4 Oxfordshire's Existing Infrastructure

Chapter at a Glance

This Chapter provides an overview of Oxfordshire's existing infrastructure context across 13 infrastructure types. This includes an indication of stakeholder responsibilities, infrastructure locational context and capacity.

4.1 Infrastructure Types

To reflect Oxfordshire's diverse strategic infrastructure context, a total of 13 infrastructure types have been developed. This includes energy, digital and transport infrastructure, as well as wider environmental and social infrastructure types such as cultural, flood alleviation, leisure and green & blue infrastructure.

These infrastructure types are applied throughout OxIS, both in relation to the baseline context, as well as the subsequent scheme identification and appraisal process (see Chapter 6) and funding (see Chapter 8). The infrastructure types, mapped by OxIS Theme, are shown in Figure 4-1.

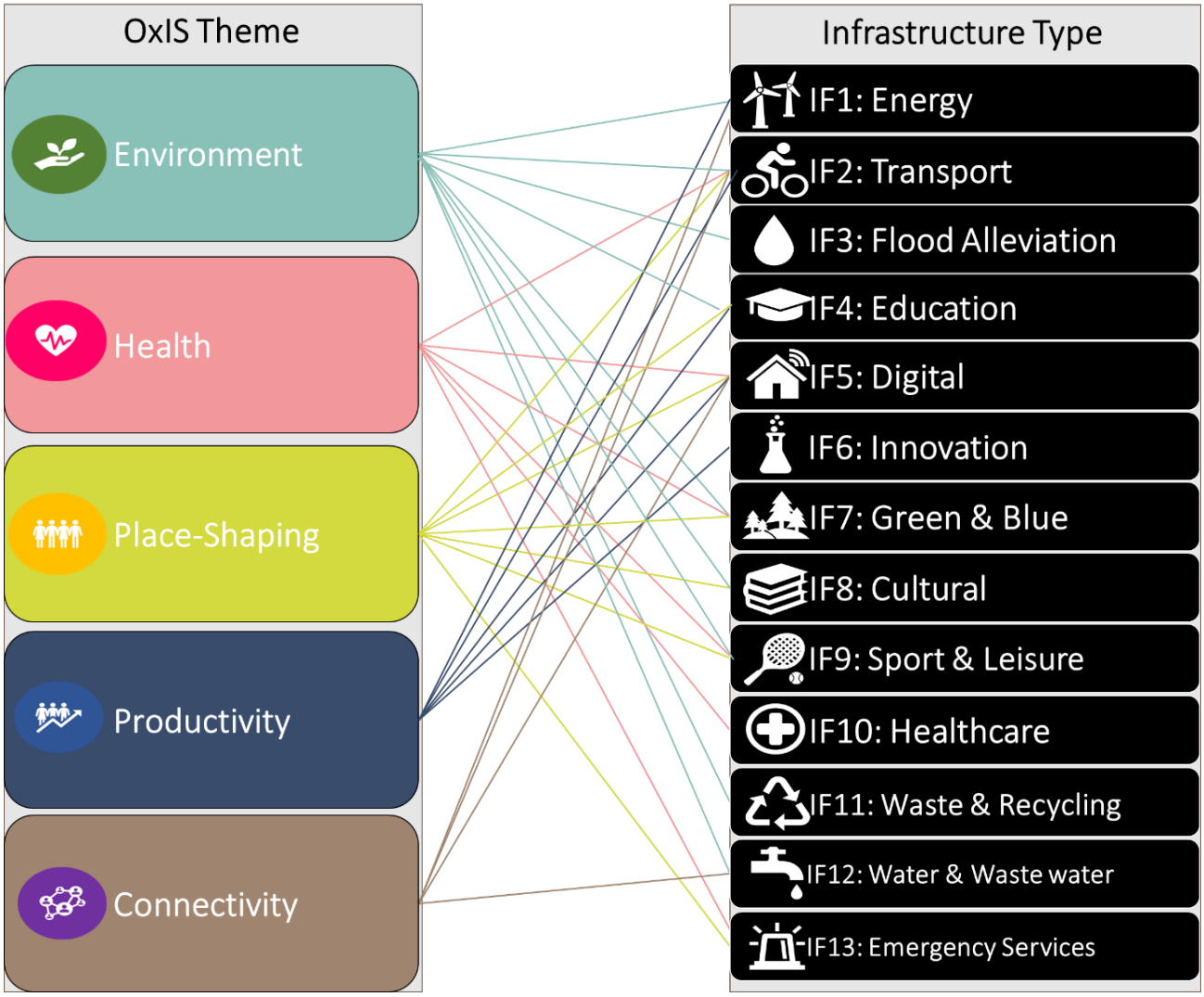

Figure 4-1: Relationship between OxIS Infrastructure Types & OxIS Theme

The remainder of this Chapter provides an overview and description of Oxfordshire's current infrastructure across these 13 infrastructure types.

4.2 Oxfordshire's Existing Energy Infrastructure (IF1)

What is Energy Infrastructure (IF1)?

Energy infrastructure covers the generation, transmission and distribution of energy, incorporating:

- **IF1A: Electricity** (e.g. substations) (see Section 4.2.1)
- **IF1B: Gas** (e.g. gas pipelines) (see Section 4.2.2)
- **IF1C: Renewable Energy Generation** (e.g. district heating) (see Section 4.2.3)

Who is Responsible for Oxfordshire's Energy Infrastructure (IF1)?

The **National Grid** is responsible for England's overall transmission of energy (both electricity and gas).

Oxfordshire's energy distribution infrastructure is owned and managed by three energy Distribution Network Operators (DNOs), namely:

- **Western Power Distribution (WPD)**, responsible for north of Cherwell and north of West Oxfordshire
- **UK Power Networks (UKPN)**, responsible for east of South Oxfordshire
- **Scottish & Southern Electricity Networks (SSEN)**, responsible for the remainder

Energy distribution infrastructure (such as gas mains and connections) is owned and managed by two gas DNOs, namely:

- **Wales & West Utilities (WWU)**, responsible for west of West Oxfordshire and west of Vale of White Horse
- **Scotia / Scottish / Southern Gas Networks (SGN)**, responsible for the remainder

OCC alongside the five District and City Councils, in their function as planning authorities, support the future planning of networks in relation to the impact of forecast growth from allocated development.

Organisation Type / Function	Organisation	Oxfordshire Geography Responsibility	Infrastructure Responsibilities				
			Transmission Operators	Network Distribution	Network Management	Delivery of New Scheme / Upgrades	Future Scheme Planning
Energy Transmission Operator	National Grid	All	✓				
Electricity DNO	WPD	North of Cherwell & North of West Oxfordshire		✓	✓	✓	✓
	UKPN (East)	East of South Oxfordshire		✓	✓	✓	✓
	SSEN	Rest of Oxfordshire		✓	✓	✓	✓
Gas DNO	WWU	West of West Oxfordshire & West of Vale of White Horse		✓	✓	✓	✓
	SGN	Rest of Oxfordshire		✓	✓	✓	✓
District Council	Oxfordshire's five District Councils	Districts					✓
County Council	OCC	All of Oxfordshire					✓

Table 4-1: IF1 Infrastructure Responsibilities

4.2.1 Electricity Infrastructure (IF1A)

4.2.1.1 National Grid

In England, the National Grid is owned by the National Grid Electricity plc and operated by a single System Operator. They manage the supply of electricity across England.

As shown in Figure 4-2 electricity is transmitted at high voltages (1kV to 22kV) from power stations to major substations (Grid Supply Points to reduce voltage) and regional generators, where it is distributed regionally at lower voltages (<1kV) to satisfy demand.

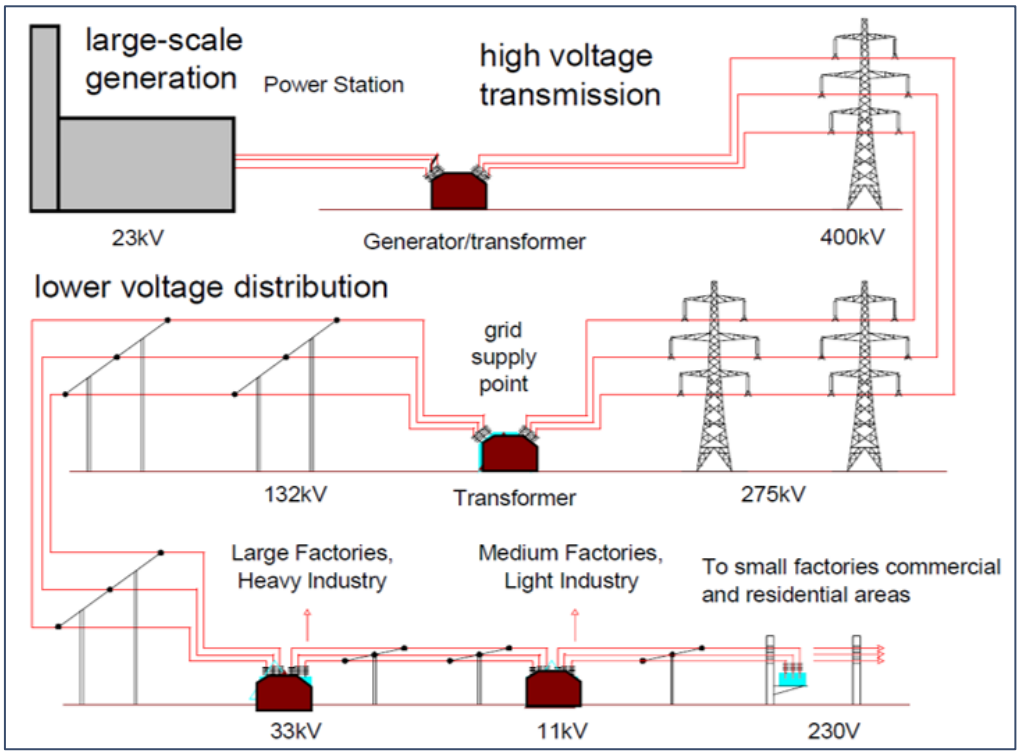

Figure 4-2: Structure of the UK electricity grid (Parliamentary Office of Science and Technology, 2001)

4.2.1.2 Regional Networks

As shown in Figure 4-3, three DNO's own and manage Oxfordshire's regional networks of engineering assets:

- Southern Electric Power Distribution, responsible for, the majority of Oxfordshire's electricity network
- WPD, responsible for the area to the north of Cherwell and West Oxfordshire
- UKPN (East), responsible for a small area located in the east of South Oxfordshire

Their roles include:

- Maintaining the network on a daily basis
- Repairing the network when faults occur
- Reinforcing the network to cope with changes in the pattern of demand
- Extending the network to connect new customers

The DNOs are regulated by the UK Government Office of Gas & Electricity Markets (OFGEM), whose primary purpose is to protect customers now and in the future, by ensuring fair practice within the energy market. It is the role of energy suppliers to buy electricity from the wholesale market and sell it to customers via the retail market.

Figure 4-3: Oxfordshire's Electricity DNO Boundaries (National Grid ESO, 2020)

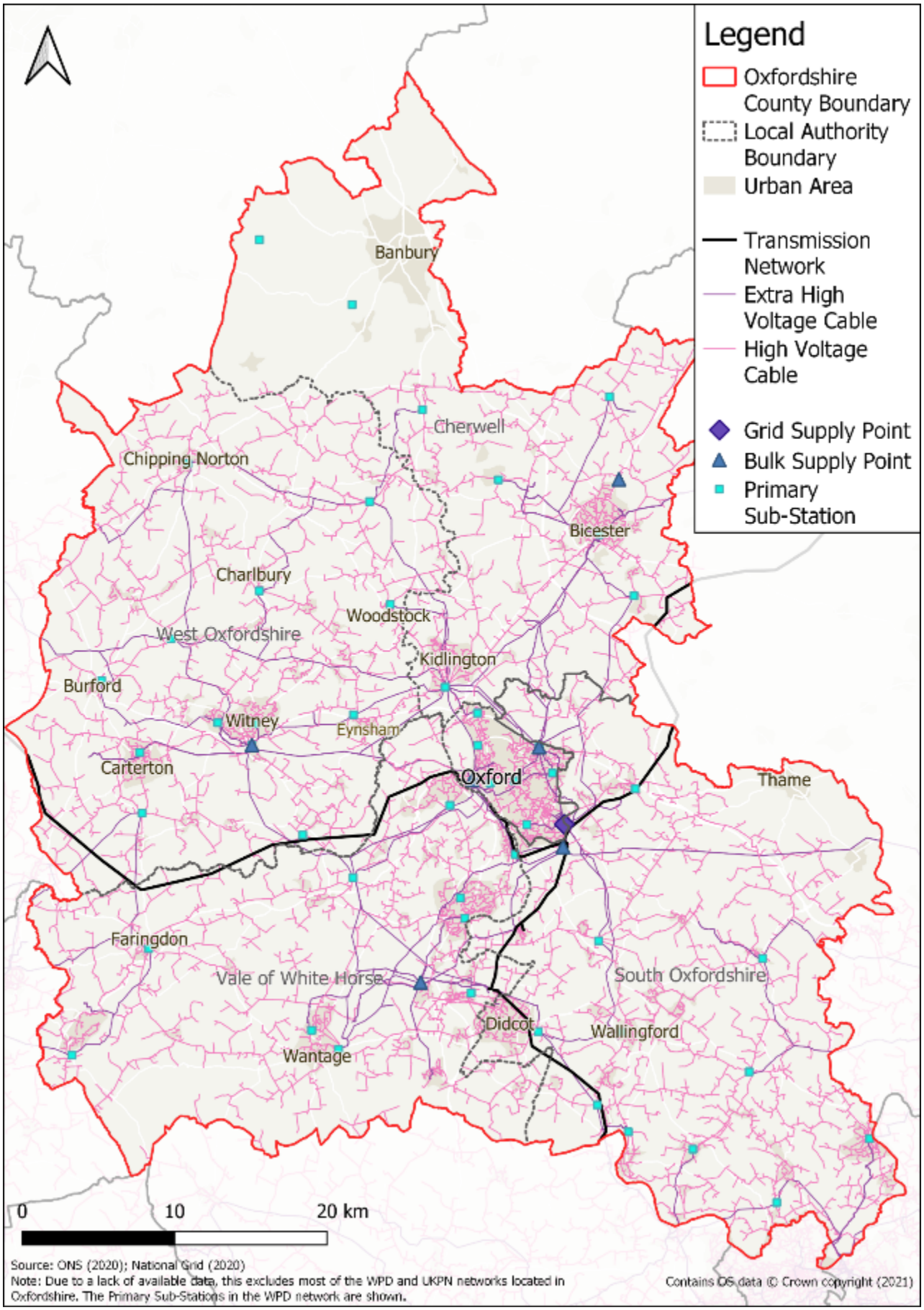

Figure 4-4: Map of Southern Electric Power Distribution Oxfordshire Extra High Voltage and High Voltage electricity network, including the Primary Sub-Stations in the WPD network (SSE mapping services, 2021)

4.2.1.3 Oxfordshire's Current Network Generation

Embedded generation capacity on the Southern Electric Power Distribution network within Oxfordshire is summarised in Figure 4-5. This represents the production of electricity from power stations that are directly connected to the distribution network, including:

- **Connected generation capacity:** Capacity currently connected to the network
- **Accepted generation capacity**: Capacity approved for connection but not yet connected

Whilst solar capacity is dominant, it is important to note that solar electricity generation varies both daily and seasonally and when estimating annual generation, appropriate capacity factors must be applied to each generator type.

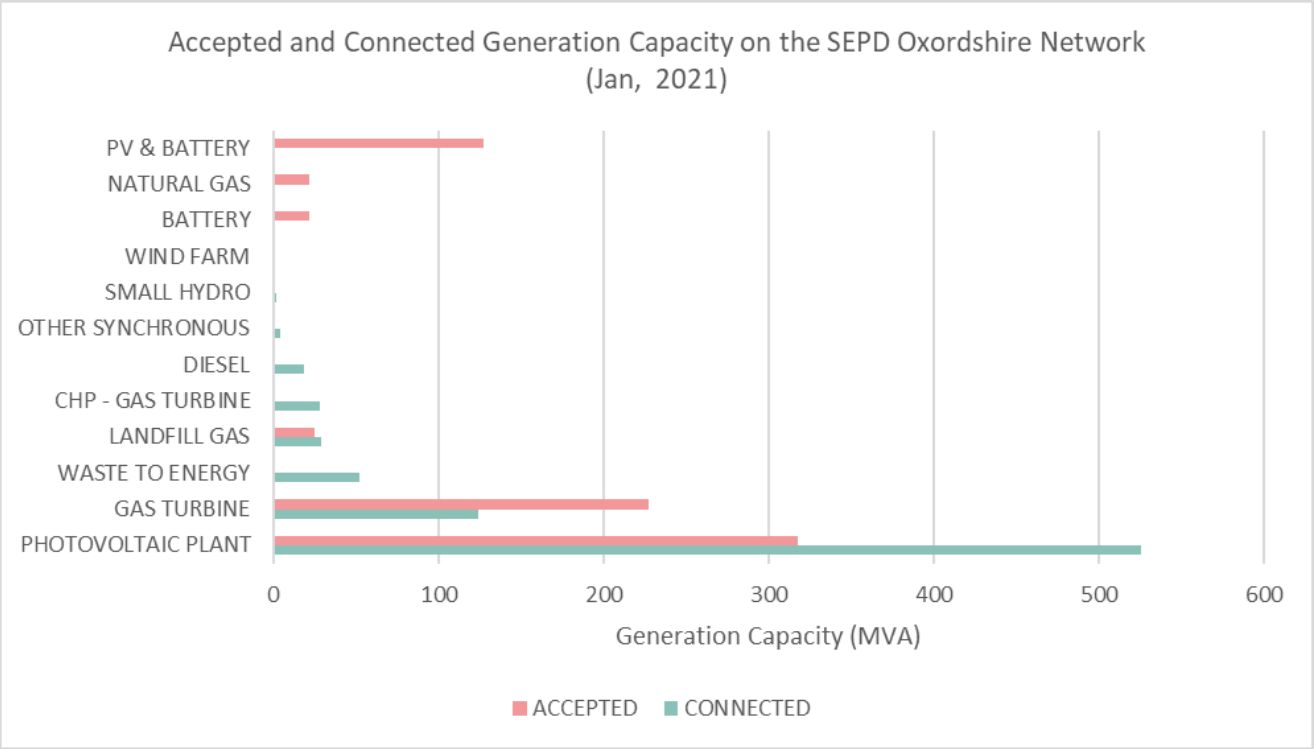

Figure 4-5: Oxfordshire connected/accepted generation capacity on the SSEN network. Data extracted from (Scottish and Southern Electricity Networks, 2021). Note: This excludes the WPD and UKPN network located in Oxfordshire]

4.2.1.4 Electricity Consumers

As shown in Table 4-2, there are around 30,000 non-domestic and 300,000 domestic electricity consumers, in Oxfordshire as of 2019.

Local Authority	All Non-Domestic Meters	All Domestic Meters	People per Metre
Cherwell	6,000	67,100	2.2
Oxford City	6,700	58,400	2.6
South Oxfordshire	6,100	64,000	2.2
Vale of White Horse	5,300	59,900	2.3
West Oxfordshire	5,400	50,700	2.2
OXFORDSHIRE	**29,500**	**300,100**	**2.3**

Table 4-2: Number of electricity meters by local authority as of 2019 (BEIS, 2020)

4.2.2 Gas Distribution Network (IF1B)

The National Transmission System owned and operated by National Grid plc, is Britain's gas transmission network. It is used to transport high pressure gas from entry points to gas distribution networks, power stations and large industrial users (OFGEM, 2021).

