5.
The infrastructure needed to support the garden town

Infrastructure acts as a skeleton, allowing the rest of the town to function properly. Both traditional infrastructure, roads and sewers, and social infrastructure, schools and community halls, are needed to ensure that a town works well for its residents. This chapter considers where infrastructure can be improved, recommending projects to solve problems and meet future demand.

5. The infrastructure needed to support growth of the town

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5.1
Transport infrastructure

New Hitachi train at Didcot Station © Frank Dumbleton

5.1.1 A connected future

The vision for Didcot is changing and the garden town is setting new horizons. Our proposals for movement in the garden town build upon the existing transport plan. They do not change the transport plan, but seek to reinforce it with new ideas and infrastructure projects associated to the garden town masterplan.

The current local transport plan for Oxfordshire addresses many of the issues caused by Didcot's historic development and influences. It is only by understanding how the town has evolved that it is possible to set a bold and ambitious vision for the future.

Since the mid 19th century Didcot has grown and changed greatly. Within these historic cycles of change the town's transport infrastructure has remained relatively unaltered when compared to the scale of growth. The infrastructure patterns of the 19th and 20th centuries by in large remain.

Although this infrastructure has been the catalyst for much of Didcot's growth, railway lines and large roads have also served to segregate development so some parts of the town are isolated from others.

Furthermore, although this transport infrastructure deals with much of the movement in the town today, on the whole it is inadequate to handle the movement associated with Didcot's future growth. The town's historic development has left a legacy that needs to be addressed in the its evolving urban form.

This legacy has resulted in:

- A high level of north/ south severance by the railway line
- A development pattern that has had a high reliance on movement by car
- A road network that is under pressure dealing with both strategic and local movement
- A need for alternatives to car transport

The garden town vision identifies a number of projects that both address these historic issues and reinforce the core principles of the transport plan. The vision also seeks to promote the sustainable transport modes that are embedded in the Didcot Garden Town masterplan.

The garden town team's new proposals include:

- Giving more alternatives to travel by car
- Utilising technology to deliver smarter travel choices
- A greatly improved cycling network with a new regional connection between Harwell Campus, Didcot and Culham Science Centre
- Enhancing a greatly improved public transport system
- Three new "movement corridors".

Infrastructure projects (discussed in more detail later in this chapter) like Science Bridge are primarily associated with severance whilst Station Gateway looks to improve the arrival sequence and sense of place. They all need momentum and funding if future growth is to be achieved.

By giving more viable travel alternatives to the private car, the garden town vision seeks to promote a healthy environment where connected, walkable and ridable neighbourhoods encourage an active lifestyle. By creating compact, mixed-use and transit-oriented development it is also possible to reduce local congestion.

All of these objectives and proposals give a balanced investment strategy to complement the existing local transport plan in accommodating growth.

Figure 5.1 - The benefits on health of greater walking and cycling © RIBA source: City Health Check 2013

5.1.2 An established movement pattern

Didcot today

Didcot has a complex movement profile. This movement profile is deeply influenced by its development from a small railway village to the significant place it is today. The growth of the town and Didcot's importance is very much tied to the arrival of The Great Western Railway in the mid 19th century.

Since this period however, there have also been many changes in the region and within the town itself that have influenced its shape, transport infrastructure and the movement patterns of those who live and work in Didcot today.

The 19th century

The arrival of the railway in the mid 19th century is generally credited with being the spur for the growth of Didcot. The town is at a crossroads on the national rail system: a rail system that connected nationally but also caused severance locally as new railway lines were built though towns and open countryside. That severance saw Didcot grow one sided, to the south of the railway. By the turn of the 19th century the town was growing to the south however there were only three modest rights of way crossing the railway line at Foxhall Road, Cow Lane and Broadway. These crossings all remain to the current day and form key parts in the existing highway network of the town.

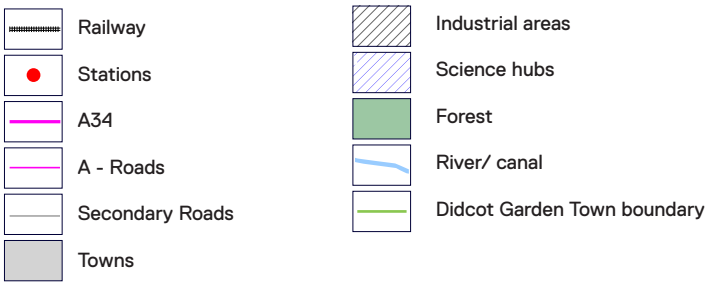
The early and mid 20th century

The last century saw a series of significant changes to the town. To the north, the railway triangle became an excellent location for rail distribution for army ordnance and later for the import of fuel for the power station. These uses have a high dependence on strategic rail connections only, with each having little influence on local movement. To the south, Didcot continued to grow around Broadway with Harwell Campus establishing itself as a major employment centre changing the employment base for the town and the region.

Train arriving from London © Frank Dumbleton

Late 20th and early 21st century

This period saw a changing role for the railway as the power station reduced in size and Didcot grew. To the north of the railway, Milton Park and Ladygrove developed and the site evolved and changed. This changing shape of the urban area was accompanied by new crossings over the railway line at the A4130 and to the east and west of Milton Park (the western crossing is now in private ownership).



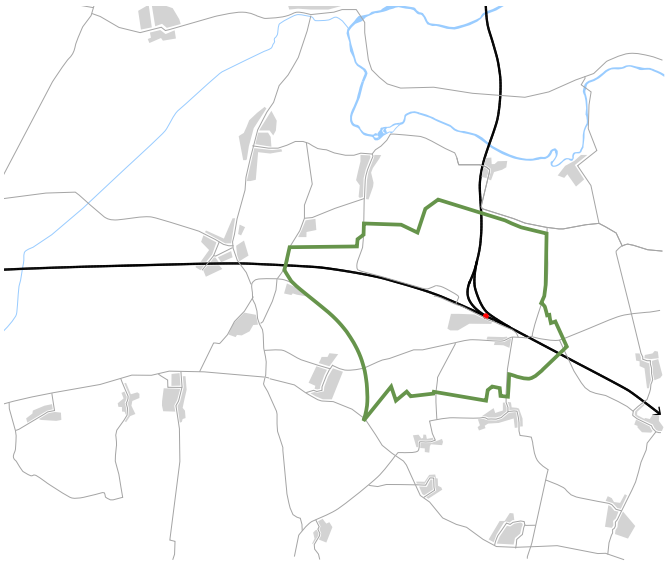


Figure 5.2 - The 19th century - a small village next to the London, Bristol and Oxford railway junction

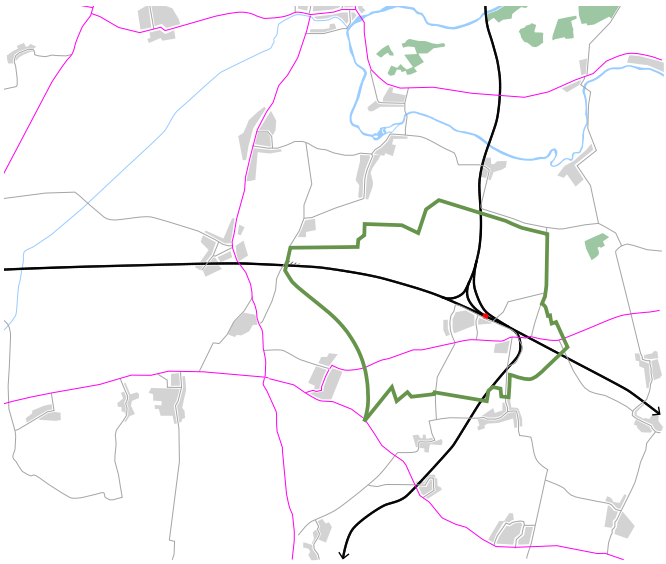


Figure 5.3 - Early 20th century - the railway extends to Southampton and Didcot grows to the South

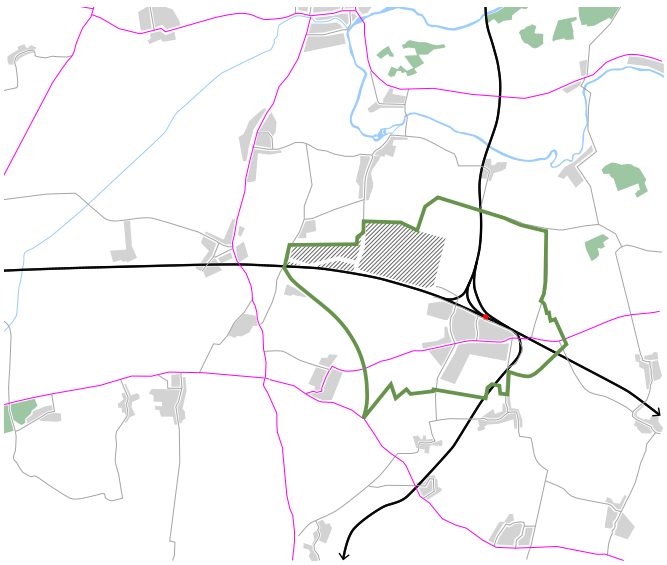


Figure 5.4 - Mid 20th century - the town grows to the north and south of the rail lines

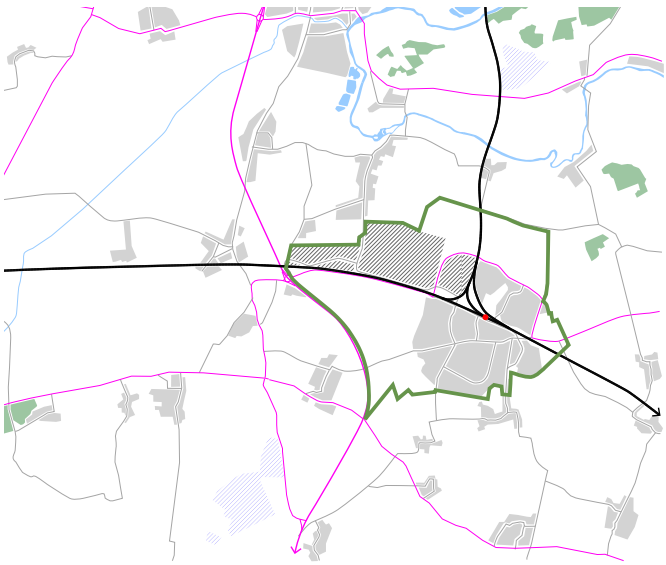


Figure 5.5 - Late 20th century - the town expands, the A34 is built and the railway line to Southampton closed

Regional infrastructure

Within the region as a whole strategic road infrastructure has developed with good north-south radial links to Oxford but with relatively poor east-west links, particularly between the A34 and the M40.

One of the two major East-West connections - the A4130 - travels through directly through Didcot. Although this provides good regional links, it is also increases the amount of strategic traffic passing through the town centre.

The town has also grown significantly, with development placing a greater reliance on the private car. This has resulted in increased pressures on the network of streets in the town and congestion at peak times. A typical example of this car reliant and complex pattern is shown by an extract from the movement statistics for Milton Park:

- 30 per cent of Milton Park workers live within Didcot but drive 2 miles to and from work every day
- 45 per cent of Milton Park workers live within the Didcot Garden Town and Science Vale area of influence
- 70 per cent of Milton Park workers drive on their own
- 25 per cent drive from Oxford and Abingdon
- Less than 17 per cent walk or cycle

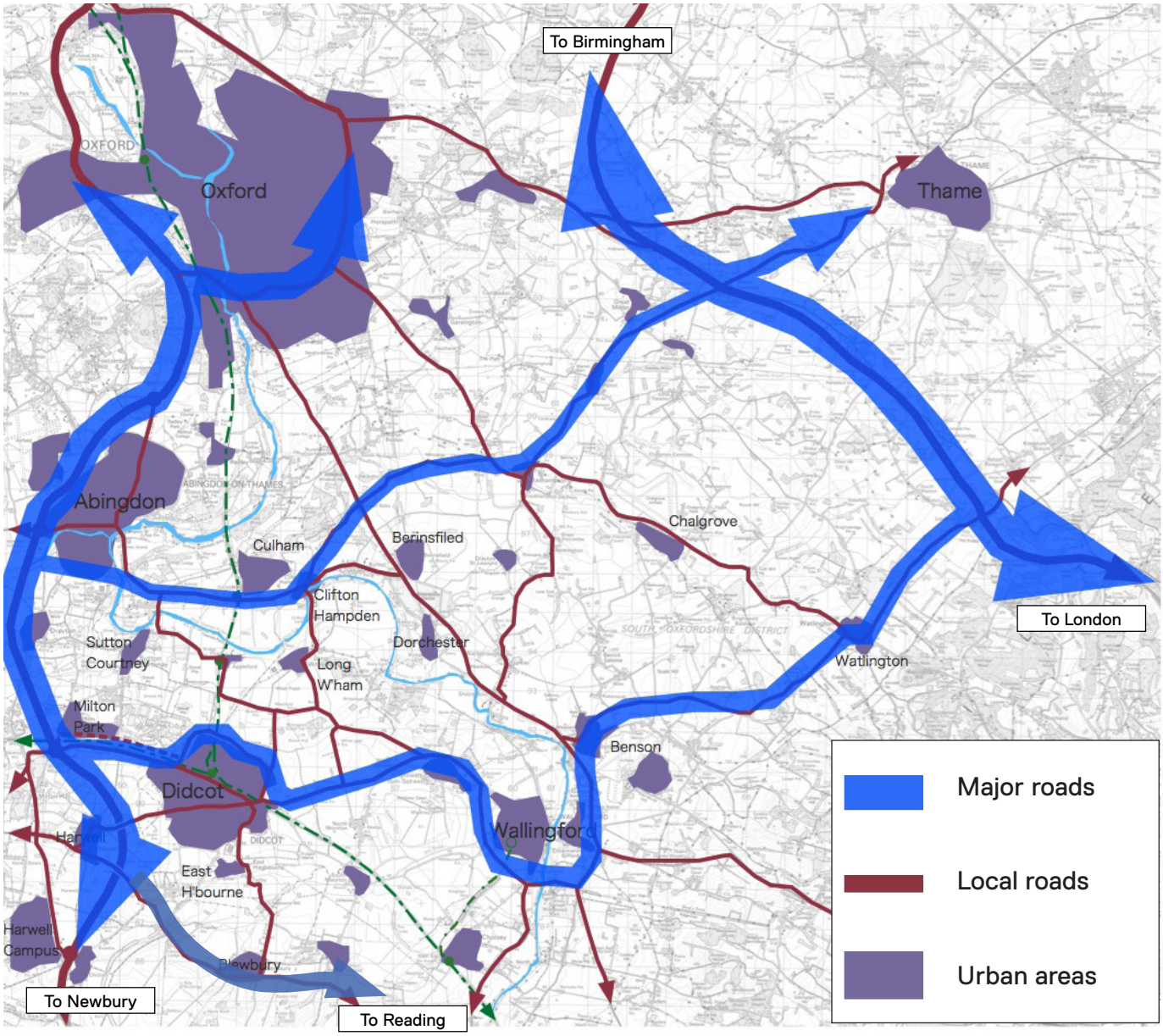


Figure 5.6 - Didcot has a strategic road network with strong radial connections to Oxford, but weak circumferential routes around the town

5.1.3 Existing traffic flows

Flows along key routes during peak times (in both directions)

The plan below visually summarises existing traffic flows in Didcot. The thickness of the lineweights represents the volume of traffic at peak times in either direction. Peak flows of vehicles along the key routes are as follows:

A34 - 50,000
A4130 - 22,000
Wantage Road - 21,000
Station Road - 13,000
Grove Road - 8,000
Reading Road - 7,000
Abingdon Road - 8,000
Ladygrove - 7,000
Milton Road - 7,000
Jubilee Way - 5,000
Park Road - 5,000

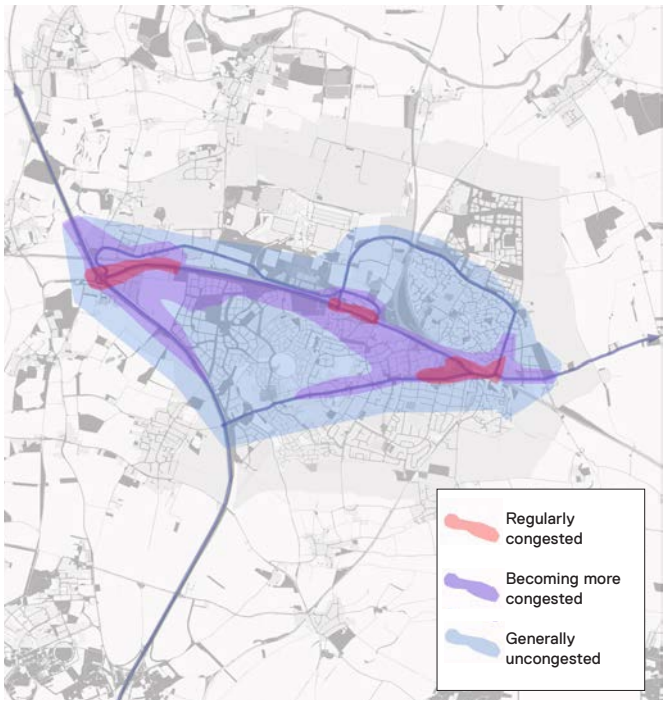


Figure 5.7 - Congestion heat map

Figure 5.8 - Traffic flows along key routes in thousands of vehicles

5.1.4 A new movement pattern

Strategic movement

Strategic growth

Didcot's strategic location is unique. Sitting comfortably at the southern end of the Oxford Cambridge growth corridor, it is in a place that will see significant growth and investment in strategic infrastructure over the coming years. The two areas of strategic investment most relevant to the garden town are the Oxford Cambridge expressway (promoted by the Department for Transport) and future investment within the national rail network.

The Oxford Cambridge Expressway

This project is currently at an initial feasibility stage. This stage will review options for route alignment north or south of Oxford. A southerly alignment could have major benefits to relieve strategic A34/ M40 traffic, bring inward investment to the region but importantly for the garden town, it could relieve the local road network from strategic traffic making investment more efficient for the town's growth.

Rail and Didcot Station

The railway has always been at the heart of Didcot and is now seeing unprecedented interest as patronage grows to meet increasing demand. Electrification of the London to Bristol line will greatly improve national services and there is growing interest in Oxford's metro rail to serve the city and its region. The railway system is changing and will continue to evolve. The garden town needs to both drive and respond to this evolution.

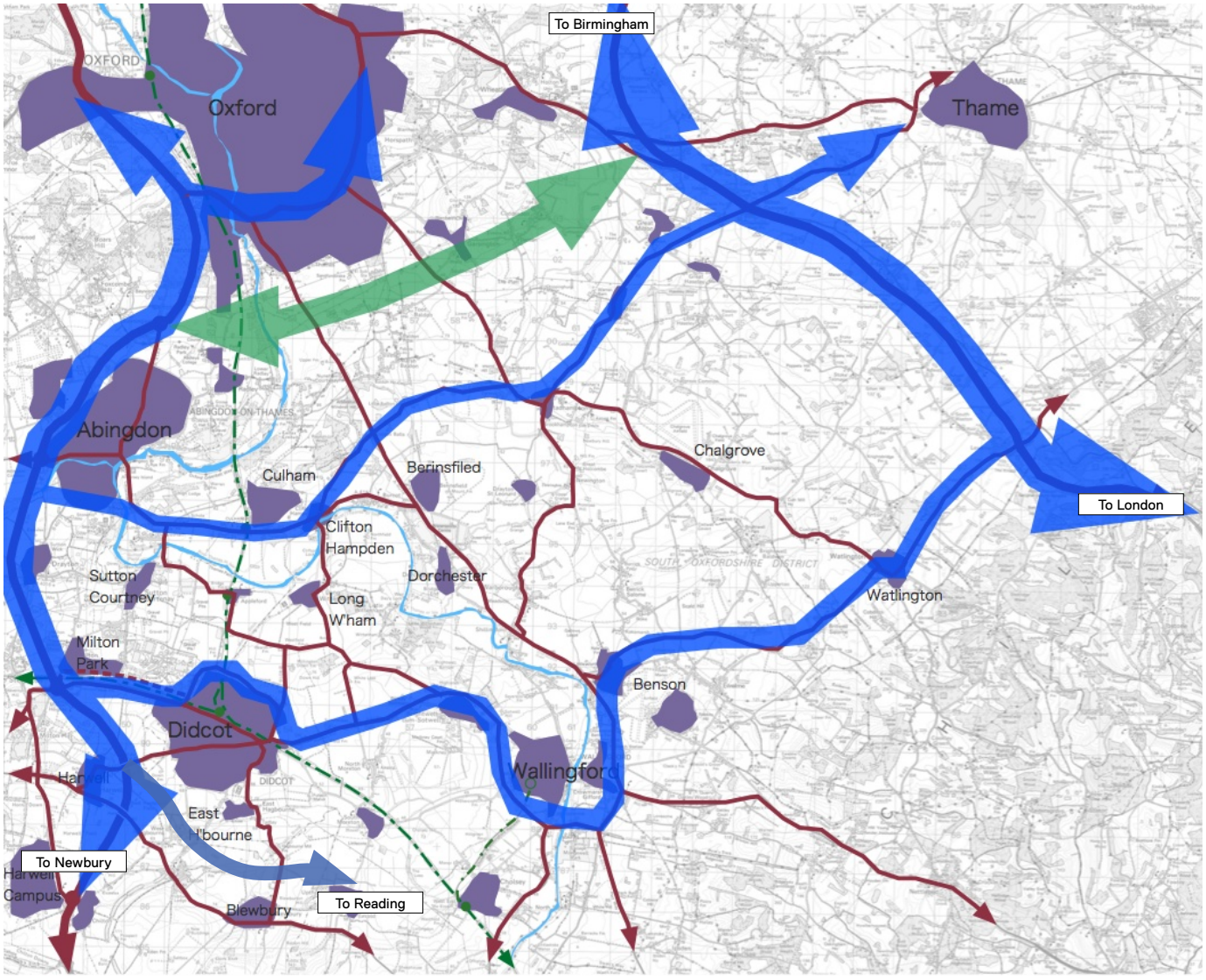


Figure 5.9 - The alignment for the Oxford Cambridge Expressway is undecided, but a southerly alignment could bring major benefit to the garden town

Future investment in rail offers a major opportunity for the town's growth, prosperity and regional rail movement.

Proposals for changes to the station and rail network are at an early stage and all of the points made in this chapter are early options that require further consideration. The next step in bringing forward a revitalised station is a capacity and accessibility study conducted in partnership between Network Rail and the Didcot Garden Town team. There are significant challenges here, including the junction itself, the need for more platforms, the embankment and levels, and land ownership near the railway line. The scope for this study is under review but likely to include:

1. A transport assessment which links transport need to local growth. This would include:
- A demand forecast and design capacity assessment for Didcot and the surrounding area to identify options to either extend, rebuild or relocate the station
- Review of options with comparison of cost benefit

2. A 'desk-top' options review and feasibility study to determine options that provide extra capacity, followed by design development of preferred options to establish costs, programme and approvals. It is envisaged that the feasibility study will include the following:
- Consideration for a 'grade separated junction' east of Didcot, which will enable trains travelling to Oxford and the Midlands to cross east-west services without conflict.
- Considering whether to rebuild, extend or relocate Didcot Station
- Review of improved connectivity to the Midlands and possibly the establishment of a Heathrow Airport service, via Reading
- Wider rail connections across the country (Great Western Railway, Cross Country and Chiltern Railways)
- Coordination with strategic electrification work
- Review of freight and passenger capacity
- Car parking and inter-modal transport assessment

As this is a multi year phased development, the garden town masterplan promotes flexibility, allowing various changes to be considered over time.

The potential improvements are clear opportunities to make national and international connections for business, residents and visitors to Didcot.

