. This should then feed into the National Chargepoint Registry (a condition of PIP funding).

11.0
Smarter Choices and Active Travel

11.1 Introduction

Bicester's Eco Town status requires the town to deliver sustainable development to exemplar standards and has acted as the catalyst for the Eco Bicester One Shared Vision; a vision which underpins this Sustainable Transport Strategy. It has also led to the Bicester Travel Demonstration Project (BTDP) which carried out a baseline assessment of walking and cycling in Bicester in the winter of 2010/11 (a summary is contained in Section 4.0). The BTDP was the first stage in developing a sustainable transport element of the wider Eco Town programme. In addition to gathering some key baseline data, BTDP has implemented a small number of pilot projects such as the Bicester Green Bike Loan scheme.

This section outlines the second stage to the initial BDTP work, with a focus on 'soft measures', to complement the 'hard measure' infrastructure improvements.

Examples of 'soft measures', now commonly referred to as Smarter Choices, implemented as part of the Sustainable Travel Towns programme in 2004-09 are highlighted in this section, together with details of outcomes achieved. In addition, measures currently underway in towns and cities across England through the Department for Transport's Local Sustainable Transport Fund (LSTF) are also highlighted.

Key objectives and outcomes of a Smarter Choices programme for Bicester are identified, and the process for programme development and implementation e.g. timeline, stakeholder engagement, partner relationships and integration with infrastructure schemes are considered.

11.2 Changing travel behaviour through Smarter Choices

Many Smarter Choice measures have been developed over the last decade or so to encourage changes in travel behaviour. Such measures include personalised travel planning, school and workplace travel plans, car clubs, teleworking and wider travel awareness campaigns. Each approach aims to tap into people's decision making about when they travel, where they go and the mode of travel they use, with the outcome being a shift from relatively expensive and high energy car use towards lower carbon, lower cost and more active travel. The report 'Smarter Choices – Changing the Way We Travel', published by the Department for Transport in 2004, defines Smarter Choices as measures which 'seek to give better information and opportunities, aimed at helping people to choose to reduce their car use while enhancing the attractiveness of alternatives'.

There is much evidence to support change in travel behaviour through revenue funded Smarter Choices programmes. Following extensive travel behaviour change programmes in the English Sustainable Travel Towns of Worcester, Darlington and Peterborough between 2004 and 2009, the three towns saw reductions in car use of between 7% and 9%. With further targeted investment in walking and cycling facilities, improvements to local public transport and better land-use planning, the data suggests that an even greater shift towards sustainable travel could be achieved. The approaches adopted in the three towns were, in many respects, quite similar. The key elements included were:

- development of a strong brand identity;

- a large-scale Personal Travel Planning (PTP) programme;

- travel awareness campaigns;

- cycling and walking promotion;

- public transport information and marketing;

- school travel planning;

- workplace travel planning.

Such measures are also typical of the Local Sustainable Transport Fund (LSTF) projects, with brand identity and technological interventions, e.g. journey planners, featuring more heavily in some areas.

11.3 Objectives and Outcomes

The BTDP identified three key objectives, which have been incorporated into the objectives and outcomes table below:

- Total car trips by Bicester residents to all destinations reduced

- Total distance travelled by car (as driver) by Bicester residents to all destinations reduced

- Total CO_2 emissions from car travel by Bicester residents to all destinations reduced

The first phase of the Eco Town development, Exemplar, has identified a target for the reduction in journeys made by car - from 69% to 50% and eventually 40%. A 19% reduction is ambitious in comparison to the 7-9% reported by the Sustainable Travel Towns. However, with high levels of investment in infrastructure together with an integrated programme of Smarter Choices, a 19% reduction is considered achievable for all new development in the town, and can be considered as aspirational in terms of the whole town.

Alan Baxter

Primary outcomes

Table 1. Smarter Travel Choices for Bicester: key objectives and outcomes	
Objectives	Intended Primary Outcomes
To encourage more people who live and work in Bicester to walk and cycle for local everyday journeys	• Reduction in work-related car journeys • Reduction in car trips for leisure and other journeys. • Increase in active travel modes. • Increase in adult physical activity levels • Reduction in CO_2 emissions from car travel • Reduction in congestion
To encourage more people who live and work in Bicester to use public transport, and other forms of shared transport, for local and longer journeys	• Reduction in work-related car journeys • Reduction in car trips for leisure and other journeys. • Increase in public transport modes • Increase in car sharing modes • Reduction in CO_2 emissions from car travel • Reduction in congestion
To encourage visitors to Bicester to travel more sustainably to the town	• Reduction in CO_2 emissions from car travel • Reduction in congestion • Increase in sustainable transport modes • Wider recognition of Bicester as an Eco Town
To link smarter choices delivery with planned infrastructure developments	• Improved awareness and usage of walking and cycling infrastructure • Improved consultation on walking and cycling infrastructure proposals • Maximisation of the shift towards more sustainable modes
To ensure effective stakeholder and community engagement	• Improved consultation on what works well for local communities • Embed behaviour change more effectively • Improved programme legacy

Figure 11.1 Smarter Travel Choices for Bicester

Secondary outcomes

There are wider social, economic and environmental benefits of a sustainable travel town, particularly if the reduction in car use, coupled with increases in active travel and bus use, is sustained over a long period of time:

- Supporting economic growth – Average journey time to work has been steadily increasing since 1995 and 38% of workers who usually travel to work by car or motorcycle experience difficulties getting there (Dft Community and Business Travel Factsheet, 2009). Car driver mileage fell by 5-7% in the Sustainable Travel Towns, which is likely to have helped reduce congestion and improve journey reliability.

- Improvements in air quality – None of the Sustainable Travel Towns had Air Quality Management Areas and therefore an assessment could not be made of the effect of lower traffic levels on air quality. However, there are likely to have been particular places e.g. in the inner areas of the towns, where roadside levels of traffic pollution would have reduced, leading to localised benefits.