4.2.2.1 District Network Operators

The DNOs own and maintain the networks within their geographical regions:

- SGN (formerly Scotia Gas Network) is one of the UK's largest gas distribution networks and covers the majority of Oxfordshire (see Figure 4-6). They currently distribute natural and green gas to 5.9 million homes and businesses across parts of South England and Scotland and are responsible for maintaining 75,000 km pipes across the distribution system in these areas
- WWU is responsible for a small area encompassing the west of the Vale of White Horse and west of West Oxfordshire serving communities such as Carterton, Burford and Farringdon

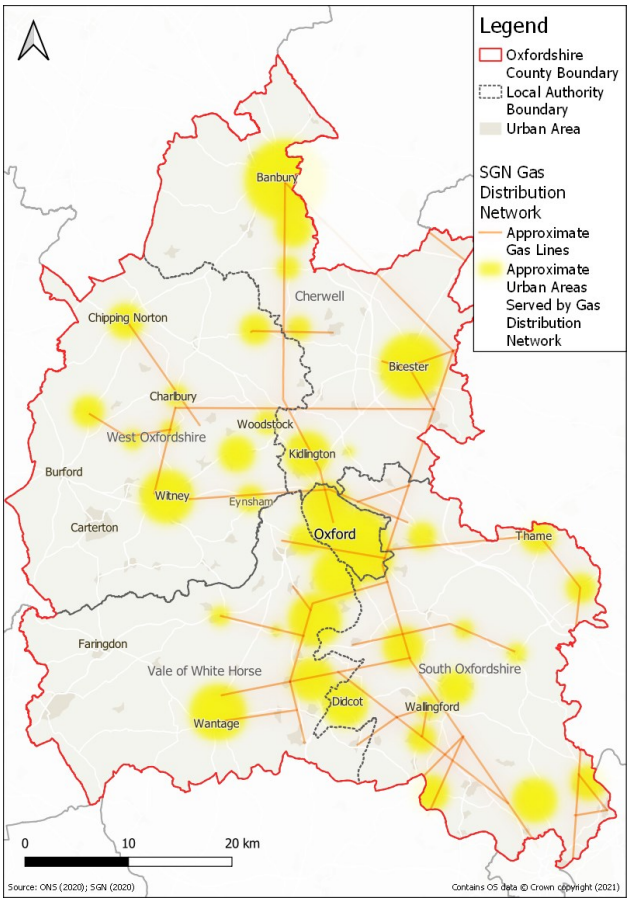

Figure 4-6: SGN higher pressure network within Oxfordshire

4.2.2.2 Local Distribution Zones

Local Distribution Zones connect to the National Transmission System via "off-take points". The gas undergoes pressure reduction before entering the distribution networks and then is transported to customers via the distribution network, undergoing further pressure reductions as needed. Energy suppliers sell gas to customers and buy gas from "shippers". Shippers pay the National Grid and DNOs to transport gas through their networks.

4.2.2.3 Gas Consumers

Table 4-3 summarises the number of consuming and non-consuming unique gas meters by local authority. This indicates that there are approximately 240,000 domestic gas consumers and 2,000 non-domestic gas consumers across the County as of 2019.

Local Authority	Non-Domestic Meters	Domestic Meters	Non-consuming Meters	Homes off-gas
Cherwell	624	51,010	546	22.7
Oxford City	1,300	50,601	453	16.9
South Oxfordshire	566	50,254	329	18.1
Vale of White Horse	577	49,364	441	15.5
West Oxfordshire	395	37,164	424	24.9
OXFORDSHIRE	**3,462**	**238,393**	**2,193**	**19.5**

Table 4-3: Number of Gas Meters by Local Authority in Oxfordshire (2019). Note some low consumption businesses are included in the domestic meter counts (BEIS, 2020)

Figure 4-7 indicates that residents living within Oxford City comprised the majority of Oxfordshire's gas consumption in 2019, followed by Cherwell with around 1,200 GWh. West Oxfordshire consumed the least gas of all Oxfordshire's local authorities. There is generally a higher proportion of non-domestic gas consumption in both Oxford and Cherwell due to a greater concentration of commercial buildings in these districts.

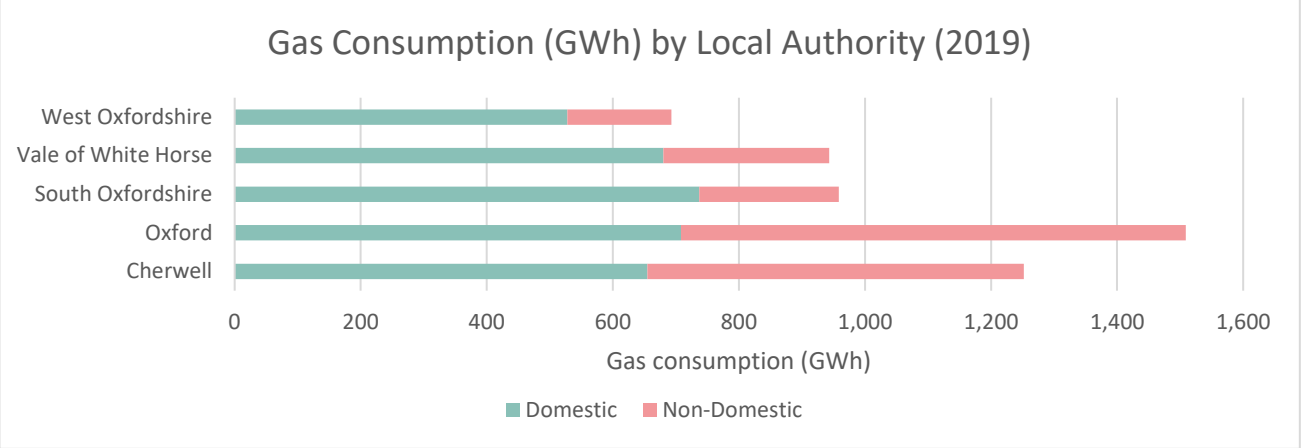

Figure 4-7: Gas consumption by District in Oxfordshire 2019. (BEIS, 2020)

As of 2019 it is estimated that 57,161 (19.5%) of homes in Oxfordshire are 'off-gas' (BEIS, 2020). This means that they are not connected to the gas network and therefore rely on off-grid heating and cooking sources such as oil, electric, district heating or off-grid gas. All of the Districts are above the Great Britain average of 14%.

4.2.3 Renewable Energy Generation Infrastructure (IF1C)

Oxfordshire's low carbon sector makes a significant contribution to the local economy, generating £1.15 billion a year in sales which is 7% of the local economic value (OxLEP, 2019). This creates a strong business case for future investment in renewable energy. It is estimated that there is opportunity to add £1.35 billion annually to the local economy and create over 11,000 new jobs whilst accelerating the move towards local and national targets. Championing clean energy generation is also a core component of the Oxfordshire Energy Strategy (OxLEP, 2019), given its importance in achieving Oxfordshire's net zero carbon targets.

UK Government figures from 2019 show that there is an estimated renewable energy capacity (maximum at any single point in time) of 453 MW (see Figure 4-8) and an average overall annual generation of 533,480 MWh (see Figure 4-9), across 10,135 installations, in Oxfordshire which is ~15% of Oxfordshire's annual electricity demand (BEIS, 2020). These show little overall change in total capacity since 2017 and average generation since 2015. However, photovoltaic (solar) has increased by 235% since 2014. Oxfordshire has a Capacity Factor (average generation / capacity x 24hrs x 365 days) of 13.4% (see Table 4-4).

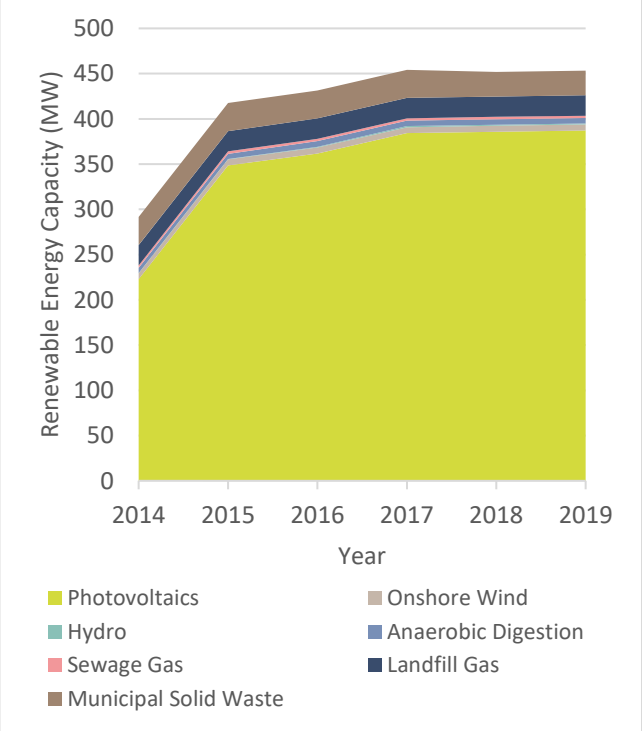

Figure 4-8: Oxfordshire's Estimated renewable energy capacity

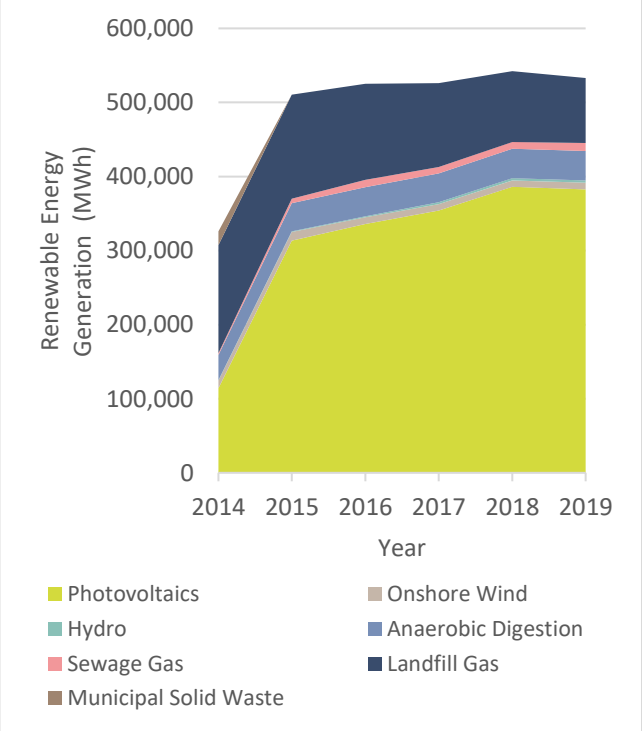

Figure 4-9: Oxfordshire's estimated annual renewable generation

Renewable Energy	Proportion	Generation	Capacity Factor	UK Capacity Factor
Photovoltaic (solar)	85%	382,457 MWh	11.3%	11.2% (2019)
Landfill Gas	16%	87,773 MWh	44.5%	39.9% (2019)
Anaerobic Digestion	7.5%	39,808 MWh	74.0%	62.0% (2019)
Sewage Gas	2%	10,670 MWh	Capacity factor is consistent with UK averages	
Onshore Wind	1.7%	9,401 MWh	16%	23% to 44% (IEA, 2020)
Hydro	0.6%	3,311 MWh	Capacity factor slightly lower than UK average	
Plant Biomass	0.1%	419 MWh	48%	62% (2019)
OXFORDSHIRE	100%	533,480 MWh	13.4%	

Table 4-4: Oxfordshire's renewable energy mix 2019 (Statistica, 2020))

Figure 4-10 shows the same data for estimated annual renewable capacity and renewable energy generation geospatially by District. Similar to the County, photovoltaic (solar) is the main source of renewable energy generation across all five districts (see Table 4-5).

Local Authority	Proportion	Generation	Capacity Factor	Photovoltaic	Landfill Gas	Anaerobic Digestion	Sewage Gas	Onshore Wind	Hydro	Plant Biomass
Cherwell	26%	137,261 MWh	26%	59%	4%	33%	4%			
Oxford City	0.2%	8,293 MWh	11%	96%				0.3%	3%	
South Oxfordshire	13%	71,571 MWh	15.6%	62%		24%	12%	0.02%	0.6%	
Vale of White Horse	44%	232,300 MWh	15.4%	64%	31%			4%	1%	
West Oxfordshire	16%	84,054 MWh	12.5%	94%	5%					0.5%
OXFORDSHIRE	100%			80%	16%	7.5%	2%	1.7%	0.6%	0.1%

Table 4-5: Oxfordshire's renewable energy mix 2019 by District (Statistica, 2020)

Capacity Factor is the level of actual electrical energy generated compared to the maximum possible electrical energy output over the same period.

- **Cherwell:** The county's second largest renewable energy producer, renewable energy in Cherwell has steadily increased since 2015 except for a small dip in 2019. The efficiency of Cherwell's Anaerobic Digestion plant is a commendable at 24% higher than the national average and the photovoltaic capacity factor meets the average. The highest potential for increasing generation from existing infrastructure lies in landfill gas. If the capacity factor is increased from 26% to the UK average of 39%, an additional 6,339 MWh could be produced per year
- **Oxford City:** The low capacity factor can be attributed to the high proportion of photovoltaic in the energy mix. Given that the UK average for photovoltaic was 11.2% in 2019 (Statistica, 2020), it is unlikely that Oxford City can significantly increase generation without implementing additional infrastructure
- **South Oxfordshire:** Improving the capacity factor for sewage gas by 3.6% (in line with the UK average) could generate an additional 800 MWh annually
- **Vale of White Horse**: Total renewable energy generation has decreased by ~23,000 MWh since 2009, despite the capacity factor for all renewable sources being the second highest in the county at 15.4%. The capacity factor for landfill gas is an impressive 15% higher than the national average and the PV capacity factor meets the average
- **West Oxfordshire** Generation has increased steadily since 2015 and is the only district to utilise plant biomass. Whilst the capacity factor for PV is higher than the UK average at 12%, efficiencies can be made in landfill gas which is currently 27% lower than the average. Bringing the capacity factor to 39% is estimated to generate an additional 3,100 MWh of renewable energy per year

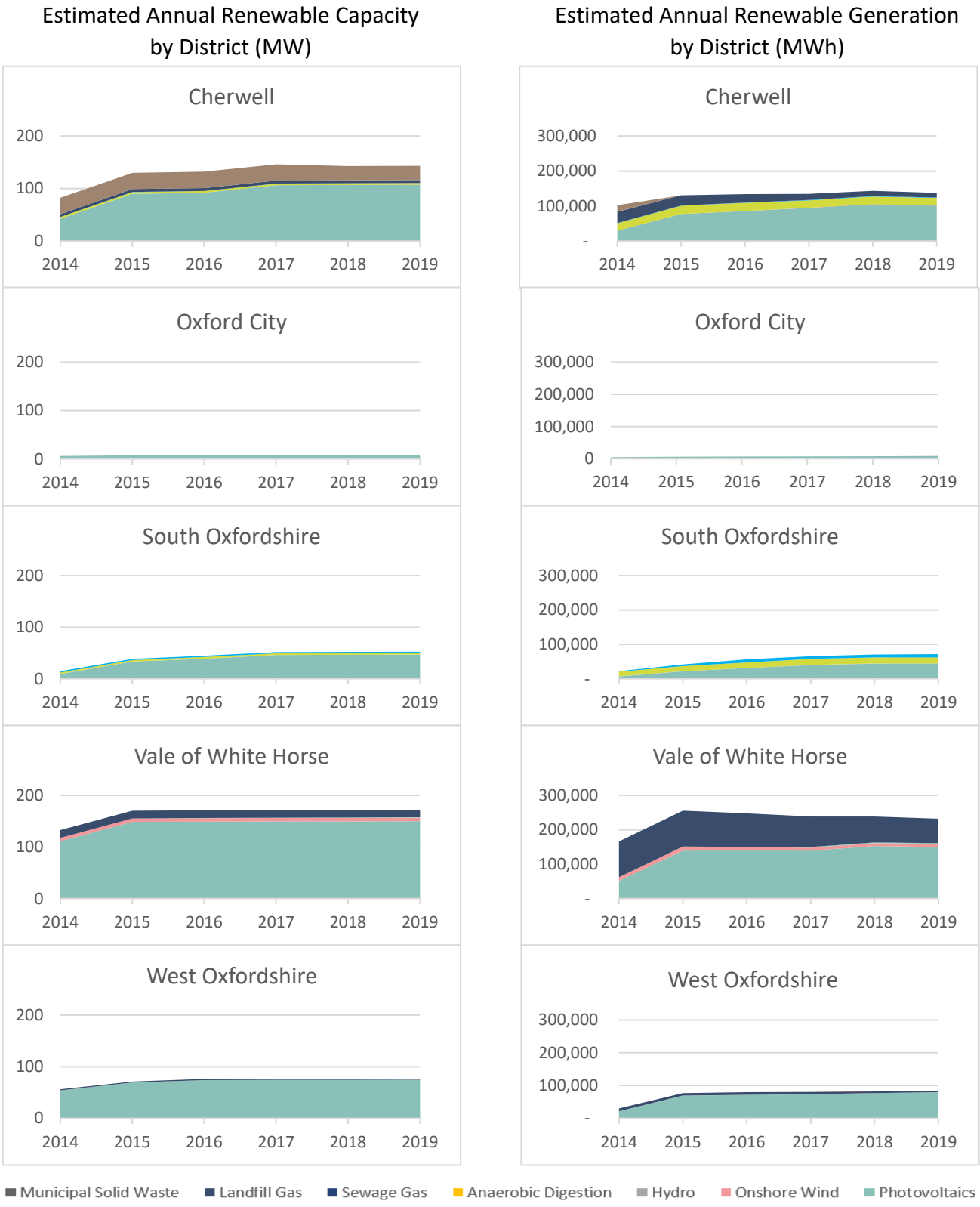

Figure 4-10: Estimated annual renewable generation & capacity by district (BEIS, 2020)

Oxfordshire's future needs relating to energy infrastructure (concerning electricity, gas and renewable energy) to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- E1: Reduced Carbon Emissions (see Section 5.2.1)
- C2: Clean Energy Supply Grid Capacity & Connectivity (see Section 5.6.1.4)

4.3 Oxfordshire's Existing Transport Infrastructure (IF2)

What is Transport Infrastructure (IF2)?

Transport infrastructure within OxIS includes the following infrastructure types:

- IF2A: Active Travel Infrastructure (e.g. cycleways, Public Right of Ways) (see Section 4.3.1)
- IF2B: Bus & Rapid Transit Infrastructure (e.g. bus priority measures) (see Section 4.3.2)
- IF2C: Rail Infrastructure (e.g. railway stations) (see Section 4.3.2.2)
- IF2D: Road Infrastructure (e.g. local and strategic road network) (see Section 4.3.3)
- IF2E: Traffic Management Infrastructure (e.g. Zero Emission Zones) (see Section 4.3.3.3)
- IF2F: Vehicle Charging Infrastructure (e.g. electric vehicle charging) (see Section 4.3.3.4)
- IF2G: Aviation Infrastructure (e.g. airports) (see Section 4.3.4)

Figure 4-11 shows the strategic location of Oxfordshire, its surrounding areas and the large-scale transport infrastructure that connects them. In terms of transport infrastructure:

- Active travel infrastructure (e.g. cycleways) is generally centred around the urban centres such as Banbury, Bicester and Oxford City (see Section 4.3.1)
- Oxford City centre and many of its suburbs are better connected by public transport with comparatively less coverage in outlying towns and villages (see Section 4.3.2)
- The County's road network supports localised and regional bus and coach services which connect Oxfordshire's towns to Oxford city centre and beyond to strategically important places such as Swindon, Northampton, Cheltenham and Milton Keynes. Five Park and Ride sites are located around Oxford city which help service the city for commuters and visitors (see Section 4.3.2.1.2)
- Strategic and localised rail services are provided out of the twenty-three rail stations across the County. Recent and ongoing investment, including East-West Rail, will improve this further but there already exists good connectivity from the county to London with hourly services running from Oxford and Banbury Railway Stations (see Section 4.3.2.2)
- The county has key nationally strategic routes such as the M40 connecting London to Birmingham and the A34 connecting the M3 to the M40 (see Section 4.3.3)

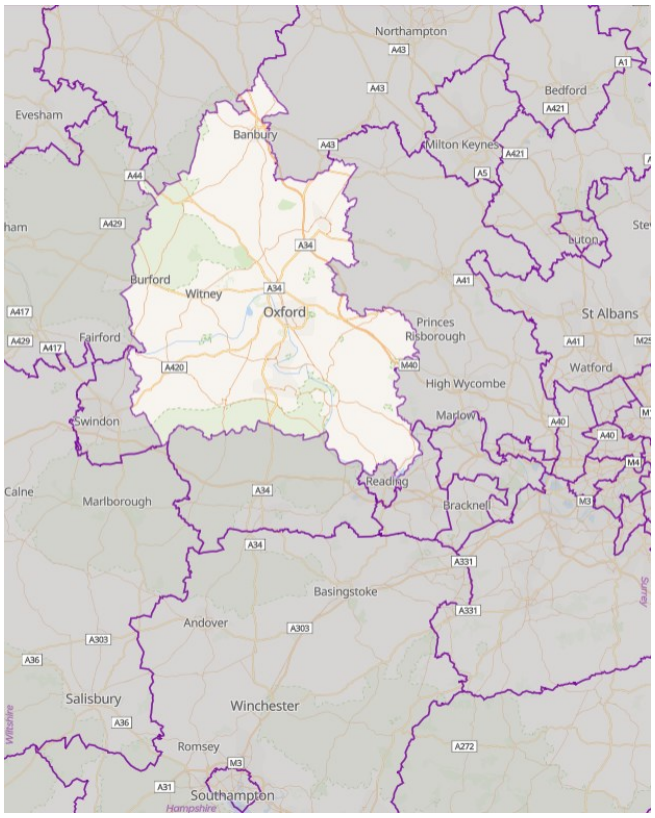

Figure 4-11: Oxfordshire's Wider Context (Cadence 360)

- Although the only civilian airport within Oxfordshire is the privately operated London Oxford Airport (specialising in private, business and freight), the County is close to international transport hubs at Southampton, Heathrow, Luton, Stansted, Southampton, Birmingham and Coventry providing multiple transport links internationally (see Section 4.3.4).