Studies will consider the benefits to Didcot, Heathrow, Crossrail and High-Speed one and two along with new services to Cambridge. Again, improved direct connections from Didcot need to be explored in depth as part of these proposals, as they could offer very significant benefits for residents and businesses associated with the town.

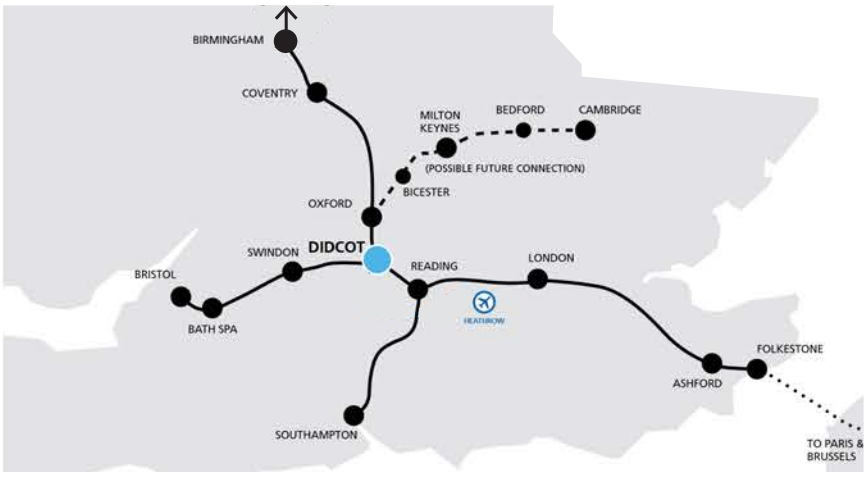


Figure 5.10 - Wider rail connections across the country

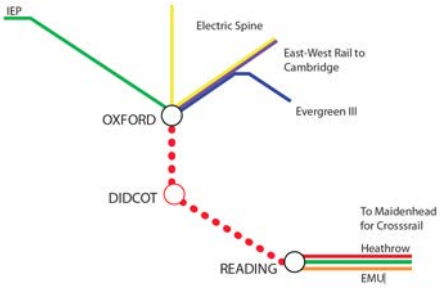


Figure 5.11 - Potential for improved direct services to Didcot from Oxford and Reading

Town wide movement

Diversifying movement patterns

The Didcot Garden Town vision recognises that Didcot will grow from approximately 26,000 people to over 60,000 by 2031. With this growth Didcot will become the largest town in Southern Oxfordshire. If the means by which residents move around the town remains unchanged, town wide journeys by car will double.

The current methods for travel to work are shown below. 64 per cent of residents travel to work by car; this representation is fairly typical of a car dependent place.

In addition to the large portion of journeys by car, the diagrams demonstrate that 11 per cent of residents travel by public transport and 5 per cent by cycling.

The challenge that lies ahead is moving travel patterns away from private cars to more sustainable alternatives. Moving travel away from the car has other benefits including making our streets safer, promoting healthier lifestyles amongst residents and allowing greater human interaction and activity in public space.

The garden town team have assessed other (less car dominated) places across the UK and can see significant opportunities to change the movement profile of Didcot towards one that is more diverse and ultimately more sustainable.

This change in travel patterns (above that included in the existing Local Transport Plan) can be realised by:

- Increased investment in public transport
- Enhancing the cycling network
- Investment in new technologies to both improve transport systems and engage residents and employees in alternative forms of transport
- Future proofing transport infrastructure to accommodate evolving transport systems

With investment in these areas the Didcot Garden Town team conclude that the future split of transport choices for the garden town should at a minimum target 47 per cent car, 15 per cent public transport and 13 per cent cycling by 2031.

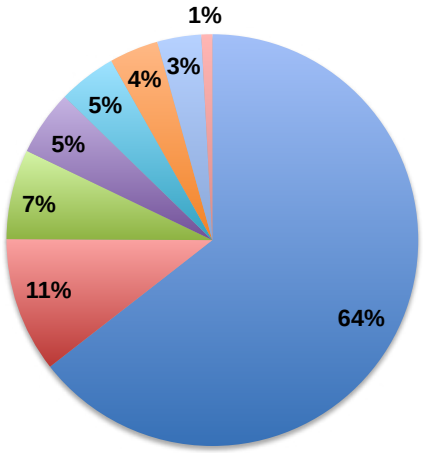


Figure 5.12 - Method of travel to work Didcot today (14,200 residents in employment)

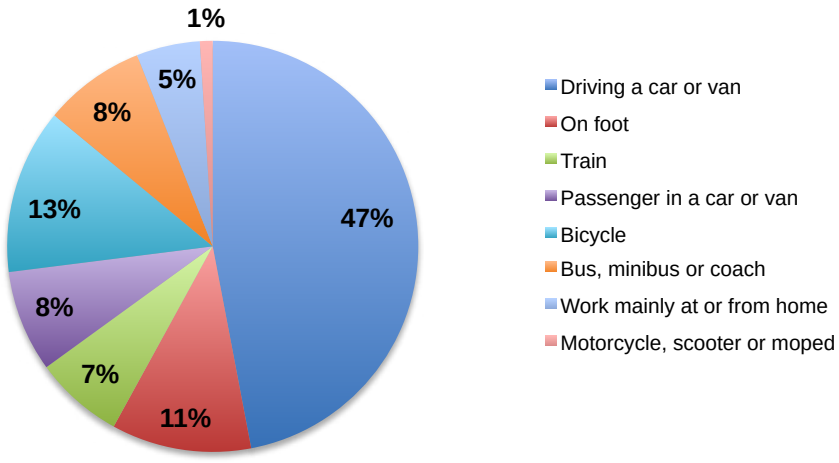


Figure 5.13 - Method of travel to work Garden Town 2031 target

Investment strategy, a balanced approach

To achieve this target a balanced approach to investment is required. The existing transport plan has identified a number of strategic infrastructure projects that require investment by 2031. The town requires that investment for its existing and new strategic transport infrastructure to address the issue of growing congestion and growth. This investment is primarily related to new roads and bridges (see later section) with the assumption that transport choices will change little over time.

If the desired change in movement choices is to be achieved, the investment in strategic infrastructure needs to be balanced with a new garden town sustainable infrastructure fund. The existing transport plan initiatives will be supported by the strategic infrastructure fund whilst a garden town sustainable infrastructure fund will address transport choices.

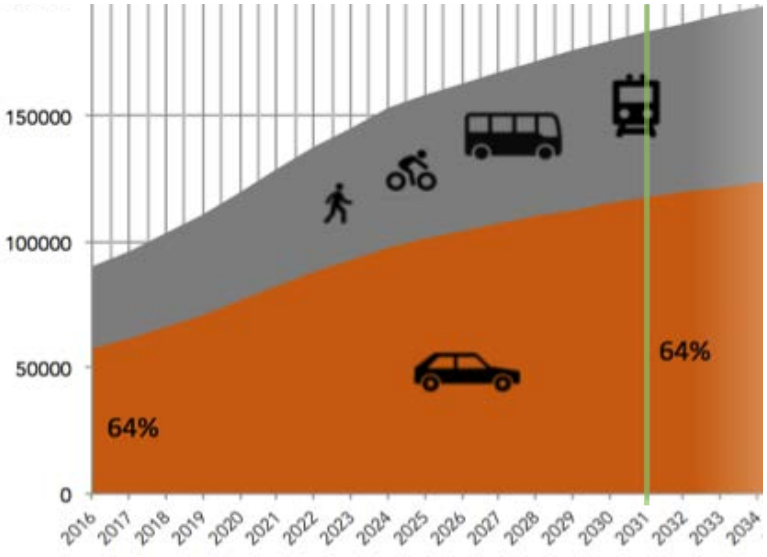


Figure 5.14 - Total number of journeys per day growth scenario one - no change: investment focused on cars and building more roads

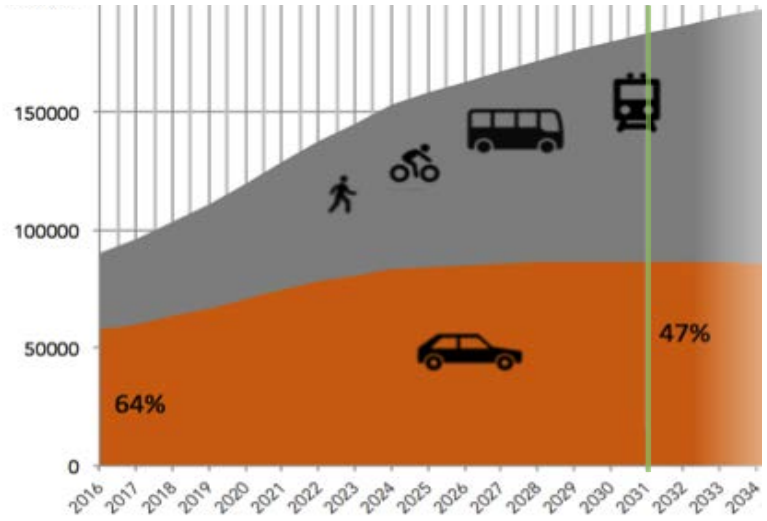


Figure 5.15 - Total number of journeys per day growth scenario two - investment shifting to other modes of transport and smarter journey planning

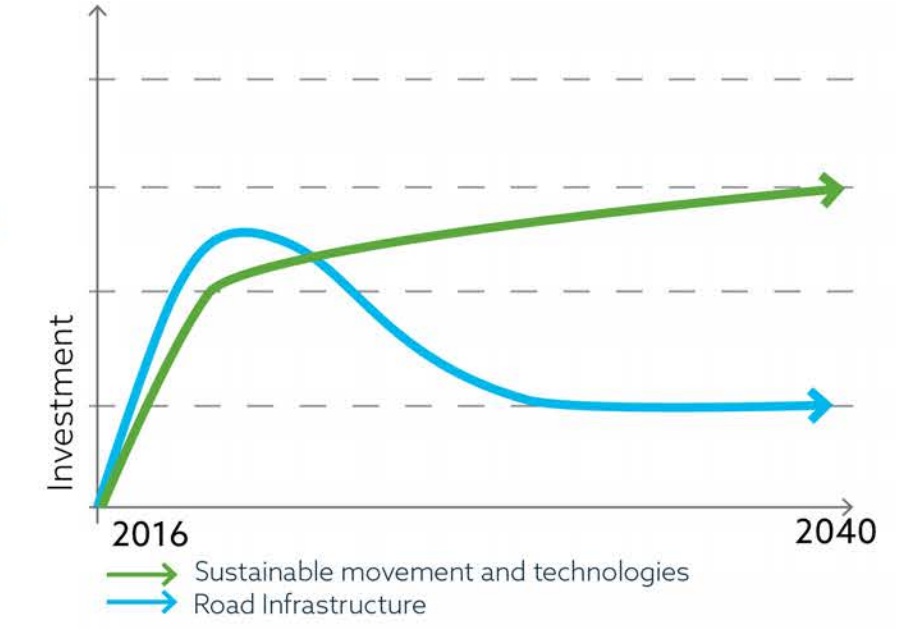


Figure 5.16 - Investment sustainable movement and technologies should be prioritised over investment in road infrastructure

A sustainable movement hierarchy

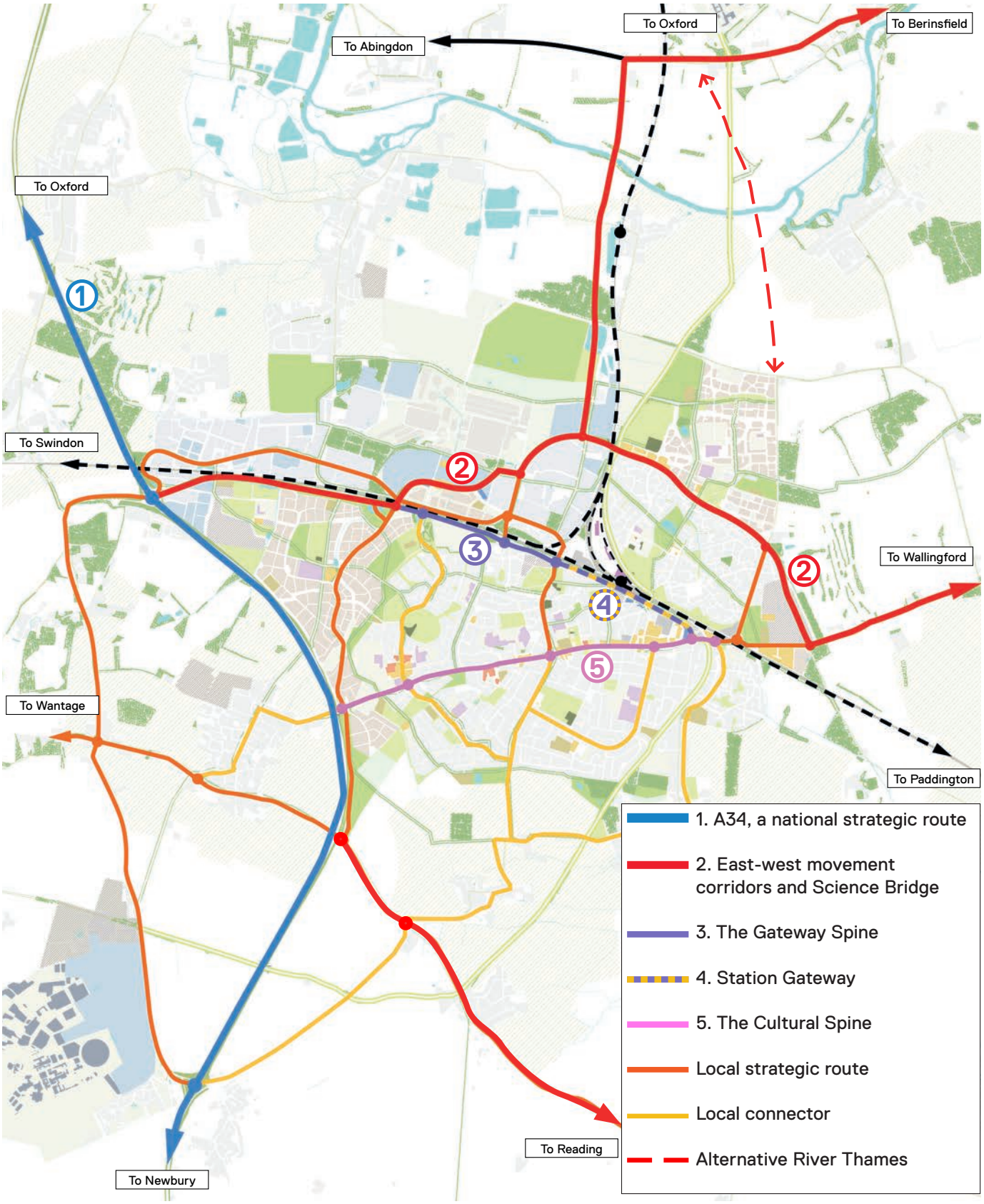


Figure 5.17 - Street hierarchy and summary of proposals

It is recognised that, in the short term, the choices people make in the way they travel are unlikely to significantly change. Despite this the masterplan and the movement strategies for the garden town are aimed at encouraging a shift away from reliance on the private car and towards other modes of transport.

Investment in new infrastructure to accommodate town-wide movement therefore needs to enable alternative modes of transport to become the preference for as many journeys as possible.

A clear movement hierarchy is needed to achieve this as local journeys, in particular, should be made by alternatives to the private car. The masterplan establishes this hierarchy through a series of interventions that develop the existing transport plan towards the sustainability targets embedded in the garden town vision.

- The top of the movement hierarchy is unchanged and is set by the A34, a national strategic route primarily dealing with north-south traffic movement, both to the town and past to Oxford and beyond
- The next tier is set by the east-west movement corridors. The first is a strategic route from the A34 through the town via the A4130 and the northern perimeter road to Wallingford. This is a route that will handle traffic that passes through and stops in Didcot and other forms of local movement within the town. This route offers relief to the town centre and station from the pressure caused by strategic traffic movement. The second route is the A417 and connects the A34 to Reading
- Below this, a series of local strategic routes interconnect the town, providing main connectors for traffic and bus routes
- Finally, shared streets near the station and Broadway interconnect all forms of movement in places with restricted vehicular access

Overlain on this hierarchy are two streets that form the radial movement back-bone to the plan (the Gateway Spine runs from the A4130 to Station Road and the Cultural Spine along Broadway to the town centre). These routes contain a bus network that serves the whole town, a greatly improved cycling network and a series of smaller scale transport hubs. These hubs form interconnections for all forms of movement and will help create a seamless journey experience.

Predictions of future levels of traffic in the town have, in the past, been based on an assumption that the number of car-based journeys will rise in line with population and economic growth in the region. The garden town strategy, by contrast, will accommodate all forms of movement.

More detailed transport modelling is now being commissioned as part of the garden town project. This modelling will enable different scenarios and assumptions on travel choices to be tested.

These, in turn, will enable a better understanding of the effect of transport patterns and how to phase and establish this movement hierarchy and promote the town's sustainable transport initiatives. Several 'early win' projects have also been identified. These projects are not dependent on this transport modelling and should be implemented now for maximum effect.

The Gateway Spine

The Gateway Spine corridor runs from the A34 to Jubilee Way. There are four movement characters along its length. From Milton Interchange to the northern perimeter road, the route handles a mixture of strategic and local traffic. Here the new corridor includes separate walking and cycling routes, two lanes for traffic and the potential for a segregated lane for public transport; a lane that in future could be dedicated to autonomous vehicles. From the northern perimeter road to Station Gateway the route changes slightly but still accommodates walking, cycling traffic and a segregated public transport route. At Station Gateway the route changes character. Here there is a much higher priority for pedestrians within a shared space in front of the station. After the station square the corridor returns to the same form as the western arm.

The Gateway Spine and its four movement corridors

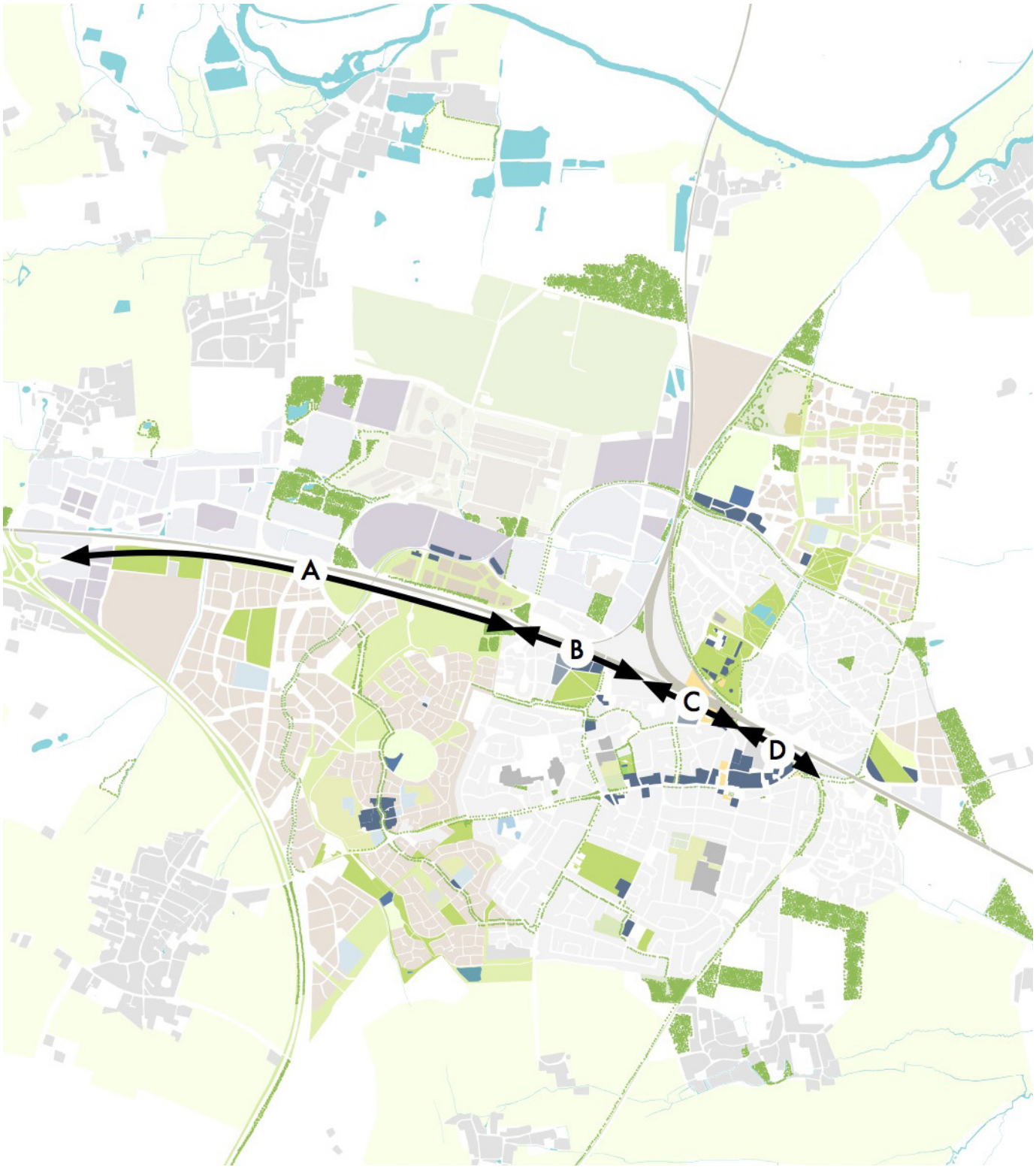
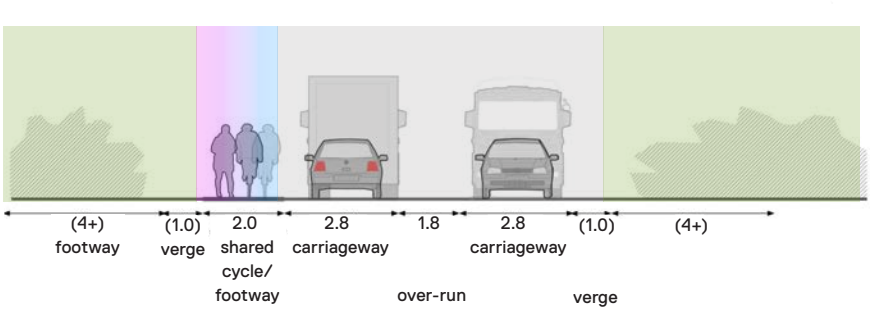


Figure 5.18 - The Gateway Spine - a new access route to Didcot Garden Town centre

Gateway Spine - Movement character area A

Existing



Aspiration

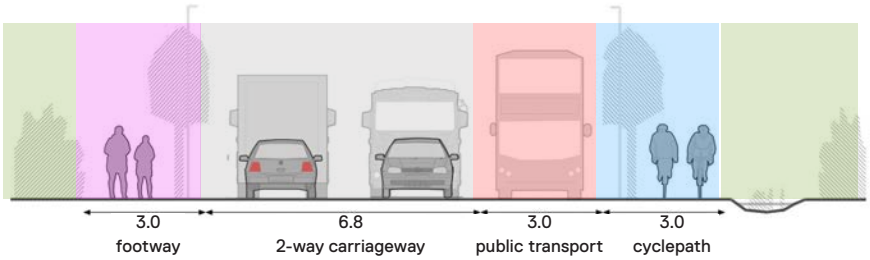
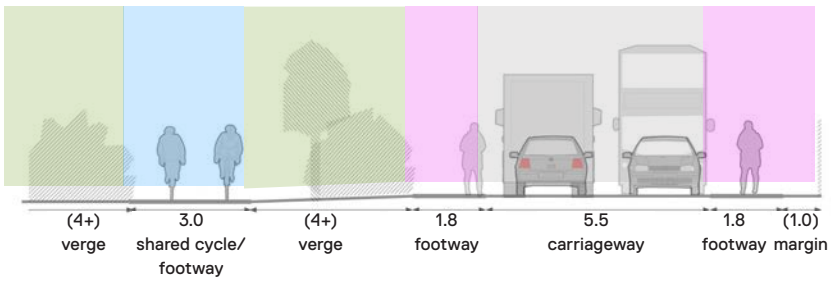