- Benefits to health - Public Health professionals recognise the importance and the potential of active travel as part of the solution to the growth of non-communicable diseases. The Travel Actively consortium of projects, funded through the Big Lottery between 2008 and 2011, saw 450,000 people become physically active enough to benefit their health and well-being (More People, More Active, 2012). The consortium included Living Streets, Ramblers, Sustrans, Walk England, CTC and London Cycling Campaign.

- Improved safety - Research suggests that a doubling of cycling would lead to a reduction in the risks of cycling by around a third, i.e. the increase in cycle use is far higher than the increase in cyclists' casualties (source: Safety in Numbers, CTC). More people walking and cycling means that other road users are more aware of these vulnerable road users.

- Promoting equality of opportunity - through reducing health inequality, improving employment opportunities by making it easier to reach workplaces without a car, improving pupil attendance at school, working with disadvantaged communities to improve public transport information.

- Improving quality of life - through making it easier to access destinations, minimising the impact of travel on the natural environment, improving the experience of end-to-end journeys and increasing social capital by encouraging community engagement.

11.4 Programme Management and Implementation

Programme delivery timeline

Linking a behavioural change programme with a 15 year housing development scheme presents a challenge in terms of defining an overarching Smarter Choices programme plan and timeline. However, the approximate phases are identified and set out in Figure 11.2.

Community and stakeholder engagement

Positive community engagement is essential to the quality, effectiveness and sustainability of Smarter Choices measures and infrastructure schemes. As identified in the programme delivery timeline, one of the key elements of Phase 1 will be to engage with local communities and stakeholders. This will mean that local people and stakeholders will be involved in the project development stages, helping to ensure that local needs are met from the outset. Community engagement works best where it is an on-going cumulative process, enabling relationships to build and strengthen over time, so engagement in the delivery process will also be encouraged.

There are a range of methods and techniques used to engage local communities. These include:

- **Public meetings** provide an opportunity to consult large numbers of people, as well as small group discussions

- **Workshops and focus groups** which allow people to discuss their ideas in a relaxed atmosphere

- **Web-based engagement** e.g. online discussion forums and blogs, Facebook, Twitter, online surveys and social networking

Phase and approximate timeline	Smarter choices programme	Integration with infrastructure programme
Phase 1 1 year to Autumn 2015	• Community and stakeholder engagement • Identification of smarter choice measures to take forward • Project partners roles and responsibilities identified • Staffing needs identified and key staff recruited e.g. Programme Manager, with additional staff recruited, as necessary to deliver identified projects • Accommodation sourced, as appropriate • Detailed project planning with key outputs, methodology, work plans and communications plan • Town-wide promotional work and awareness raising of projects to start in phase 2	• Raise awareness of existing walking and cycling infrastructure • Identification of 'quick wins' e.g. drop kerbs and barrier removals • Community consultation on new scheme proposals, such as walking and cycling infrastructure, road closures, 20mph zones, street design and bus routes • Detailed design of schemes • First residents move into Exemplar site
Phase 2 3 years to Autumn 2018	• Projects delivered • On-going progress review with interim evaluation points • Regular engagement with stakeholders and partners • Legacy implemented through volunteers, networks and marketing campaigns	• Schemes delivered • On-going progress review with interim evaluation points • Identification of new walking and cycling schemes • Exemplar site completed by 2018 • Housing building commences elsewhere in Bicester – potentially from early 2016. First residents move in from early 2017. • Rail service to Oxford re-opens in 2016
Phase 3 6 months to Spring 2019	• Review of phase 2 • Dissemination of results, success and lessons learnt • Identification of projects for phase 4	• Review of phase 2 • Dissemination of results, success and lessons learnt • Detailed design of new schemes
Phase 4 to 2031	• Reduced level of project delivery, but on-going resource for sustainable transport measures • Intensive periods of delivery, as per phase 2, if required	• On-going maintenance of routes • New schemes identified and delivered

Figure 11.2 Programme Delivery Timeline

- **Street stalls and exhibitions** which use outdoor displays to capture the views of people
- **Community surveys** e.g. questionnaire surveys undertaken to identify the needs and views of people in a standard format
- **Community mapping** where maps and photographs of an area or specific location are used to illustrate how people view their area

It's likely that a range of techniques will provide for the most effective community engagement. For example, community mapping would be most appropriate in the context of a street design scheme as it provides a visual approach, compared to questionnaire surveys which are a more suitable method for eliciting the barriers to travelling actively to the workplace.

Delivery partners

There are a number of delivery partners, each with their own areas of expertise, who could play a key role in the development and delivery of a Smarter Choices programme. These include:

- **Challenge for Change** and **Please Cycle** – online travel challenge providers with 'gamification' techniques to encourage more sustainable travel choices
- **Co-wheels** – a social enterprise that develops and runs car clubs
- **CTC** – a national cycling charity and membership organisation promoting all forms of cycling
- **easitNetwork** – a social enterprise providing workplace travel planning networks, public transport discounts and other incentives for businesses
- **Living Streets** – a national charity which stands up for pedestrians and helps to create safe, attractive and enjoyable streets
- **Sustrans** – a national charity encouraging more walking, cycling and public transport through infrastructure and behaviour change projects
- **20s Plenty** – a not for profit organisation campaigning for 20mph to become the default speed limit on residential and urban streets

These 'third sector' organisations would work alongside Cherwell District Council, Oxfordshire County Council and other key partners involved in Bicester and the Eco Town development e.g. P3Eco and A2Dominion (responsible for the housing and transport infrastructure developments), Bioregional (involved with the eco home design and build), and local bus operators such as Stagecoach and Thames Travel.