Oxfordshire is a predominantly rural county in terms of land, with nearly two thirds of its population living in urban areas (see Section 2.1). Much of the strategic transport infrastructure supports longer distance journeys both within and outside of the County.

Who is Responsible for Oxfordshire's Transport Infrastructure (IF2)?

- Most road-based transport infrastructure in Oxfordshire is managed by OCC as highways authority, with support from the five District and City Councils. Parish and town councils and the City Council also have responsibilities for some local transport related amenities, including bus shelters and street furniture
- Alongside OCC, National Highways are responsible for managing Oxfordshire's Strategic Road Network which includes the M40, A34 and A43
- Public transport operators, including the Oxford Bus Company and Stagecoach, provide transport services on Oxfordshire's roads connecting people and communities. Network Rail are responsible for managing Oxfordshire's rail infrastructure with services and stations managed and operated by Train Operating Companies Great Western Railway and Chiltern Railways
- As the local highway authority, OCC are also responsible for the county's Public Rights of Way network whilst Sustrans and the Canal & River Trust also have responsibility for some of Oxfordshire's active travel infrastructure
- Electric vehicle charge points are operated by private Charge Point operators.

Organisation Type / Function	Organisation	Oxfordshire Geographical Coverage	Infrastructure Responsibilities		
			Infrastructure Operation & Management	Delivery of New Infrastructure Schemes	Future Infrastructure Service Planning
UK Government Agency	Network Rail	County-wide Rail Network	✓	✓	✓
	National Highways	Strategic Road Network	✓	✓	✓
Transport Operator	Great Western Railway	County-wide Rail Network			✓
	Chiltern Railways	County-wide Rail Network			✓
	Oxford Bus Company	County-wide			✓
	Stagecoach in Oxfordshire	County-wide			✓
Private Organisation	London Oxford Airport	London Oxford Airport	✓	✓	✓
Electric Vehicle ChargePoint Operator	Various Operators	County-wide	✓	✓	✓
Charitable Organisation	Canal & River Trust	Canals & Tow Paths	✓	✓	✓
	Sustrans	National Cycle Network Routes	✓	✓	✓
Highways & Transport Authority (including Public Rights of Way)	OCC (as Transport Authority)	County-wide	✓	✓	✓
District and City Councils	Oxfordshire District and City Councils	Oxfordshire Districts		✓	✓
Parish / Town Council	Oxfordshire Parish & Town Councils	Oxfordshire Parishes & Towns	✓		

Table 4-6: Summary of IF2 Infrastructure Responsibilities

4.3.1 Active Travel Infrastructure (IF2A)

Oxfordshire has an expansive network of footpaths, cycleways and Public Rights of Ways (see Figure 4-12). Some of these designated facilities are located alongside green and blue infrastructure corridors, including the county's extensive network of canals and the River Thames. These designated routes have an important function in connecting rural communities as well as the larger urban areas.

The density of key urban centres within places such as Oxford, Banbury, Abingdon and Bicester mean that they have the highest concentration of dedicated walking facilities. Some streets within Banbury, Bicester and Oxford (e.g. Cornmarket Street and Bonn Square) are pedestrianised. This means they are closed to general traffic thus allowing free movement for people walking and, in some cases, cycling.

Oxford is a national cycling city, with around 20% of all commuting journeys made by bike (ONS, 2011); placing fourth of all UK local authorities.

Oxfordshire also contains five National Cycle Network routes (maintained by Sustrans) connecting towns and rural communities. These are formed of a mixture of on-road and segregated paths. Park & Pedal schemes also operate out of the Seacourt and Redbridge Park & Ride sites.

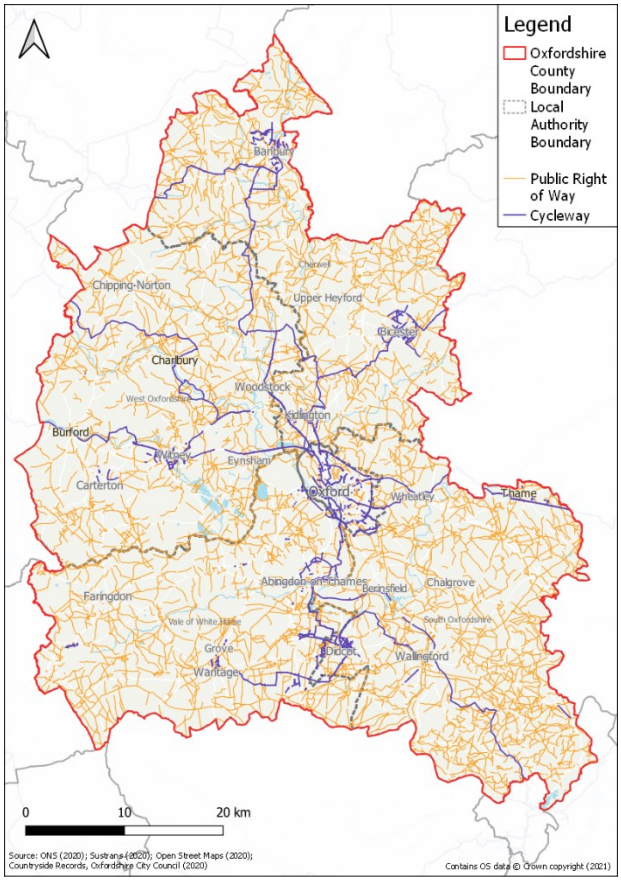

Figure 4-12: Active Travel Infrastructure in Oxfordshire (Including Public Rights of Way)

COVID-19 Emergency Active Travel Infrastructure

During COVID-19, the DfT Emergency Active Travel Fund has enabled substantial investment to enhance Oxfordshire's active travel infrastructure to make journeys easier for those walking or cycling to work, school or for leisure. This has included an investment of £600,000, as part of phase 1, in new or upgraded cycling infrastructure and footpaths, including road space reallocation in Oxford, Witney, Wantage and Upton (OCC, 2021). Oxfordshire were also awarded £2.98 million in November 2020 as part ot the Active Travel fund Phase 2.

Alongside walking and cycling, OCC (in collaboration with Oxford City) has recently launched a trial of a zero-carbon e-scooter rental scheme in Headington (east of Oxford City Centre). The scheme, comprising of 50 e-scooters and run by VOI, aims to reduce the need for as many short car journeys and improve air quality for local communities (OCC, 2021).

Oxfordshire's future active travel needs to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- E1: Net Zero Carbon Emissions (see Section 5.2.1)
- H2: Access to Spaces for Physical Activity (see Section 5.3.2)
- PS1: Local & Liveable Communities (see Section 5.4.1)
- PS5: Inclusive & Integrated Active Travel (see Section 5.4.5)
- C4: Oxfordshire Transport Connectivity & Performance (see Section 5.6.4)

4.3.2 Bus & Rail Infrastructure (IF2B & IF2C)

4.3.2.1 Bus & Coach (IF2B)

Local bus services in Oxfordshire are predominantly operated by Oxford Bus Company, Stagecoach in Oxfordshire and Thames Travel. Their networks (see in Figure 4-13) are generally radial in nature, connecting Oxford with Banbury, Abingdon and Didcot. There are also high frequency bus routes along other corridors, including

- The A4260 which connects Kidlington and Banbury
- The A40 which connects Eynsham, Witney and Carterton towards Cheltenham
- The A420 which connects rural communities such as Kingston Bagpuize and Faringdon and onwards to Swindon
- The Arriva 280 which connects Oxford, Wheatley, Thame and Aylesbury.

Bus service coverage in Oxfordshire's more rural communities, away from the core network, is less comprehensive.

Local bus services are supported by dedicated bus priority infrastructure provided by OCC to reduce the impact of traffic congestion and improve bus journey time reliability. This infrastructure is primarily located in Oxford City, however, there are advanced proposals for a dedicated bus lane on the A40 (OCC, 2021). Through changes enacted by the National Bus Strategy (DfT, 2021), OCC's role, as highways authority, in enhancing bus reliability is to be become a key part of their future network management duties.

4.3.2.1.1 Coach

Frequent inter-regional bus and coach services operate from Gloucester Green Bus Station in Oxford. Services are operated by several commercial organisations including National Express, Oxford Bus Company (services branded 'the Airline') and Stagecoach (services branded 'Oxford Tube'). These services connect the County to London alongside Heathrow and Gatwick Airports.

4.3.2.1.2 Park & Ride

There are six Park & Ride sites throughout Oxfordshire; five of which are located at key strategic locations close to Oxford's Ring Road, with an additional site located to the south west of Bicester. There is a combined total capacity of around 4,000 car parking spaces across the six sites (see Table 4-7). There is also currently an ongoing advanced scheme to construct a new Park & Ride facility at Eynsham as part of the wider A40 improvement scheme whilst expansion works at Seacourt Park & Ride are currently also underway.

Park & Ride Site	Destination	Car Parking Capacity
Bicester	Bicester	580
Oxford Parkway	Oxford	758
Pear Tree	Oxford	1,035
Redbridge	Oxford	1,070
Seacourt	Oxford	786
Thornhill	Oxford	1,335
	Total Capacity	**4,229**

Table 4-7: Park & Ride capacities in Oxfordshire

Oxfordshire's future needs relating to bus and coach connectivity to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- **E1: Net Zero Carbon Emissions (see Section 5.2.1)**
- **C4: Oxfordshire Transport Connectivity & Performance (see Section 5.6.4)**
- **C5: Strategic Transport Connectivity Into & Out of Oxfordshire (see Section 5.6.5)**

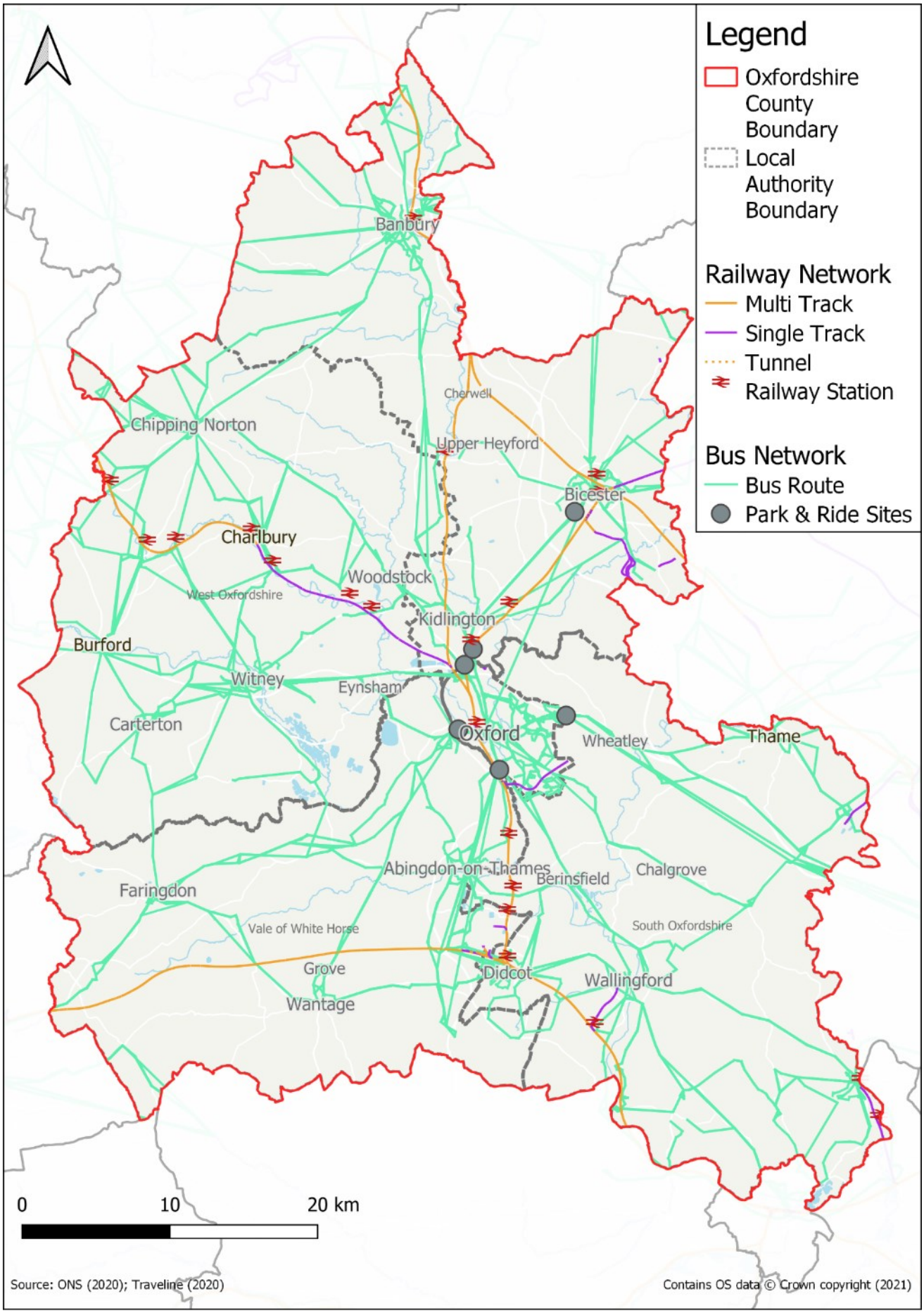

Figure 4-13: Oxfordshire's Public Transport Infrastructure

4.3.2.2 Rail (IF2C)

Network Rail is responsible for operating, maintaining, and renewing the rail infrastructure within Oxfordshire. The existing rail network (see Figure 4-13), primarily comprises of a north-south multi-track spine and connects Didcot via Oxford towards Banbury and Bicester. The main Great Western Line also crosses the south of Oxfordshire, connecting to London Paddington.

Three rail franchises lease the stations and run passenger services throughout the county:

- Chiltern Railways: operate within the county connecting London Marylebone to Oxford, Bicester, Banbury and the West Midlands via High Wycombe
- CrossCountry: run services connecting key urban areas all over the county, with services running through Oxford connecting Bournemouth and the North
- Great Western Railway: connects the county to London and the South West with trains running between London Paddington via Reading to Didcot and Oxford, continuing on to Bristol and Swindon.

Great British Railways: Williams-Shapps Plan for Rail

The recently published Williams-Shapps Plan for Rail sets out the strategic vision to transform railways in the UK (DfT, 2021). Proposals involve the establishment of a new public body called Great British Railways which will replace Network Rail and replace the current rail franchises. Great British Railways will be responsible for operating and planning the railway, will own all rail infrastructure, and be recipients of all passenger revenue. Current rail franchises will be replaced by Passenger Service Contracts which will use a concession model (similar to London Overground) to contract private organisations to run trains. This system will allow Great British Railways to retain control over timetabling, branding and most fares.

Oxfordshire is located on the Strategic Freight Network (SFN), a network of trunk freight routes which can accommodate more and longer freight trains. Within the county there are seven rail freight facilities which handle a wide range of goods from automotive exports, aggregates and defence. Alongside this, frequent container trains pass through the county to and from the ports at Bristol and Southampton.

East-West Rail

East-West Rail is a major rail project underway which aims to deliver enhanced rail connectivity and wider economic benefits for communities on the Oxfordshire-Cambridge corridor. The proposed route, shown in Figure 4-14 connects Oxford to Milton Keynes and Cambridge via the Oxfordshire stations of Oxford Parkway and Bicester Village.

Figure 4-14: East West Rail Scheme (East West Rail, 2021)

The project is split into three connection stages. Connection Stage One (between Oxford to Bicester Village) has already been completed. Connection Stage Two (between Bicester Village and Milton Keynes) is under construction, and Connection Stage Three is planned.

There are 23 railway stations in Oxfordshire, providing a mix of local and national services. Of these Oxford Station is the busiest with almost 9,000,000 entries and exits in 2019-20 (Figure 4-15).

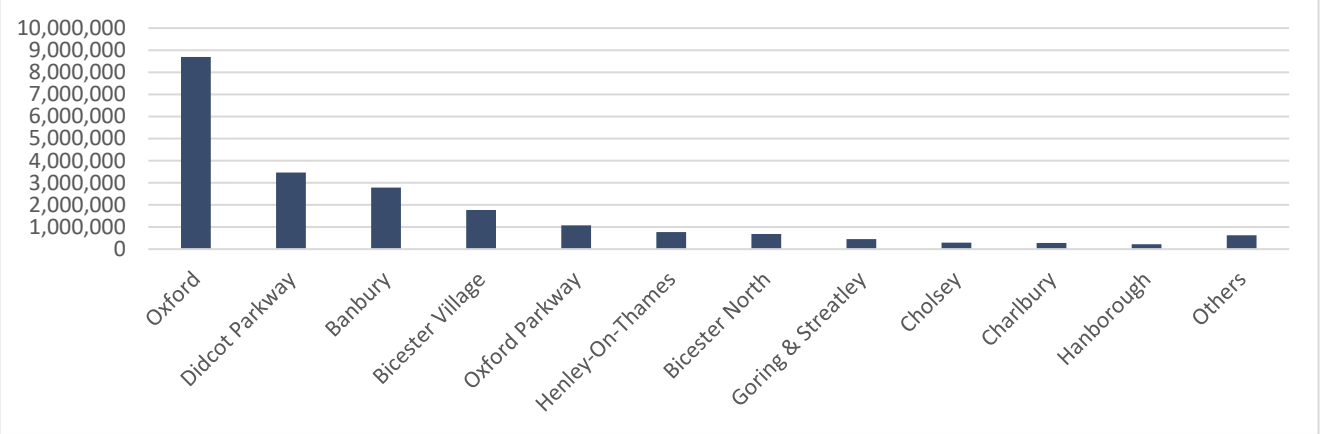

Figure 4-15: Summary of Estimated Passenger Entries & Exits at stations in Oxfordshire 2019-20 (ORR, 2020)

People can get from London to Oxford in under an hour on services from either London Paddington or London Marylebone. Banbury Station provides connections to Birmingham, Manchester and London, acting as a key gateway out of the county. Didcot Parkway, another key gateway, provides links to London Paddington, Oxford, Cheltenham and Bristol. The newest stations in the county are Oxford Parkway and Bicester Village, which both opened in 2015.