Figure 5.19 - Section A From Milton Interchange to the northern perimeter road

Gateway Spine - Movement character areas B

Exisiting



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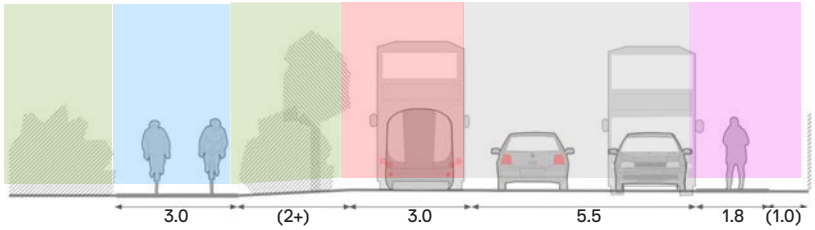


Figure 5.20 - Section B the northern perimeter road to Station Gateway

Carriageway
Footway
Verge
Cycleway
Public transport/ smart vehicles

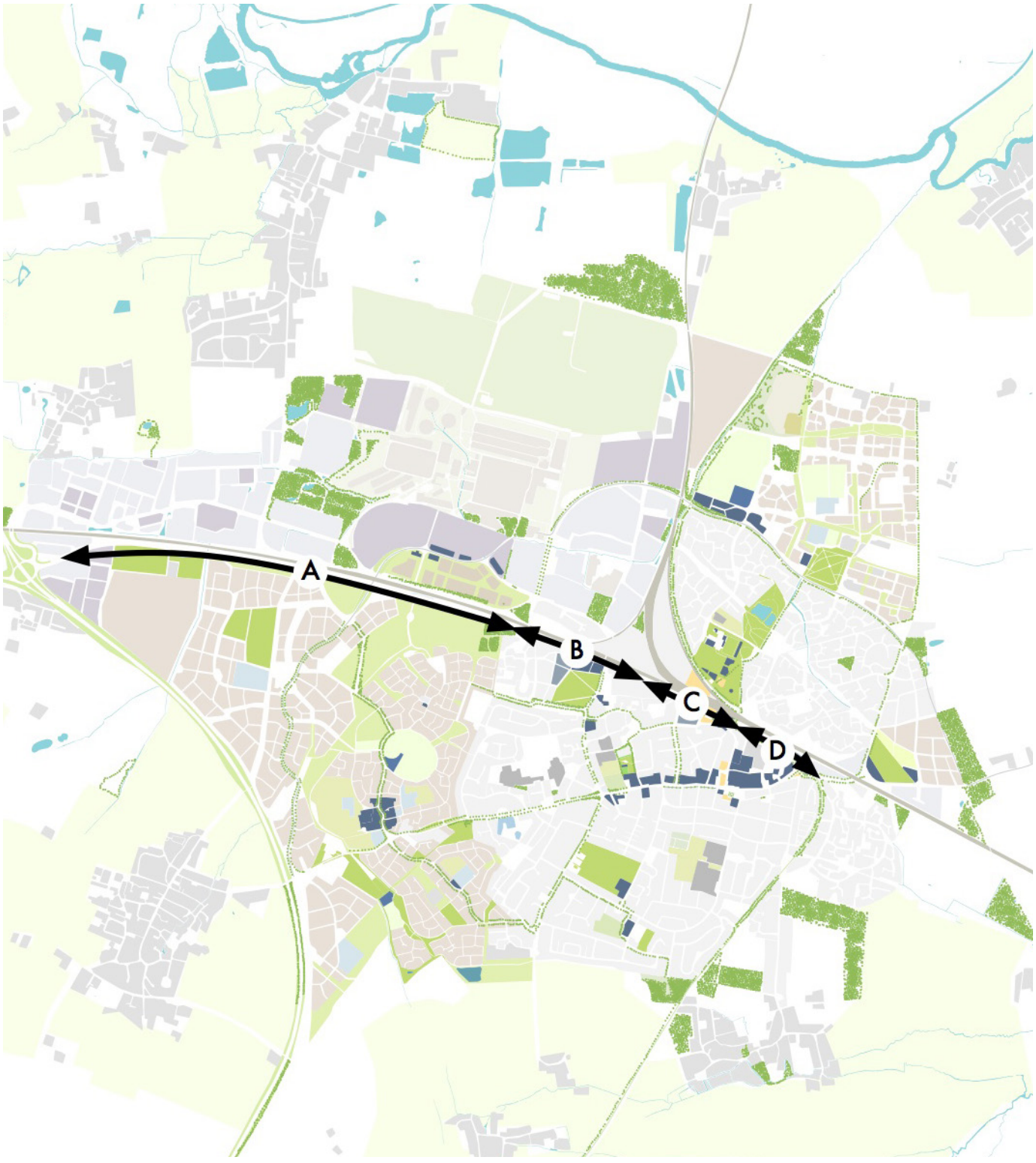
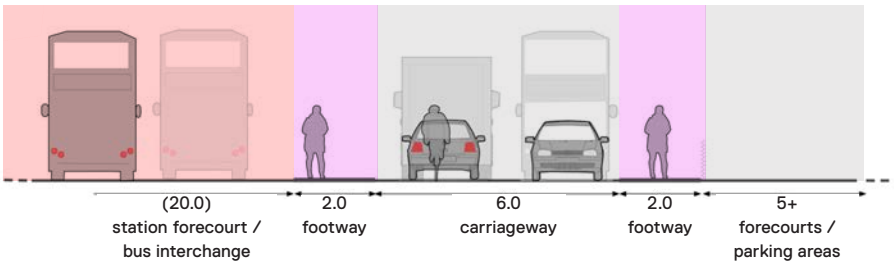


Figure 5.21 - The Gateway Spine - a new access route to Didcot Garden Town centre

Gateway Spine - Movement character area C

Existing



Aspiration

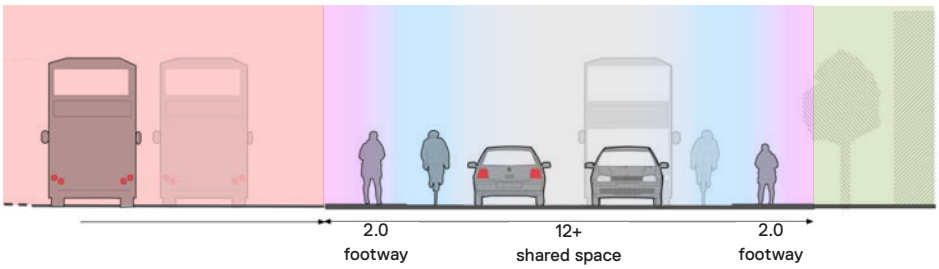
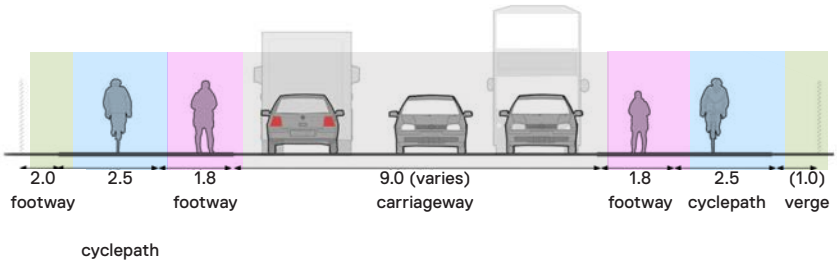


Figure 5.22 - Section C Station Gateway

Gateway Spine - Movement character area D

Existing



Aspiration

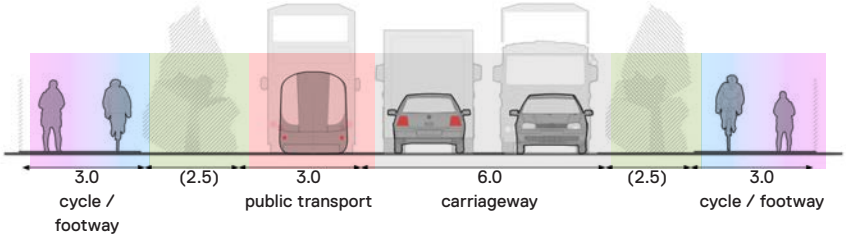


Figure 5.23 - Section D Station Gateway - Jubilee Way

Carriageway
Footway
Verge
Cycleway
Public transport/ smart vehicles

The Cultural Spine and its two character areas

The Cultural Spine

The Cultural Spine runs from the A34 to Jubilee Way. Here there are two character areas that focus mainly on providing new segregated cycling routes. Between the A34 and Broadway the corridor has separate walking footpaths with cycleways adjacent to the main carriageway which handles two lanes of traffic and public transport (mixed).

Looking to the future

The Cultural Spine and the Gateway Spine are main radial routes into the centre of Didcot. They are historic routes that form key movement corridors into and out of the centre. The garden town team have shown how they can adapt and change to accommodate new movement over the coming years. Beyond then they must remain as key radial links as they are corridors that can accept change. These are the routes that could accept much more significant transport proposals as Didcot continues to grow into the future.

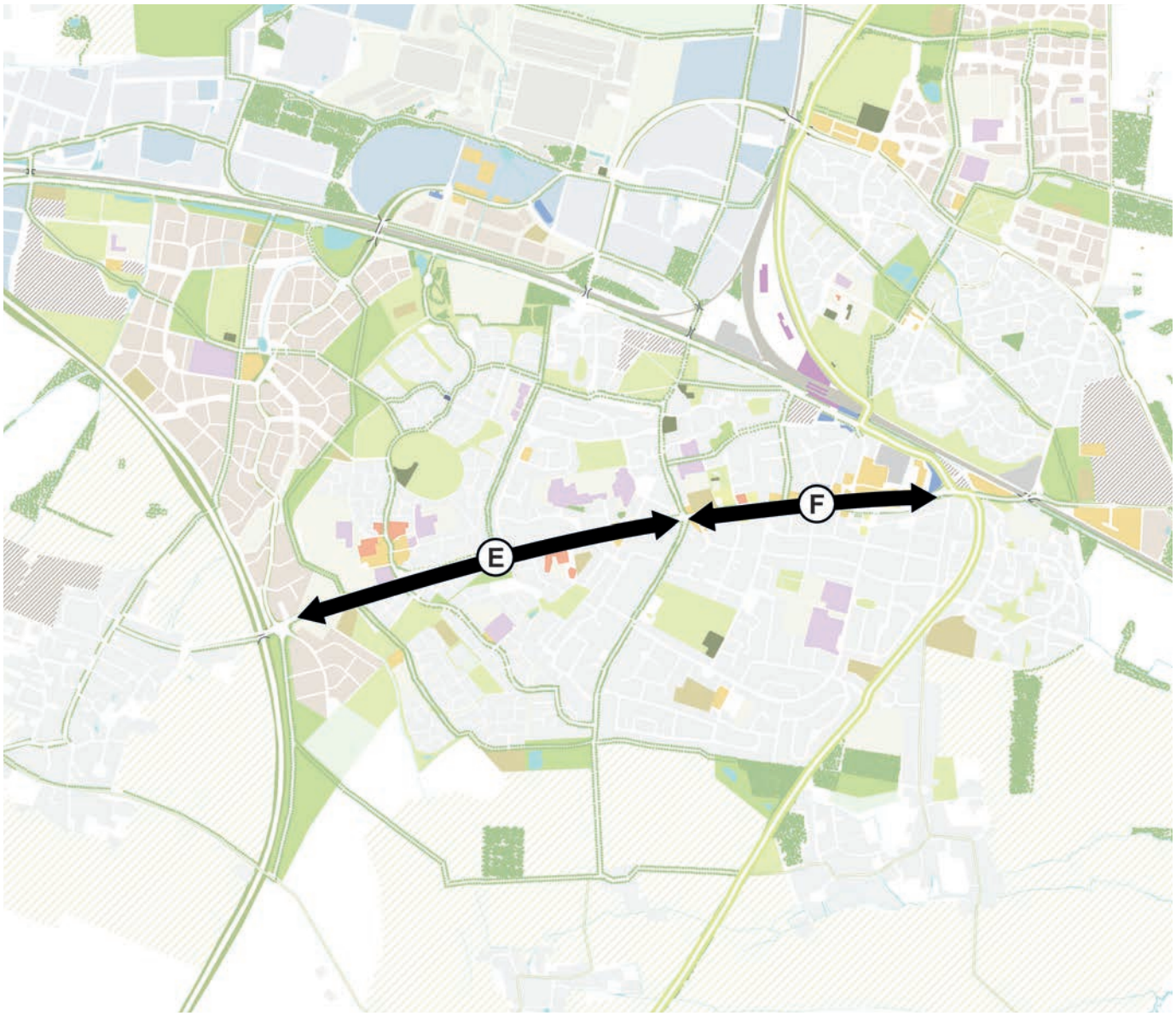
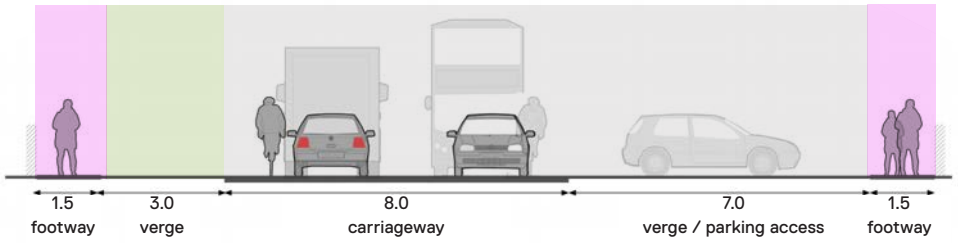


Figure 5.24- The Cultural Spine - a new multi-use street at the heart of Didcot town centre

Cultural Spine - Movement character area E

Existing



Aspiration

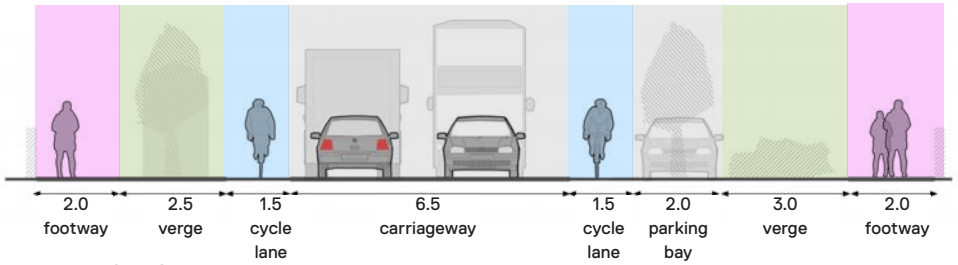
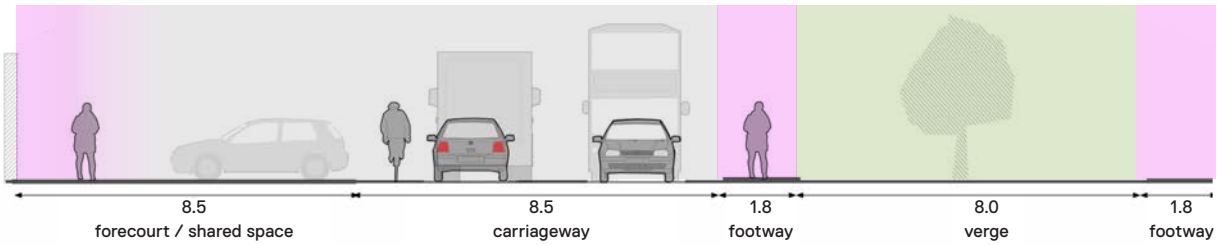


Figure 5.25 - Section E A34 - Broadway

Cultural Spine - Movement character area F

Existing



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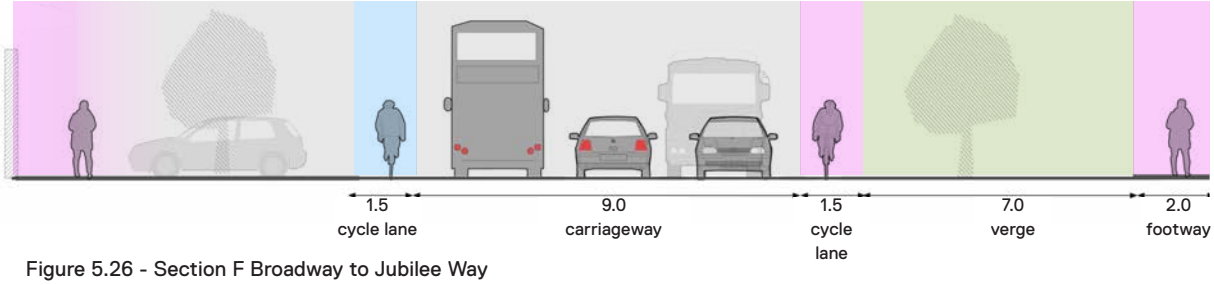


Figure 5.26 - Section F Broadway to Jubilee Way

Carriageway
Cycleway
Footway
Verge

5.1.5 Increased investment in public transport

Currently, bus services in the town are a combination of inter-urban services, local loop services and a dedicated private service between Didcot Station and Milton Park.

A strategy for improved services has already been proposed by Oxford County Council and is to be implemented as part of the S106 planning agreements reached with various developers. Clearly this is a very positive start to the important process of encouraging more car journeys to be replaced by bus in future. The routing of future services has been included in the garden town masterplan.

In support of the bus strategy the Didcot Garden Town team believe that there are simple measures that can be put in place to both improve bus patronage and increase the status of public transport in the town.

Often the journeys we take by bus are mixed and interrupted by simple issues that break our journeys into unconnected pieces. Walking to the bus stop, waiting in the cold, and having no place to leave a bike.

Micro hubs can transform bus stops into places of movement interconnection with the following attributes:

- Focused on micro interconnection
- Bike bus interchange with e-charging points and secure parking
- High quality shelters that can act as meeting places for social interaction

Another 'early win' in making the transition from a dependence on individually owned private cars could lie with car clubs, car pooling or the introduction of easily available short term hire cars.

Micro hubs - developed around the town at places like school gates where people meet.

Places that form the focus for social interaction.

New local urban centres that can bring together:

- Cycling and e-bike charging points
- Comfortable places to wait for your bus
- Information about local transport within one place

Micro hubs

Cycle racks and e-bike charging points

With high quality bus shelters

Transport information

@

New local centres

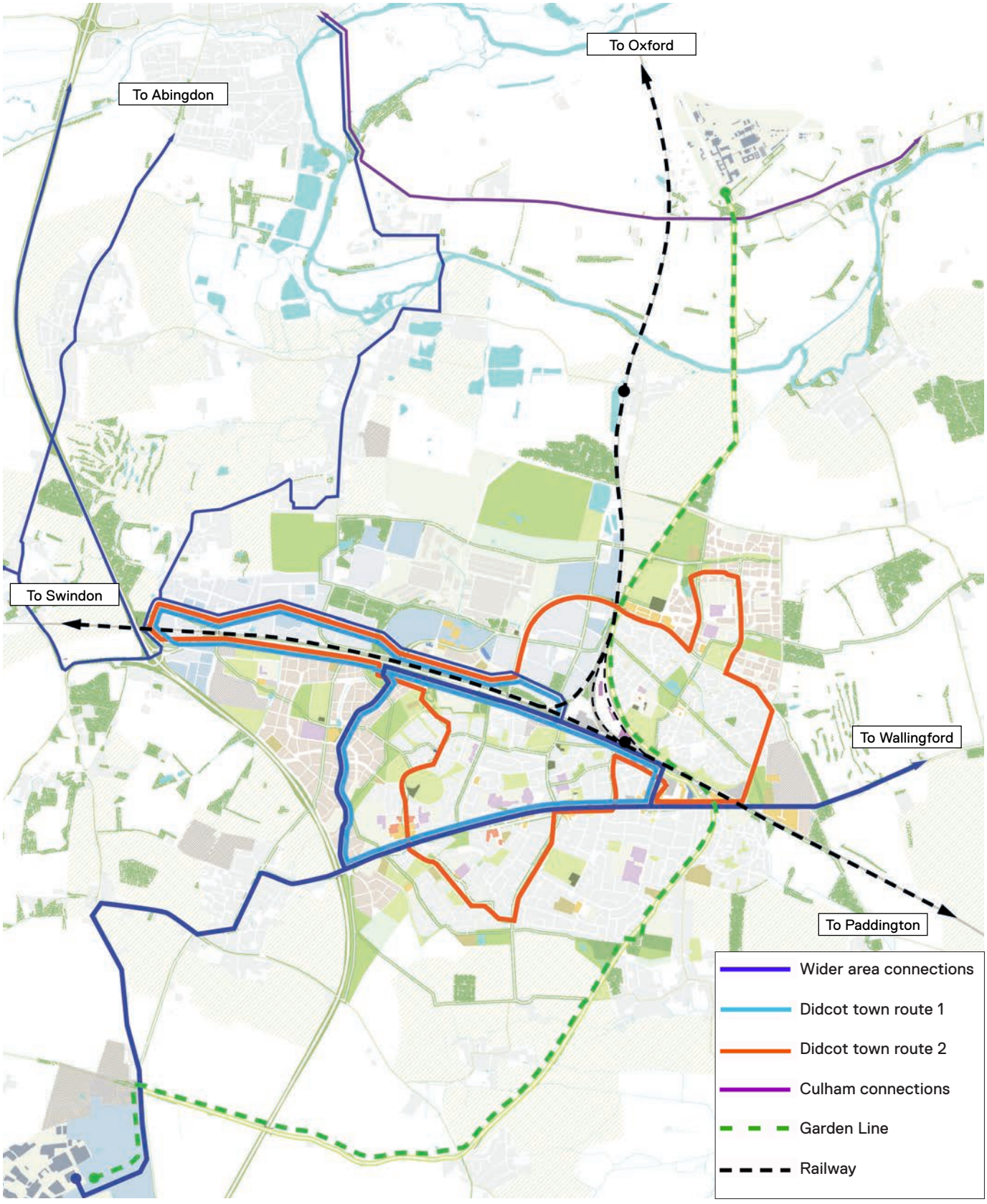


Figure 5.27 - Bus network

5.1.6 Enhanced cycling opportunities

Cycling within the town

There are major opportunities to promote cycling within the town and in the wider region. This untapped potential could form the movement backbone for the garden town. The size and topography of Didcot are ideal for cycling and its location is excellent to promote cycling as a preferred mode of transport around the town and beyond. The routes are also ideal to connect places, both north/ south and east/ west.

As well as improving routes within the garden town, improving routes into the countryside and nearby towns, such as the Didcot to Abingdon cycle route will also be important.

Whilst there are some good cycle routes in the town at the moment, they are often unconnected and contain potential hazards - simple points that are easy to fix. So these proposals are based on improving the existing network with enhancements and additions in several places.