Funding and staffing requirements

Staffing requirements will largely be determined by the Smarter Choices measures being implemented. An over-arching Programme Manager could be responsible for commissioning various projects to a number of partners, or a small project delivery team could be recruited from one organisation for the whole of Phase 2, with the flexibility to work across a range of settings. This could include

infrastructure schemes in addition to smarter choices, to ensure a fully integrated programme. Alternatively, it could be a mixture of both, with a core team delivering the majority of work and various smaller schemes being commissioned alongside. Staffing structures in some of the larger LSTF projects, e.g. Southampton, typically consist of:

• Programme Manager, with budget and line management responsibilities

• Marketing Officer

• Schools Project Officer

• Communities Project Officer

• Workplaces Project Officer

Pool of contracted providers to deliver schemes such as PTP activities, promotional events, cycle training and car clubs

The Southampton LSTF revenue budget is £3.51million over 3 years. Expenditure for the Smarter Choice schemes of the Sustainable Travel Towns projects was estimated at £4.4 million in Darlington; £6.8 million in Peterborough; and £4.4 million in Worcester – for programme of 5 years duration. These figures include both revenue funding and capital expenditure on a number of supporting measures, such as bus and cycle infrastructure and safe routes to school. The staffing levels in the towns were 6-10 full-time equivalent posts per annum, with variation in the resource allocation to each smart measure e.g. Peterborough invested more staff time than either of the other towns in public transport information and marketing, and Darlington invested more time in cycling and walking promotion. All three towns invested quite heavily in personal travel planning.

Figure 11.3 illustrates how the three Sustainable Travel Towns allocated funding between different initiatives.

In a town the size of Bicester, with a population of just over a third of the size of Darlington or Worcester (both around 100,000), it's likely that the number of Project Officers required would be no more than two FTE during the peak delivery Phase 2, with additional resource commissioned for specific schemes e.g. personalised travel planning. Applying the measure of one third to the budget would suggest a figure in the region of £1.5million for a period of 4 years.

With protracted delivery, due to the longevity of the housing build, it is recommended that there is a permanent sustainable transport resource in the form of an overarching Programme Manager. This post could be funded by a mix of local government and Section 106 funding.

Smarter Choice measures for Bicester

Potential for change

The National Travel Survey, DfT, 2012, found that 64% of all trips were made by car (as a driver or passenger). Just over half of these journeys are less than 5 miles.

The BTDP surveys found that just over 20% of trips of less than 1km were made by either car drivers or car passengers. It also found the 48% of trips surveyed were for journeys within the survey area – less than 5km. These figures suggest that there is good potential to change mode of travel to walking and cycling for short trips. Figure 11.5 suggests how the target of 19% reduction in car use could be apportioned across increases in walking, cycling and public transport, with the biggest step change in cycling (from 4% to 15%).

The following Smarter Choice measures have been chosen on the basis of reflecting the 'best fit' for Bicester.
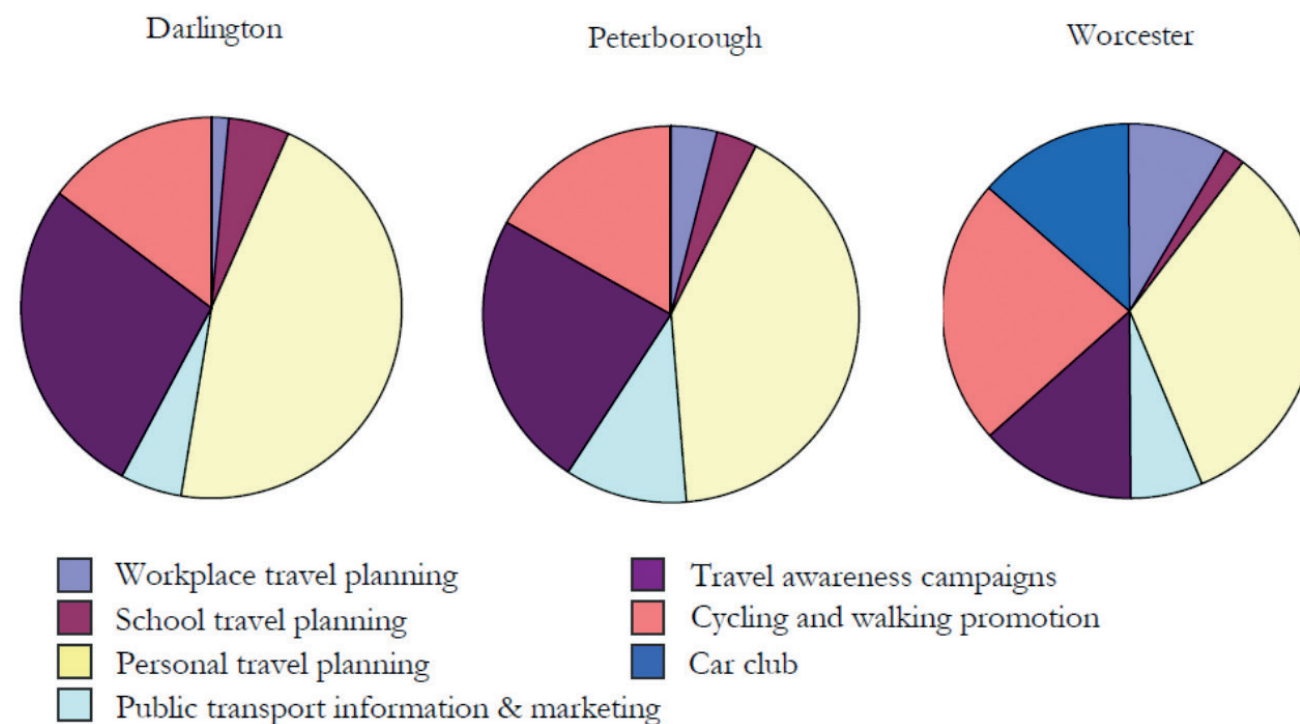