Oxfordshire's future needs relating to rail to 2040, including the Oxfordshire Rail Corridor Study, are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- E1: Reduced Carbon Emissions (see Section 5.2.1)
- C4: Improved Sustainable Transport Connectivity & Performance Across Oxfordshire (see Section 5.6.4)
- C5: Strategic Transport Connectivity Into & Out of Oxfordshire (see Section 5.6.5)

4.3.3 Road Infrastructure (IF2D, IF2E & IF2F)

4.3.3.1 Strategic Road Network (IF2D)

Oxfordshire's Strategic Road Network, which is managed by National Highways, provides connectivity both between communities and externally to the wider region. The Strategic Road Network in Oxfordshire consists of the M40 in the east of the county running north to south, the A34 between the Oxford Ring Road and towards the M4 Junction 14 and the A43 in the north of the county towards Northampton. These routes serve as key access routes to Oxfordshire for freight traffic travelling from key international ports such as Southampton Port and Heathrow Airport.

As part of its programme of works identified in Road Investment Strategy 2 from 2020 (DfT, 2020), National Highways are currently progressing the Oxford Enhancement works on the A34, which involves installing CCTV cameras and driver information systems at several locations along the A34 between the M4 to the south of Oxfordshire and the M40 to the north and other safety improvement measures such as the closing of laybys.

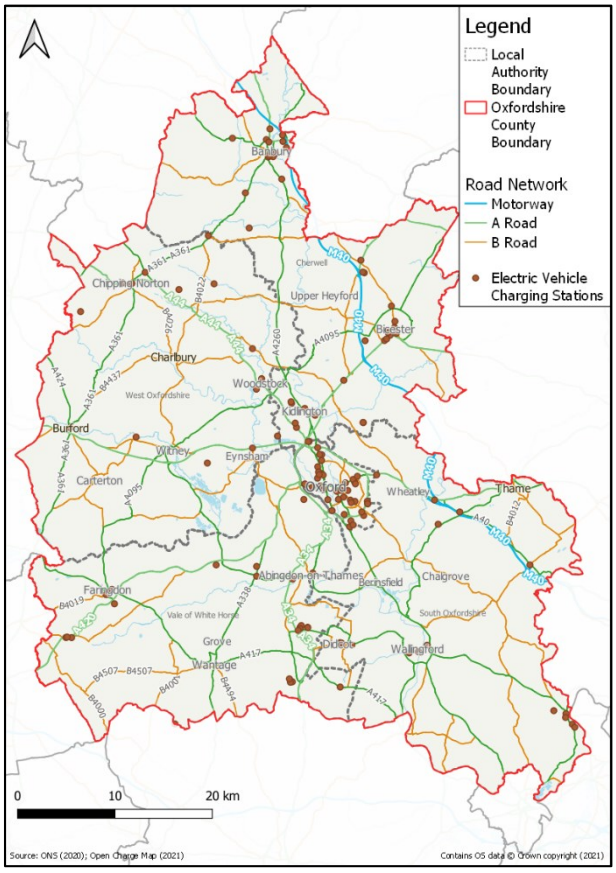

Figure 4-16: National & Regional Road Network in Oxfordshire

4.3.3.2 Key OCC Road Corridors (IF2D)

As highways authority, OCC (who work in partnership with the Districts), are responsible for the remainder of Oxfordshire's road network. The road network, shown in Figure 4-16, includes of A-roads which are generally radial in nature, connecting to the orbital Oxford Ring Road.

The key A road corridors managed by OCC are:

- **A40:** Connecting M40 at Junction 8A towards Cheltenham via Oxford Ring Road, Eynsham, Witney
- **A41:** Connecting the M40 at Junction 9 towards Aylesbury and Hemel Hempstead via Bicester
- **A44:** Connecting the Oxford Ring Road towards Worcester via Begbroke, Oxford International Airport, Woodstock and Chipping Norton
- **A420:** Connecting the Oxford Ring Road to Swindon via Kingston Baguize, Faringdon and Shrivenham
- **A4074:** Connecting the Oxford Ring Road towards Reading via Benson

4.3.3.3 Traffic Management (IF2E)

There are several established and forthcoming traffic management schemes throughout Oxfordshire to reduce the detrimental impact that vehicular traffic can have on communities. This includes the forthcoming Zero Emission Zone in Oxford City centre alongside a series of Low Traffic Neighbourhoods (LTNs) currently being trialled at locations in the Cowley area of Oxford City. These are predominantly residential roads where motorised traffic is banned with traffic filtering infrastructure such as planters, bollards or camera enforcement to prioritise travel by more sustainable modes.

Oxford Zero Emission Zone

The UK's first Zero Emission Zone overing Oxford's City centre is due to come into force in early 2022. This aims to enhance air quality, create quieter streets, and accelerate the transition / uptake of zero emission vehicles to positively contribute to Oxford City's climate change action.

This zone will operate whereby all vehicle drivers that are not 100% zero emission will be charged a daily cost to enter the zone.

4.3.3.4 Vehicle Charging Infrastructure (IF2F)

The UK Government has committed to stopping the sale of new petrol and diesel cars and vans by 2030, with all new cars and vans required to be zero emissions (electric or hydrogen vehicles) by 2035 (HM Government, 2020). This a core component of the UK's obligations to meet net zero carbon emissions by 2050.

To enable this transition, there is a need for a comprehensive network of vehicle charging infrastructure. Within Oxfordshire there are currently around 260 publicly accessible electric vehicle charging points (DfT, 2021), of which 46 are rapid (see Figure 4-16). These are operated by a range of commercial organisations including PodPoint, Polar, Ubitricity, Swarco, BP Chargemaster and New Motion.

A detailed breakdown of charging infrastructure (shown in Table 4-8) indicates that the highest density of provision is within Oxford City which has 62 chargers per 100,000 people, followed closely by Cherwell with 43 chargers per 100,000 people. West Oxfordshire and the Vale of White Horse have much lower infrastructure densities than the national average.

Local Authority / Geography	Number of Publicly Available Chargers	Density of Chargers per 100,000 People
Cherwell	64	42.5
Oxford City	94	61.7
South Oxfordshire	46	32.4
Vale of White Horse	33	24.3
West Oxfordshire	19	17.2
OXFORDSHIRE	**256**	**37.0**
SOUTH EAST ENGLAND	**2,869**	**31.3**
UK	**20,775**	**31.1**

Table 4-8: Number of electric vehicle charging devices at all speeds by Oxfordshire Local Authority (January 2021) (DfT, 2021)

Oxfordshire's future needs relating to road infrastructure (concerning roads, traffic management schemes and vehicle charging infrastructure) to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- **E1: Net Zero Carbon Emissions (see Section 5.2.1)**
- **E5: Water and Noise Pollution (see Section 5.2.5)**
- **H4: Cleaner Air (see Section 5.3.4)**
- **PS2: Community Safety & Security (see Section 5.4.1.3)**
- **P5: Drive Economic Growth & Productive Employment (see Section 5.5.5)**
- **C4: Oxfordshire Transport Connectivity & Performance (see Section 5.6.4)**
- **C5: Strategic Transport Connectivity Into & Out of Oxfordshire (see Section 5.6.5)**

4.3.4 Aviation Infrastructure (IF2G)

The only civilian airport within Oxfordshire is London Oxford Airport which is a privately owned airport specialising in private, business and freight. The airport does not have a direct rail service however there is a shuttle bus service which runs seven days a week between the airport, Oxford Railway Station and Oxford Bus Station. Other local bus services also provide connections to surrounding communities.

Additionally, London Heathrow, London Luton, Gloucestershire, Birmingham and Coventry Airports are all within around 50 miles of central Oxford. Coach services run return from Oxford City centre to Heathrow (80 minutes) and Gatwick (2 hours) Airports operated by Oxford Bus Company and National Express.

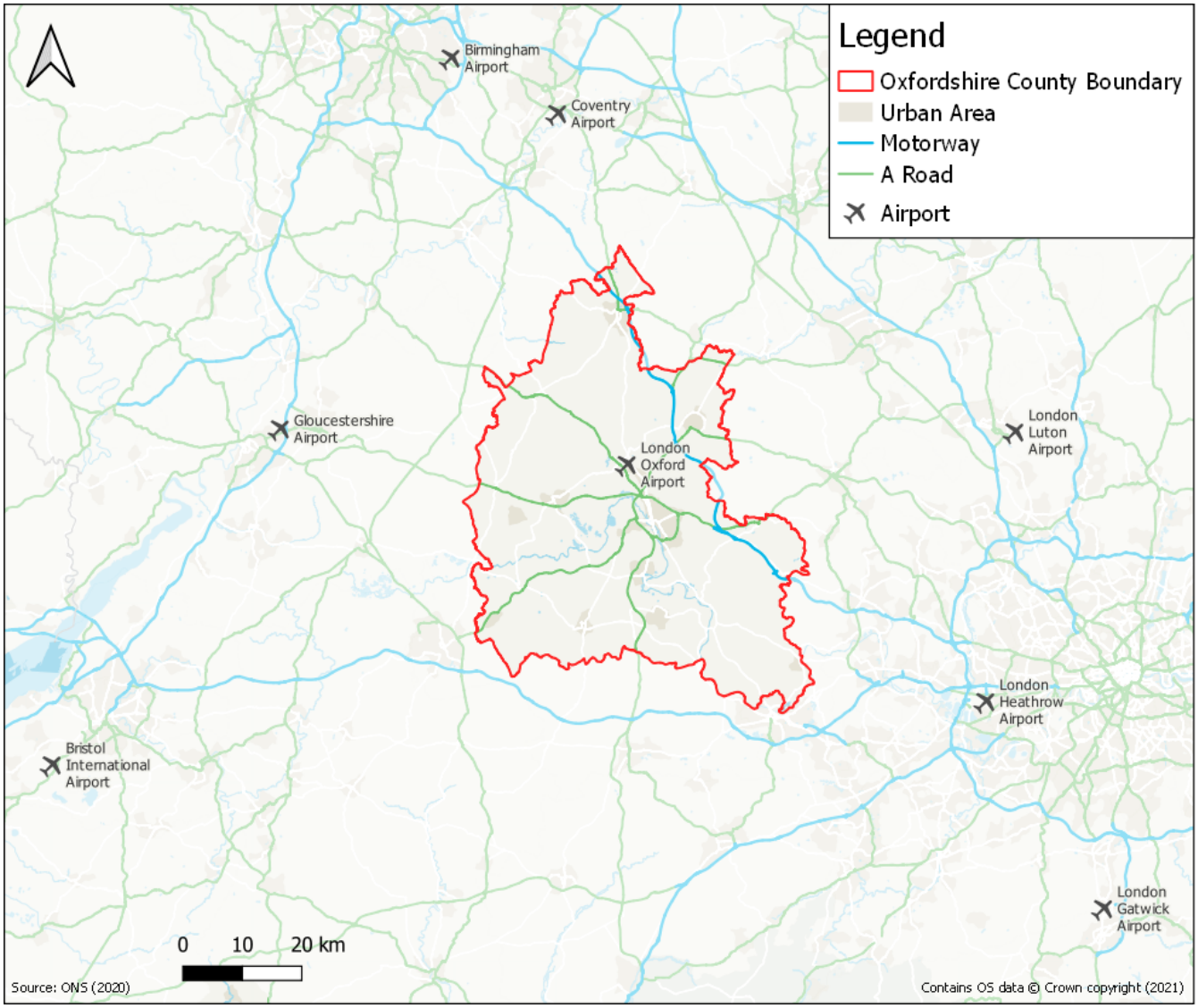

Figure 4-17: Aviation Infrastructure in and around Oxfordshire

4.4 Oxfordshire's Existing Flood Alleviation Infrastructure (IF3)

What is Flood Alleviation Infrastructure (IF3)?

Formal flood alleviation infrastructure within OxIS includes the following infrastructure types:

- **IF3A: Flood Defence Infrastructure** (e.g. retention basin, channelling, an embankment) (see Section 4.4.1)
- **IF3B: Sustainable Drainage System** (see Section 4.4.2)

Its purpose is to reduce the risk to people and damage to property from flooding, generally caused by extreme weather events. Informal infrastructure can play a role.

Who is Responsible for Oxfordshire's Flood Alleviation Infrastructure (IF3)?

- The Environment Agency provide a strategic overview of all sources of flooding in Oxfordshire. They are responsible for managing the risk of flooding from main rivers, which includes the delivery of flood alleviation infrastructure
- The Environment Agency works closely with OCC as the Lead Local Flood Authority, who are responsible for managing and delivering infrastructure to address local flood risks (e.g. surface water, ground water and other watercourses)
- Oxfordshire's five District Councils also play a vital role to plan flood alleviation infrastructure in their role as planning authorities
- Oxfordshire's water utility companies, including Thames Water, are responsible for managing their own infrastructure to reduce flooding risk from water supply and sewerage connections (see Table 4-9)

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF3 Infrastructure Responsibilities			
			Strategic Infrastructure Operation & Management	Local Infrastructure Operation & Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Environment Agency	UK Government Agency	County-wide Main River Network	✓		✓	✓
Thames Water	Potable Water & Wastewater Utility Provider	County-Wide				✓
OCC	County Council (as Lead Local Flood Authority)	County-wide		✓	✓	✓
Oxfordshire District Councils	District Council (as Planning Authority)	Oxfordshire Districts				✓

Table 4-9: Summary of IF3 Infrastructure Responsibilities

4.4.1 Flood Defence Infrastructure (IF3A)

Flood defences are dedicated infrastructure that prevents flooding of surrounding or downstream areas by altering the natural flood flow paths from a watercourse or by retaining flood water.

- A formal defence is a structure specifically built to defend land or property from flooding and is maintained for this purpose by the Environment Agency, OCC as Lead Local Flood Authority or a riparian landowner
- An informal defence, such as embankments, is a structure that has not been specifically built to retain floodwater and is not maintained for this specific purpose but may afford some protection against flooding

An indication of the nature and location of defences and flood alleviation infrastructure within Oxfordshire is provided in Table 4-10 and Figure 4-18. This has been informed by each of the Districts' Strategic Flood Risk Assessments (SFRA) and using data provided by the Environment Agency.

Local Authority	Type	Description
Cherwell	Formal	A major defence asset is identified at Grimsbury in Banbury, (built to a 1:200 year protection) and at Kidlington, (built to a 1:100 year protection). The defences include a range of methods of protection including embankments, walls, culverts and gabions with the standard of protection of these defences varying from 2 to 200 years. However, many of the defences have a design standard less than 5 years and will not be able to withstand a flood event of larger magnitude. In 2005 the Environment Agency developed a scheme to reduce the incidence and severity of fluvial flooding in Banbury. Other recent Environment Agency flood alleviation schemes include Bicester Town Centre Trash Screen Investigation and Bloxham Flood Alleviation Scheme.
	Informal	There are numerous informal flood defence features in the District (including at Bloxham and Bicester Town centre).
Oxford City	Formal	The Environment Agency owns and deploys demountable flood defences at Osney Island and New Hinksey, which are erected as required during high water events. There is an Environment Agency controlled 0.6m wide sluice gate (penstock) and eight x 300mm diameter overflow pipes set in a stone headwall either side of an earth bank walkway, upstream of Hythe Bridge Street. **Oxford Flood Alleviation Scheme:** Plans for delivery of the Oxford Flood Alleviation Scheme are currently at an advanced stage and there is a commitment from the Environment Agency in partnership with 3 Oxfordshire local authorities OxLEP, National Highways, University of Oxford, Thames Water, Oxford Flood Alliance and Thames Regional Flood and Coastal Committee for its delivery. Through delivery of the flood alleviation scheme, the scheme aims to reduce flood risk to people's existing homes, local businesses, roads and the railway, as well as provide some resilience to the future impacts of extreme weather events from climate change. Once the scheme obtains the necessary consents and approvals it will be constructed and be operational within the timescales of OxIS Stage 1.
	Informal	Although informal flood defences exist within the district, their level of protection is insufficient in Oxford City's SFRA. Private river defences in the area have typically been constructed to protect private properties, often exacerbating flooding issues downstream.
South Oxfordshire	Formal	**Goring on Thames Flood Risk Management Scheme:** This scheme provided an improved level of flood protection to 55 homes and was completed in April 2019.
Vale of White Horse	Formal	**Abingdon River Ock Flood Storage Area:** This is the only formal flood defence in the district. It consists of a flood wall at St Helens Mill in Abingdon and was developed to manage flood risk associated with the River Ock. See also commentary above on **Oxford Flood Alleviation Scheme**.
West Oxfordshire	Formal	The defences offer a standard of protection ranging from 2 to 100 years. Defences designed to a 100-year standard are found along the Upper Thames and are maintained by the Environment Agency. Such defences include flood walls, embankments and stone revetments. Many of the other fluvial defences across WODC have a design standard less than 50 years.

	Informal	The Environment Agency Asset Information Management System (AIMS) (which contains details of flood defence assets associated with main rivers), shows that the majority of the watercourses in West Oxfordshire are not formally defended but may be informally protected by high ground on either side of the watercourse.

Table 4-10: Existing Flood Alleviation Infrastructure

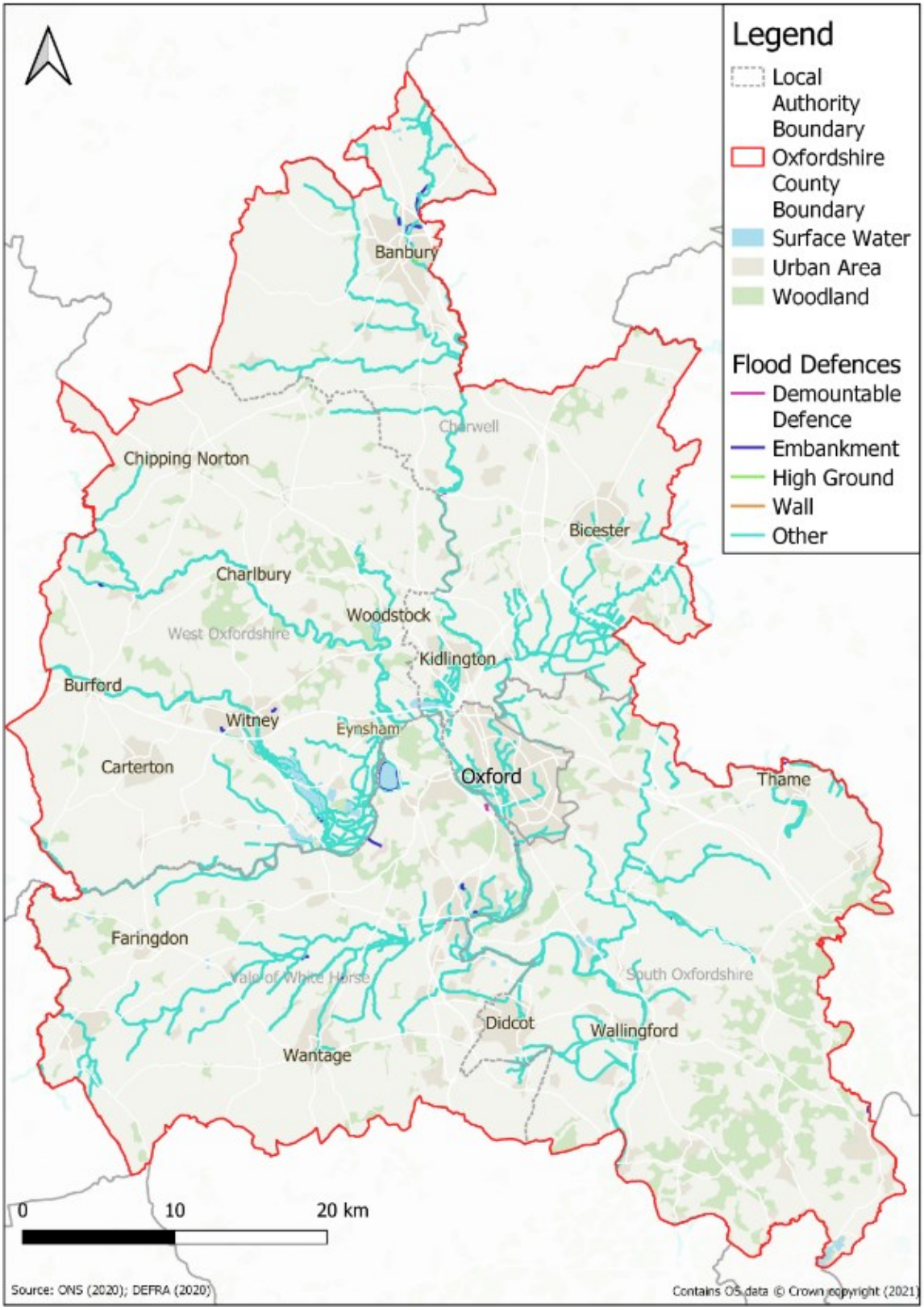

Figure 4-18: Flood Defences and Alleviation in Oxfordshire

Oxford Flood Alleviation Scheme

Plans for delivery of the Oxford Flood Alleviation Scheme are at an advanced stage and there is a commitment from the Environment Agency in partnership with OCC, Oxford City Council and Vale of White Horse District Council for its delivery. Necessary approvals and consents are required for the scheme to go ahead but once complete, it will become one of the largest flood alleviation schemes across the UK. This £150m scheme aims to reduce flood risk to people's existing homes and local businesses as well as reduce disruption to key transport corridors in the city and is designed to provide some resilience to the future impacts of extreme weather events from climate change.