Connecting Culham and Harwell - the Garden Line

Part of the cycling network is a new connection between Harwell with Didcot and Culham. The Garden Line is a new cycle route between these

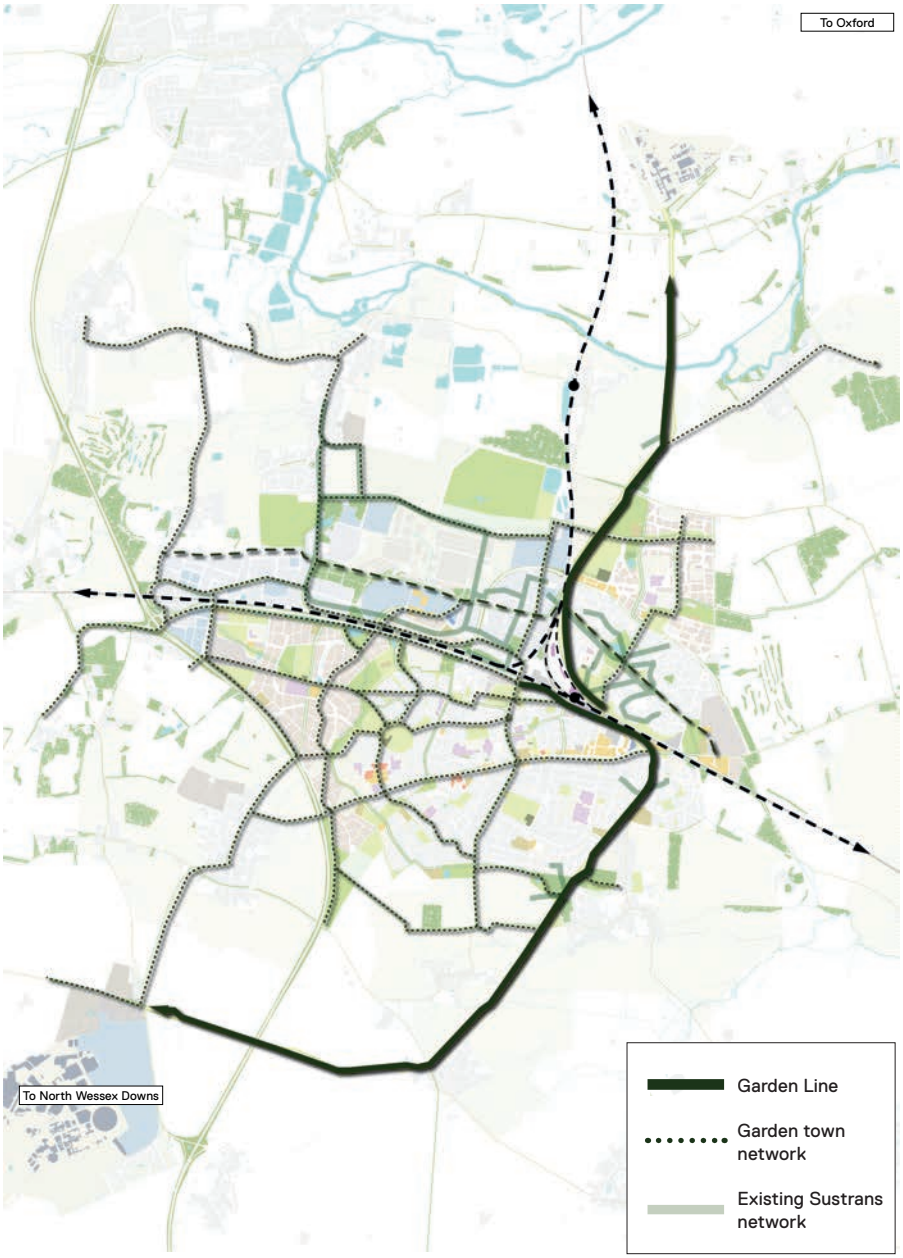


Figure 5.28 - Proposed cycling network

Cycle hire can evolve to e-bike hire and charging © UES

E-bikes in Copenhagen © Jon Ram Bruun-Pedersen

places. Much of the route to the south of the River Thames exists and only requires comparatively modest infrastructure intervention to make it very attractive to use.

Improvements to the cycle network are:

1. New river crossing and upgrading route to Culham

2. New bridge over Oxford railway line to connect northern areas of Didcot

3. Improvements to route under northern perimeter road including widening and installation of lighting

4. Widening of wheeling channel over new railway bridge

5. Upgrading of Cow Lane underpass to provide pedestrian and cycle only route

6. Improvements to connection between Hadden Hill, Jubilee Way and Broadway

7. Improvements to route, including widening, resurfacing, connections to adjacent residential areas and installation of intelligent lighting

8. Improvements to track connecting to Blewbury

9. New ramp connection between cycle route and main road

10. Improvements to track over A34 and link to Harwell

11. General improved provision for cycling across the garden town that includes:

- Covered and secure cycle parking facilities at all key destinations, including shopping areas, bus stops, businesses and the station
- Development of the cycling network to promote e-bikes, including facilities for communal charging of electric bikes in public places, in new homes and at key employment, shopping and leisure destinations
- Improvement of the existing cycle hire scheme based at Didcot station
- Long term proposals to improve the route between Didcot and Milton Park to premium cycle route standard also exist. These propose a new section of cycle track along the B4493 to provide a better alternative to using Basil Hill Road, where the railway bridge creates less than ideal conditions for cycling. The link through from the A4130 has been secured as part of the Didcot A development.

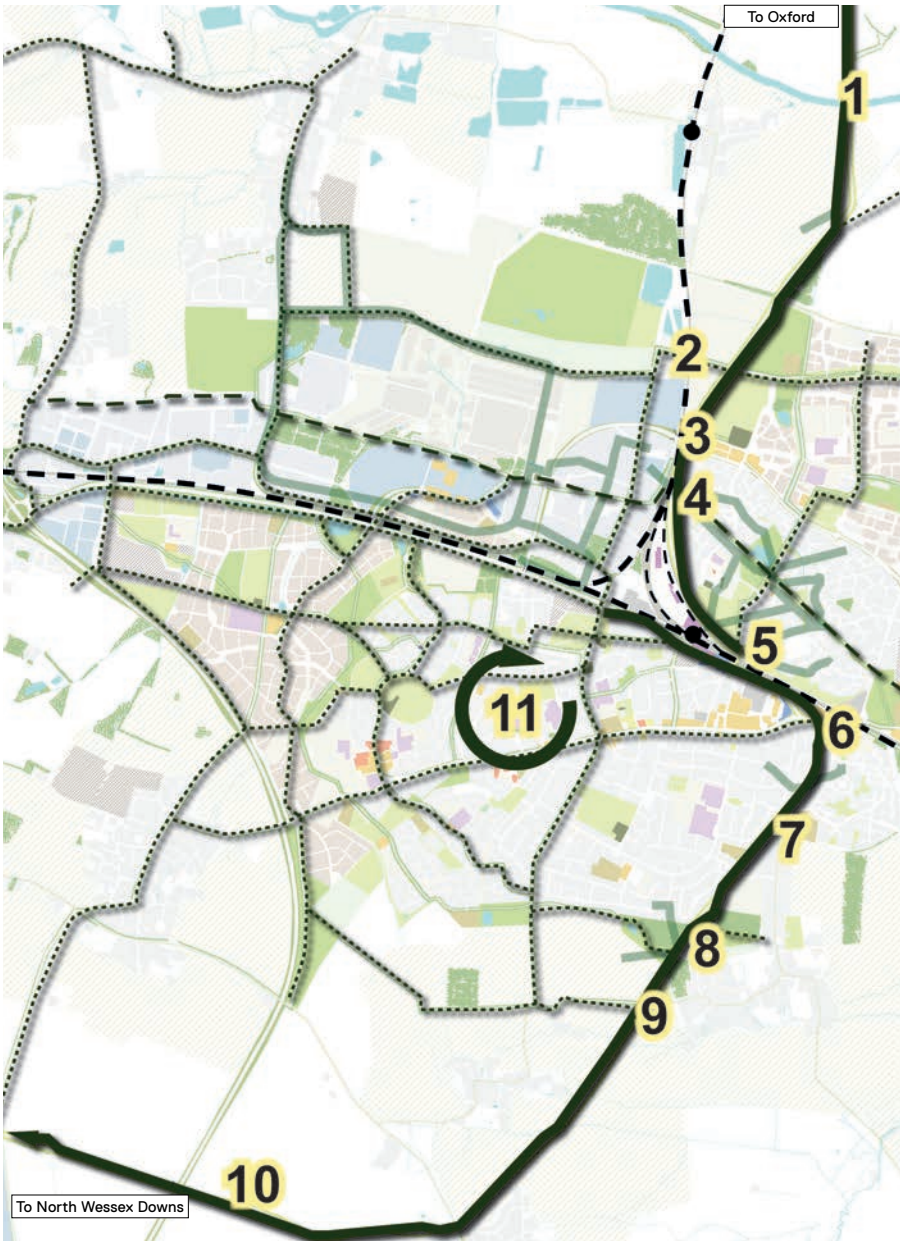


Figure 5.29 - The Garden Line A new cycling route between Harwell, Didcot and Culham

5.1.7 Technology and the future

The garden town team is the beginning of a technological revolution. Lives are changing quickly as new technology unfolds and gives access to an increasing platform of knowledge. Transportation technology is also moving at a fast pace, that in many ways is ahead of physical changes being made 'on the ground'. Private vehicles currently run on carbon intensive fossil fuels will soon give way to part automated vehicles powered by alternative sources, including electricity and hydrogen.

Now is the time for the garden town to embrace evolving technology to both enhance sustainable travel patterns and improve the quality of existing ones.

Smart travel

Smart travel is established within Oxfordshire. The garden town embraces that initiative and puts forward thinking in technology at the core of its transport strategy. For transport technology there are three areas requiring immediate development and investment They are information technology, connected ticketing, and future proofing. Given the right early investment, these are quick wins that offer much to a future of sustainable movement in the garden town.

Information technology

Journeys are often complex, potentially requiring the use of different modes of transport by different members of a household at different times of the day. That complexity can easily lead to a simple choice of traveling by car: a choice that is often made because of lack of information on alternative ways to travel. The plan recognises that information needs to be available to all when choosing how to travel.

The garden town vision offers the opportunity to develop information systems that are being established across the county and are now common in larger towns and cities. These systems can form the basis for future travel: an information system that "optimises everything that moves people and goods around the UK".

Smart, multi-use integrated ticketing, Oyster in London and Swift in West Midlands © UES

Connected ticketing

Connected ticketing is now common place in many towns and cities. The Oyster card in London is one example of a system that allows a user to make a single purchase for many journeys. It enables a single means of payment for combined trips by different modes and by different operators to simplify journeys. Linking to information technology through journey planning gives added benefits allowing comparisons be made between the cost of making a similar journey by private car (running costs, parking charges, etc). It facilitates simple informed choices on the most economical way to travel.

Future proofing - autonomous vehicles

The garden town is also at a point of change in vehicle technology. New infrastructure needs to accept that vehicle types will change and adapt. Automated vehicles are already under trial on the Greenwich Peninsula and driverless cars are under development now. It is highly likely that technologies associated to these new forms of transport will progress rapidly over the next few years and their acceptability will grow.

The garden town team have developed an infrastructure strategy that can adapt and grow to meet these changes. The Garden Line provides an ideal opportunity for movement to evolve from a walking and cycling link to a dedicated route for autonomous vehicles, making direct links between Harwell, Didcot and Culham via a new Didcot Station. The Cultural Spine and Station Road will also have flexibility to accommodate change over time.

Car clubs are now common across the UK, autonomous vehicles are being tested on the Greenwich Peninsula in 2016 © TFL Gateway Project

Traffic modelling

Our understanding of movement patterns is changing. The garden town recognises that one key challenge in the future lies in obtaining a better understanding of movement patterns.

A detailed micro simulation traffic model is currently being commissioned to assess growth and phasing. This model will form the foundation for future work on movement. The model will be unlike traditional traffic models that provide an aggregated representation of traffic, typically expressed in terms of total flows per hour. Here the garden town team will have the ability to analyse complex highway junctions and congested networks by giving a visual representation of the proposed effects on traffic operations. It will be a model that is understandable by all. Through this new process the impacts of developments and the phasing of new infrastructure will be analysed in much greater depth. Options can be assessed for effectiveness and the impacts of alternatives to the car can be compared so investment streams become optimum for the garden town vision.

This type of modelling is also particularly suited to development, testing and evaluation of the intelligent transportation systems (ITS) that are envisaged in the garden town. These systems can interact with vehicles providing responsive signal control, public transport priority and reactions to vehicles approaching junctions.

The pace of technological development shows no sign of reducing (chapter 7). New ITS: road side instrumentation, satellite powered GPS, in-car equipment and roadside-car communications are also increasing, providing new opportunities for data collection that can be used for much better model calibration and detail.

These sources of greater knowledge and information will grow as part of the increased awareness in technology within the garden town. That knowledge will give much greater certainty on infrastructure choice and support funding choices that is needed for delivery.

Intelligent traffic modelling will change movement patterns and travel choices © UES

Parking

Most of Didcot's urban environment is currently dominated by space taken up by parked cars. The change from a 'carless' society to a car dominated one has happened in less than 60 years. But the urban legacy that car dominated planning will leave will last much longer. The next few decades will see great changes in our attitude to cars. Driverless car technology is well advanced and autonomous vehicles will be a normal sight our streets within a lifetime. The garden town recognises that our approach to car parking needs to change.

In the short term the need remains to park cars efficiently within both residential and commercial areas. The design and planning of these areas, however, should allow for future adaptation to changing modes of transport and travel patterns. The garden town promotes plans that can accept present conditions but are also adaptable to change in the future. These places should incorporate the best in parking management and technology. From the widest perspective, parking should promote movement for all, including the Oxfordshire County Council's blue badge system, along with pre-booking management at public facilities and information technology on space availability.

In the medium and longer term the garden town will have parking schemes that are more common place in many developed urban centres, whereby land values create dense urban spaces and spaces are shared between different users.

We are seeing this change happen in Didcot, as decked parking is coming forward at the station. Elsewhere car stacking and modular car parking are common place. As well as altering our behaviour and attitudes to parking, these developments allow more compact and walkable places to evolve. These types of developments are at the core of the garden town's long term vision.

The Garden Line

The Garden Line can be phased, so the first part between Harwell and north Didcot is an 'early win'. This project can adapt and grow as a new autonomous vehicle route between Harwell, Didcot and Culham at a later stage.

More information about this project is set out in the chapter 9.

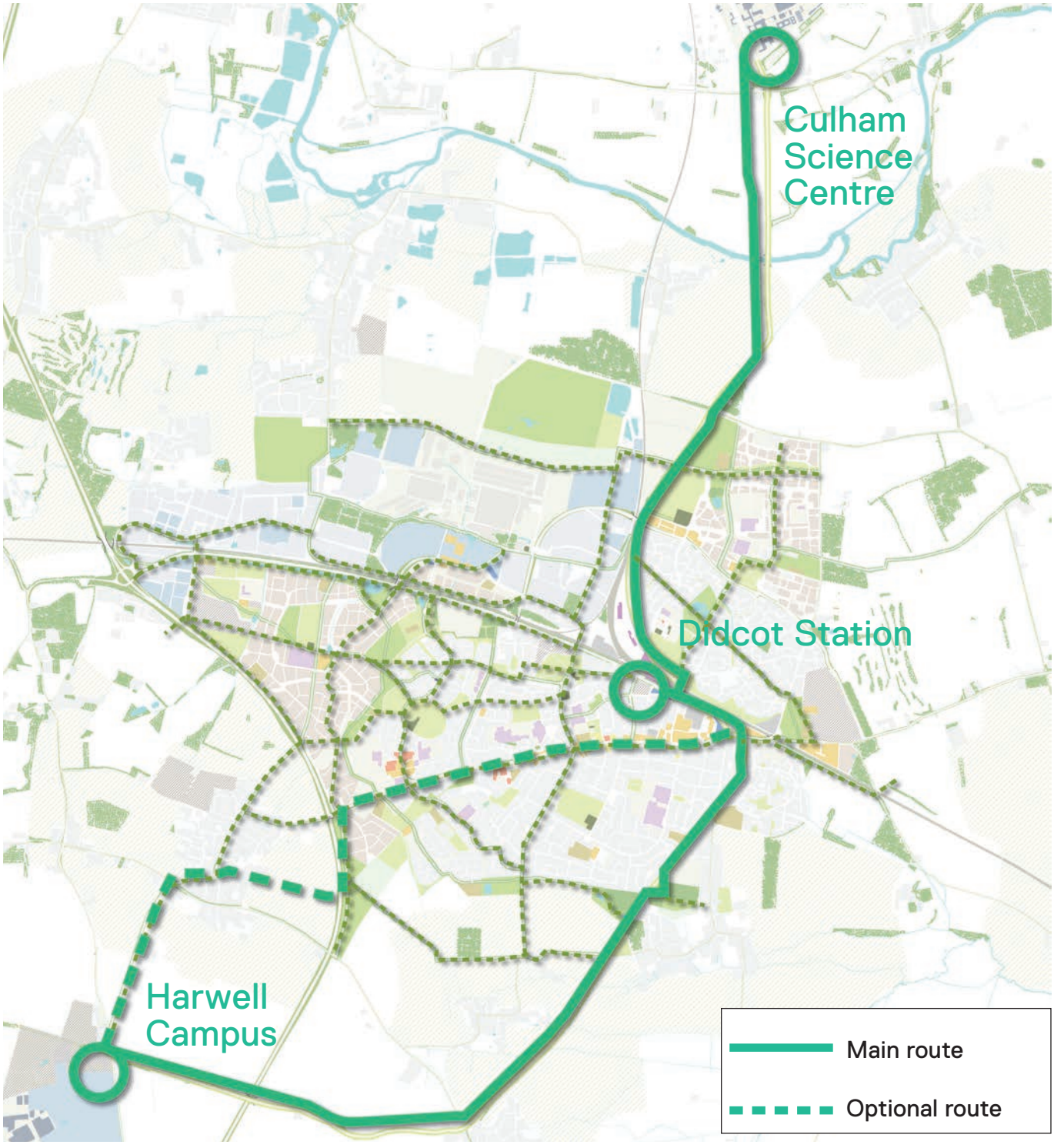
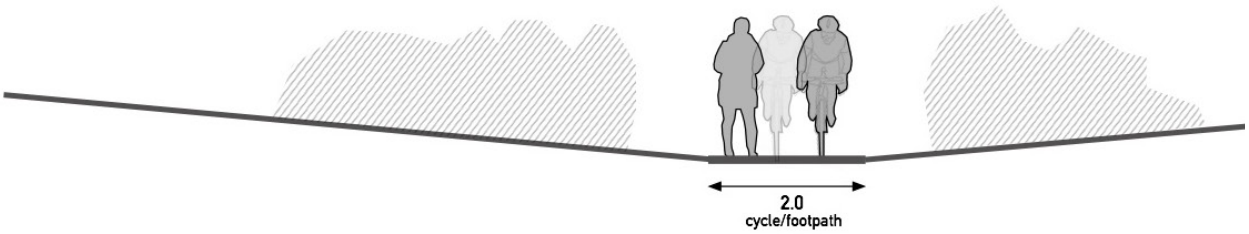
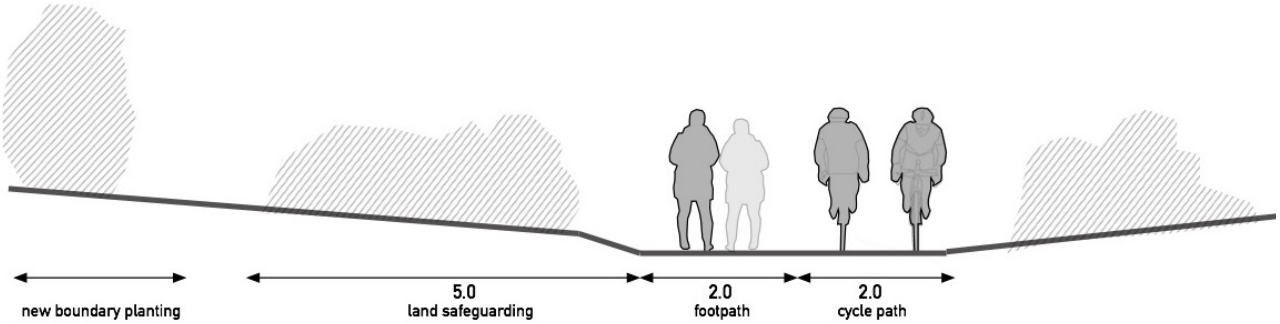


Figure 5.30 - Autonomous vehicle routes

Existing



Improved cycle route



Autonomous vehicle route

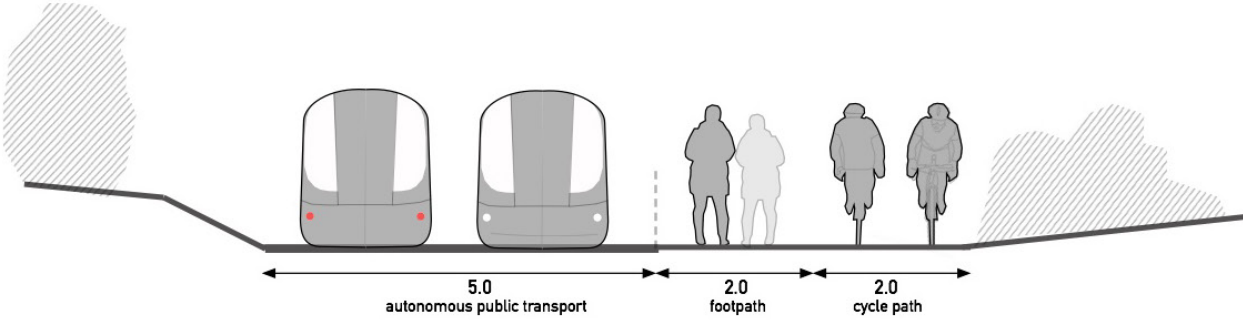


Figure 5.31 - Currently proposed infrastructure schemes

5.1.8 Transport infrastructure phasing

The transport infrastructure associated with the growth of Didcot will be phased over the plan period. There is a strong link between the delivery of infrastructure and the acceleration of housing growth and economic development in areas of high growth like Didcot.

Infrastructure projects range from quick wins, like cycling improvements, that can be completed in the short term through to more significant changes such as the River Thames crossing which will come later. The garden town team have summarised the proposed infrastructure phasing in three periods:

the first a five-year period from 2016 to 2020, the second a ten-year period from 2021 to 2031 and the last one post 2031.