Figure 11.3 Proportion of revenue allocated to each individual smart measure.
Source: The effects of Smarter Choice Programmes in the Sustainable Travel Towns, Summary Report, 2010
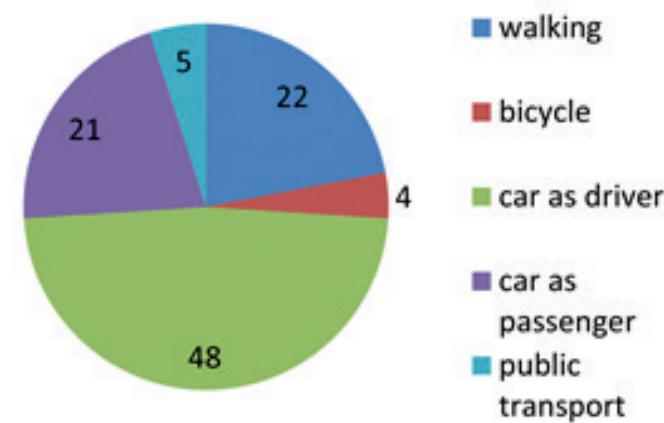
Figure 11.4 Current modes of travel in Bicester. Source: Bicester Travel Demonstration project, 2011
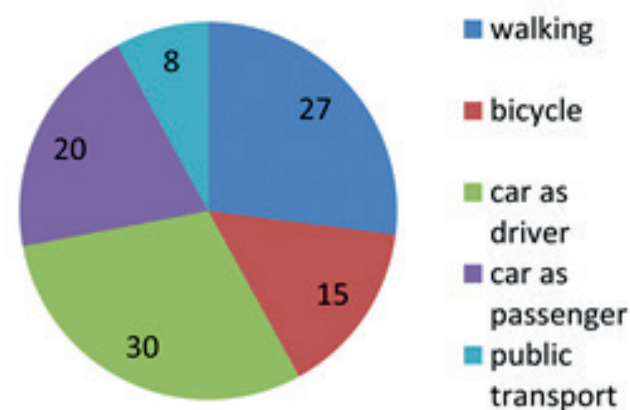
Travel awareness campaigns

All three Sustainable Travel Towns developed a clear brand identity for their programmes. Oxfordshire has adopted Travel Choices and more recently some of the larger LSTF programmes e.g. My Journey in South Hampshire and TravelSmart in Surrey have been developed. Branding is used on printed materials such as maps and timetables, and also on websites, advertising materials, buses and in PR and press work.

Specific awareness campaigns and materials could be developed for Bicester which target some of the issues identified through the BTDP surveys these being:

- High levels of second car ownership

- Perception that walking and cycling are risky

- Perception that public transport is slow and doesn't take people to where they want to go

Sustainable Travel Roadshow: events and promotion

A mobile and interactive Sustainable Travel Roadshow could operate throughout the year, linking in with the various travel awareness campaigns as and when they are running. It would bring various partners together, not just those with a transport and environmental remit, but also those involved in health and community support.

The exhibition equipment and roadshow team will initially spark interest by catching people's attention through free, interactive and fun activities and offers. Once a roadshow attendee's attention has been attracted, a project officer could discuss their travel needs and the various sustainable travel options available to them.

The roadshow team will work in partnership to plan and schedule the roadshow programme; attending existing annual events e.g. Bicester Town Carnival and organising new ones. Increased demand in the spring and summer months will be resourced through additional voluntary advisors and casual staff. The roadshow will be tailored

Figure 11.5 Potential modes of travel in Bicester, showing reduction in car use of 19% and increases in walking, cycling and public transport

Figure 11.6 Travel brand examples

in the colder months to provide an emphasis on public transport promotion and other seasonally appropriate advice such as how cyclists can keep warm and visible on the darker nights.

Bicester Village has become a very popular shopping and leisure destination for over 4million customers who visit each year. The worst traffic congestion is often at weekends or on Bank Holidays, but significant congestion also exists on weekdays. Bicester Village would be a key roadshow destination, particularly during the winter months, to encourage more sustainable modes to the Village for both local residents and visitors.

Travelling to the events sustainably will be promoted and rewarded, with the direct purpose of encouraging travel behaviour change for leisure and shopping journeys, which have been highlighted in the BTDP report as journeys to target.

Working with rail stations

Bicester has two railway stations with improved regional connections becoming operational in 2016 as a result of the Evergreen 3 project. Such a high profile infrastructure scheme provides an excellent opportunity to tailor a behavioural change project around Bicester Town station, encouraging an increase in walking and cycling to the station as well as an increase in train travel generally, particularly in relation to providing an alternative to car travel on the A34.

Such a combination of station-based infrastructure and Smarter Choices work is currently underway through the LSTF funded Access to Stations projects in around 20 locations, including Bedford, Exeter, Swindon, Warwick and Beaconsfield. Infrastructure improvements are identified through a Station Travel Plan, which include forecourt redesigns, new bridges, cycle parking and walking and cycling routes. Behaviour change measures include workplace activities, pop-up travel hubs, community events, cycle training and Dr Bike sessions.

Sustainable Transport Hubs

Sustainable Transport Hubs are community based travel resource centres, which use Personalised Travel Planning (PTP) and practical activities to provide flexible solutions to travel challenges.

Hubs provide a local focus for walking and cycling promotion,

increasing the profile of active and sustainable travel in the area. A Hub can be a physical presence where people drop into a dedicated site for cycle hire, travel advice and information, or to take part in more structured activities like led rides/walks and bike mechanics. Examples include:

- **Train station** - focussing on increasing active travel for multi-mode journeys and tying in with the rail improvements outlined above

- **Town centre** - linking in with local walking, cycling and public transport routes, focussing on journeys into the town for shopping, leisure and work. A good example of this is the Dunstable Transport Hub in Bedfordshire which involved the renovation of a vacant shop in the High Street.

- **Retail centre** - providing travel advice to shoppers – this would be particularly relevant to Bicester Village to help encourage visitors outside of the town, as well as local residents, to travel more sustainably.