The scheme (see Figure 4-19), which was included in OxIS-17, is being delivered as a partnership between the Environment Agency, OCC, Oxfordshire's five District and City Councils, Thames Water, OxLEP, the University of Oxford, Oxford Flood Alliance and Highways England. It will involve the construction of a new stream and the lowering of the floodplain to the west of Oxford to divert water away from more densely populated areas within Oxford.

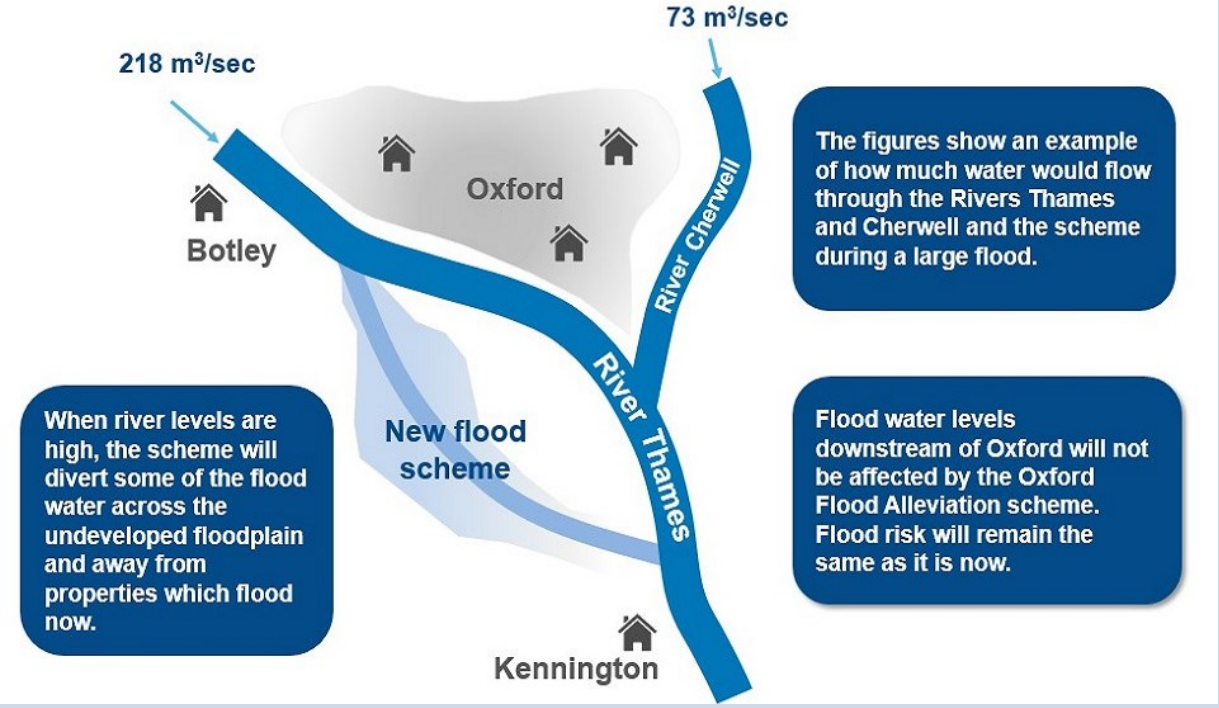

Figure 4-19: Oxford Flood Alleviation Scheme (EA, 2021)

4.4.2 Sustainable Drainage Systems (SuDS) (IF3B)

Sustainable Drainage Systems (SuDS) are water management practices that enable surface water to be drained in a way that mimics the run-off and drainage prior to site development. NPPF paragraph 165 states that major developments are obligated to incorporate SuDS unless there is clear evidence that this would be inappropriate. The primary benefits of SuDS are:

- To control the run-off of water to support the management of flood risk and maintain and protect the natural water cycle
- Manage the quality of water to prevent pollution
- Create and sustain better places for people and nature

There are a range of smaller scale SuDS schemes at development sites throughout Oxfordshire.

Oxfordshire's future needs relating to flood alleviation infrastructure (taking account of the impacts of climate change) to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. This additionally includes a consideration of the number of current and planned future homes in areas of flood risk broken down by district. Relevant sections include:

- E2: Climate Change Resilience (see Section 5.2.2)

4.5 Oxfordshire's Existing Education Infrastructure (IF4)

What is Education Infrastructure (IF4)?

Education infrastructure within Oxfordshire takes a variety of different forms. Infrastructure types considered within OxIS include:

- **IF4A: Early Years Facilities** (see Section 4.5.1)
- **IF4B: Primary Schools** (see Section 4.5.2)
- **IF4C: Secondary Schools** (see Section 4.5.2)
- **IF4D: Special Educational Needs** (see Section 4.5.3)
- **IF4E: Further and Higher Education** (see Section 4.5.4)

Who is Responsible for Oxfordshire's Education Infrastructure (IF4)?

- OCC as local authority is ultimately responsible for the management and delivery of *'maintained schools,'* comprising of around 300 primary, secondary and Special Educational Needs schools
- Over half of the maintained schools are directly managed by Academy Trusts
- Support for future infrastructure capacity planning is provided by the District Councils in their capacity as planning authorities
- Oxfordshire also has around 50 Independent Schools who, as charitable organisations, are responsible for the management and delivery of their own education infrastructure assets
- Both Universities and Further Education (FE) Colleges are responsible for the operation, planning and delivery of infrastructure

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF4 Infrastructure Responsibilities		
			Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Early Years Education Providers	Private & Charitable Organisation	County-wide	✓	✓	✓
Independent Schools	Charitable Organisation	County-wide	✓	✓	✓
University of Oxford	Charitable Organisation	County-wide	✓	✓	✓
Oxford Brookes University	Charitable Organisation	County-wide	✓	✓	✓
Further Education & Adult Learning Colleges	Charitable Organisation	County-wide	✓	✓	✓
OCC	County Council	County-wide	✓	✓	✓
Oxfordshire District Councils	District Council (as Planning Authority)	Oxfordshire Districts			✓

Table 4-11: Summary of IF4 Infrastructure Responsibilities

4.5.1 Early Years Facilities (IF4A)

Preschools, nursery schools and classes provide play and education sessions for children aged between two and four years. Preschools are usually run by voluntary management committees and can be based in community centres or on school sites. Nursery schools and classes, some private or independent, usually offer sessional childcare and early education during school terms (OCC, 2021). Early years facilities have been mapped in Figure 4-20. There are 276 facilities in Oxfordshire.

4.5.2 Primary & Secondary Schools (IF4B & IF4C)

In Oxfordshire there are 244 primary and 41 secondary state schools, including a mixture of state-maintained schools, free schools and academies. These primary schools are spread across the county, with secondary schools more centred in towns and Oxford City Centre.

Table 4-12 and Table 4-13 show the capacity of Oxfordshire's state-funded primary and secondary schools, alongside the number of pupils on roll for the academic year 2019/20.

Across 244 primary schools and 41 secondary schools, the average number of pupils is at 86% and 70% of capacity respectively. It is assumed that a school at 95% of its capacity is full, and so spare capacity has been calculated assuming 95% capacity (final column) as well as 100% capacity (penultimate column).

The highest demand for primary schools is seen in Vale of White Horse (91%) and the lowest in Cherwell (82%).

The highest demand for secondary schools is seen in Oxford City (73%) and the lowest in Vale of White Horse (63%).

4.5.3 Special Educational Needs (IF4D)

There are 17 Special Educational Needs schools within the county, providing educational provision for pupils up to the age of 25 who have needs which either cannot be accommodated by mainstream education or which can be better provided by these dedicated schools. The number of pupils needing a place within a Special Educational Needs school has increased more rapidly than the general population, particularly for pupils with autism. This has been a factor in all of these Special Educational Needs schools being oversubscribed.

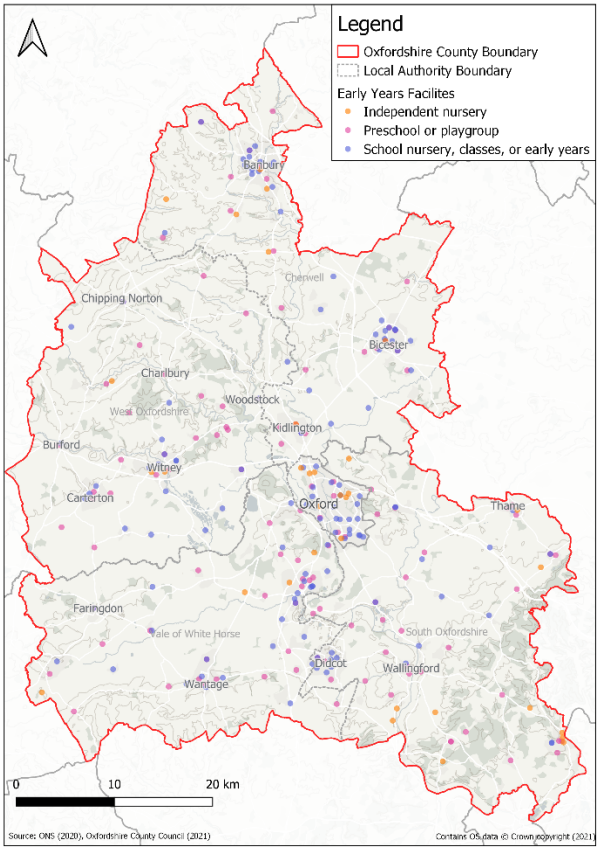

Figure 4-20: Oxfordshire early years providers by category (OCC, 2021)

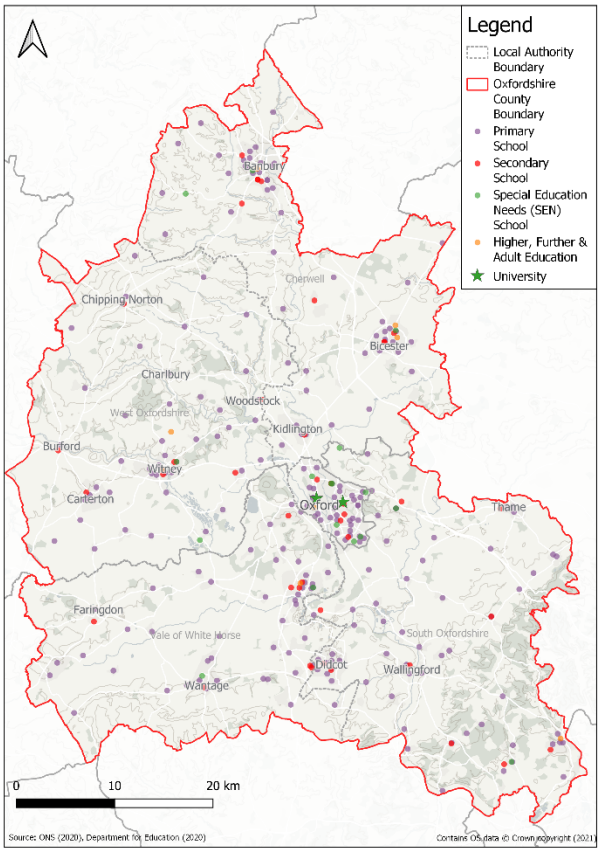

Figure 4-21: Oxfordshire education providers by category (Department for Education, 2020)

4.5.4 Further & Higher Education (IF4E)

There are five providers of Further and Higher Education (FHE) within the county, spread out over 10 sites. This number is low because the majority (all but six) of secondary schools also contain a sixth form which provides education up to the age of 18. Within the five FHE institutes are the two Oxford universities within Oxford city centre, Oxford Brookes University and the University of Oxford. The latter has been ranked the world's number one university since 2017. Around 40,000 students attend one of the two universities within the city, nearly a quarter of Oxford's population. Both universities entice students from all over the globe, with international students making up around 45% of the University of Oxford's student population.

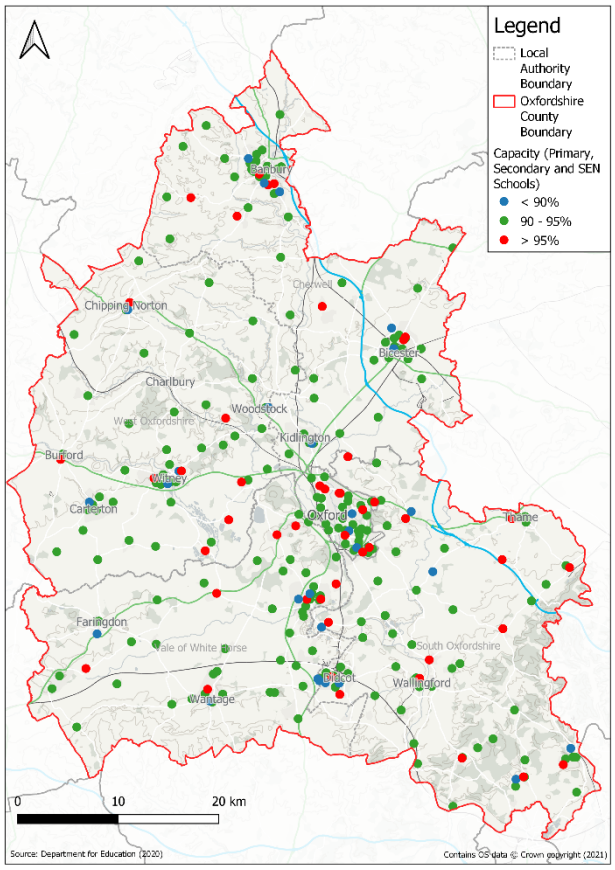

Figure 4-22: Capacity status of Oxfordshire schools

ocal Authority	Number of primary schools	Pupil capacity	Number of pupils on roll	Spare pupil capacity	Spare pupil capacity (95%)
Cherwell	51	14,593	11,943 (82%)	2,650	1,920
Oxford	35	11,204	9,611 (86%)	1,593	1,033
South Oxfordshire	59	12,781	10,684 (84%)	2,097	1,458
Vale of White Horse	49	11,295	10,224 (91%)	1,071	506
West Oxfordshire	50	9,596	8,673 (90%)	923	443
OXFORDSHIRE	**244**	**59,469**	**51,135 (86%)**	**8,334**	**5,361**

Table 4-12: Existing State-Funded Primary Education Capacity and Availability of Places (2019/20) (Department for Education, 2020)

Local Authority	Number of secondary schools	Pupil capacity	Number of pupils on roll	Spare pupil capacity	Spare pupil capacity (95%)
Cherwell	10	9,761	6,880 (70%)	2,881	2,393
Oxford	6	7,535	5,526 (73%)	2,009	1,632
South Oxfordshire	10	11,470	8,504 (74%)	2,966	2,393
Vale of White Horse	8	9,931	6,269 (63%)	3,662	3,165
West Oxfordshire	7	8,906	6,313 (71%)	2,593	2,148
OXFORDSHIRE	**41**	**47,603**	**33,492 (70%)**	**14,111**	**11,731**

Table 4-13: Existing State-Funded Secondary Education Capacity and Availability of Places (2019/20) (Department for Education, 2020)

Oxfordshire's future needs relating to education infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- P1: World Class Inclusive Education & Skills Development (see Section 5.5.1)

4.6 Oxfordshire's Existing Digital Infrastructure (IF5)

What is Digital Infrastructure (IF5)?

Digital infrastructure concerns the physical resources required to allow the transmission and communication of data and information between people. A critical component of digital infrastructure considered within OxIS **is full-fibre ('gigabit capable') broadband (IF5A).** This also underpins and enables the implementation of 5G cellular technology.

Who is Responsible for Oxfordshire's Digital Infrastructure (IF5)?

- Oxfordshire's digital broadband infrastructure is managed and delivered by a range of commercial operators including Openreach, Virgin Media, Gigaclear, Zzoomm and Airband.
- Whilst public sector organisations do not provide digital infrastructure, OCC provides strategic leadership in collaboration with the District and City Councils (in their capacity as planning authorities) to ensure that private investment in digital infrastructure is maximised and that any emerging infrastructure gaps are addressed (see Table 4-14).

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF5 Infrastructure Responsibilities		
			Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Openreach	Commercial Operator	County-wide	✓	✓	
Virgin Media	Commercial Operator	County-wide	✓	✓	
Gigaclear	Commercial Operator	County-wide	✓	✓	
Airband	Commercial Operator	County-wide	✓	✓	
Zzoomm	Commercial Operator	County-wide	✓	✓	
OCC	County Council	County-wide			✓
Oxfordshire District Councils	District Council (as Planning Authority)	District-wide			✓

Table 4-14: Summary of IF5 Infrastructure Responsibilities

4.6.1 Full Fibre Broadband Infrastructure (IF5A)

The COVID-19 crisis has highlighted the critical role that digital infrastructure plays in reducing transport demand and supporting the functions of wider infrastructure, concerning education, healthcare and business innovation. It also has a crucial function in connecting people and integrating communities both locally within Oxfordshire and on an international scale.

As identified in both the National Infrastructure Strategy (HM Treasury, 2020) and the Oxfordshire Digital Infrastructure Strategy (OCC, 2020), a critical component of digital infrastructure is gigabit broadband provision ('full fibre' or 'fibre to the premises (FTTP)'). Full fibre is capable of providing download speeds in excess of 1,000 megabits per second (Mbps) to homes and businesses. Full fibre infrastructure is also crucial to enabling the roll-out of 5G mobile cellular networks.

The delivery of full fibre broadband infrastructure within Oxfordshire is provided on a commercial basis by several different organisations, with OCC providing support alongside the Districts and City to aid infrastructure delivery. Of these commercial providers, Openreach is responsible for the majority of Oxfordshire's infrastructure, followed by Gigaclear and Virgin Media. Several smaller providers also have localised full fibre infrastructure networks in place; including Zzoomm which covers Henley-on-Thames in South Oxfordshire alongside Hyperoptic.

Figure 4-23 and Table 4-15 illustrate the existing full fibre broadband infrastructure coverage across Oxfordshire by District. This indicates that full fibre access in Oxfordshire is lagging behind the rest of the UK, with around 17% of all properties with access; over four percentage points lower than the national average.

The data also identifies that more rural parts of Oxfordshire, particularly within West Oxfordshire where almost a third of its residents have access, are best served by full fibre infrastructure. By contrast, the data identifies that urban areas, including Oxford City, has amongst the poorest infrastructure coverage with around 1% of properties served.