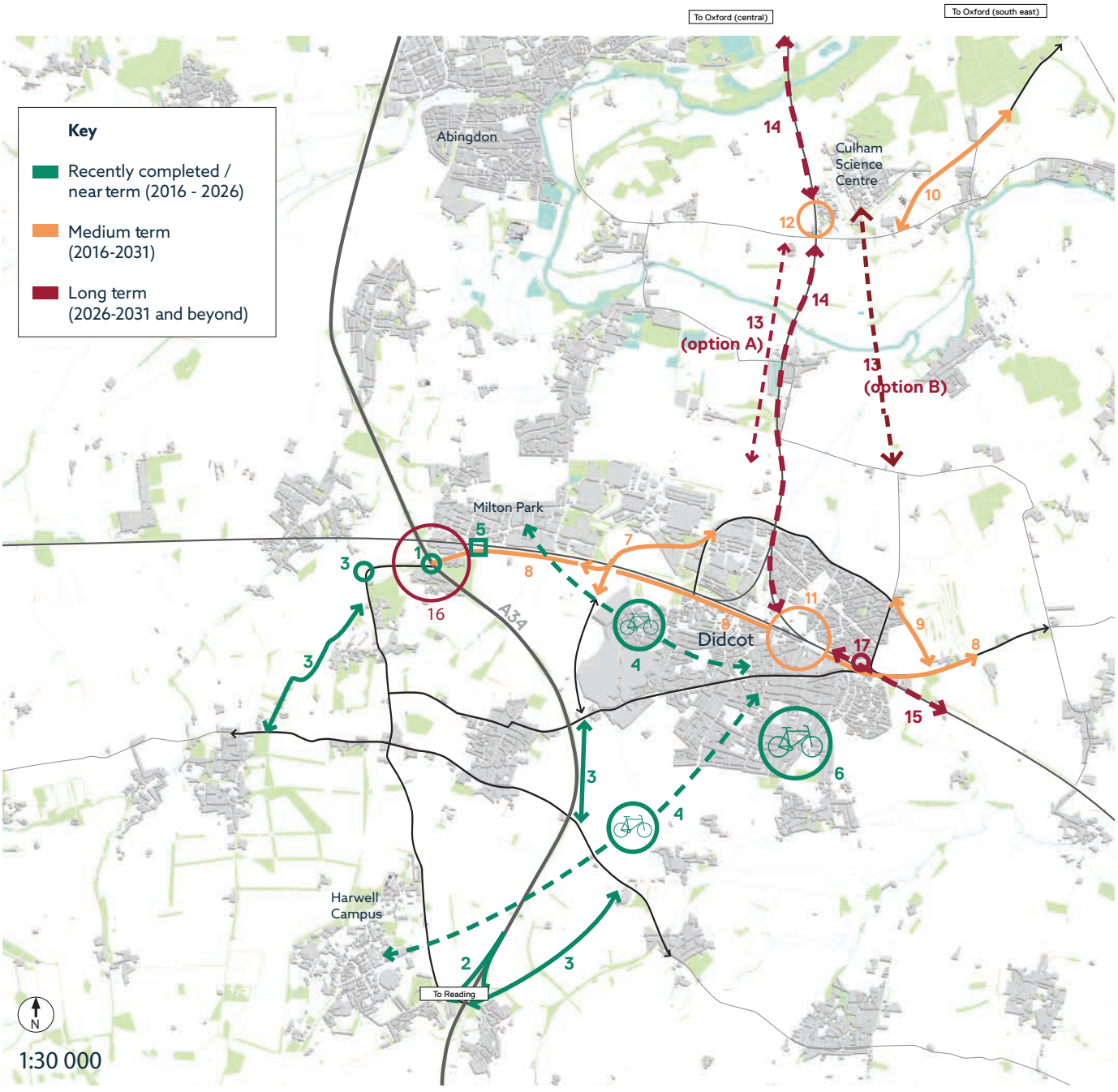


Figure 5.32 - Currently proposed infrastructure schemes

Infrastructure schemes - present and future

Recently completed/ near term (2016 - 2026)

1. Milton Interchange junction improvements
2. Chilton interchange junction improvements
3. Access to EZ areas, including Hagbourne Hill, Featherbed Lane & Steventon lights, Harwell link road
4. Cycle network improvements to Harwell Campus and Milton Park
5. Backhill Lane cycle/ pedestrian scheme
6. Sustainable transport package: Cycle route maintenance and improvements within the garden town

Medium term (2016-2031)

7. Didcot Science Bridge A4130 capacity improvements
8. Central Didcot transport corridor
9. Didcot northern perimeter road
10. Access to Culham Science Centre
11. Didcot Station interchange
12. Culham Station improvements

- Public transport infrastructure within the garden town
- Implementation of car parking strategy within the garden town

Long term (2026-2031 and beyond)

13. New River Thames crossing
14. Four tracking railway between Didcot and Oxford
15. Railway junction grade separation, east of Didcot

Not currently planned or set out in the existing infrastructure delivery plan:

16. Milton Interchange - north facing slips directly linking A34 and Milton Park
17. Redevelopment of existing Didcot Station or potential relocation to the east

Recently completed / near term (2016 - 2026)
Significant highway improvement projects and the start of improved cycling and public transport initiatives.

Medium term (2016-2031)
A balance of investment in highway and more sustainable forms of movement.

Long term (2026-2031 and beyond)
Highway and railway investment in regional connections with a greatly enhanced investment strategy for sustainable forms of movement within the garden town.

Additional garden town infrastructure

Quick wins

- Multi-use transport model for the town to assess overall phasing and delivery
- Enhanced cycling network
  Implementation of micro hubs

Near Term (2016 - 2026)

- First phase of the Garden Line (Harwell to north Didcot)
- Implementation of smart travel with a package of investment in new technology

Medium Term (2016-2031)

- Second phase of the Garden Line (north Didcot to Culham)
- The Cultural Spine
- The Gateway Spine
- The east-west movement corridor

Long Term (2026-2031 and beyond)

- Development of the Garden Line for autonomous vehicles

Figure 5.33 - Proposed infrastructure projects

5.2
Grey infrastructure

Berks Bucks and Oxon Wildlife Trust Lake and Didcot Power Station © RWE

5.2.1 Utilities

With significant growth planned for Didcot Garden Town, it is essential that the utilities infrastructure can support the increased demand for connections and capacity.

A review of the baseline situation has been carried out followed by an assessment of the impact of the proposed growth on the utilities networks. The key utilities companies have been consulted to understand what upgrades are proposed to support the growth and to ensure that they are fully informed about the scale, locations and build programmes for the growth to allow them to plan their asset management effectively.

Existing utilities

Sewerage network

The majority of the sewerage infrastructure is the responsibility of Thames Water with the exception of the partially completed Great Western Park development which is currently serviced by SSE Water.

The Didcot drainage catchment is approximately 45 km2 and is situated approximately 16 km south of Oxford. The catchment includes Didcot town centre, Blewbury, Chilton, Dene Hollow, Harwell, Milton Hill, Upton and both East and West Hagbourne.

The majority of Didcot town sewers drain under gravity via three crossings underneath the west coast mainline railway (375mm, 600mm and 1200mm diameter) before discharging at the Sewage Treatment Works (STW) which is located between the power station and the railway station. Flows from Milton and Ladygrove require pumping stations to transfer the waste water to the STW.

A drainage strategy for Didcot was undertaken by Thames Water which identifies the catchment system to be foul only. However, over time this has suffered with ingress from groundwater and surface water connections, which means that the sewage treatment works has to deal with additional flows that may not require treatment.

Didcot STW deals with the domestic and industrial flows from Didcot as well as outlying villages. The STW currently serves a population equivalent of 37,000 and provides preliminary, primary and secondary treatment as well as biogas generation.

Surface water network

The data received from the utilities companies indicates a limited surface water network within the town, with the exception of the Ladygrove development. It is likely that where there are drains, these discharge to local drainage ditches and culverts throughout the catchment. The network at Ladygrove is shown to discharge via multiple outfalls to Ladygrove Brook.

Details of the highways drainage network are not available but these are thought to discharge to the Thames Water sewerage network.

Potable water

The majority of the potable water network is the responsibility of Thames Water with the exception of the partially completed Great Western Park which is the responsibility of SSE Water.

Didcot is supplied by several strategic water mains from the south-west and north-east ranging in size from 300mm to 400mm and are identified as ductile iron pipelines. These then feed into distribution networks throughout the town. There are currently three crossings of the west coast mainline railway through underpasses at Broadway, Cow Lane and Hitchcock Way. There is another crossing of the railway through a culverted watercourse.

Electricity

The regional electricity distribution infrastructure is the responsibility of Scottish and Southern Energy (SSE) for the Didcot Garden Town area. There are also National Grid owned assets for very high voltage electricity transmission across the country.

A feasibility study for the Planned Housing Growth in Oxfordshire 2015 to 2031: Impact on the Scottish & Southern Electricity Networks Distribution Network issued by SSE in October 2016 stated that the Oxfordshire area is fed mainly from the 400/132 KV grid supply point at Cowley, which is operated by National Grid.

The feasibility study states that 132kV networks supply the Bulk Supply Point (BSP) at Drayton approximately 9km north of Didcot. At the BSP the supply is then reduced from 132kV to 33kV and supplied to the Milton primary substation approximately 3km west of Didcot town centre. At Milton primary substation 33kV is further reduced to 11kV and distributed through Didcot to local substations before being distributed to properties.

There is currently only one electrical vehicle charging points identified on the data received which is located at Orchard Centre near station road. The charging point is equipped with three pin 3kW and type two 7kW supply.

Gas

The regional gas infrastructure is the responsibility of Scotia Gas Networks (SGN) for the Didcot Garden Town area.

There are also National Grid owned assets for high pressure gas transmission across the country.

There are currently several national high pressure gas mains (responsibility of National Grid) crossing the Didcot Garden Town masterplan boundary from the north-east connecting to Didcot B Power Station (Didcot B). Didcot B is a natural-gas power generation plant supplying national grid.

There is an intermediate pressure main crossing from the west to the north through the town with a range of medium and low pressure gas mains shown throughout the town. These are used for distribution of gas to properties and are therefore the responsibility of SGN.

The records show a gasworks site which lies adjacent to the south-west of Ladygrove East. Further to discussion with National Grid gas and SGN it is understood that this site has been decommissioned as a storage site. However, all pipes crossing the site are still live.

Telecommunications

The existing UK telecommunications network is built up using a range of copper and fibre-optic cables with radio signals used for mobile phones. Fibre-optic broadband is the most reliable solution currently available within the UK. The existing town is served by both the Didcot and Rowstock telecommunications exchanges which are fibre enabled. Didcot exchange currently serves approximately 11,000 residential premises and 430 non-residential premises.

The Rowstock exchange serves approximately 3,400 residential premises and 360 non-residential premises. These exchanges are owned by BT Group and both of these exchanges are fibre enabled. The system comprises a fibre to cabinet system with copper cables from the cabinet to each property (FTTC). The existing network delivers fibre broadband from a range of providers and broadband speeds can be as high as 100Mbps, depending upon location and provider.

Openreach announced in November 2016 that they would deploy fibre to the premises (FTTP), free of charge, into all new housing developments of 30 or more homes. FTTP is a fibre-optic cable connection running from the telecommunications exchange directly to the user's home or business, providing a choice of broadband speeds up to 330mbps. It is understood that FTTP is available already in the Great Western Park new development.

The majority of the existing Didcot Garden Town masterplan boundary is served by the Virgin Media fibre-optic network. Virgin Media owns and operates one network, which it exclusively uses to deliver FTTP broadband at speeds up to 100Mbps to large parts of Didcot, and up to 120Mbps in upgraded areas.

The mobile network coverage is variable in the area, with the four major mobile network providers having masts within the town. Vodafone has ten masts in the area and provides the best coverage, with O2 also providing good coverage despite only having three masts within the area. EE and Three have a number of areas of poor coverage with the town.

Capacity for proposed growth

Sewerage network

Thames Water has confirmed that the wastewater network in this area is unlikely to be able to support the demand anticipated from the Didcot Garden Town developments, without upgrades and additional pipes being laid. These requirements are dealt with for each individual development through liaison with the developers to ensure that the necessary upgrades are installed so the network will have sufficient capacity when the developments are built.

To support the Great Western Park and Valley Park developments to the west of the town, a new sewerage tunnel has been installed under the railway, together with a pumping station, which is due to be commissioned early in 2017. The capacity of the sewage treatment works is planned for more strategically within the asset management plan of Thames Water. The sewage treatment works was upgraded in 2009 and currently has capacity to serve a population of 38,112. There is scope for further upgrades in line with planned growth to serve a population of 53,877 by 2021 and 63,392 by 2026. Section 5.3).

Potable water

Thames Water has identified potential concerns with the existing potable water network for some recent planning applications. There may be some upgrades to the network required locally to provide adequate capacity within the pipes for new developments. Thames Water resource management plan 2015-2040 has identified that there is a predicted water deficit in the region from 2020 onwards. The proposed mitigation is primarily demand management by metering and use of water saving devices, and also through leakage reduction within their own network.

There is currently an area 7km north west of Didcot which is safeguarded for a potential reservoir. This is a proposal that has been considered on a number of occasions to increase supply to the south east Thames Valley region, in particular London. The proposed growth in Didcot is small by comparison to the growth in the south east and does not increase the likelihood of this reservoir being constructed.

Electricity

SSE completed a feasibility study reviewing the impact of proposed growth on their network in October 2016. The feasibility study indicated that the existing Milton transformers will need upgrades to provide sufficient capacity. These upgrades are planned to start in 2017 for completion in 2019 and based on planned growth will have sufficient capacity to support the Didcot Garden Town.

Gas

There are no known capacity issues for gas supply in the area and no known plans for upgrades.

Telecommunications

There are no known issues with capacity within the existing catchment area for the Openreach network or the Virgin Media network and no known plans for upgrades at this stage.

The network providers will install the required cabling for each development as required and early consultation is key.

Opportunities

With a view to promoting sustainable growth and development there are several opportunities to mitigate the impact of the scale of growth in Didcot in terms of utilities. These include:

- Reduce the demand for potable water supply and foul drainage by use of water saving devices
- Reduce the demand for potable water supply by rainwater harvesting
- Reduce the demand for potable water supply and associated foul drainage by water metering
- Make use of renewable energy sources to reduce electricity and gas demand (see later section on renewables)
- Provide electric vehicle charging points using solar power generation
- Reduce demand for gas by increasing thermal efficiency of buildings
- Use FTTP technology in preference to FTTC as faster data speeds, which could encourage home working and reduce traffic
- Construct new mobile masts in the region with provision for shared use by different mobile companies.
- Assess the potential for local heat and electricity networks

The key to ensuring that the development and rate of growth of the garden town proposals is deliverable is early consultation and engagement with all utilities companies. This will mean that the companies will have access to the best and most up to date information on the build programmes and will allow them to plan effectively for the planned growth. The statutory undertakers have an obligation to provide connections to new developments, but the length of time that is needed to implement these upgrades means that it is vital for developers to consult with the companies at the earliest possible opportunity. As part of the Didcot Garden Town Delivery Plan the sharing of build programme information will be facilitated. The required information will be gathered by the garden town team for issue to the utilities companies at regular intervals.

5.2.2 Waste

The treatment of waste within the town, and the ability of the existing operations to grow to suit the proposed growth of the town, is key to delivering the garden town.

With significant growth planned for Didcot Garden Town, it is essential that the utilities infrastructure can support the increased demand for connections and capacity. A review of existing and required waste management infrastructure, existing and ongoing environmental services delivery and future utilisation of technology and innovation to support and enhance service delivery in a garden town environment has been carried out.

Policy background

As the waste collection authority (WCA) and principal litter authority (PLA) for the Didcot area, Vale of White Horse and South Oxfordshire District Councils have a statutory duty to ensure the collection of controlled waste and to keep its relevant land clear of litter and refuse as far as is reasonably practicable (as defined in section 89(1) of the Environmental Protection Act 1990). Oxfordshire County Council, as waste disposal authority (WDA), has the responsibility for the treatment and disposal of material collected by the WCA. Consideration is given to both national and local waste management policies and strategies in order to support and promote sustainable waste management practices within garden town developments.

At EU and national level this includes targets for recycling, and reducing waste to landfill, as well as legislation for controlled waste and waste separation.

At a local level, Oxfordshire's joint municipal waste management strategy aims to promote waste reduction and treatment of waste before disposal, as well as joint working across the area to save money.

Planning policy requirements for new developments are outlined and include:

- Details of waste containment to be provided to each property
- Confirmation that all waste containers must be stored within property boundaries without the need to go up/ down steps or through the property, and with suitable access points to allow for the presentation of waste for collection
- Consideration of internal methods of waste separation to support collection services, such as a two-bin system in kitchen areas for waste and recyclable material
- Accessibility to bin storage areas by all residents, including those who are less mobile
- Provision of a suitably clear and wide path from any bin store to the collection point
- Confirmation that waste should be presented no more than 25m away from the nearest accessible point for a collection vehicle
- Road design should address minimising the need for vehicle reversing, and construction should be suitable for a full sized refuse collection vehicle, both in terms of width and in terms of suitability to accept vehicles of 32 tonnes gross vehicle weight

Waste collection containers used by Vale of White Horse District Council

Existing environmental services provision

Waste and recycling collection services

Oxfordshire is a high performing county in terms of municipal waste recycling. For the 2015/ 16 annual period the waste collection authorities of South Oxfordshire and Vale of White Horse District Councils achieved preliminary recycling figures of 66.5 per cent and 64.8 per cent respectively, placing them in first and second place in the national recycling league table. This level of performance means that both councils are already achieving the 2020 target of 50 per cent set by the EU Waste Framework Directive, and together surpass the circular economy target for 2030 of 65 per cent recycling.

South Oxfordshire and Vale of White Horse District Councils have jointly procured and manage waste collection services, currently provided by Biffa, under a contract that has been extended to run up to 2024. No further extension will be permitted and therefore the contract will need to be tendered in advance of 2024. This contract also includes street cleansing services, dog and litter bin servicing, and fly tipping removal.

Street cleansing and grounds maintenance services

A good level of street cleanliness is being achieved in the South Oxfordshire and Vale of White Horse area, with NI 195 measurements sitting at 3 per cent for litter and 11 per cent for detritus, against targets of 4 per cent and 7 per cent respectively. The target for detritus is not currently being met, largely due to the rural nature of the area. Street cleansing is a contracted service, currently undertaken by Biffa. This service attends to the cleansing of inner and outer town centre areas and car parks, large and small villages, and is undertaken under schedule utilising both manual and mechanical sweeping methodologies. Grounds maintenance is also a contracted service, currently provided by Sodexo. Waste arisings from grounds maintenance operations are the responsibility of the contractor. Sodexo ensure that all grounds maintenance waste is composted off site.

Waste disposal arrangements

Oxfordshire County Council has a contract with Viridor, due to expire in 2040, for the processing of residual waste. This contract has an exclusivity clause whereby all residual waste for which Oxfordshire County Council has responsibility for must be processed by Viridor through their Energy Recovery Facility (ERF) at Ardley.

Similarly, there is agreement between the county council and all waste collection authorities to ensure that all collected residual waste is to be managed by the county council. Therefore, there is full exclusivity in the management of this material stream.

Dry mixed recyclable material is currently deposited at a waste transfer station at the 'Culham No 1' site, approximately three miles north of Didcot. From this site material is bulk hauled to materials recovery facilities in North London and the West Midlands. There are a number of in-vessel composting and anaerobic digestion plants that are used to receive organic waste, and minimal waste is transferred to landfill.

Oxfordshire County Council also provides a network of Household Waste Recycling Centres (HWRC) but some of these are reaching capacity and are in need of refurbishment. The closest HWRC site to the Didcot area, in Drayton, has an annual throughput of approximately 10,000 tonnes per annum and achieves a 60 per cent recycling rate. However it suffers as a result of limited space and high usage, resulting in regular queuing on site.

Didcot Biogas to Grid Plant © CNG Services

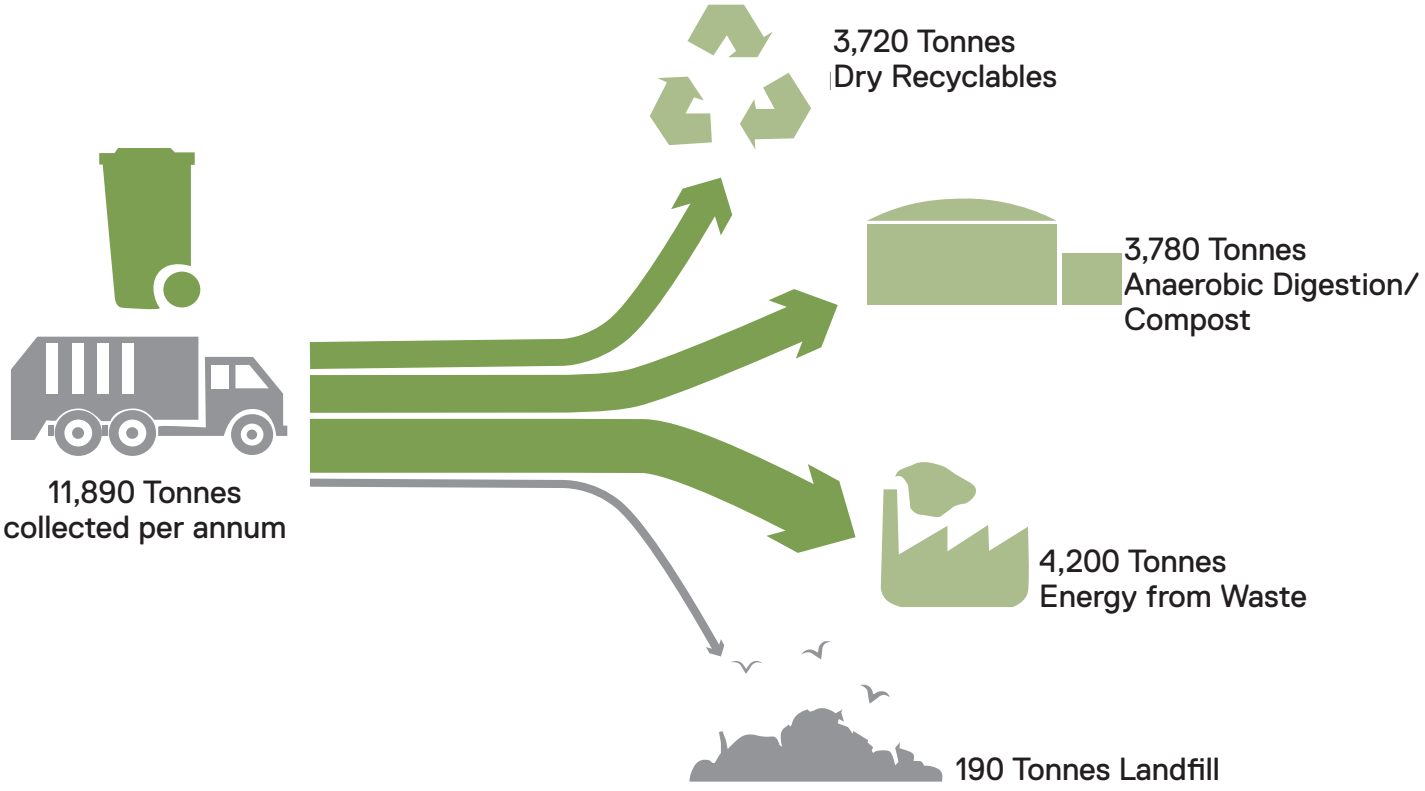


Figure 5.34 - Waste from additional 15,050 homes in Didcot source: Amec Foster Wheeler, appendix F, table 1.3

Impact of proposed population growth

The level of development planned for Didcot will result in an inevitable growth of waste arisings for that area which must be incorporated into existing or new waste management infrastructure. The anticipated growth in waste arisings for each waste stream is shown in the image below. This increase will require additional vehicles to collect and transfer the waste within the town and this is calculated to be an additional three vehicles in total. The existing collections contract has provision for increases such as this by way of a contract variation. The increase in vehicle movements around the town is not considered to have a significant impact. The receiving facilities for the waste (Ardley ERF and anaerobic digestion or composting plant) are all confirmed to have sufficient capacity for the increase in waste throughput.

However, the existing HWRC infrastructure is struggling and the proposed growth is anticipated to increase the waste throughput at Drayton HWRC by 33 per cent. As this site is already under pressure this increase would not be sustainable. The current contract provision of HWRCs was renewed for a seven year period in 2017. For longer term provision, the Oxfordshire County Council HWRC Strategy sets a site rationalisation approach moving to fewer but larger sites close to population centres creating an opportunity for a new HWRC to serve Didcot and surrounding areas. Further enhancements could be realised by providing a facility to promote more sustainable waste management on a local level, for example with a 'reuse' shop on the site and community initiatives to repair broken goods.

Innovation

Core to the principles of garden town developments is community engagement and involvement, and the creation of an environment where residents want to feel part of the community. From a service provision perspective these principles are supported by ensuring that services are easily understood and convenient to participate in.

Best practice in design

Engagement and participation in waste and recycling collection schemes is best promoted at property level through direct communication with residents, however, there is considerable benefit from promoting the separation of waste and recyclable material through the inclusion of waste segregation containment systems at the development stage of property design.

In particular, the following principles should be considered and implemented to support service delivery and provide best value solutions:

- The provision of in-premise storage for each material stream collected as part of a kerbside collection scheme
- Suitable and adequate storage (individual and communal) for waste and recyclable material
- Adequate and convenient access to services for all residents
- Adequate and accessible space for waste containment, allowing full access to the point of presentation for collection
- Consideration of underground waste storage to minimise environmental impact
- Provision of durable, low maintenance and clean facilities
- Ensuring that facilities take into account noise, odour and fire safety.