- **Business park** - targeting employees and the journey to work

Workplace engagement

Working with major local employers in Bicester will be an important element of the Smarter Choices package, particularly since there are plans to bring new jobs to the area as part of town growth. Engaging with new employers as and when they come into the area is an ideal opportunity to get sustainable transport embedded within the organisation from the beginning.

With a mixture of large businesses and public sector organisations, together with retail-based SMEs, in the town centre and in Bicester Village in the South, a workplace package that has the flexibility to work with both large and medium-sized workplaces would be beneficial. The workplace programme should take into account that some businesses will want to engage more or less than others; large workplaces tend to be in a better position to engage more intensively compared to smaller ones. In response to this a sliding scale of support, from light touch (up to 3 hours) to medium (12 hours) to intensive (12+ hours) could be implemented, with a full travel plan service for intensively supported businesses compared to light

touch services e.g. cycle training referrals for light touch. Workplace activities can also include managing workplace travel networks and organising workplace conferences,

Commuter Challenge

A Commuter Challenge is a fun and interactive competition designed to engage businesses and employees. The aim is to encourage people to try a more sustainable way of travelling to and from work during the Challenge period. The main three providers in the Challenge market are Sustrans (multi-modal), Please Cycle (multi-modal) and Challenge for Change (cycling). Individuals log journeys on the interactive web platform, with the option to compete in teams and as a business. Individuals and businesses can also upload photos and share stories in a vibrant online community.

The Challenge is an effective engagement tool for both large businesses and SMEs. Workplaces are categorised according to their size and prizes are awarded accordingly.

Case study: My Journey Challenge South Hampshire

Delivered in 2013, as part of Sustrans' workplace engagement across the Transport for South Hampshire LSTF programme area, the following results were achieved:

Registered businesses: 85	Journeys: 36,116
Participants registered: 1,999	Logging journeys: 1,629
Distance: 264,103 miles	Calories: 4,687,850
Cost saved: £71,315	CO2 saved: 33,939 kg

Additional benefits include:

- Excellent publicity for winning businesses
- Promotes local businesses and attractions
- Shows how businesses & staff can save money
- Cuts carbon emissions and improves staff well-being
- Travel Incentives: discounted rail fares and bus tickets

Figure 11.6 Case Study

Residential Personalised Travel Planning (PTP)

The population of Bicester is around 30,000 people. The town is divided into 5 wards and the age structure varies between wards, which has implications for service needs.

- Bicester North (27%) and South (23%) have high proportions of young people aged 0-15, above the Oxfordshire average (18%).

- Bicester South (72%) also has a particularly high proportion of people of working age (63% for Oxfordshire).

- Bicester Town has the highest proportion of older people (25%), above the Oxfordshire average (19%).

This population is forecast to increase to just under 50,000 within the Local Plan period to 2031.

Residential-based Personalised Travel Planning (PTP) projects work directly with householders at home. Information needs to be directly relevant to the participant to enable behaviour change, so a tailor-made pack is put together for everyone who takes part in the project.

PTP is proven to be effective in reducing car use on its own, but is especially effective as a part of package of measures (as evidenced in Sustainable Travel Towns), as it can provide a means of tying together and promoting all the other measures being delivered in a town or city.

A PTP package for Bicester would need to tie in with the planned new housing developments as much as possible. Individuals could be provided with a PTP resources pack at the point of 'transitioning' into the town, whilst the more traditional on-street canvassing approach would be used for existing residents.

There is limited data available showing the impact of PTP. Sustrans Travel Smart projects have the most comprehensive data set, showing that an 11% reduction in car driver trips, with increases in walking, cycling and public transport trips of between 15% and 33% is typically achieved.

School engagement

Bicester has 10 primary schools and 2 secondary schools, with a further primary school in the village of Launton and new schools planned as part of new development. The majority of pupils walk to school and cycling rates to school are considered relatively good. All of Bicester's schools have a School Travel Plan.

Whilst walking and cycling to school rates are relatively good in Bicester, this should be considered as an opportunity to aim higher rather than be complacent, particularly as an exemplar eco-town. The foundation is in place to achieve levels in line with Oxford where one school, Cherwell School, has the highest cycle rates to school in the UK at 58.4% (Cycling Oxford, The Hub). Non-school journeys by bike should also be encouraged, particularly since all parts of Bicester are currently within a 15 minute cycle ride of the town centre; a message which could be spread to parents as part of a wider family engagement programme through the school.

Alan Baxter

Sustrans, Living Streets and Modeshift are the main national providers of activities and resources which encourage more sustainable travel to school.

One of the most popular school engagement projects is Sustrans' Bike It. This is a practical project that delivers an intensive programme of promotional and educational activities in schools, both primary and secondary, to increase the number of school journeys undertaken by active travel modes – walking, cycling and scooting. The aim of Bike It is to create a pro-active travel culture, particularly around cycling, in schools. It typically leads to increases in the level of regular cycling in schools to 20% of pupils, or a doubling of cycling levels (where 20% is not considered achievable due to low local levels). In addition to Bike It, Sustrans has developed a number of lighter touch approaches tailored to meet the needs of the local authority area. There are also a number of online resources available to schools free of charge.

A schools project will work closely with County Council staff responsible for school travel, and assist in the updating of School Travel Plans. The project will complement any existing provision of National Standards Cycle Training, or proactively help increase the delivery of Cycle Training in schools where uptake is low.

Living Streets run a number of school initiatives, such as Walk to School Week and Walk once a Week (WoW). The popular WoW scheme encourages children to walk to school by rewarding them with collectable badges, and has shown to increase walking rates by up to 26%.

Community street design

Community street design projects give local people greater control over their immediate environment, and support them to work together to improve the quality of life for everyone. They can help create high quality urban environments that promote sustainable travel, and that are safe and pleasant to live in, work in and visit. The community street design project in the London Borough of Haringey (2010 – 2012) led to a 10% average reduction in traffic volume at monitoring sites and 3% increase in traffic travelling 20mph or less.