Local Authority / Geography	% of Premises with Access to Full Fibre Broadband (gigabit capable)	Maximum Mean Download Speeds Across all Connection Types (Megabits Per Second)
Cherwell	13.6%	53.5 Mbps
Oxford City	1.0%	74.4 Mbps
South Oxfordshire	21.3%	47.2 Mbps
Vale of White Horse	19.3%	53.8 Mbps
West Oxfordshire	29.5%	47.9 Mbps
OXFORDSHIRE	16.5%	53.7 Mbps
SOUTH EAST ENGLAND	18.8%	51.6 Mbps
UK	20.8%	52.6 Mbps

Table 4-15: Summary of Full Fibre (gigabit capable) Access by Oxfordshire District (thinkbroadband, 2021) [Data Correct as of 08/03/21]

Oxfordshire's future needs relating to digital infrastructure (taking account of policy need, coverage gaps and the future growth trajectory) to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- C1: Digital Connectivity (see Section 5.6.1)

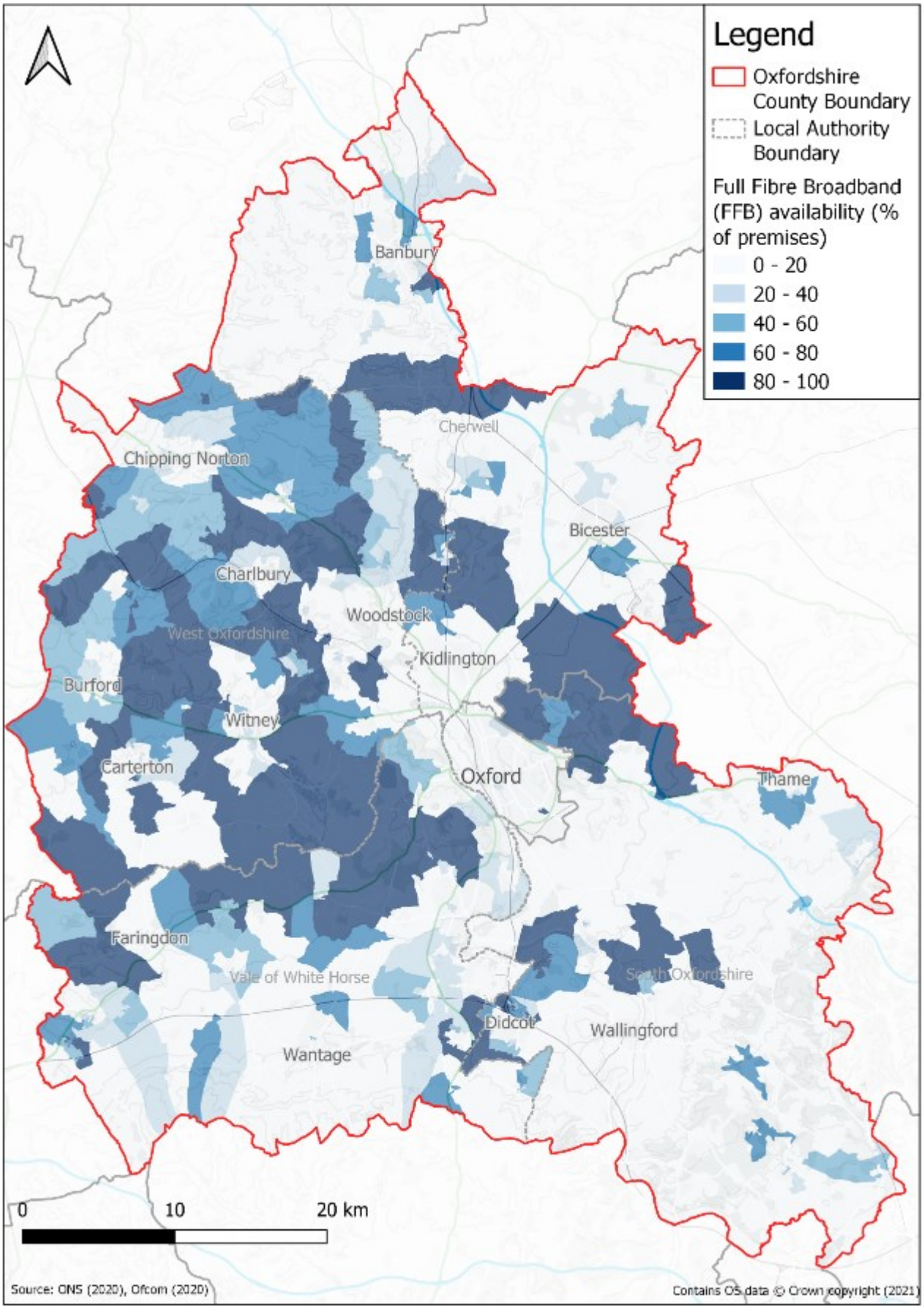

Figure 4-23: Existing Full Fibre Coverage in Oxfordshire [Data Correct as of Summer 2020]

4.7 Oxfordshire's Existing Innovation Infrastructure (IF6)

What is Innovation Infrastructure (IF6)?

Innovation infrastructure is defined within the Oxfordshire Local Industrial Strategy (2019) as national or international assets which positively contribute to the creation of a *'global innovation ecosystem.'* Within the context of OxIS, this considers physical infrastructure schemes ranging from national research and development facilities to knowledge-intensive assets **(IF6A).**

Who is Responsible for Oxfordshire's Innovation Infrastructure (IF6)?

- The responsibility for Oxfordshire's innovation infrastructure, primarily concentrated in the *'Knowledge Spine',* lies with a combination of commercial organisations, futher and higher education providers, such as the University of Oxford (e.g. Begbroke Science Park) as well as the NHS University Hospitals Trust
- OxLEP also play a vital role in catalysing and driving investment in future innovation and research and development infrastructure through the Oxfordshire Local Industrial Strategy and the Oxfordshire Investment Plan (see Table 4-16)

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF6 Infrastructure Responsibilities		
			Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Oxford Brookes University	Charitable Organisation	Location-Specific	✓	✓	✓
University of Oxford	Charitable Organisation	Location-Specific	✓	✓	✓
Commercial Organisations	Commercial Organisations	Location-Specific	✓	✓	✓
NHS Oxford University Hospitals Trust	NHS Trust	County-Wide	✓	✓	✓
Science and Technology Facilities Council	Government Agency	County-Wide	✓	✓	✓
United Kingdom Atomic Energy Authorirt	Government Research Organisation	County-Wide	✓	✓	✓
Oxfordshire Local Enterprise Partnership (OxLEP)	Local Enterprise Partnership	County-Wide		✓	✓
Oxfordshire District Councils	District Council (as Planning Authority)	District-Wide			✓

Table 4-16: Summary of IF6 Infrastructure Responsibilities

4.7.1 Innovation Infrastructure (IF6A)

Oxfordshire has one of the highest concentrations of innovation assets in the world with universities, science parks and facilities at the forefront of global innovation and transformative technologies. These assets provide a strong and economically-critical platform for:

- Research and development
- New business creation
- Employment providing facilities to develop new products and services, take the first steps towards commercialisation, scale-up and grow
- Internationally-recognised centres of excellence

As shown in Figure 4-24, the majority of facilities are located along the Oxfordshire 'Knowledge Spine' that extends from Bicester down to Grove, Wantage and Milton Park in the south.

In the south of Oxfordshire, the region around Abingdon and Didcot, is known as Science Vale UK, and covers two enterprise zones:

- Harwell Campus, home to internationally recognised Space, Energy and Health assets
- Milton Park and Didcot which have a high concentration of life science and creative industries

There are also a range of other facilities to the North and West of the county.

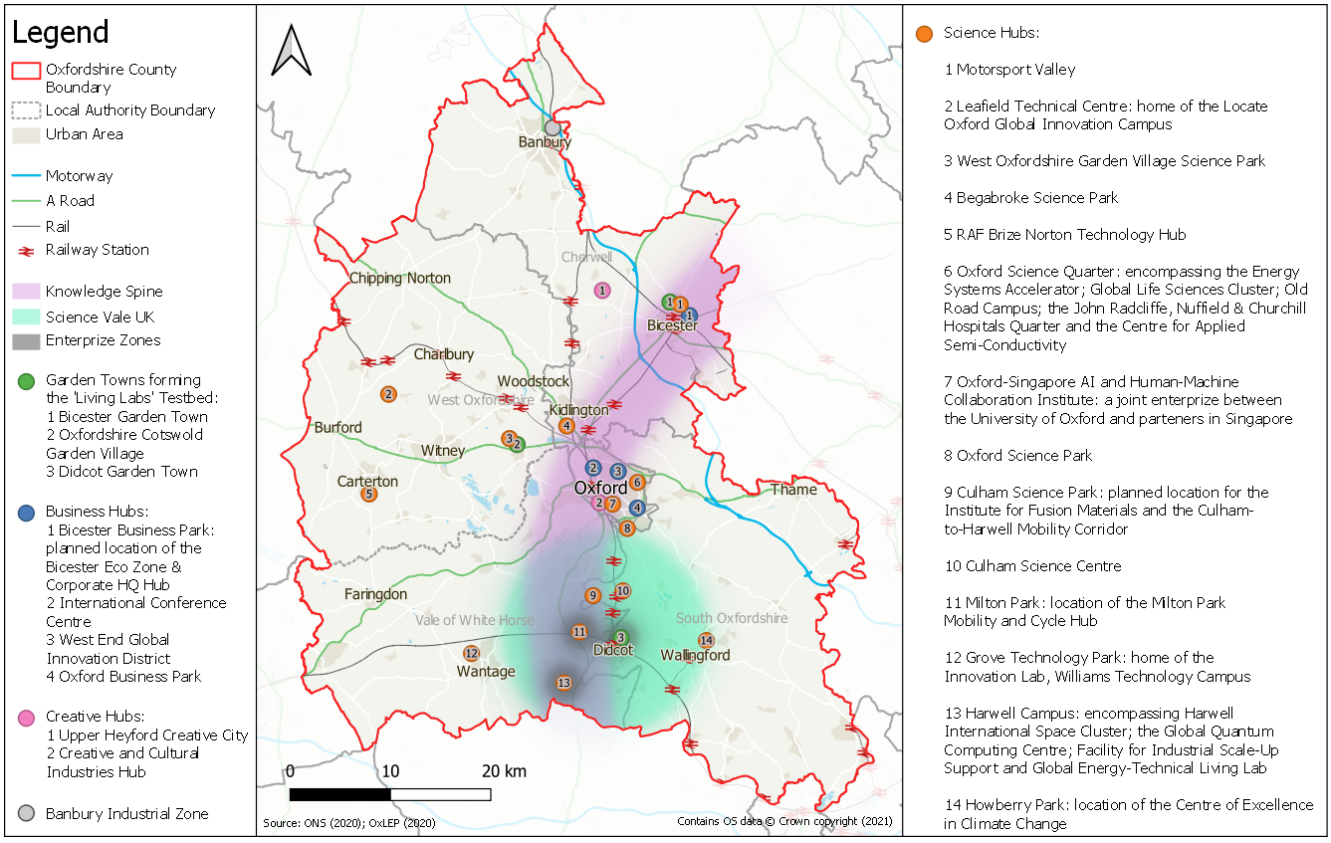

Figure 4-24: Oxfordshire knowledge & innovation assets

Oxfordshire's future needs relating to innovation infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- P1: World Class Inclusive Education & Skills Development (see Section 5.5.1)
- P3: Attract and Retain Talent In Oxfordshire (see Section 5.5.3)
- P4: Build a Global Business Innovation Ecosystem (see Section 5.5.4)
- P5: Drive Economic Growth & Productive Employment (see Section 5.5.5)

Organisation	Key Sectors	Description
Begbroke Science Park	• Advanced Engineering • Medical Tech	• 60+ world leading research and technology companies (900+ staff) • Begbroke Innovation Escalator spin out hub • Proposed 4,000 homes as part of wider A44 corridor vision to double capacity at Begbroke including new station & linking to Oxford Airport & Oxford Parkway
Living Labs Testbed	• Sustainable Technologies	• Bicester Garden Town 13,000 homes (e.g. healthy town and EcoTown) • Didcot Garden Town 15,000 homes • Oxfordshire Cotswolds Garden Village 2,200 homes
Harwell Campus	• Health Sciences (Med Tech, Life Sciences, Digital Health) • Space Applications Energy	• 200+ world leading research and technology companies on site employing c6,000 people • Designated UK Space Agency gateway with UK largest space cluster of 100 growth companies • Location of critical UK strategic assets including Diamond Light Synchrotron, Medical Research Council & Public Health England • Enterprise Zone development site of 93ha • Proposed new homes as part of Harwell Innovation Village to pioneer solutions for grand challenges focused on clean growth and mobility
Motorsport Valley	• Advanced Engineering • Battery Engineering and Technology • High-Performance Motorsport Technologies	• Motorsport Valley is the biggest hub of motor racing in the world and is home to the majority of the UK's motorsport companies and engineers • Motorsport Valley refers to the cluster of firms based around Oxfordshire and the Midlands • The firms supply cutting-edge technology for Formula One, Formula E and other motorsport sectors
Upper Heyford Creative City	• Creative Industries (e.g. International Film & TV Studio Complex)	• Cherwell District Council approved the masterplan in November 2020 • It will cover 29 acres and be used for film production technology • It will be surrounded by 1,175 homes, new employment buildings, a primary school, a sports park and medical centre
Innovation Lab at Grove Technology Campus	• Advanced Engineering (e.g. High Performance Technology Campus Cluster)	• Led by Williams Advanced Engineering (WAE), the project plans to deliver a new Innovation Lab at Grove Technology Campus • The Lab will be highly collaborative, working with research institutes and businesses across the Oxfordshire and wider UK innovation ecosystem, acting as an engine for rapid advanced technology development
Milton Park/Didcot Garden Town	• Life Sciences • Creative Industries	• 250+ high technology companies employing 9000+ people, encompassing leading life sciences cluster • Enterprise Zone 1 package of 9 separate development sites totalling 21ha • Adjacent to Enterprise Zone 2 Didcot Growth Accelerator • Testing of new forms of mobility via Autonomous Vehicles pilot • International Film and TV Studios Hub around Rebellion Studios development
Oxford City Science Area	• Life Sciences • AI Technologies • Digital Health • Quantum Computing • Global CBD	• John Radcliffe, Nuffield and Churchill Hospitals Quarter • Oxford Station and Global Innovation District • Old Road Campus – Jenner Institute and Medical Research Centre • Centre for Applied Semi-Conductivity • Oxford BioEscalator • Oxford Science Park • Oxford Business Park • Oxford North
Culham Science Centre	• Fusion Energy • Robotics & Autonomous Systems	• 2,000+ world-leading scientists on site working with UK strategic assets • Centre for Fusion Energy and Supply Chain Cluster • Remote Applications in Challenging Environment Centre (RACE) • 3,500+ homes proposed at Culham providing a testbed for new mobility solutions, digital health and smart technologies

Table 4-17: Oxfordshire's Critical Economic Sectors, Assets & Growth Opportunities

4.8 Oxfordshire's Existing Green & Blue Infrastructure (IF7)

What is Green & Blue Infrastructure (IF7)?

Green Infrastructure is defined as *a 'network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.'* (MHCLG, 2019). 'Blue Infrastructure' is generally used to refer to assets involving water, however they are all included in the overarching term of **Green Infrastructure (IF7A)**. Types of Green and Blue Infrastructure are wide-ranging and include open spaces (such as parks), woodlands, gardens, ponds, nature reserves, allotments, wetlands, canals and rivers. Note that formal outdoor sport facilities e.g. sport pitches are considered within IF9.

Who is Responsible for Oxfordshire's Green & Blue Infrastructure (IF7)?

- Through their management responsibilities of main rivers in Oxfordshire, the Environment Agency are responsible for improving water quality, fisheries and conservation at a broader level including duties under the WFD commitments to improve the condition of waterbodies
- This is supported by other Government Agencies including Natural Engand and Forestry England who are responsible for several woodland sites across Oxfordshire
- Oxfordshire's five District and City Councils, as planning authorities, play a vital role in the identification, planning and facilitating the delivery of green and blue infrastructure schemes through the planning process. OCC is also the Minerals and Waste Planning Authority
- Charitable organisations such as the Canal & Rivers Trust and Wild Oxfordshire also have an important function in the planning, delivery and management of green and blue infrastructure
- The three Areas of Outstanding Natural Beauty (AONB) (Chilterns, Cotswolds and North Wessex Downs) in Oxfordshire are managed by independent AONB Conservation Boards
- Private landowners play a vital role in delivery of nature based interventions (see Table 4-18).

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF7 Infrastructure Responsibilities		
			Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Forestry England	Government Agency	County-wide	✓	✓	✓
Environment Agency	Government Agency	County-wide	✓	✓	✓
Canal & River Trust	Charitable Organisation	County-wide	✓	✓	✓
AONB Conservation Boards	AONB Conservation Board	AONBs	✓	✓	✓
Natural England	Government Agency	County-wide			✓
RSBP	Charitable Organisation	County-wide	✓	✓	✓
Wildlife Trust	Charitable Organisation	County-wide	✓	✓	✓
Wild Oxfordshire	Charitable Organisation	County-wide			✓
Local Community Trusts	Charitable Organisation	County-wide	✓	✓	✓
Parish/Town Councils	Parish / Town Councils	Parish / Town Councils	✓		✓
OCC	County Council (As Minerals and waste Authority)	County-wide	✓	✓	✓
Oxfordshire District Councils	District Council (as Planning Authority)	District-wide	✓	✓	✓
National Trust	Charitable Organisation	County-wide	✓	✓	✓
Private Landowners	Landowners	County-wide	✓	✓	✓

Table 4-18: Summary of IF7 Infrastructure Responsibilities

Oxfordshire has a substantial foundation of highly valued green infrastructure assets that form a versatile network of natural and semi-natural spaces. Overall, there are around 135,000 hectares of green infrastructure assets and 5,500 km of access routes (OCC, 2020). This includes approximately 8,500 woodland sites, 1,600 greenspaces and 6,300 hectares of biodiverse permanent pastures.

Key benefits of Green Infrastructure:

- **Environmental:** Providing habitat and diversity, improving water quality, storing carbon and mitigating flood risks (SuDS) and improving climate change resilience for species allowing movement in adaptation to climate change
- **Social:** As highlighted during COVID-19, green infrastructure can improve air quality, encourage outdoor activity, improving mental health and contribute to the character of a place
- **Economic:** Regulating temperatures, increasing the lifespan of grey infrastructure, increasing property values and protecting infrastructure systems by reducing stress (e.g. from flood risk)

The three categories for strategic green infrastructure applied in OxIS-17 have been retained, however, sub-categories have been applied, where relevant, to reflect the application of a place-based approach and the importance of smaller-scale green infrastructure assets for local communities (see Table 4-19).

Infrastructure Categories	Sub-Categories	Definition
Landscape-Scale Infrastructure	AONB	An AONB is a designated exceptional landscape whose distinctive character and natural beauty are precious enough to be safeguarded in the national interest.
	Green Belt	Green Belts are used in land-use planning and act a buffer between urban areas, which may or may not have natural capital value.
	Blue Network	Network of rivers, canals, lakes, ponds, wetlands, and floodplains across Oxfordshire.
Strategic Ecological Resources	Protected Habitats	A protected habitat is a habitat that has been identified as needing to be conserved. Levels of protection can very, however often include laws to ensure that nature and wildlife within the boundary are not harmed or destroyed and are therefore protected from planning and development. These include areas such as Special Areas of Conservation, Sites of Special Scientific Interest and Nature Reserves.
	Ancient Woodlands	Ancient woodland is a woodland that has persisted since the year 1600 or earlier. Ancient woodlands are protected from the impact of new development in planning legislation and guidance.
	Sites of Special Scientific Interest	An area of particular interest to science due to the presence of a rare species of fauna or flora, or important geological or physiological features. These are protected from the impact of new development in planning legislation and guidance and the Wildlife and Countryside Act 1981.
	Special Areas of Conservation	Special Areas of Conservation are part of the UK's European site network of protected areas and are designated under the Habitats Regulations.
	Other Habitat & Sensitive Areas	Other areas noted for their value and potential sensitivity either individually or as part of the county's ecological mosaic.
Strategic Recreational Resources	Access to large strategic sites	One of the ways that accessibility of natural green space is assessed is using Natural England's Accessible Natural Green Space Standards which state that for certain sizes of green space there should be a maximum distance or time to walk.
	Country and Historic Parks	Country Parks are sites primarily for people to enjoy recreation in a countryside environment. Historic parks and gardens are areas with historic value which are also usually associated with areas of green or blue infrastructure.
	Coutryside Access &Public Rights of Way	This refers to the ability for residents to access the countryside for recreation in a natural setting. Public Rights of Way refers to areas where the public have legal rights to cross private land.

	Other strategic resources	Other strategic recreational resources such as woodlands, grasslands, and recreational lakes.

Table 4-19: Green and Blue Infrastructure Categories and Definitions

4.8.1 Landscape-Scale Green Infrastructure

Oxfordshire features a diverse landscape character, with landscape types including chalk downland and slopes, rolling clayland and wooded estate lands. There are three distinctive essential areas that support the function of these landscape types. They are AONB, the Green Belt and the blue river network.