Balancing service provision methodologies with innovative building design means that new and smart waste solutions should be incorporated into design principles in order to meet residents' needs and ensure that solutions are forward facing and future oriented.

The inclusion of embedded and well-designed waste management systems can bring benefit to the local community, service delivery companies and the environmental outlook of an area. The use of underground or semi-underground waste storage systems can both keep streets and garden areas free from wheeled bins and reduce vehicular movements around housing areas. Due to 60 per cent of the container being underground, the visual impact of these systems is considerably less than

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that of traditional wheeled bin style communal bins. In addition, building such collection systems into the design of housing areas can ensure ease of access to all residents. Underground storage systems bring further benefit in the form of a reduction in odour due to cooler storage conditions, reduced manual handling for collection staff, and collection of waste and recyclable material from a single location, rather than individual households.

Best practice in service provision

Recognising that the South Oxfordshire and Vale of White Horse District Council areas are the top performing areas in England for recycling, and that service delivery methodologies are limited by the contracts held by private contractors, best practice is, in essence, already being achieved. Any further step-change improvement in recycling performance will likely require a fundamental change to either the frequency of residual waste collection (for example from fortnightly to three-weekly) or a restriction in residual waste collected through provision of smaller waste bins. Neither options could be implemented for Didcot Garden Town alone due to the perceived imbalance of service levels being received within a single local authority area and also due to the contractual and service complications that this would cause.

Participation in recycling schemes will support the sustainable principles of the garden town and as such the available services should be promoted to new residents within the garden town, Science Vale and area of influence, using direct communication to ensure that knowledge of services is in place as soon as a new resident is occupying their property. This will maximise participation in recycling schemes and minimise confusion that can lead to recyclable material becoming contaminated.

Progressive sustainable practice

Over and above the core services delivered to all residents, a number of initiatives could be considered for the integration of sustainable practices within the community of Didcot Garden Town.

Recommendations

- Community engagement and service development – e.g. community groups promoting reuse and repair, and engagement with the third sector
- Community development – e.g. community composting schemes, food redistribution, a sustainability hub
- Incentives – e.g. financial incentives to maximise recycling
- Connectivity – e.g. 'smart bins' to report on fill rate of litter bins, or damaged infrastructure
- Streetscene enhancement – e.g. community litter picking, apps to allow public to report environmental issues

Solar compactor and recycle bin

5.2.3 Energy and renewables

In keeping with the sustainability principles for the garden town there is a desire to provide sustainable solutions for the growth in energy requirements to support the growth of the town.

The baseline situation for energy use has been considered, together with the forecast for energy use and the opportunities for introducing additional and new renewable energy options.

Baseline situation

The figures below indicate the existing energy consumption of different energy supplies for both Industrial and domestic use in the Didcot region. Natural gas and electricity are the main demand sources for both subsets of consumers. Other data indicates that there has been steady decline in gas use over the last ten years, whereas electricity use has remained relatively constant.

Increased demand

The proposed growth of the town will increase demand for energy but there is uncertainty around the scale and nature of this. To meet the anticipated increase in demand the challenge is to:

- Diversify supply sources to promote de-carbonisation of electricity supply
- Enhance thermal energy efficiency (such as building fabric and boiler efficiency)
- Consider the potential for local heat and electricity networks
- Diversification of heat sources
- Encourage individuals and community groups to improve their awareness of energy efficiency and impact they can make in reducing energy use

Long term trends in energy consumption for residential and non-domestic buildings show that demand for heat is reducing due to greater efficiencies in both providing heat and retaining heat. At the same time electricity consumption continues to rise or is at best remaining constant. Demand-side management could offer a solution to the peak demands that are currently experienced for grid electricity as well as the peak supplies from certain sources (e.g. solar energy). This can take several forms, but includes provision of battery storage within individual dwellings or for larger scale installations.

From a consumer engagement viewpoint, the ability to collate large amounts of data sources via online applications and web-based tools offer new avenues by which the benefits of energy efficiency and low carbon energy sources can be shown. Initiatives such as the Community Action Platform for Energy (CAPE) offer potential routes to engage and empower local energy users to seek

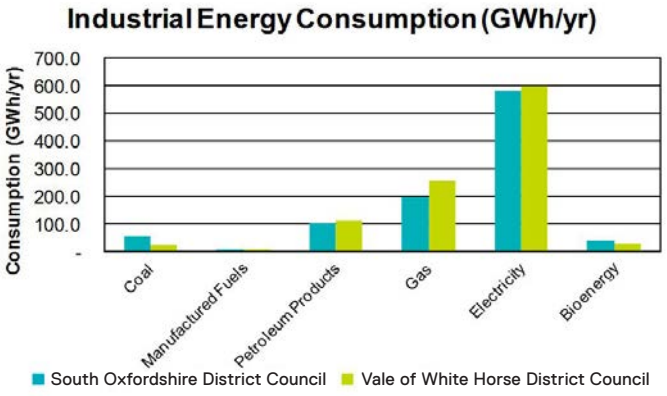


Figure 5.35 - Industrial energy consumption

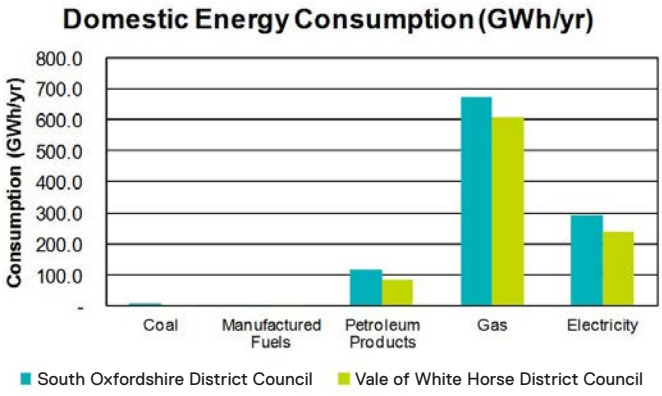


Figure 5.36 - Domestic energy consumption

innovation and alternative solutions to meeting their energy needs.

The vision for the garden town focusses on greenways and sustainable travel routes as a crucial element in integrating the diverse areas of Didcot into a holistic living space. The provision of charging points for both electric vehicles and e-bikes then becomes an important element to overall urban design which needs to be accounted for by:

- Charging of electric vehicles at home and allocation of space for parking such vehicles
- Public access charging areas within central areas (vehicles and e-bikes)
- Community parking areas with access to charging points where density of development precludes space for vehicles at individual dwelling level

The most feasible way to support this is through solar energy which can be provided by:

- Small scale solar photovoltaic panels
- Dwelling scale solar photovoltaics
- Solar canopies within car parking areas
- New technology including photovoltaic road surfaces

E-bike charging points in Copenhagen

Local Renewable Energy

Ongoing work at UK level seeks to deliver an increasingly de-carbonised energy mix, in terms of both electricity and heat. While large scale assets, particularly in the context of traditional 'top down' supply models, remain a part of the future energy supply mix, there is increasing recognition of the need to seek low carbon energy supplies at a localised level, closer to end users, in order to achieve overall carbon emission reduction targets.

There is no single prescription that will serve the needs of all the consumers within the expanded garden town. However, it is useful to consider, in broad terms, how significant contributions to local energy supply mixes could be achieved.

Solar

Within the OX11 postcode area there are 369 existing small scale (0-5kW) solar installations and 16 existing medium scale (5-50kW) solar installations. This gives a total capacity of 1,593 kW for existing solar generation. There is potential for significantly growth in retrofit or new build installations on residential properties or for non-domestic users.

Example of solar canopies

The take up of this can be supported by due consideration of the roof orientation (preferably south or south west/ south east) and avoiding potential overshading issues for new developments.

Oxfordshire County Council has an existing position paper setting out guidance in relation to large-scale ground mounted solar arrays, which is broadly supportive of solar photovoltaic (PV) development in principle. In the first instance, such developments should look to brownfield or industrial sites, and while greenfield sites can be considered, these should avoid high grade agricultural land where possible. Large numbers of ground-mounted solar PV arrays are not proposed, but an opportunity has been identified at the existing landfill site at Sutton Courtenay, which is scheduled for closure in 2030. At present the commitment from the operator is to restore it to agricultural grade use. An alternative option, used in several other cases with capped landfill sites, is to develop a ground-mounted array. The scale of array could be in the range two – three mega watt (MW), with an associated output of around 12 – 18 giga watt hours (GWh) per year.

There are several innovative solar technologies that are emerging including:

- Solar roof tiles
- Solar floors
- Solar windows
- Photovoltaic road surfaces

These products offer on-site generation solutions that provide for aesthetic qualities and can therefore be used in a variety of settings to enhance on-site energy generation for both retrofit and new developments.

Fuel cell combined heat and power (CHP)

The vast majority of combined heat and power plants presently operating in the UK typically use natural gas as the primary fuel source to feed either reciprocating engines or gas turbines. Penetration of alternative fuel source systems, such as biomass or fuel cell technologies remains low. Fuel cell CHP systems offer potential for low emission heat and power generation, and significant flexibility in the source of input fuel that is used.

The DIMES (distributed integrated multi use energy system for urban developments) feasibility project is an ongoing piece of work looking at supporting low carbon ambitions within the Bicester area. The proposed fuel cell CHP will supply 10 MW via a private wire network to local consumers. Heat available from the CHP will be supplied to a planned district heating network. There is also opportunity to use the hydrogen, reformed from processing the waste gas, as a fuel supply for transport.

This multiple energy supply solution has potential value for the proposed Didcot Garden Town, in offering a means of generating low carbon electricity,alongside high grade heat for use in heat networks and (potentially) a source of hydrogen as transport fuel.

While there are consumables associated with the operation of any proposed fuel cell system, there is no significant direct combustion processes. This is a considerable advantage in an urban development setting, in comparison to natural gas fuelled CHP systems, since it means no local emissions of nitrogen oxides, sulphur oxides or particulates.

Anaerobic digestion

There is limited opportunity to use waste to generate further energy within the Didcot area as residual waste collection is currently tied into a services contract with Viridor. Residual waste is taken from the area to the Ardley Energy Recovery Facility (ERF) for processing. There is no current opportunity to use this resource in a local energy generation scheme.

However, food waste is subject to contractual obligations. The county council, as the waste disposal authority, has a contract with Agrivert at the Wallingford and Cassington anaerobic digestion plants to take food waste which is collected separately from garden waste in South Oxfordshire and Vale of White Horse District Council areas. This is a minimum tonnage contract to 2026 with an option to extend by up to 5 years. As a result, food waste arising from Didcot will not be available for other methods of treatment during this time. The Wallingford plant has a capacity of 50,000 tonnes per year, generating 2.4MW of electricity and producing a biofertiliser. The garden waste composting contract has no minimum tonnages but creates a compost like material so would not be suitable for creating renewable energy.

An anaerobic digestion plant © Daniel Ullrich, Threedots

Biomethane

Didcot sewage treatment works (STW) was the site of the first UK biogas plant to carry out biomethane injection to the national grid network. Anaerobic digestion results in a biogas, predominantly consisting of methane and carbon dioxide, with additional impurity levels of siloxanes, hydrogen sulphide and nitrates. Cleaning this gas mixture results in a biogas that can be injected into the national gas grid.

Biomethane injection can be into the national high pressure gas transmission grid or a local low pressure gas distribution network. The advantage of using by-products from processes at the STW is that is provides a constant supply of input fuel. As this plant is already in operation, there is no further opportunity for additional generation from this source, other than an increase in the quantity of sewage which will arise from the growth of the town.

Decentralised heat networks

Space heating and domestic hot water needs are predominantly met in the Didcot area through the use of natural gas as the primary fuel source and there are no decentralised heat networks operating within the town at present. A study is underway to carry out a heat mapping study for the garden town area to identify potential small scale networks for heat which will be used to determine the feasibility of such schemes.

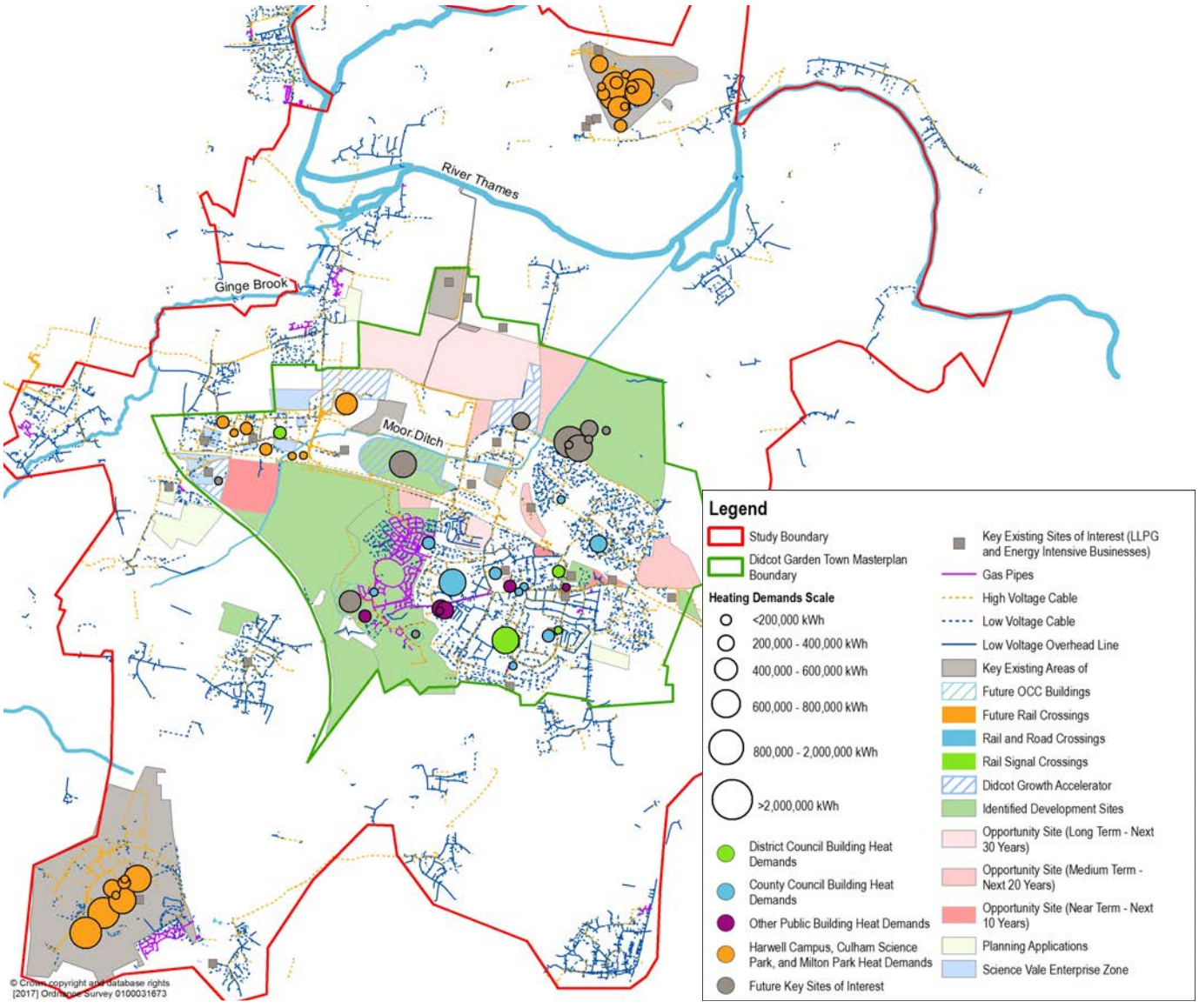


Figure 5.37 - Decentralised heat networks heat map study

The study team have begun working with key stakeholders gathering information for existing public and private sector buildings and sites in the Didcot Garden Town and Science Vale wider area of influence, as well as modelling the potential heat demands for proposed new garden town developments. This data is being used to produce detailed heat maps of the area, an example of which is shown below, which illustrates the estimated heat demands of existing and potential buildings and sites and the location of existing or potential sources of low carbon or low cost heat. This visual representation can help to highlight areas of most promise for heat networks, due to the density of heat demands, and/ or the proximity to potential sources of heat.

Considerations will include:

- The location and energy demands of key consumers
- Available low carbon and waste heat sources
- Suitability of energy supply options (e.g. gas CHP, biomass, etc)
- Sizing of plant and heat network
- Integration of heat network routes with proposed masterplan developments
- Network design including tempreatures, flow control and minimising heat losses
- Impact assesments and risk analysis
- Fair treatment of customers
- Reducing energy costs and greenhouse gas emissions

The next steps for the work will be to use the heat maps to help identify the areas, or 'clusters', with the greatest potential, so that these can be taken forward for technical and financial feasibility analysis. It is important to recognise that the proposed heat networks could have implications for the existing masterplan. As a result, the study will consider aspects such as the integration of heat network pipes with the proposed infrastructure from the masterplan and whether particular routes could be safeguarded to ensure that existing or future buildings can be connected to the network. Further work will be undertaken to identify critical heat loads and carry out more detailed analysis on the various advantages and disadvantages of each potential scheme. After completion of the heat mapping and energy masterplanning study, subsequent heat network delivery unit development stages include more focused feasibility studies, detailed project development, financial modelling and commercialisation.

Other technologies

Other options considered, but discounted for suitability and viability reasons, include: wind, hydro, stand-alone large scale thermal storage (independent of any proposed district heating networks) and geothermal.

Key opportunities

Within Didcot Garden Town the key opportunities for increasing the proportion of energy supply from low carbon and renewable sources are considered to be:

- Provision for battery storage to complement roof mounted solar PV array (new domestic and non-domestic developments)
- Provision of electric vehicle charging points at home with allocation of space for parking such vehicles, or community parking areas with access to charging points where density of development precludes space for vehicles at individual dwelling level (new developments)
- Public access charging areas within central areas (vehicles and e-bikes)
- Use of solar panels to power electric vehicle charging points
- Use of the landfill site at Sutton Courtenay as a ground mounted solar PV array, following closure as a landfill site in 2036. This could have an energy generating capacity of 12-18 GWh per year
- Solar innovation making use of new technology in building, eg. solar tiles, solar floors, solar windows
- Potential to integrate a fuel cell CHP system at the Harwell Campus or Culham sites
- Potential for development of low carbon or renewable-fuelled district heat networks in and around the Didcot Garden Town masterplan boundary area
- The operations management and business development team at RWE are open to discussing further additional sustainable energy production and storage at the Didcot power station site based round the potential extension of the existing gas turbines

Didcot Railway Centre carriage shed solar panels © Frank Dumbleton

5.3
Blue infrastructure

Swale

5.3.1 Flood risk and sustainable drainage

With the proposed growth of Didcot Garden Town, it is important to assess adequately the potential sources of flooding that might pose a risk to new developments but also how new developments might influence the water environment upstream and downstream. The selection of appropriate mitigation measures to minimize the impacts and the promotion of Sustainable Urban Drainage Systems (SuDS) is fundamental to manage surface water and face the new challenges posed by climate change.

The historic and existing situation has been reviewed and considered with a view to the most recent data for flood levels with regards to climate change. Opportunities for strategic initiatives to improve flood risk and implement sustainable drainage in the garden town as a whole have also been considered.

Planning and policy

Flood risk

In Didcot, Oxfordshire County Council is designated as the Lead Local Flood Authority (LLFA), under the Flood and Water Management Act (2010). As the LLFA, Oxfordshire County Council is responsible for co-ordinating the management of local flood risk from surface water, groundwater and ordinary watercourses. The Environment Agency has responsibility for flooding from main rivers, reservoirs and from the sea.

The National Planning Policy Framework (NPPF) issued in March 2012 requires that flood risk must be taken into consideration during the planning process. The NPPF states that development in areas at risk of flooding should be prevented and development should be undertaken on sites at lower risk of flooding. If development is necessary in flood risk areas then care should be taken to ensure the development is both safe and does not increase the risk of flooding elsewhere.

The NPPF indicates that local plans should be supported by a Strategic Flood Risk Assessments (SFRA) and should develop policies to manage risk from all sources, taking advice from flood risk management bodies, in particular the Environment Agency. The NPPF states that planning authorities should apply the precautionary principle when considering flood risk to locations of proposed development, using a risk based approach to avoid flood risk wherever possible and managing it elsewhere, applying the sequential test, and applying the exception test where necessary. Land that is required for current flood management should be safeguarded from development and opportunities offered by new development which have potential to reduce causes and impacts of flooding should be pursued.

SFRA have been undertaken for Didcot and the surrounding areas to support recent local plans and have been updated to meet the latest guidelines as appropriate. The 2007 SFRA included hydraulic and hydrological modelling of the Moor Ditch and Hakkas Brook systems to provide improved flood mapping for these catchments. An update was carried out in 2013 to collate information from different sources and updated information from the Environment Agency. This is the most recent SFRA at the time of producing this delivery plan and the recommendations from it are:

- Development should be sequentially located away from Flood Zone 2 and 3, and located in Flood Zone 1 where possible
- Development should be located away from small watercourses, but if development is necessary then a site specific flood risk assessment should be undertaken to understand the potential level of flood risk
- Development should not interfere with existing surface water flood risk or flow paths

Sustainable Drainage Systems (SuDS)

For the Didcot local area, South Oxfordshire District Council and Vale of White Horse District Council have the duty to ensure that fit for purpose SuDS schemes are delivered. The lead local flood authority, Oxfordshire County Council has taken on the role of statutory consultee.

South Oxfordshire District Council's Local Plan 2032 proposes that any development taking place has to be on flood zone 1 land and permeable surfaces with SuDS incorporated into them according the climate change regulation and meeting prescribed standards of good design. A SFRA produced by the council should be used to determine the best approach depending on the requirement of each area.

Vale of White Horse District Council's Local Plan 2031 establishes policies where national guidance alone is not sufficient to deliver the council's vision. All development will be required to provide a drainage strategy. Developments will be expected to incorporate SuDS and ensure that run-off rates attenuated to greenfield run-off rates. Higher rates would need to be justified and the risk quantified. Developers should strive to reduce run-off rates for existing developed

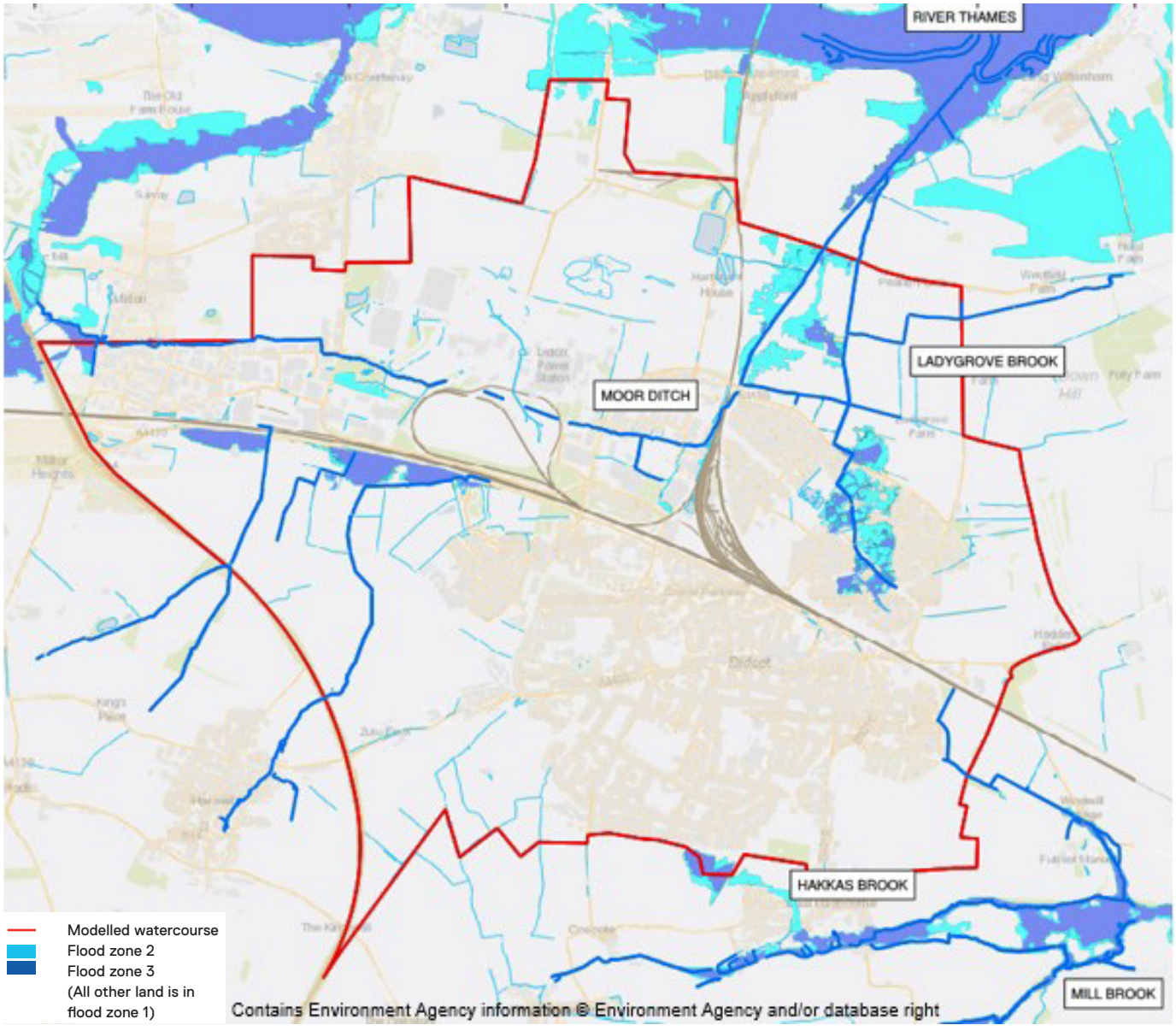


Figure 5.38 - Designated main rivers taken from the Environment Agency website.

sites. SuDS should seek to enhance water quality and biodiversity in line with the water framework directive.