Street design schemes are most effective where there have been good levels of community engagement, through methods such as

local workshops and community mapping. As a result, residents feel a sense of ownership of the scheme. A good example of this is in Lambeth where the Borough Council, Sustainable Urban Drainage and Sustrans engaged with residents to develop a series of innovative and eye-catching designs. The design responded to the community's aspirations, utilising both rain gardens and permeable paving.

A number of streets in Bicester where the community street design approach could be implemented have been identified:

- George Street, Community College access road, Margaret Close, Barry Avenue, Ewart Close, The Approach, Hudson Street and East Street

- Chalvey Road, Kings Avenue, Lawrence Way, Ruck Keene Close, Ashby Road, Ashdene Road, Danes Road and Langford Gardens

- Greenwood Drive, Byron Way and Longfellow Close

- Windmill Avenue

- Balliol Road, Keble Road and Hertford Close

- Longfields, North Street, Kings End, Church Lane, Causeway, Cemetery Road and Old Place Yard

Car sharing and car clubs

As highlighted above, 'car as driver' forms the largest proportion of mode share in Bicester at 48%. This is above the national average of 42% (National Travel Survey, 2012). The target is to reduce this mode share to 30% in Bicester, coupled with an increase in car occupancy rates from 1.44 to 1.67. It is inevitable that driving will be the most practical option for some journeys and it is therefore important that the car is not precluded from the Smarter Choices programme for Bicester.

Carbon Heroes has recently entered the car sharing market, but Liftshare remain the main provider of the journey-matching web-based platform. Oxfordshire County Council have commissioned a car sharing website – www.oxfordshire.liftshare.com, which is reported to have over 7,000 members and to have saved users £7.5m in two years. The Oxfordshire liftshare scheme will be promoted in Bicester, particularly as part of the workplace engagement package.

With regards to car clubs then a scheme which is successfully embedded within other local transport infrastructure can provide a viable and attractive alternative to private car use. Car clubs give people the option of having a car when it's needed; separating car use from ownership so that users are free to consider the best way of making a journey rather than being tied to the car as a default option.

Figure 11.7 Community workshop in Lambeth, Ardlui Street

The majority of local authorities opt to use national car club operators, such as Co-wheels, Zipcar and City Car, to run services in their area. The development of new residential property has emerged as a focus for car clubs and local authorities are increasingly using Section 106 agreements with developers to secure funding for their implementation. Such a funding arrangement could be consider for new housing and commercial developments in Bicester.

Moving into a new property is a key time when people consider other aspects of their lifestyle; the presence of a car club which is marketed appropriately to incoming residents can potentially attract people to a new development. Carplus survey data suggests that people join in response to some sort of trigger: 77% of joiners had undergone some sort of life change recently, influencing their decision to join. Of these 77%, 25% involved moving house, 19.4% selling a car, 13.9% changing job and 8.3% to do with changes in personal relationships.

Evidence of the contribution "pay-as-you-go car clubs" make to tackling congestion comes from the 2009/10 Annual Survey of Car Clubs published by Transport Research Laboratory (Cairns, S. & Harmer, C.) in 2010. The survey found that:

- Car club members travel in the order of 50% fewer miles per year than non-members by car;

- Car club members make more trips by public transport and walking or cycling, and considerably fewer trips involving a car, lift, taxi or motorbike, (16-23% of their journeys, as compared to 66%).

11.5 Electric Bikes

The UK has been identified as the seventh biggest market for electric bikes in Europe (Bike Biz, April 2014). The general public are becoming increasingly aware of the technology, which has improved over the last decade, and the e-bike market is now buoyant in Northern Europe. In 2012 one million e-bikes were in use on Dutch roads and this is growing, particularly for cyclists over 46 years (People for Ecologically Sustainable Transport, January 2013). One in every five bicycles sold in the Netherlands is an e-bike and 10% of all households own an electric bicycle.

There are many commercial providers of electric bikes in the UK. The most local to Bicester is The Electric Transport Shop, which is based in Oxford and has been selling e-bikes since 2005. A limiting factor is affordability, since a good quality e-bike will cost in the region of £1,000. However, prices are falling as sales increase. The industry recognises that the mainstream market is boosted by the Cycle to Work Scheme and that a further boost is likely to come with the expansion of London's cycle hire scheme, which will see several hundred e-bikes introduced in the capital's hilliest parts.

A Bicester Smarter Choices programme will raise general awareness of electric bikes. Uptake could be targeted to certain groups e.g. over 55s. Workplaces could also be targeted, particularly amongst those undertaking short and regular business-related journeys e.g. estate agents.

11.6 Cycle Hire

There are a number of different types of cycle hire schemes operating across the UK as listed below.

A.   Long Term Bike loan with new bikes: scheme loans new bikes for a long term period, usually a year or term. Maintenance support is provided for people who borrow the bikes, e.g. Nottingham Ucycle

B.   Short Term Bike loan with new bikes: scheme loans new bikes for a short period, usually between one and six weeks. Maintenance support is provided for people who borrow the bikes, e.g. Bradford Bike Hub

C.   Bike loan with recycled bikes: scheme recycles bikes and loans these out. Maintenance support is provided for people who borrow the bikes. These schemes also often include sales of recycled bikes, e.g. Luton

D.   Bike Hire: scheme makes bikes available to hire for a limited period of time, e.g. Barclays Cycle Hire Scheme in London.

E.   Bike Pool for Projects: a number of projects also have a pool of bikes which are used for delivery of engagement activities. These projects can be based either in a community setting, for example in a hub, in a school, university or college or in a workplace setting.

The existing project at Bicester Green is a combination of types B and C and this model of combining bike loans with bike recycling is a popular combination, but does need continuous investment to make it financially viable.