4.8.1.1 AONB

AONBs are designated and overseen by Natural England to be protected and enhanced for nature, people, business and culture. Under the Countryside and Rights of Way Act (2000), Local Authorities are responsible for conserving and enhancing the natural beauty of AONB.

Within Oxfordshire there are three AONBs that make up around 26% of the county's total area (see Figure 4-27). The areas are covered by AONB management plans which include a broad range of socioeconomic and environmental objectives (OCC, 2020).

The Cotswolds AONB	*The Chiltern Hills AONB*	*The North Wessex Downs AONB*
The Cotswolds was designated as an AONB due to its rare limestone geology and its habitats. It covers a total of 2,040 km^2 spread between north-west Oxfordshire, Gloucestershire, Wiltshire, Somerset, Worcestershire, and Warwickshire. 12% or 245 km^2 is located in north-west Oxfordshire. The Cotswolds Conservation Board maintains The Cotswolds AONB Management Plan 2018 – 2023.	Containing a wide variety of landscape and character areas, the Chiltern Hills AONB includes a vast area of woodland (specifically with a high proportion of ancient woodland) and a nationally important concentration of high-quality chalk grassland. It spans for 1,700 km^2 across Oxfordshire, Buckinghamshire, Hertfordshire and Bedfordshire, 28% or 476 km^2 is located in Oxfordshire. The Chiltern Hills Conservation board maintains The Chilterns AONB Management Plan 2019 – 2024.	Although this AONB is 1,730 km^2 in total, only 10% (or 173km^2) is located in Oxfordshire. The rest extends across Buckinghamshire, Hertfordshire and Bedfordshire. The area features species-rich chalk grassland and chalk streams in addition to ancient woodland and monuments. The North Wessex Downs is managed by The Council of Partners, which consists of 35 members including representatives from 9 Local Authorities in addition to stakeholders such as community groups and The National Farmers' Union. The current North Wessex Downs Management Plan covers the years 2019 – 2024.

Figure 4-25: Oxfordshire's three AONBs

4.8.1.2 Green Belt

Green Belts are designated areas of land where urbanisation is resisted. The State of Natural Capital Annual Report (Natural Capital Committee, 2020) acknowledges the potential Green Belts can offer for environmental enhancement. Some land within Green Belts has potential to simultaneously provide ecological benefits (by providing habitats for wildlife) and recreational benefits (through access to the countryside for residents).

In Oxfordshire, a Green Belt, named the Oxford Green Belt has been implemented with the primary purpose of restraining development around Oxford City. The Oxford Green Belt starts at Oxford City's limits and extends radially outwards. Currently, the majority is under agricultural use, around 20% is at a significant flood risk and around 18% is of noteworthy ecological value (based on the proportion which is under ecological designation or other typology of value such as woodlands or Royal Society for the Protection of Birds reserves).

4.8.1.3 Blue Network

The River Thames is one of the most significant features in Oxfordshire's landscape and is a highly valuable ecological and recreational resource. Notably, across the middle of the county, there is a significant (blue) network of rivers and streams that feed into the Thames (see Figure 4-26).

The Environment Agency manages the maintenance of 'main rivers' and 'ordinary watercourses' (all other watercourses) are overseen by the Local Authority. Riparian landowners (those who own land or property next to a river, stream or ditch) are legally obliged to fulfil responsibilities to manage flood risk and protect the environment. Formal consent is required from the Environment Agency for works on, under or close to 'main rivers'. Works on 'ordinary watercourses' need Flood Defence Consent from the LLFA (OCC).

The Upper Thames River Valley spreads across the northern half of the County and is a designated Futurescape site by the Royal Society for the Protection of Birds.

Futurescapes is an EU-funded initiative run by the Royal Society for the Protection of Birds, which engages landowners throughout priority biodiversity areas to promote species and decrease fragmentation of habitats.

4.8.2 Ecological Resources

4.8.2.1 Special Areas of Conservation

There are 256 Sites of Special Areas of Conservation in England; of which seven are in Oxfordshire (see Figure 4-27). It is the responsibility of Oxfordshire's local authorities (as the Competent Authorities) with respect of planning to preserve these areas, in line with the Conservation of Habitats and Species Regulations 2017.

4.8.2.2 Sites of Special Scientific Interest

There are 111 Sites of Special Scientific Interest in Oxfordshire (see Figure 4-27), their designations are:

- 78 for biological interest
- 27 for geological interest
- 6 for both biological and geological interest

4.8.2.3 National & Local Nature Reserves

Nature reserves are a key designation of protected habitats. As shown in Figure 4-27, in Oxfordshire there are a total of four National Nature Reserves and 12 local nature reserves; some of which are also designated as Sites of Special Scientific Interest. These nature reserves are managed by a combination of Natural England, local authorities, parish and town councils and charitable organisations such as the Wildlife Trust.

The four National Nature Reserves in Oxfordshire as designated by Natural England are:

- Aston Rowant: a 159 hectare site with main habitats of chalk grassland, beech woodland and juniper
- Chimney Meadows: a lowland grassland habitat on the River Thames floodplain
- Cothill: a two hectare site of fen, oak and alder woodland
- Wychwood: a 262 hectare site of ancient oak and ash woodland

4.8.2.4 Ancient Woodland

Ancient woodland is found throughout Oxfordshire (see Figure 4-27), with concentrations in the Chilterns AONB, Wychwood (also a National Nature Reserve) and Bernwood in South Oxfordshire. Ancient woodland is designated by Natural England and managed by local authorities.

4.8.2.5 Other Habitats and Sensitive Areas

Oxfordshire's Conservation Target Areas identify the counties most important areas for wildlife conservation. 37 of these areas exist in Oxfordshire covering over 20% of the county by area (526.2 km^2) (Wild Oxfordshire, 2021). Conservation Target Areas contain 95% of the Sites of Special Scientific Interest land area in the county. Wild Oxfordshire is the custodian for the Conservation Target Area process and through a strategic approach provide a coordinated delivery of biodiversity work, agri-environment schemes and biodiversity enhancements. Also of note is the Local Wildlife Site network, where some sites meet or exceed SSSI quality.

Figure 4-26: Blue Network in Oxfordshire

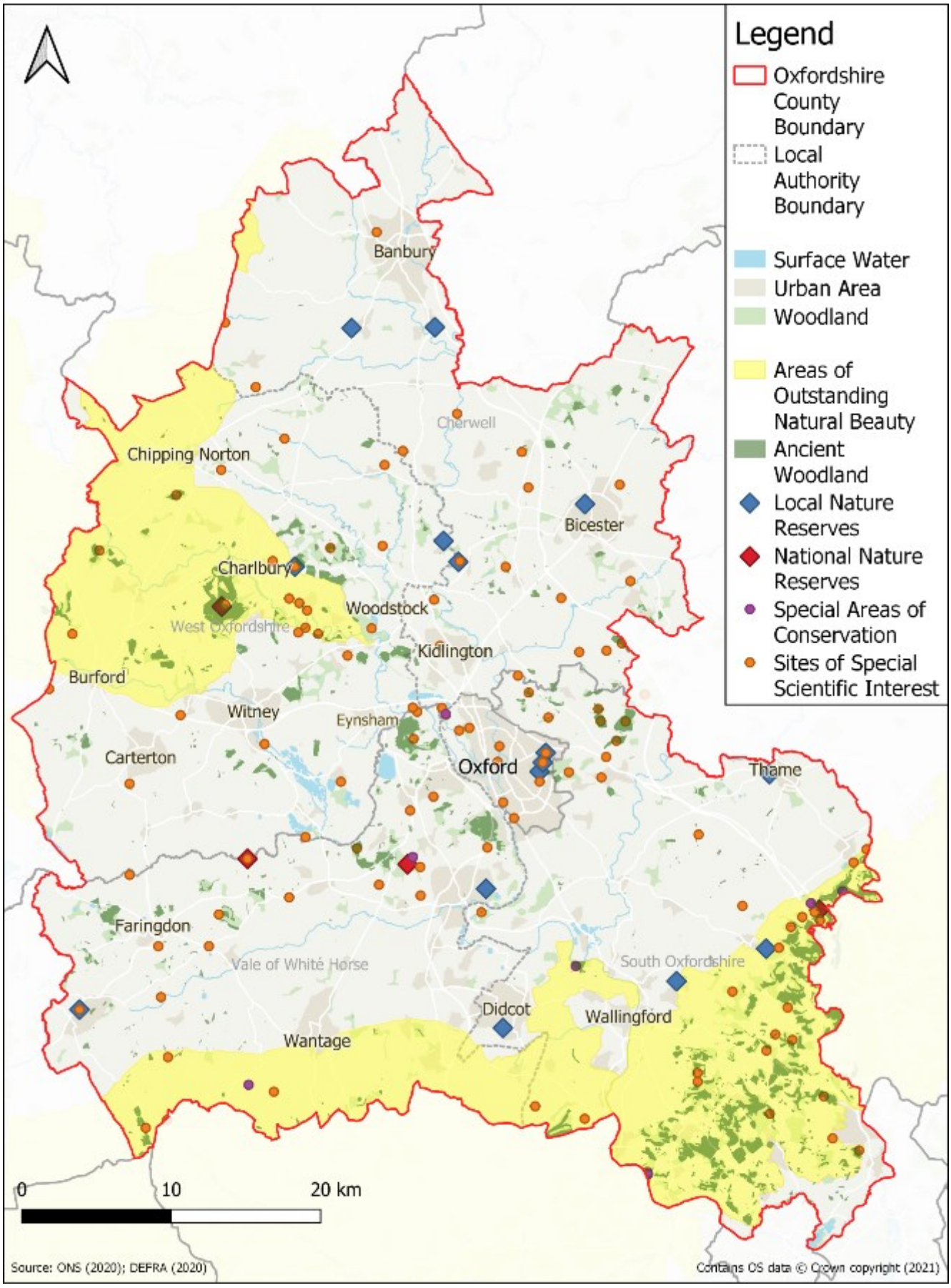

Figure 4-27: Strategic Ecological Resources Oxfordshire [Note that there are six Special Areas of Conservation]

4.8.3 Recreational Resources

Although Green Infrastructure has multi-functionality, it is essential in the context of development and growth to make a distinction between Strategic Ecological Resources and Strategic Recreational Resources. Whilst Strategic Ecological Resources can provide recreational value without detracting from their ecological value, Strategic Recreational Resources are recreational-focused sites that have human use as the primary concern but within a natural setting. This category definition includes access to large strategic sites, country and historic parks, access to the countryside and rights of way, and woodland.

4.8.3.1 Large Strategic Sites

Figure 4-35 shows strategic greenspace parks and gardens. Other types of strategic greenspaces include areas such as outdoor sports pitches, sports facilities and play areas and are included in Section 4.10.

4.8.3.2 Historic and Country Parks

Shotover Country Park, located to the north of Cowley at the eastern periphery of Oxford (see Figure 4-28), is the only Country Park within Oxfordshire. Extending to around 117 hectares, most of the park is also designated as a Sites of Special Scientific Interest due to its abundance of wildlife.

4.8.3.3 Public Right of Way Network

Oxfordshire's Public Right of Way network, previously shown in Figure 4-12 (see Section 4.3.1), is expansive and serves an important function in both connecting rural communities and allowing people to access, and spend time, in nature.

4.8.3.4 Woodland

Oxfordshire has woodland coverage equating to around 9% of the overall land in Oxfordshire. As indicated in Figure 4-28, most of this woodland coverage is concentrated within the Chilterns AONB but there are additionally large concentrations within rural areas of West Oxfordshire.

4.8.4 Access to Recreational Resources & Green Space

Alongside the established Accessible Greenspace Standard (ANGSt) developed by Natural England, the Natural Capital in Oxfordshire Short Report (Environment Change Institute, 2020), identifies the relative accessibility of recreational sites that provide opportunities for exercise, camping, playing and relaxing. Many habitats have the potential to deliver recreational services, provided that they are accessible. Figure 4-29 considers the recreation 'usability' of each habitat in addition to whether the habitat is deemed 'accessible'. A variety of metrics were utilised such as considering whether a habitat is within 50m of a pathway (aligned with the definition of accessibility Vale of White Horse and South Oxfordshire Green Infrastructure reports). This demonstrates there is an extensive network of rural footpaths (which provide access to recreational habitats), particularly in the Chilterns in the southeast corner of the county.

This indicates that the largest and highest scoring recreational habitats include Blenheim Park, Port Meadow, Wychwood and Wytham Woods. There is a significant need to increase access to such habitats in areas with low opportunity scores and high growth trajectories such as Banbury, Chipping Norton, Didcot and Wantage.

Oxfordshire's future needs relating to green and blue infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- E1: Net Zero Carbon Emissions (see Section 5.2.1)
- E2: Resilience to Climate Change (see Section 5.2.2)
- E3: Enhance Natural Environment & Biodiversity (see Section 5.2.3)
- E5: Reduce Water & Noise Pollution (see Section 5.2.5)
- H2: Access to Spaces for Physical Activity (see Section 5.3.2)
- H4: Cleaner Air (see Section 5.3.4)
- H5: Enhance Mental Health & Wellbeing (see Section 5.3.5)
- PS1: Local & Liveable Communities (see Section 5.4.1)

- PS4: Socially Integrated Communities (see Section 5.4.4)

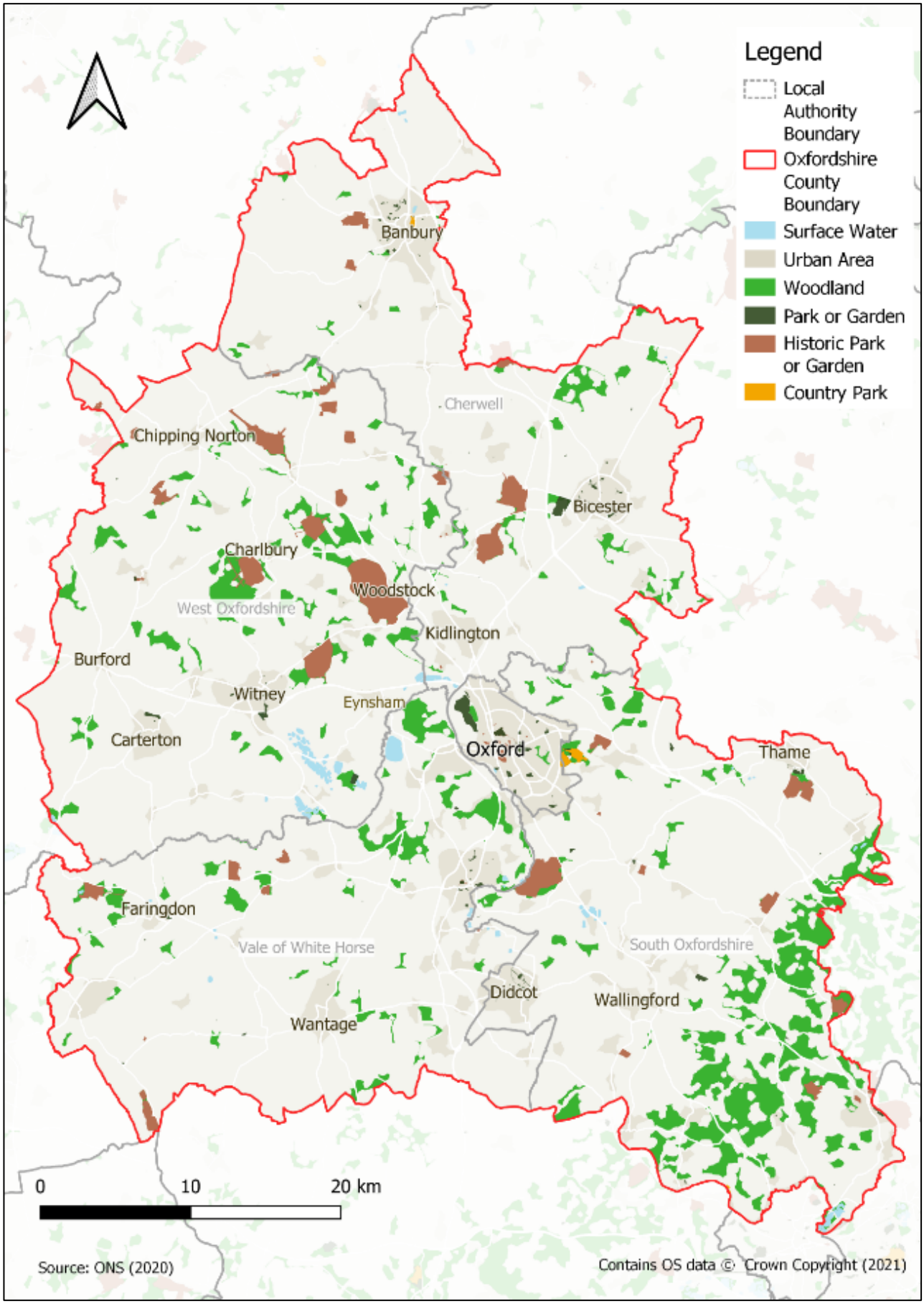

Figure 4-28: Strategic Recreational Resources Oxfordshire [Excluding Public Right of Way Network]

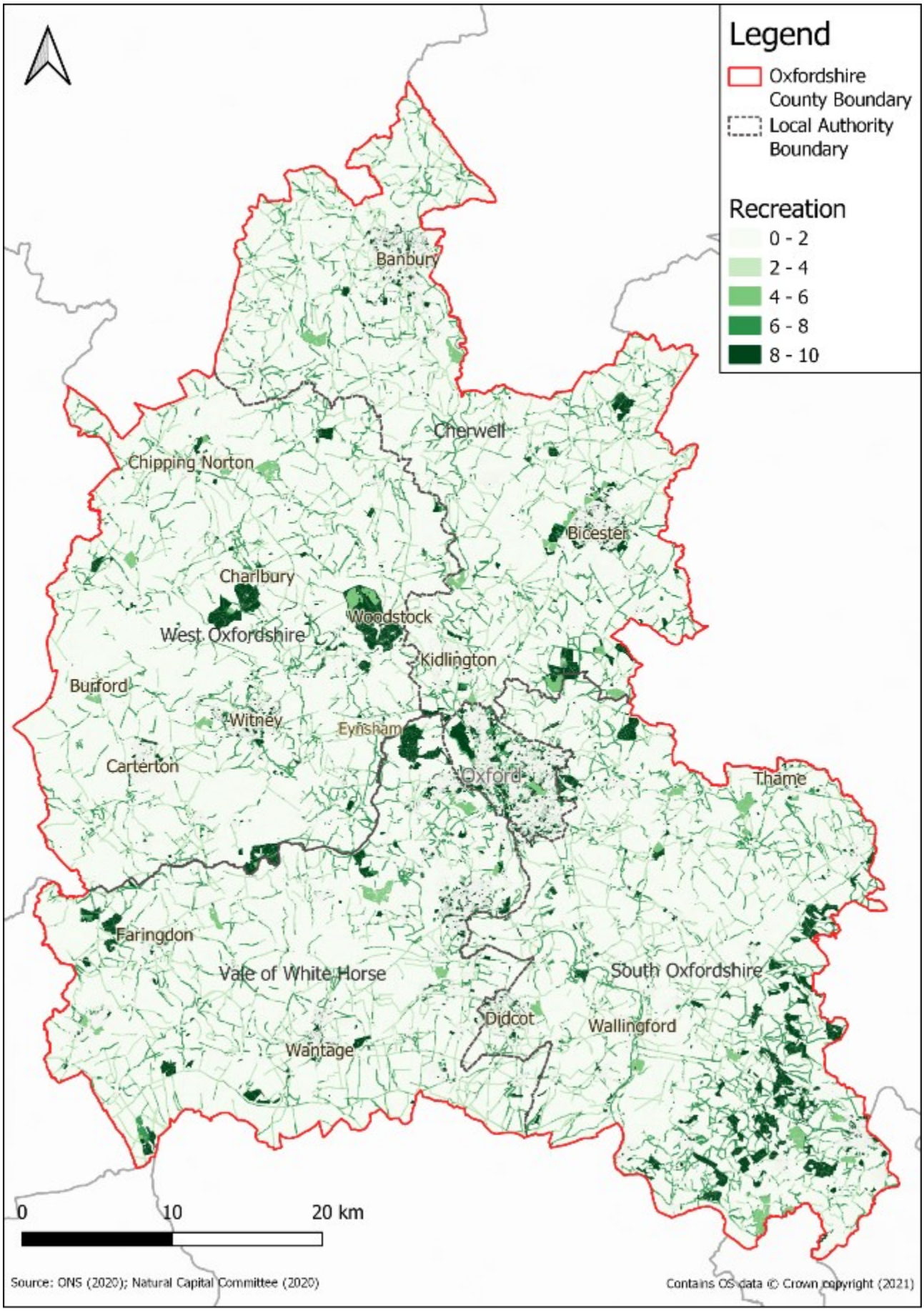

Figure 4-29: Opportunities for recreation in green and blue spaces based on habitat type and public accessibility [Numbers in key represent index of relative opportunity with 10 being a high level of accessibility and 0 being a low level of accessibility]

4.9 Oxfordshire's Existing Community & Cultural Infrastructure (IF8)

What is Community & Cultural Infrastructure (IF8)?