Baseline information

In the north eastern quarter, Didcot is relatively flat at an approximate elevation of 55 metres above ordnance datum (mAOD). South of the railway line in the south east quarter, the elevation slopes to an elevation of 72mAOD before levelling out and forming a plateau. The north western quarter has a gradual slope from an elevation of approximately 55mAOD at the northwards railway line, to an elevation of approximately 60mAOD at the western extent, in the vicinity of Milton. The south western quarter is at approximate elevation of 58mAOD along the A4130, before rising to an approximate elevation of 80mAOD in the vicinity of the B4493. This means that generally, elevations increase from north to south and from east to west, with the north eastern quarter having the lowest elevation, and the south western quarter having the highest elevation.

There are two main types of bedrock geology in Didcot – calcareous sandstone and siltstone to the south and mudstone to the north. There are three main watercourse systems in Didcot:

- Moor Ditch covering the west and north west
- Ladygrove Brook covering the north east
- Hakkas Brook covering the south

All three are designated 'main rivers' by the Environment Agency. Historically, Didcot has had problems with flooding, although modern drainage has alleviated the some of the problems. The location of Didcot, lying at the southern edge of the River Thames floodplain with hills and slopes to the east and south makes the town prone to flooding. The area to the north of the railway line, on what is now Ladygrove Estate, was historically part of a marsh associated with the River Thames floodplain. The Romans did much to aid drainage in the northern area of Didcot, canalising what is now known as Moor Ditch in order to drain the marshy area.

Much of the historical flooding to the south of the railway line only occurred in the years 1970-1990. After 1990, the main areas that have experienced flooding are the industrial estate to the north west of Didcot town centre, and to the south of Didcot in the vicinity of West Hagbourne. The industrial estate to the north west of Didcot town centre is associated with the Moor Ditch floodplain, and flooding is believed to be related to new development both in this area and further upstream. As hydraulic modelling does not suggest flood risk, the flooding at this location may be as a result of culverts being blocked by debris. It is unclear why the area of West Hagbourne floods, although it is theorised that flooding is as a result of changing farming practices, leading to less infiltration of water into the ground, and hence more runoff. However, the importance of the Hakka's Brook is noted in relation to any future development south of Didcot and some further investigation may be required to confirm whether or not the brook will need to be upgraded, if further development takes place south of Didcot town centre.

Ladygrove estate in north east Didcot experienced flooding in July 2007, believed to be caused by backing up of the culverted Ladygrove Brook and sewer outfalls, worsened by poor maintenance and blockages from build-up of silt.

In more recent times, in September 2016, Didcot Parkway railway station flooded. Heavy rain starting on the evening of the 15 September 2016 and continuing overnight until early morning on the 16 September 2016 led to flash flooding in Didcot and inundation of the station underpass, causing the north platform to become inaccessible to passengers. This occurred despite recent improvements to the station forecourt. This flooding was caused by increased surface run-off and high water table. The station and station subway are at a lower elevation than the land to the south, so water flows downhill and can inundate the station.

Impact of proposed developments

The garden town proposals will promote the opportunity to use SuDS as a means of reducing the flood risk to Didcot. SuDS features such as swales, green roofs, tree pits and rain gardens can increase the amount of visual and environmental benefits and can also positively affect water quality by providing an early treatment step. SuDS features also reduce flood risk by attenuation of surface water or rainwater and can result in less water going into surface water sewers which reduces the overall volume of water going to water treatment stations.

There are a number of development sites which are already consented. These have the approval of the relevant planning authority and the drainage strategies have been reviewed as part of the applications. In some areas there are potential opportunities for watercourse enhancements which would provide for some SuDS relief as well as improving the biodiversity of the watercourses. The Environment Agency is being consulted regarding these opportunities.

Strategic proposals

Flood risk

Improvements to drainage and flow of water in Didcot have been identified and separated into five main strategic areas for improvement.

Strategic area 1

The proposed development allows for green corridors to the north of the site, parallel to the A4130 on the south side. Proposed built development in the north of the site has been located away from areas of Flood Zone 2 and 3. However, the flooding extents are subject to change following updates to climate change allowances.

The proposed development has taken into account the presence of existing watercourses on the sites and green corridors have been maintained along these watercourses.

SuDS features will provide added value to the surface water management in this areas and will tie in with the landscape proposals along the gateway spine, as described in chapter 8.

There are potential opportunities to improve the weirs, valves and culverts along the southbound drainage ditch and improve the connectivity between the culverts beneath the A4130 and the railway line.

Strategic area 2

There are areas designated as green infrastructure corridors that will eventually discharge into the River Thames. Restoring the rivers to their natural state will provide an important link to the River Thames.

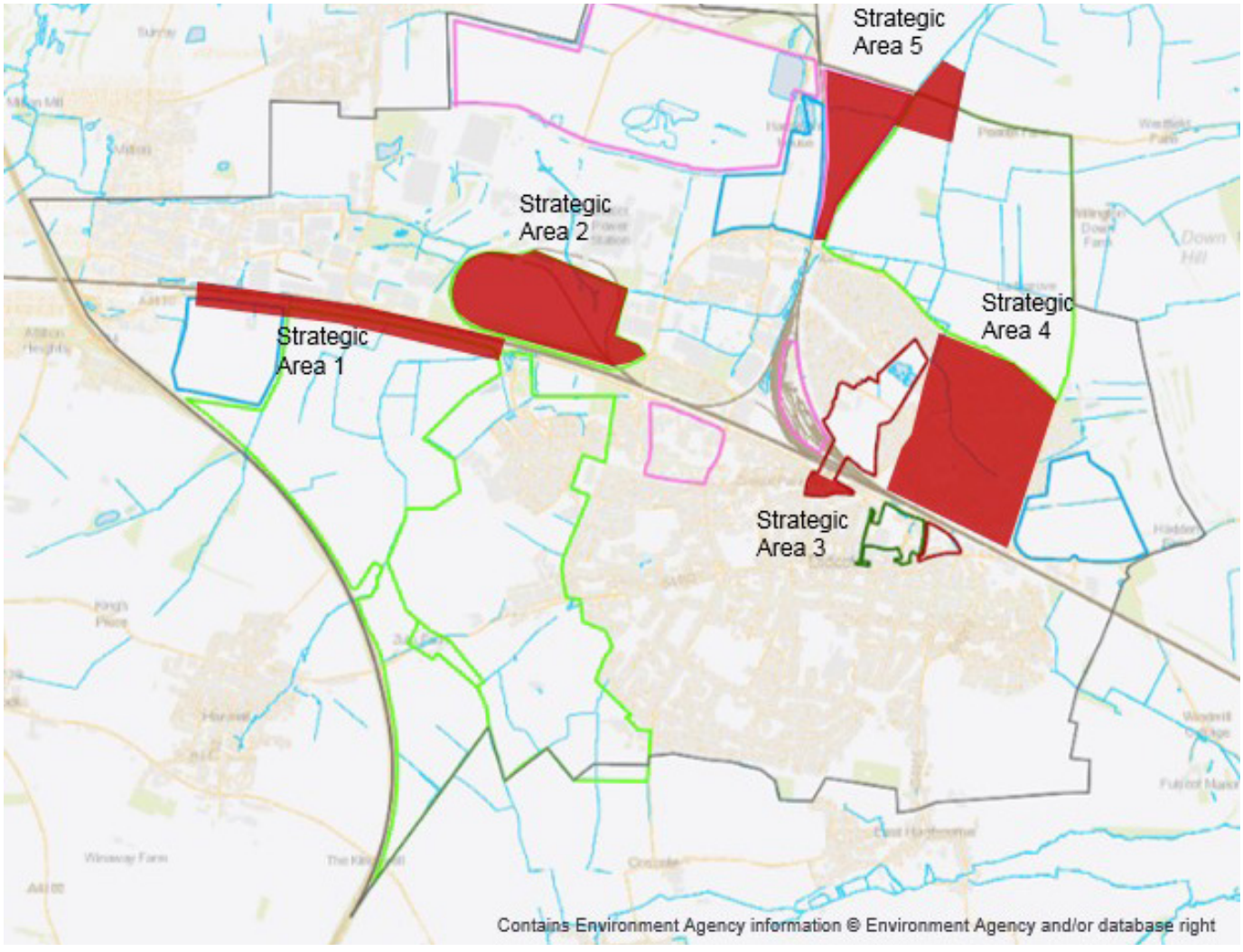


Figure 5.39 - Strategic areas for floor risk improvement

Strategic area 3

Didcot Station is of crucial importance for commuters living in Didcot and travelling to London on a daily basis, and disruption to travel caused by flooding of the station is not acceptable. Initial layouts of the south development show open green spaces where SuDS will be accommodated, though lack of available space may remain a constraint.

Strategic area 4

While there are options for improving flood risk in the Ladygrove estate area, consideration of downstream effects must be taken in order to not exacerbate flooding issues downstream.

Strategic area 5

There are currently no plans for proposed development in this location. The route of Moor Ditch and Ladygrove Brook through this site has been identified as a green infrastructure corridor and it could potentially connect to the River Thames. Further description of what is proposed to the centre of the site in the vicinity of Ladygrove Brook will be required to assess vulnerability of the development. This would need to be assessed along with a potential Flood Alleviation Scheme.

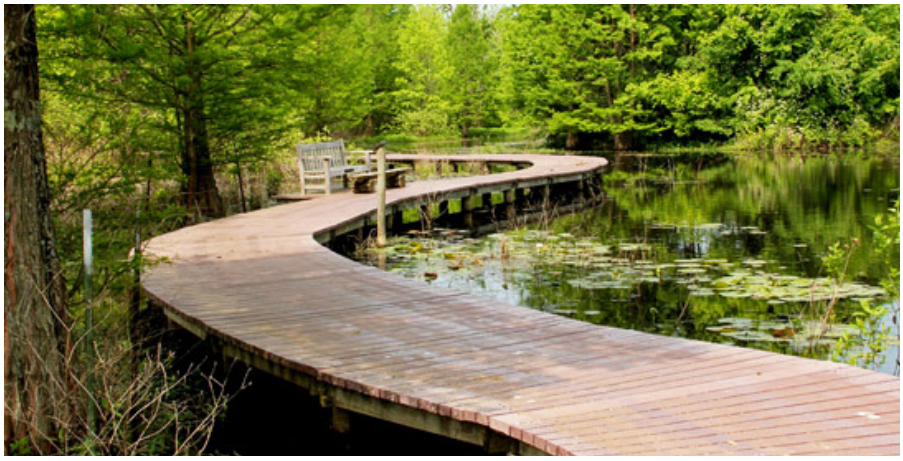
The proposed development in this area has taken into account the presence of watercourses on site and does not disrupt their route. During detailed design this will need to be granted. The proposed development has taken into account areas of Flood Zone 2 and 3 and has located built development away from these zones. A small area of leisure centre sports pitch is in Flood Zone 3, however national planning policy permits 'less vulnerable' development to be located in this zone.

SuDS

In general, the geology and hydrogeology of Didcot is not appropriate for infiltration options such as soakaways, especially to the north of Didcot where water levels are high.

Possible options for SuDS include the following:

- Detention and wetland areas
- Permeable paving
- Green and brown roofs
- Tree pits
- Swales



Wetland

Swale at Waddesdon Manor

Permeable paving

Opportunities

There is potential to improve the flooding issues in several areas of Didcot. A maintenance management plan and regular cleaning of culverts, gullies (drainage assets of the county council, district councils, and Network Rail) would remarkably improve some of the pluvial and fluvial issues in Didcot.

Improvements in the surface and foul sewer Thames Water networks might also improve some of the flooding issues in Didcot.

Potential opportunities for SuDS have been identified for Didcot. The adequacy on the selection of the different features will depend on the geology and existing land use conditions. The use of SuDS attempts to mimic the existing flow regime of the undeveloped thus reducing the impact of the new developments on the hydrology of the undeveloped catchment.

With regards to land uses, it is deemed appropriate that ponds and swales (features that require a bigger land take) are proposed in greenfield sites whereas permeable paving, tree pits green roofs and brown roofs would be considered more appropriate in more urbanised areas of the town.

It is highlighted that a consistent approach should be provided to developers in the future in terms of design criteria for the climate change allowances to consider for rainfall, as well as the discharge limitations when designing SuDS.

Thames Water has identified that could have issues for the existing surface water infrastructure to accommodate the discharge flow produced by runoff on the new developments. They shall be consulted at an early stage to ensure that sufficient capacity is available in the existing drainage system, and agreeing the discharge rates.

Example of a green roof

5.4
Social infrastructure

5.4.1 Introduction to social infrastructure

Social infrastructure provides everyday services to the local community, examples include schools, healthcare facilities and community buildings. Didcot is changing and growing. Its population at the time of the last Census (2011) was just over 25,000 people[1]. With plans for in the region of 15,000 new homes to be added to the town in the next 15 to 20 years, that population is expected to grow by approximately 37,000 people.

The new communities brought to the area by these new homes will require facilities and services to meet their day-to-day needs – this includes schools, healthcare, leisure and retail facilities. The timely provision of new facilities will be vital to ensuring that additional residents do not overburden existing facilities. New infrastructure will need to complement existing facilities rather than compete with them and be provided in a way which enhances the quality of life for existing residents as well as new ones. These facilities will help deliver walkable, social and vibrant neighbourhoods and enable people to have choices in regards to their health and well-being, their education and how they spend their free time.

The Garden Town masterplan provides an overview of how Didcot could look in 20 years time. It considers how the town will function as one entity rather than a collection of communities that do not relate to one another.

Planning for social infrastructure provision is complex for a number of reasons. Firstly, it is important to time the provision of facilities carefully, both to avoid over-burdening existing provision or undermining through competition/ over-capacity. This can be made difficult by fluctuations in housing delivery rates which can be influenced by external factors, particularly the economic and political climate. Secondly, many public services are planned and funded on relatively short-term cycles of up to three years compared to a 15 to 20 year planning and development time-scale. Thirdly, other important facilities such as culture and leisure are partly driven by demand and there are no standard benchmarks for the level of provision that should be planned for.

The planning and delivery of facilities is also influenced by how development comes forward, whether in large-scale masterplanned communities or through smaller in-fill sites and everything in between. The c.15,000 new homes planned for Didcot are expected to come forward in a number of settings including as significant strategic extensions to the town (such as at Great Western Park, North-East Didcot, Valley Park and Ladygrove East) and also as smaller pockets of development (such as Gateway South or the former Didcot power station dite).

The larger, strategic sites (in some cases delivering several thousand homes) will generate significant demand for facilities and will be expected to mitigate that demand in full – either through on-site provision of facilities or through financial contributions to improve and expand nearby facilities.

The smaller sites may not, when considered in isolation, generate sufficient demand to justify the provision of on-site facilities. However, when assessed alongside other smaller schemes, the cumulative demands can place significant pressure on existing services if not anticipated and closely monitored. In these cases, it is usual practice for the local planning authority to require a section 106 payment to go towards the improvement and expansion of a nearby facility(ies). However, with the introduction of 'pooling restrictions' on section 106 payments as a result of the Community Infrastructure Levy (CIL) regulations in April 2016, the ability of a local authority to collect monies for a particular infrastructure project is limited to just five payments. Therefore, if for example, there were proposals for a school to be expanded to meet additional demands arising from a development, the local authority would need to ensure it was able to generate a sufficient level of funds from no more than five developments or else face a potentially significant funding gap on the project.

This is a challenge which many local authorities are facing. In Didcot, the challenge is more difficult given it sits on the boundary of two local authorities – South Oxfordshire and Vale of White Horse District Council. Whilst the majority of Didcot's existing built up area is within South Oxfordshire District Council, a significant proportion of the new housing proposed for the town is within the Vale of White Horse District Council boundary. This indicates the

1 Based on the four wards covering the core of the built up area of Didcot – Didcot All Saints; Didcot Ladygrove; Didcot; Northbourne; Didcot Park. The wards covering Didcot have changed since the 2011 Census. They have reduced in number from four to three. The wards now covering Didcot comprise: Didcot North East; Didcot South and Didcot West.

need for close working arrangements between both district councils.

This section of the Didcot Garden Town Delivery Plan looks at a range of education (primary and secondary), healthcare and cultural and leisure facilities. Where they exist standard benchmarks have been applied to identify the level of provision that is likely to be required to meet the needs of the growing population. A comparison exercise has also been undertaken looking at settlements of the size that Didcot is likely to become and identifying potential gaps in the provision of cultural and leisure facilities. There is then commentary on how the masterplan responds to the needs identified (including development sites that are already being developed or in the planning pipeline).

This work has been informed through a range of data analysis, desktop research and engagement with the local communities and key stakeholders. A number of consultation events have been held to facilitate public feedback on the garden town masterplan as it has evolved. A number of meetings and interviews have also taken place with key stakeholders within the education, health and leisure community including school leaders, the county council and healthcare providers.

Cornerstone Arts Centre © South Oxfordshire District Council

5.4.2 Education

Didcot is currently home to several primary schools (see Figure 5.40), three secondary schools and UTC Oxfordshire (see Figure 5.41). The majority of these schools are achieving excellent standards of education provision.

Based on analysis of Annual Schools Census data, there is assessed to be capacity across these schools to accommodate some increases in demand over the short term. In the longer term, more capacity will be required at both primary and secondary level. Delivery of any new capacity should be carefully phased and planned so that existing schools are not undermined.

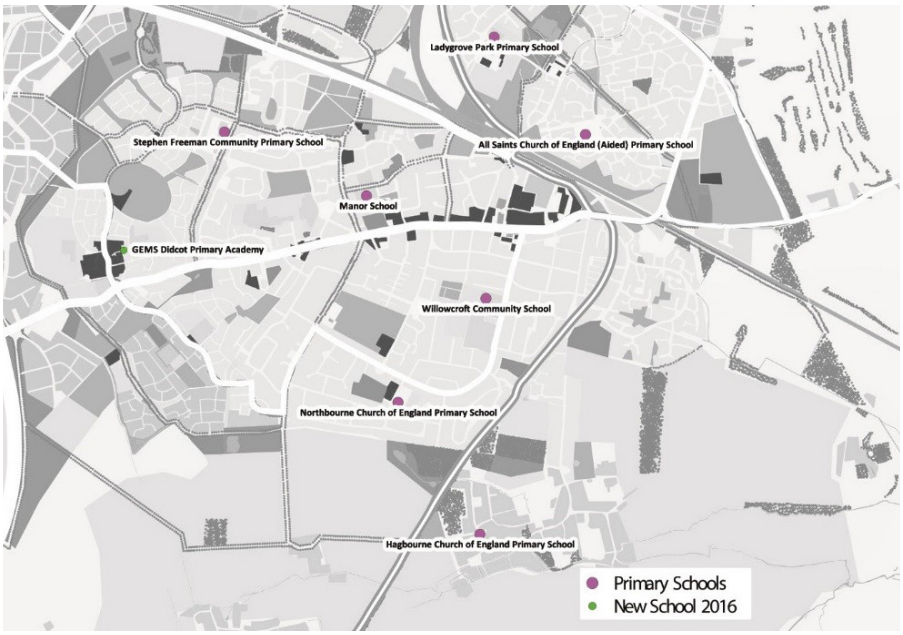


Figure 5.40 Existing primary schools in Didcot

Figure 5.41 Existing secondary schools in Didcot

Delivering education

Planning for education has changed significantly in recent years. Whilst the responsibility for ensuring that there are school places for every child remains with the relevant authority (in this case, Oxfordshire County Council), the ability for that authority to control the delivery of new schools and new school places has diminished. There is now a presumption in favour of academies and free schools which means that academy operators and community/ parent groups are able to apply directly to the Secretary of State (via the Department for Education and the Education Funding Agency) to open a new school and do not need permission from the authority to open (apart from the necessary planning permissions). Multi-Academy Trusts (MATs) have a fast-stream application process. If an authority needs to open a new school it must identify an academy/ free school operator to run it. The authority can only open a new school itself if no academy or free school can be found.

As part of the work to inform the Garden Town Masterplan, a high level review was undertaken to understand the level of demand for school places arising out of planned housing growth and to identify whether sufficient new facilities or section 106 contributions have been planned to enable these demands to be mitigated. A total of seven new schools (six primary and one secondary) are proposed as part of consented and pipeline development in Didcot. There are also proposals to expand several existing primary schools to provide additional forms of entry to meet demand.

The outcome of the review suggests that overall there will be a sufficient number of school places available to meet anticipated need through existing plans for new schools or contributions towards off-site facilities. However, what did become clear through the review was that several of the smaller sites, which do not in themselves generate sufficient demand to support a school building on their site, rely on the delivery of new school premises on nearby strategic development sites. This will require monitoring and joint-working by Oxfordshire County Council, South Oxfordshire and Vale of White Horse District Councils with education providers and landowners to ensure school places are provided in the right places and at the right times.

The garden town masterplan does not include additional school sites beyond those planned. If housing numbers increase significantly (e.g. as a result of new development sites being identified or an intensification of housing development on identified housing sites) then additional school provision may need to be planned for. This situation will require monitoring by the county council and the local planning authorities.

Students at UTC Oxfordshire

5.4.3 Healthcare facilities & healthy active lifestyles

According to NHS Choices data, there are currently three GP surgeries (Didcot Health Centre, Woodlands Medical Centre, Oak Tree Health Centre – all of which are purpose-built facilities), five dentists, seven pharmacies, three opticians, and a community hospital located within Didcot (see Figure 5.42).

As with education, planning for healthcare facilities is often complex, involving a range of stakeholders and subject to changing funding and organisational structures. It is generally accepted that healthcare facilities such as dentists, pharmacies and opticians tend to be provided by the market depending on the level of demand in an area. GP provision tends to be driven more by population numbers and is the responsibility of Clinical Commissioning Groups (CCGs).