Evidence from 15 bike loan projects across the UK shows that bike loan schemes can have a positive impact, particularly on increasing participants' levels of cycling and active travel. In the Active Travel programme the proportion of bike loan participants doing at least 10 minutes of active travel on five or more days a week increased from 47% to 57%. Participants in Active Travel bike loan schemes reported a 27% reduction in car use but this was lower than for participants in other Active Travel activities. (Sustrans internal review, 2013)

Learning points from this review include:

- Bike loans are most applicable where the aim is to increase levels of cycling. If the aim of the project includes mode shift then the target groups needs to be focused on people who currently travel by car for short trips;

- Short term loans are more cost effective than long term loans as the bikes can be used to reach a greater number of beneficiaries, and hence maximise impact, over a given period of time;

- Schemes should focus on target groups where bike ownership is a genuine barrier to uptake of cycling;

- The business model needs to identify an exit strategy which includes routes to bike ownership e.g. cycle to work schemes, negotiated discounts or good quality recycled bikes;

- The overall project cost-benefit is very sensitive to the cost of the bikes so the business model should explore procurement options including commercial partnerships, social enterprises to source cheap new or recycled bikes;

- Evaluation should be built into scheme design so that the costs and impacts can be assessed to inform future project design.

Public bike hire schemes are best suited to large cities where there is significant demand from visitors (commuters and tourists) and where bike storage and security are major issues. We do not think these conditions apply in Bicester, so we would not recommend a public scheme at this stage. Commercial providers such as Bicester Village, Chiltern Railways and the local bike shops could be encouraged to provide space for cycle hire and to consider their own schemes.

11.7 Legacy

Incorporating volunteers or champions into a Smarter Choices measure from the outset is a key element of helping to achieve long term sustainability. Examples include:

- A School Champion Network involves recruiting and supporting Schools Champions, who will help continue the promotion of sustainable travel in schools. A Champion Resource Kit will provide ideas and tools to give School Champions the information and confidence they need to continue running initiatives within their school.

- A school travel accreditation scheme such as Modeshift STARS or Sustrans School Mark. Each scheme has progressive levels, recognising and supporting schools' excellence in sustainable and active travel.

- Workplace Champions – similar to the School Champions, but provided with a tailored Champion Resource Kit for the employer. A Travel Plan Network would also help support the Champions and share best practice across the town.

- Community Champions – these could be targeted through the street design schemes or the wider Roadshow events programme.

An organisation will need to lead and co-ordinate these volunteers particularly once the formal programme of delivery is complete.

11.8 Monitoring and evaluation

Monitoring was a key element of the Sustainable Travel Towns programme and continues to be embedded within the LSTF schemes. It is essential to measure the effectiveness of schemes in order to inform future project design. Typically, monitoring can be divided into two areas; process and impact.

Process monitoring will be undertaken by the Project Officers and includes:

- Reviewing progress against agreed milestones on a quarterly basis;

- Reviewing progress in spend against budget each month/quarter;

- Reviewing and updating project risk registers.

Impact Monitoring can be carried out by the organisation responsible for delivery and coordinated centrally by the Programme Manager. Data collected by Oxfordshire County Council e.g. traffic flows could also be incorporated. Impact monitoring methods include:

- Database systems to centrally record beneficiary numbers and details;

- Pre and post surveys to record basic travel, physical activity and well-being data (or more in-depth surveys where funding allows);

- Activity diaries;

- School and workplace travel plans, together with workplace travel surveys;

- Focus groups to collect qualitative data.

12.0
Delivery Plan

The Delivery Plan breaks down the different elements of the STS into actions that are quick wins, high priority, medium priority and low priority.   The broad timescales for these priorities is as follows:

Quick Win – (to be implemented now)

High – 1 to 5 years (2015-2020)

Medium – 5 to 10 years (2020-2025)

Low – 10 – 15+ years (2025- 2031)

For each action, lead and supporting delivery organisations are identified together with broad costs and sources of funding. Implementation of the strategy will require partnership between a number of organisations including Cherwell District Council, Oxfordshire County Council, Chiltern Railways, Bicester Villages, Developers, Employers etc.

The timings of the different actions are necessarily broad and more detailed programmes will need to be developed that are flexible and responsive to changing circumstances.

In summary the actions to be taken up to 2020 are as follows:

*   Low cost, minor improvements to the existing primary walking and cycling network.

*   Significant improvements to the primary walking and cycling network with a particular focus on the Central Corridor. This includes a reduction in vehicle capacity on this corridor.

*   Closure of Bell Street and Chapel Street in the town centre.

*   Major public realm improvements to Market Place in conjunction with the restriction of vehicle access through this space.

*   Implementation of 20mph zones in the town centre, in residential areas and on parts of some radial routes.

*   Changes to Bicester North Station to improve multi-modal interchange.

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Mode	Priority	Description	Responsible	Capital Cost	Source of Funding	Comments
Walking and Cycling	Quick Win (0-2 years)	Various locations - Removal of barriers on shared pedestrian/cycle paths	Lead: OCC Support: CDC	£16,000	CDC?	
		Cycle infrastructure improvements: Balliol Road (CR13b) - dropped kerb extension	Lead: OCC Support: CDC	£200	CDC?	
		Cycle infrastructure improvements: Highfield to Bure Park (PR6b)	Lead: OCC Support: CDC	£500	CDC?	Admin/legal costs for converting existing subway to shared use.
	High (1-5 years)	Cycle infrastructure improvements: Sheep Street (CR14c) - TRO to be amended to allow cycling 6pm to 10am	Lead: OCC Support: CDC	£500	CDC?	Admin/legal costs for amending and consulting on changed TRO
		Cycle infrastructure improvements: Central Corridor (CC)	Lead: OCC Support: CDC	£459,500	CIL transport contributions?	Implement by Impact of proposals to be modelled by OCC. To be delivered by Autumn 2018
		Cycle infrastructure improvements: Buckingham Road (RR1d to g)	Lead: OCC Support: CDC	£565,500	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Churchill Road (PR1)	Lead: OCC Support: CDC	£76,000	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Glory Farm Withington Road (RR2d)	Lead: OCC Support: CDC	£30,000	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Launton Road	Lead: OCC Support: CDC	£246,000	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Path parallel to railway line (RR5d)	Lead: OCC Support: CDC	£7,500	CIL transport contributions?	Requires 3rd party land. Cost excludes land. To be delivered by Autumn 2018
		Cycle infrastructure improvements: Graven Hill London Road (RR6) - Level Crossing to Market Square (RR6f)	Lead: OCC Support: CDC	£25,500	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Wendlebury Road Oxford Road (RR7c, d & e)	Lead: Developer Approval: OCC	£50,000	Developer	Works to be incorporated into new access junctions (1 No.) and improved junctions (2 no.). To be delivered by Autumn 2018
		Cycle infrastructure improvements: Wendlebury Road Oxford Road (RR7f)	Lead: OCC Support: CDC	£23,100	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Kingsmere Access Oxford Road (RR8b to e)	Lead: OCC Support: CDC	£63,000	Part CIL transport contributions and Developer?	To be delivered by Autumn 2018