Didcot is covered by the south west locality of the Oxfordshire CCG (OCCG). Based on discussions with OCCG, it is understood that current GP facilities in Didcot are expected to reach full capacity in 2018/19. There is recognition of the demand for facilities arising from the growing resident population of Didcot. Part of the response to this has included the expansion the existing Woodlands Medical Centre to provide six new consulting rooms as well as some ancillary facilities. With c.15,000 new homes and a further c.37,000 new residents, Didcot will need to plan for additional GP services. Based on standard benchmarks, this new population could generate demand for approximately 18 GPs.

The councils are currently seeking to agree plans for a health centre at Great Western Park. A section 106 obligation required the developer to make available a site suitable for the delivery of a health centre that could accommodate a minimum of four GPs and pay the capital costs of that facility. However, since that section106 Agreement was signed, the model of GP service provision in Oxfordshire and across the UK has changed. As a result, that facility is no longer anticipated to be preferable for OCCG to run.

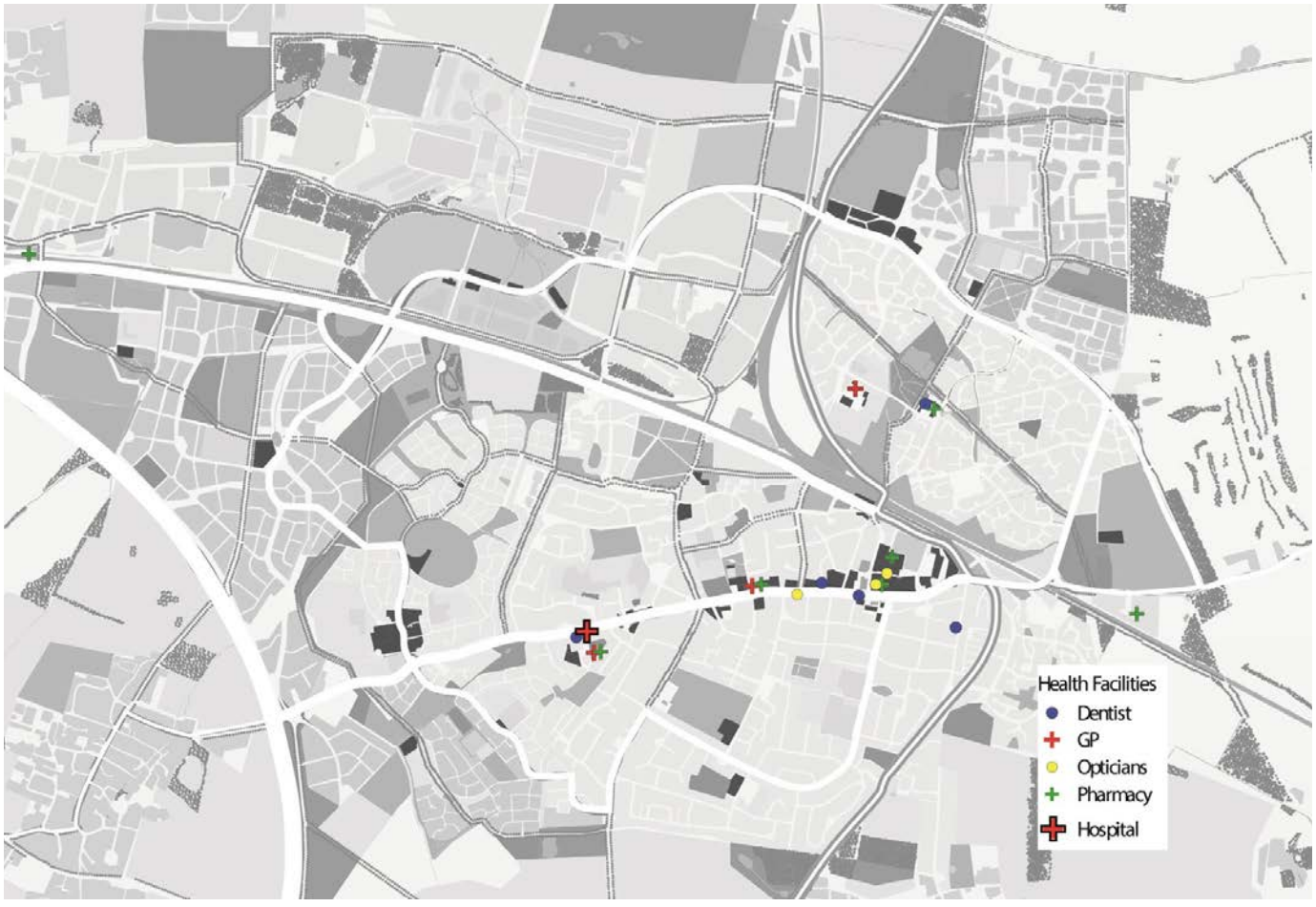


Figure 5.42 Existing healthcare facilities in Didcot

At the date of publication of this report, it is understood from OCCG that discussions are in progress between OCCG, NHS Property Services, the developer and the councils to secure a healthcare facility on the GWP site that the NHS is able to make a long-term commitment to. Such a facility would be expected to serve not just the needs of communities at GWP but across a wider area too.

A review of other planned development sites across Didcot suggest that there are no plans for any other new GP provision although this may not be necessary should on-going discussions regarding the facility at GWP lead to a sustainable solution. The local planning authorities should look to engage closely with OCCG and early in the planning process in order to ensure requests i.e. those that meet the Regulation 122 tests for developer contributions can be met. There is also a need for those bodies to work closely together in updating the Infrastructure Delivery Plan (IDP) which informs the Community Infrastructure Levy (CIL) charging schedules of the local planning authorities. This will ensure that where additional facilities are required, their cost is taken into consideration when identifying the overall cost of infrastructure required across the district.

The need to provide services to meet the needs of the UK's growing elderly population is well recognised by OCCG. OCCG has ambitions to promote the concept of 'supported housing communities', a number of which are currently operational in mainland Europe and North America. These villages essentially provide an alternative to standard nursing/ care/ residential home provision for people suffering from dementia. Support housing communities are effectively adapted environments that allow dementia sufferers liberty to come and go at will but in safe surroundings (see Appendix I). Again, this is a longer term project that the garden town masterplan is seeking to provide the flexibility to enable.

Delivering primary healthcare

As with education, planning for healthcare facilities is often complex, involving a range of stakeholders and subject to changing funding and organisational structures. It is generally accepted that healthcare facilities such as dentists, pharmacies and opticians tend to be provided by the market depending on the level of demand in an area. GP provision tends to be driven more by population numbers and is the responsibility of clinical commissioning groups. However, the garden town team will work with the clinical commisioning groups to improve quality of local health services, to match other improved infrastructure provision.

Children running at Berks, Bucks & Oxon Wildlife Trust Sutton Courtenay © Ric Mellis

5.4.4 Cultural and leisure facilities

Didcot is home to a range of existing cultural and leisure facilities. There has been significant recent investment in the Cornerstone Arts Centre, the Orchard Centre (phase one and two) and Cineworld. The town also has three leisure centres, Didcot Railway Centre, a library, a civic hall and a variety of community facilities.

Facilities such as these – along with new provision – are crucial to supporting a high quality of life that will ensure people want to live, work and invest in Didcot. Without them, the town will struggle to achieve its full potential as a high quality living environment for both existing and new residents.

Unlike the provision of statutory public services like education and healthcare, there are no clearly defined benchmarks of what number, type and scale of cultural and leisure facilities are required to support a population of the size that Didcot is currently and the size that Didcot will grow to in the next 15 to 20 years. Some provision has historically been driven by the public sector but is increasingly driven by the private and voluntary sectors depending on viability and needs.

Local planning policy and evidence base documents suggest that when Didcot is compared to other settlements in the local area it has a relatively low amount of facilities for its population size.[3] There is also recognition of the need to expand the retail offer of the town centre to include more comparison retail including independent shops and bars, restaurants and pubs.[4]

A number of comparator towns have also been studied to consider current and potential future gaps in provision to be identified (see Appendix H).

These gaps have focused on facilities that provide an exciting and vibrant environment where people want to live, work, and visit. The comparator towns were selected on the basis that their resident population is of a similar size to the level at which Didcot is currently at and also the population number it is anticipated to reach in 20 years time.

This analysis highlighted that Didcot could benefit from a range of additional or enhanced provision including:

- Expanded retail offer including specialist/ independent/ boutique shops
- Improved night-time economy offer including bars, restaurants, pubs
- More cinema screens
- Enhanced library provision
- Enhance leisure offer
- Commercial leisure e.g. private gyms
- Gallery space
- Hotel accommodation (and associated facilities such as conference space, spa facilities, gyms)
- Additional community spaces (potentially co-located with other new facilities)
- Increase the range of cultural/ heritage attractions – potentially relating to the military presence in Didcot, a learning resource focused on Didcot's role in energy generation etc

3 South Oxfordshire District Council (June 2016) settlement assessment background paper
4 South Oxfordshire District Council (May 2016) South Oxfordshire District retail and leisure needs assessment

- Higher education or additional further education presence[5];
- Destination attractions e.g. climbing centre, sculpture park, urban farm, measured walks and jogging trails throughout the town, cultural route through the town and surrounding area etc

A number of these facilities are expected to be delivered by development sites that are already permitted or in the planning pipeline. For example, there is a potential opportunity for a new leisure centre to be provided as part of the North East Didcot site and the Orchard Centre phase two will provide an opportunity to further expand Didcot town centre's retail offer.

A review of proposed development (both consented and pending determination) across Didcot shows that a number of sites are providing floorspace that could be used to accommodate small-scale community facilities particularly where they are of a scale which requires provision of 'local' or 'neighbourhood' centres to serve the day-to-day needs of new communities. A number of the larger strategic sites are also expected to make financial contributions to enhance existing facilities in the Didcot including: Didcot Library, Didcot Day Centre and Didcot Wave.

During the public consultation exercise for the delivery plan it was suggested that the possibility of providing a running track in Didcot be explored further. This will be incorporated into a proposed 'cultural, leisure and recreational provision study' for the garden town.

There is also likely to be a need for the council to update its own evidence base documentation and commission studies to identify demand for specific facilities. This will require joint working with existing stakeholders, organisations and strategic partners including Sport England.

5 Abingdon and Witney College is currently based in Abingdon but may consider the option of opening a Didcot-based satellite campus in the longer term to meet demand expected to arise from the growing population. The college is keen to establish a presence once again in the town potentially through a training facility in/close to the town centre

5.4.5 Masterplan response

The masterplan for the garden town shows how Didcot could look spatially once proposed housing and economic growth has taken place and seeks to define a role for different parts of the town and how they then relate to one another. The different components of the town and how these could respond to different infrastructure requirements are set out below.

Didcot town centre

The masterplan envisages the expansion of the town centre to support the completion of the Orchard Centre project. This could involve the development of the Rich's Sidings site which is adjacent to Orchard Centre (phase two) to provide a mix of uses including offices, small retail units, and new homes. A mixed development in this location will help to further animate the area by providing non-residential ground floor uses. Providing office floorspace in this location also fits with the economic strategy to encourage more commercial activity in the central core of Didcot. Introducing new homes to this part of the town, will increase the resident population of the town centre which will be vital in achieving the critical mass needed to support a greater range of shops, bars and restaurants. The town centre has also been identified as an appropriate location for a new cultural centre adjacent to a new public space that would complement the existing offer of the Cornerstone Arts Centre. Further studies will be required to identify an occupier for that space.

Enhanced retail offer © VS-B

Didcot Road, Wantage Road and Broadway - Cultural Spine

The garden town masterplan seeks to strengthen the role of the east-west route formed by Didcot Road, Wantage Road and Broadway. A number of Didcot's key community facilities are already located along this route including Didcot Library, Didcot Civic Centre, Didcot Health Centre, and Didcot Community Hospital. It is envisaged that footfall along this route could be enhanced by a series of new cultural features and public space improvements to make that route more attractive to users. The nature of the cultural features along the route are yet to be confirmed – different opportunities are likely to be identified over the delivery plan period – but could include a new cultural centre (identified as part of the expanded offer in the town centre), a new public open space (Didcot town square), café associated with the allotments that are currently located along the route, and public art.

North East Didcot - health and wellbeing

The vision and principles guiding the masterplan for Didcot Garden Town have health and well-being at their core (see healthy active living below).

The masterplan intends to create a health and well-being 'hub' focused around the North East Didcot development which will see the delivery of up to 1,880 new homes. The site may also be the location for a new leisure facility for the town. The site will become an integral part of the Garden Line that will provide a north-south route dedicated to sustainable modes of transport such as cycling, e-bikes and potentially autonomous pods for mass transport. This route will not only make clear connections between Didcot, Culham and Harwell, it will also provide direct links to the countryside beyond the town's boundaries at Long Wittenham and also the Mowbray Fields Nature Reserve.

The provision of high quality public open spaces and a clearly defined green infrastructure network will also play a significant role in encouraging people to get active outside whether that be through walking, jogging, using trim trails or gardening. Green infrastructure is considered in chapter 8 of this delivery plan.

Other specific projects relating to health and well-being include identifying suitable locations for new GP provision and a community hospital as more details of the specification of these two facilities becomes available and investigating the potential to utilise science and technology through 'smart' solutions for the benefit of people suffering from specific health issues. This aspect is considered in Chapter 7 of this delivery plan.

Links to green infrastructure © South Oxfordshire District Council

Gateway South - public space and culture

The area surrounding Didcot Station is recognised as being vital in influencing perceptions of the town. It is important that this 'arrival space' communicates what a vibrant, high quality, well-connected and innovative place Didcot is and entices people to explore further by providing clear signposting to other parts of the town – in particular the town centre. As such, the masterplan identifies a number of potential 'opportunity sites' including Gateway South.

Gateway South, is already the subject of an existing planning permission but there is an opportunity to revisit and optimise this in light of the garden town objectives. Therefore, the masterplan proposes that this site should deliver – in addition to new housing – a new arrival square immediately in front of the station building, a new facility for Didcot Railway Centre and potentially an exhibition/ business/ events space which could complement the existing offer at the Cornerstone [6].

Local and neighbourhood centres in new developments

As noted earlier in this chapter, a number of the planned extensions to Didcot propose local, district and/ or neighbourhood centres. Typically, these centres are planned to potentially provide a range of small-scale retail units and community facilities to meet day-to-day needs of residents. Although the majority of these sites are at the outline stage of the planning process and are, therefore, subject to change, a list of the centres they propose and their content is provided below:

- Great Western Park – two neighbourhood and one district centre comprising of local shops and community buildings
- North East Didcot - one neighbourhood centre approximately six units to accommodate shops, cafés, restaurants and a pub, crèche/ day nursery, hotel and community hall
- Valley Park – two small local centres (north and south) – content yet to be defined
- Ladygrove East – no defined centre but could potentially provide a new primary school and community centre (to be confirmed – this is based on an exisiting permission)

These hubs are not intended to compete with Didcot's main town centre but rather to enable localised provision of facilities that new and nearby existing communities require on a day-to-day basis. The role of the main town centre is to provide a more strategic function and facilities that require critical mass to support them.

6 Gateway South could potentially be considered for this

Healthy active living

One of the aims of the Didcot Garden Town masterplan is to create a place which provides people with the opportunities to make healthy lifestyle choices regardless of age, gender or income group. There are a number of features of the masterplan and delivery plan that could help to achieve this:

- Ensuring that key facilities and areas of employment are accessible by one of more of the following: by foot, bicycle and/ or public transport
- Reducing health inequalities through addressing wider determinants of health such as through the promotion of good quality local employment, affordable housing, environmental sustainability and education and skill development
- Securing provision of health facilities so that people can get medical help when they need it to address health issues
- Providing convenient and equitable access to local healthcare services and social infrastructure
- Providing convenient and equitable access to a range open space and natural environments providing opportunities for informal and formal recreation for all age groups
- Providing opportunities for people to buy locally-sourced, healthy, fresh food
- Creating safe, accessible and well-designed built environment that encourages social interaction for all demographic groups including older people, vulnerable people, low income groups and children
- Embracing the Smart Cities agenda by encouraging the incorporation and future-proofing of technology and innovation that improves health outcomes across a range of areas
- Working with stakeholders such as Sport England to maximise the opportunities for incorporating healthy active features and concepts within the town
- Considering the potential of co-locating existing and new community facilities to ensure their long-term sustainability and to bring different community groups together
- Providing high quality natural spaces, which is discussed further in chapter 8.

Opportunities to buy fresh, healthy, locally-produced food

5.4.6 Conclusions

Didcot Garden Town will see significant growth and change over the coming decades. For the garden town to achieve beneficial outcomes for the people who live and work there, it must be a place which provides a high quality of life. In the context of social infrastructure, this means ensuring the facilities that people need are available and are accessible, giving people a choice of facilities and the ability to walk or cycle safely to the facilities they need on a day to day basis and providing people with the opportunities to live healthy and active lifestyles.

It is important that the town grows into a whole rather than a collection of separate places. The Didcot Garden Town masterplan provides an overview of how the town could develop, taking into account the sites that already have planning permission or have existing proposals associated with them.

The development that is already planned for the town will deliver a range of community, education, cultural and leisure facilities – all of which are required to make the garden town a vibrant and enjoyable place to live. The Didcot Garden Town masterplan seeks to ensure that where there are gaps in current and future provision, that there is the opportunity and the flexibility to enable those things to come forward.

Figure 5.43 shows the extent of new infrastructure required to implement the delivery plan, and deliver over 15,000 new houses.

Recommendations

- Joint working between the local planning authority and stakeholders (such as OCCG) to ensure their needs for new facilities in Didcot are taken into account through the plan-making and decision-taking process – key activities could involve identifying a robust formula for basing requests for section 106 payments to fund facilities and/ or considering the financial requirements of new facilities through Infrastructure delivery plans to allow the cost of these facilities to be reflected in future CIL charges for the town
- Monitoring of housing delivery to ensure that social infrastructure required to mitigate the demands from those sites is provided in time. This is particularly important where sites are relying on off-site provision from other new developments or where an expansion of an existing facility is necessary
- Joint-working between the local planning authority and OCCG and NHS England to identify an appropriate site and agree a brief and specification for a new strategic health centre
- Exploring the potential for additional innovative/ pioneering ways of providing residential accommodation for the elderly
- Feasibility study and discussions with providers to consider the potential to accommodate a higher/ further education institution at Didcot
- Promote town-centre living by introducing/ encouraging additional residential development
- Work with Sport England to update councils evidence base documents in relation to sports and leisure facilities and to identify opportunities for healthy active living within new developments
- Commissioning further studies into the need for cultural, leisure and recreational facilities in the town. Studies identified to date include:
  - Opportunities for commercial leisure and professional team provision in Didcot
  - Opportunities for an integrated approach to health and leisure
  - Ways of working with developers to encourage 'age-friendly' design
  - Opportunities for an annual programme of Didcot-based cultural events e.g. festivals, markets, conferences etc.

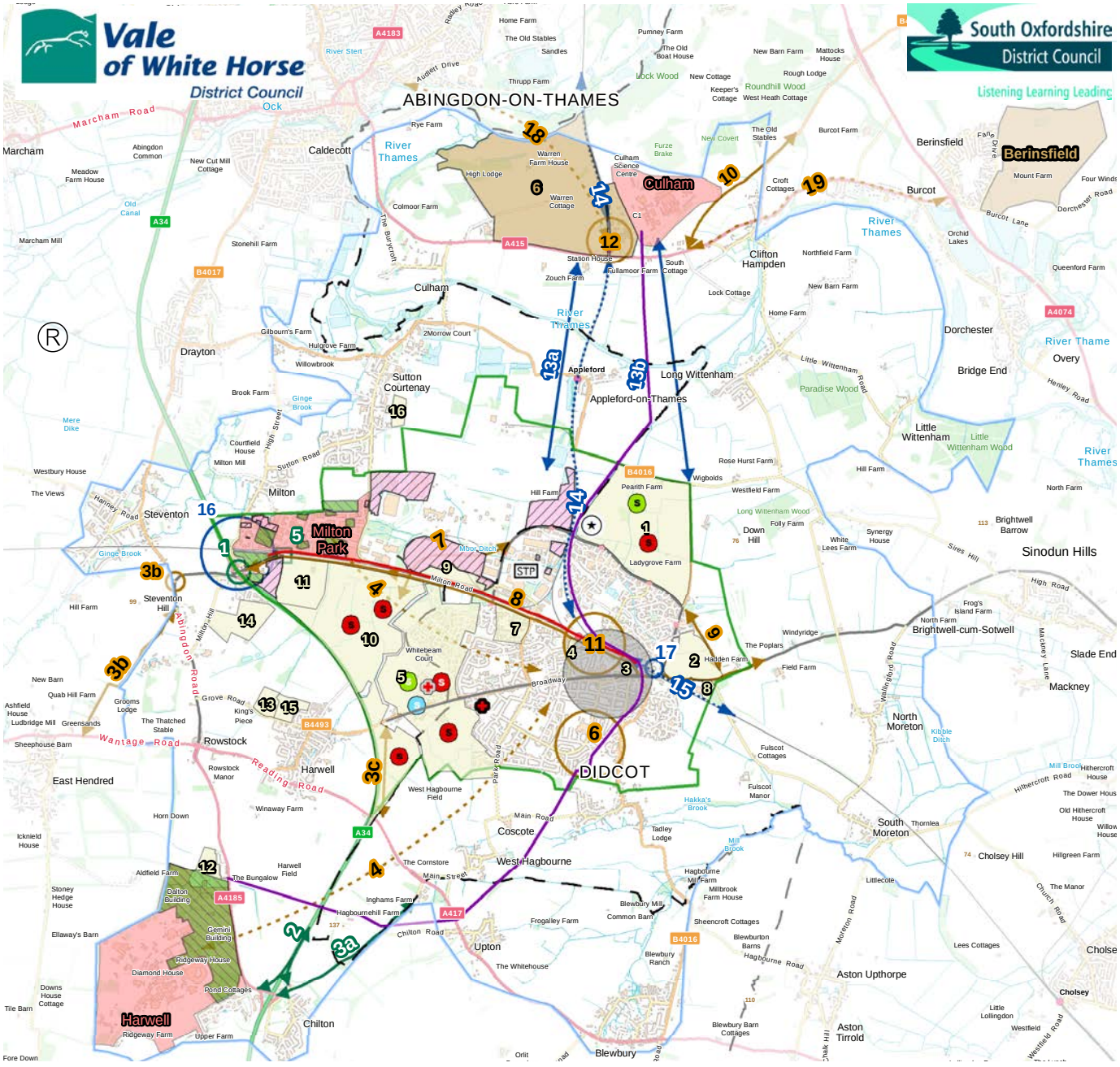


Figure 5.43 - Local sites and planned infrastructure

Potential opportunity to increase the number of homes emerging at the below sites to be explored further through the South Oxfordshire District Council's emerging Local Plan

	Site	Bid doc	Updated position	Status
South Oxfordshire	1. North East Didcot	2,100	2,030	Resolution to grant for 1,880 and remaining allocation
	2. Ladygrove East	700	642	Allocation for 642
	3. Rich's Sidings	300	400	Allocation for 300
	4. Gateway South	300	400	Resolution to grant for 300
	5. Great Western Park	3,500	3,300	Consented
	6. Culham No. 1		500*	Proposed allocation
	7. Vauxhall Barracks	400	300*	Allocation for 300
	8. Hadden Hill		74	Consented
Both	9. Didcot A	400	400	Resolution to grant
Vale of White Horse	10. Valley Park	4,300	4,254	Resolution to grant
	11. North West Valley Park	800	800	Allocation
	12. Harwell Campus	1400	1000	Proposed allocation
	13. Harwell Village		100	Proposed allocation
	14. Milton Heights	450	458	Application pending
	15. West of Harwell	200	207	Consented
	16. East of Sutton Courtenay	200	200	Application pending
	Total	15,050	15,065