Figure 12.1 Delivery Plan Table

Mode	Priority	Description	Responsible	Capital Cost	Source of Funding	Comments
		Cycle infrastructure improvements: Kingsmere Access Oxford Road (RR8f)	Lead: OCC Support: CDC	£14,000	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Chesterton Kingsmere (RR9a)	Lead: OCC Support: CDC	£40,000	Developer funded - South West Bicester Phase 2?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Middleton Stoney Road (RR10f)	Lead: OCC Support: CDC	£30,000	Developer funded - South West Bicester Phase 2?	Requires 3rd party land. Cost excludes land. To be delivered by Autumn 2018
		Cycle infrastructure improvements: Banbury Road (RR15a & b)	Lead: A2 Dominion Approval: OCC	£140,000	Developed funded - A2 Dominion	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Banbury Road (RR15d to f)	Lead: OCC Support: CDC	£96,000	CIL transport contributions?	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Bicester Village Bicester Town (PR3a)	Lead: OCC Support: CDC	£23,100	Developer funded - Bicester Village Extension	To be delivered by Autumn 2018
		Cycle infrastructure improvements: Bicester Village Bicester Town (PR3d)	Lead: OCC Support: CDC	£3,600	Developer funded - Chiltern Railways??	Incorporated as part of station improvement works. To be delivered by Autumn 2018
		Cycle infrastructure improvements: North Street Sheep Street (CR14b)	Lead: OCC Support: CDC	£500		To be delivered by Autumn 2018
		Cycle infrastructure improvements: St John's Street Manorsfield Road (CR15a & b)	Lead: OCC Support: CDC	£35,250	CIL transport contributions?	To be delivered by Autumn 2018
	Medium (5-10 years)	Cycle infrastructure improvements: To be added				
	Low (10-15 years)	Cycle infrastructure improvements: To be added				
Rail	High (1-5 years)	Bicester North Rail Station: Undertake movement and urban design study to identify measures to improve multi-modal interchange in conjunction with Station Travel Plan	Lead: Chiltern Railways Support: OCC and CDC	£50,000		
		Bicester North Rail Station: Implement measures to improve multi-modal interchange as part of Station Travel Plan	Lead: Chiltern Railways Support: OCC and CDC	£250,000		

Mode	Priority	Description	Responsible	Capital Cost	Source of Funding	Comments
		Bicester Town Station: Undertake movement and urban design study to identify measures to improve multi-modal interchange in conjunction with Station Travel Plan	Lead: Chiltern Railways Support: OCC and CDC	£10,000		
		Bicester Town Station: Implement measures to improve multi-modal interchange as part of Station Travel Plan	Lead: Chiltern Railways Support: OCC and CDC	£100,000		
Buses	High (1-5 years)					
	Medium (5-10 years)					
	Low (10-15 years)					
Roads and Streets	High (1-5 years)	Closure of Bell Street and Chapel Street	Lead: OCC Support: CDC	£250,000	CIL transport contributions?	Connected to cycle infrastructure improvements on the Central Corridor
		Market Square Public Realm Improvements and Access Restrictions	Lead: OCC Support: CDC	£1,750,000		3,500 sq m area
		Implement 20 mph zones in town centre, residential neighbourhoods and on some radial routes	Lead: OCC Support: CDC	£100,000		
	Medium (5-10 years)	Causeway and Manorsfield (Market Square to Hanover Gardens) Public Realm Improvements. Causeway becomes pedestrianised zone. Kingsclere and Kings Avenue closure.	Lead: OCC Support: CDC	£1,250,000		2,500 sq m area
		Access restrictions on Field Street. Public Realm Improvements and pedestrian zone on Sheep Street (Bell Street to North Street). Rowan Road closure.	Lead: OCC Support: CDC	£850,000		1,750 sq m
	Low (10-15 years)					
Public Parking	High (1-5 years)					

Mode	Priority	Description	Responsible	Capital Cost	Source of Funding	Comments
	Medium (5-10 years)					
	Low (10-15 years)					
Electric and Low Emission Vehicles	High (1-5 years)					
	Medium (5-10 years)					
	Low (10-15 years)					
Smarter Choices and Active Travel	High (1-5 years)	Establishing the Smarter Choices team, initiatives and programme	Lead: OCC Support: CDC	£250,000		Complete by Autumn 2015
		Deliver the Smarter Choices initiatives	Lead: OCC Support: CDC	£1,000,000		Complete by Autumn 2018
		Review of Smarter Choices team, initiatives and programme	Lead: OCC Support: CDC	£250,000		Complete by Spring 2019
	Medium (5-10 years)	On going but lower level delivery plus maintenance	Lead: OCC Support: CDC	£250,000		
	Low (10-15 years)	On going but lower level delivery plus maintenance	Lead: OCC Support: CDC	£250,000		

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