Community and cultural infrastructure relates to places where people from the local area can meet or visit which positively contributes to a community's sense of place. The following categories have been applied within OxIS:

- **IF8A: Community Centres & Halls** (see Section 4.9.1)
- **IF8B: Libraries** (see Section 4.9.2)
- **IF8C: Cultural Attractions** (e.g. Museums, Heritage Centres, Arts Centres) (see Section 4.9.3)

Who is Responsible for Oxfordshire's Community & Cultural Infrastructure (IF8)?

- The responsibility for cultural and heritage infrastructure schemes in Oxfordshire primarily lies across both the County and District and City Councils alongside key charitable organisations, foundations and trusts who manage and operate key assets, such as museums and arts centres throughout the county.
- Oxfordshire's local Parish and Town Councils also play a key role in managing and identifying future local community and cultural infrastructure from village halls to cemeteries.

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF8 Infrastructure Responsibilities		
			Infrastructure Operation & Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Historic England	Government Agency	County-wide	✓		
Charitable Foundations (e.g. Oxford Preservation Trust, Blenheim Place, Oxford Playhouse)	Charitable Organisation	Location Specific	✓		
Commercial Operators	Commercial Organisation	Location Specific	✓	✓	
Community First Oxfordshire	Charitable Organisation	County-wide			✓
Community Associations	Community Associations	Location Specific	✓	✓	✓
National Trust	Charitable Organisation	Location Specific	✓		
Parish & Town Councils	Parish / Town Councils	Parish / Town Councils	✓	✓	✓
OCC	County Council	County-wide	✓	✓	✓
Oxfordshire's District Councils	District Council (as Planning Authority)	District-wide	✓	✓	✓

Table 4-20: Summary of IF8 Infrastructure Responsibilities

4.9.1 Community Centres & Halls (IF8A)

District Councils in partnership with Local Town and Parish Councils and Community Associations are responsible for the operation of community centres throughout Oxfordshire. Community First Oxfordshire also provide support as a central resource to allow people to access information and local contact details about local community centres.

Community centres and halls serve an important function within Oxfordshire in providing a place for local people to meet, whether through regular group activities, meetings, or ceremonial events. They are also frequently used for physical activity through regular organised classes.

There are a total of around 230 community centres and halls within Oxfordshire. A more detailed breakdown provided by Community First Oxfordshire (see Table 4-21) indicates that except for Oxford City, these facilities are generally evenly distributed across the Districts.

Local Authority	Number of Community Centres & Halls in Oxfordshire				
	0 – 50 Capacity	51 – 100 Capacity	101 – 150 Capacity	150+ Capacity	TOTAL
Cherwell	10	32	9	5	**56**
Oxford City	*Not Available*				**19**
South Oxfordshire	8	35	9	13	**65**
Vale of White Horse	6	13	8	17	**44**
West Oxfordshire	4	25	8	9	**46**
OXFORDSHIRE	*Not Available*				**230**

Table 4-21: Summary of Oxfordshire's Community Centres & Halls (Community First Oxfordshire, 2021)

4.9.2 Libraries (IF8B)

OCC are responsible for the operation of all publicly accessible libraries throughout Oxfordshire. As shown in Table 4-22, this responsibility extends to a total of 44 libraries. These libraries offer local communities access to literature and additionally provide wider key community services such as internet access.

Local Authority	Number of OCC Libraries
Cherwell	7
Oxford City	8
South Oxfordshire	12
Vale of White Horse	6
West Oxfordshire	11
OXFORDSHIRE	**44**

Table 4-22: Summary of Libraries in Oxfordshire by District

4.9.3 Cultural Attractions (IF8C)

4.9.3.1 Museums

There are around 40 museums in Oxfordshire (OCC, 2021), with key facilities shown in Figure 4-30. Most of these are operated by a combination of charitable organisations, foundations and trusts, however, some are owned and operated by both OCC and Oxfordshire's five District Councils.

4.9.3.2 Arts Centres

Figure 4-30 also denotes the location of arts centres throughout Oxfordshire. There are a total of around 12 facilities, primarily owned and operated by charitable organisations and trusts.

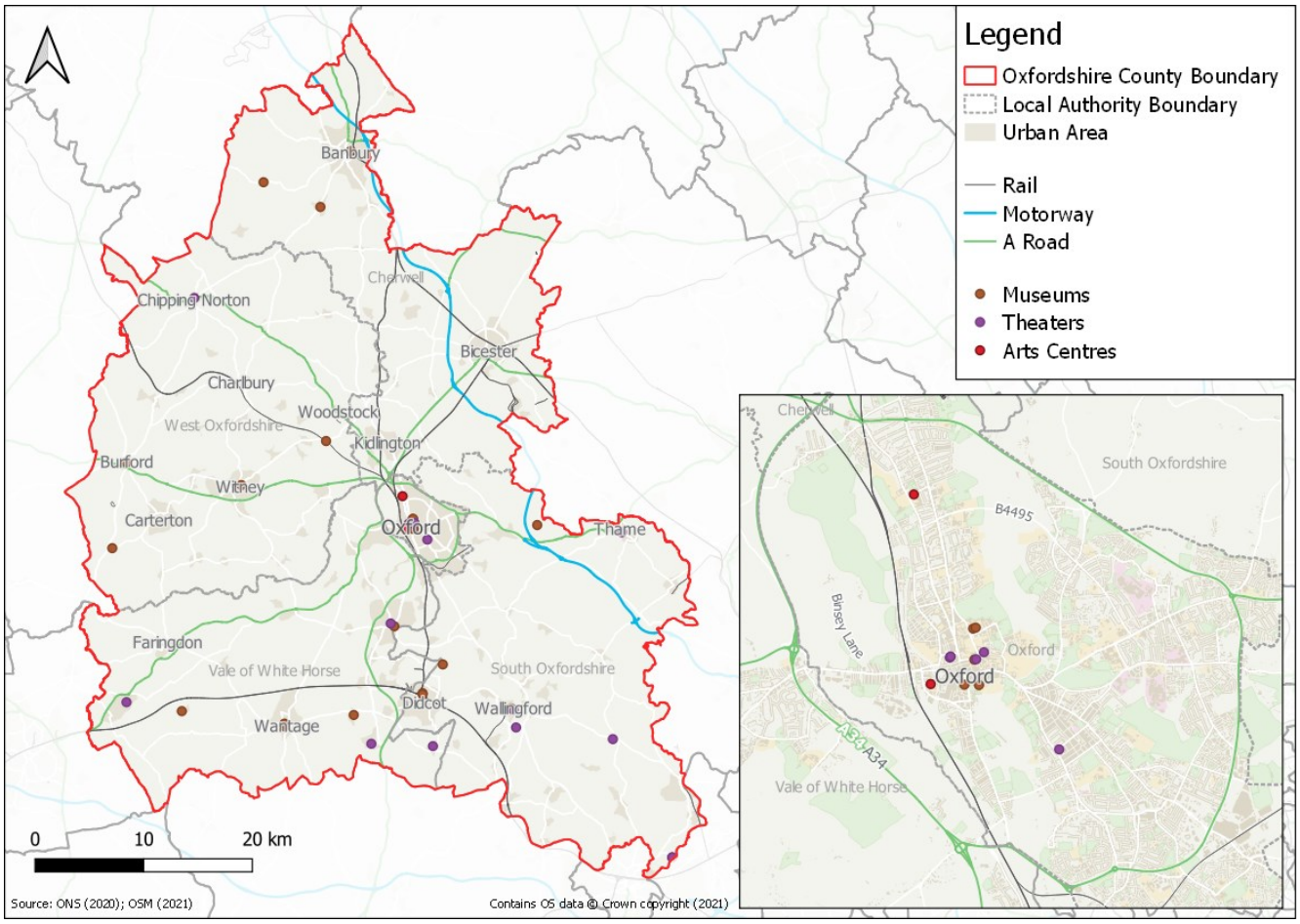

Figure 4-30: Location of Existing Museums & Arts Centres / Theatres in Oxfordshire

Oxfordshire's future needs relating to community and cultural infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- H2: Access to Spaces for Physical Activity (see Section 5.3.2)
- H5: Enhance Mental Health & Wellbeing (see Section 5.3.5)
- PS1: Local & Liveable Communities (see Section 5.4.1)
- PS3: Resilient Heritage & Culture (see Section 5.4.3)
- PS4: Socially Integrated Communities (see Section 5.4.4)
- P1: World Class Inclusive Education & Skills Development (see Section 5.5.1)

4.10 Oxfordshire's Existing Sport & Leisure Infrastructure (IF9)

What is Sport & Leisure Infrastructure (IF9)?

Sport and leisure infrastructure relates to formal indoor and outdoor provision where sport or physical activity can occur. For the purposes of OxIS the following categories have been included:

- **IF9A: Indoor Sport or Leisure Infrastructure** (e.g. Sports Centre, Swimming Pool) (see Section 4.10.1)
- **IF9B: Formal Outdoor Sport or Leisure Infrastructure** (e.g. Sport Pitches) (see Section 4.10.2)

Who is Responsible for Oxfordshire's Sport & Leisure Infrastructure (IF9)?

- Oxfordshire's five District and City Councils, who work in partnership with a series of charitable social enterprises, play a vital role in the management, delivery and future planning of both indoor and outdoor formal leisure and recreation facilities.
- In some instances, this responsibility is shared with local Town and Parish Councils who are generally responsible for the maintenance of recreation and open spaces.
- Sport England, a Government Agency, provides investment in sport and leisure infrastructure through strategic partnerships and infrastructure funding awards.
- In addition, there are several commercial organisations throughout Oxfordshire who operate formal indoor and outdoor sport facilities (see Table 4-23).

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF9 Infrastructure Responsibilities		
			Infrastructure Operation & Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Sport England	Government Agency	County-wide		✓	✓
Commercial Operators	Commercial Operators	Location Specific	✓	✓	✓
Fusion	Charitable Social Enterprise	Oxford City	✓		
Legacy Leisure	Charitable Social Enterprise	Cherwell	✓		
Better	Charitable Social Enterprise	West Oxfordshire; South Oxfordshire; Vale of White Horse	✓		
Parish & Town Councils	Parish / Town Councils	Parish / Town Councils	✓	✓	✓
OCC	County Council	County-wide			✓
Oxfordshire District Councils	District Council (as Planning Authority)	District-wide	✓	✓	✓
Community Amateur Sport Clubs	Charitable Organisation	County-wide	✓		
Schools	Education	County-wide	✓		

Table 4-23: Summary of IF9 Infrastructure Responsibilities

4.10.1 Indoor Sports & Leisure Infrastructure (IF9A)

Oxfordshire's five District and City Councils control numerous formal sports and leisure facilities which are currently operated by external charitable social enterprises including Better (West Oxfordshire, South Oxfordshire and Vale of White Horse), Legacy Leisure (Cherwell) and Fusion (Oxford City).

As indicated in Table 4-24 (see also Figure 4-31) there are a total of 24 indoor sports facilities operated by these charitable social enterprises throughout Oxfordshire. Infrastructure on site varies, however, alongside studios and gymnasiums, some larger facilities incorporate sport halls, swimming pools, ice rinks, tennis courts and trampolining facilities. In addition to dedicated infrastructure, primary and secondary schools with on-site sports facilities also allow local community access.

Alongside infrastructure owned by District Councils, Oxfordshire has commercially run sport facilities; some of which are also represented in Table 4-24.

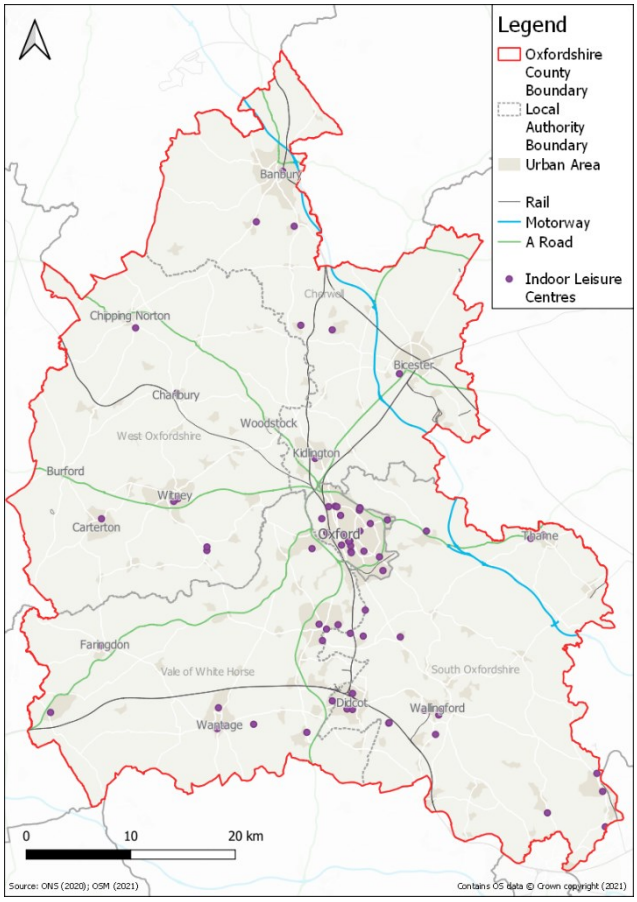

Figure 4-31: Oxfordshire's Key Indoor Sport & Leisure Infrastructure

Local Authority	Facility Operator	Indoor Sport & Leisure Centres
Cherwell	Legacy Leisure	• Spiceball Leisure Centre, Banbury • Bicester Leisure Centre • Woodgreen Leisure Centre, Banbury • Kidlington and Gosford Leisure Centre
Oxford City	Fusion	• Barton Leisure Centre • Ferry Leisure Centre • Leys Pools and Leisure Centre • Rose Hill Community Centre Gym • Hinskey Heated Outdoor Pool • Oxford Ice Rink
South Oxfordshire	Better	• Abbey Sports Centre, Berinsfield • Didcot Leisure Centre • Didcot Wave Leisure Centre • Henley Leisure Centre • Park Sports Centre, Wheatley • Riverside Park and Pools, Wallingford • Thame Leisure Centre
Vale of White Horse	Better	• Faringdon Leisure Centre • Wantage Leisure Centre • White Horse Leisure and Tennis Centre, Abingdon
West Oxfordshire	Better	• Bartholomew Sports Centre, Eynsham • Carterton and Chipping Norton Leisure Centres • Windrush Leisure Centre, Witney

Table 4-24: Summary of District Council Owned Indoor Sport & Leisure Infrastructure in Oxfordshire

4.10.2 Outdoor Formal Sports & Leisure Infrastructure (IF9B)

Formal outdoor sports and leisure infrastructure within Oxfordshire plays a vital role in providing a space for physical activity as well as functioning as a place for the local community to meet. Dedicated outdoor facilities, shown in Figure 4-32 include sport pitches, bowling greens, tennis courts, golf courses and children's playgrounds. Infrastructure is more readily available in proximity to Oxfordshire's towns, with more sparse coverage in rural communities.

In addition to dedicated outdoor sport facilities, wider local green space including parks as well as recreational paths also play a key role in allowing people to undertake physical activity. Information relating to public parks and gardens is contained within Section 4.8.3 whilst Oxfordshire's Public Right of Ways are identified in Figure 4-12.

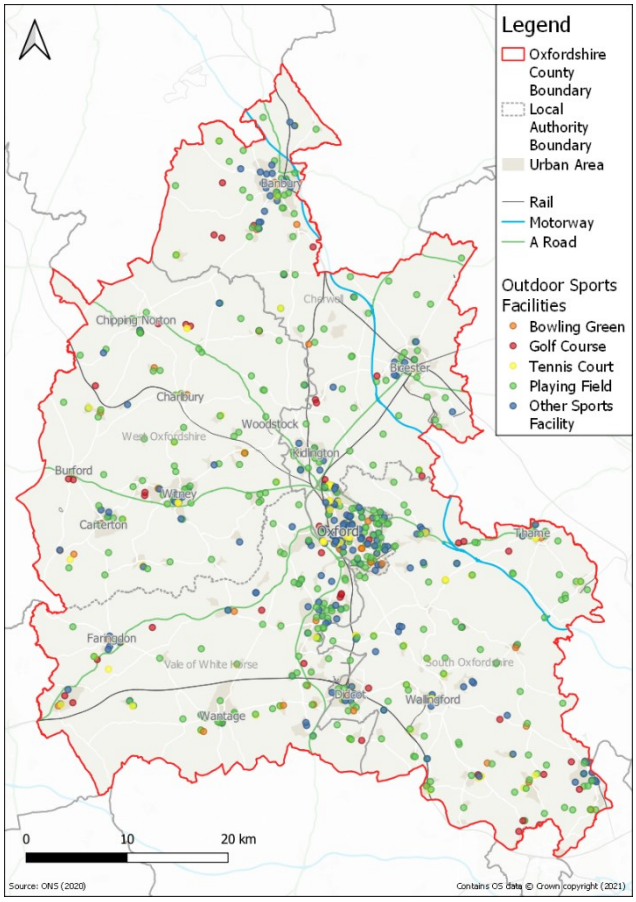

Figure 4-32: Location of Oxfordshire's Outdoor Sports Facilities

Oxfordshire's future needs relating to sport and leisure infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- H1: Health Inequality (see Section 5.3.1)
- H2: Access to Spaces for Physical Activity (see Section 5.3.2)
- H5: Enhance Mental Health & Wellbeing (see Section 5.3.5)
- PS1: Local & Liveable Communities (see Section 5.4.1)
- PS4: Socially Integrated Communities (see Section 5.4.4)

4.11 Oxfordshire's Existing Health & Adult Social Care Infrastructure (IF10)

What is Health & Adult Social Care Infrastructure (IF10)?

Primary, community, acute and adult social care health infrastructure underpins Oxfordshire's healthcare system. Within OxIS the following categories have been applied:

- **IF10A: Primary & Community Healthcare Infrastructure** (e.g. General Practice (GP) surgeries, community hospitals) (see Section 4.11.1)
- **IF10B: Adult Social Care Infrastructure** (e.g. care homes, assisted living facilities) (see Section 4.11.2)

Note that healthcare emergency infrastructure relating to ambulance depots are in IF13 (see Section 4.14).

Who is Responsible for Oxfordshire's Health & Adult Social Care Infrastructure (IF10)?

- The Oxfordshire Clinical Commissioning Group (OCCG) represents all GP practices and plans and oversees primary and community healthcare services throughout the county. They work in partnership with Primary Care Networks
- The Oxford University Hospitals NHS Trust is responsible for four acute hospital sites
- Oxford Health NHS Foundation Trust provides community care including mental health services
- Charitable organisations and private providers provide wider community, acute and social care. Private organisations also own several GP surgeries and health centres
- Oxfordshire's five District Councils, in their capacity as planning authorities play a key role in supporting the future planning of healthcare infrastructure through the planning process
- OCC are primarily responsible for the provision of Adult Social Care services (see Table 4-25)

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF10 Infrastructure Responsibilities			
			Healthcare & Social Care Service Provision	Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Oxford University Hospitals NHS Foundation Trust	NHS Trust	County-wide	✓	✓	✓	✓
Oxford Health NHS Foundation Trust	NHS Trust	County-wide	✓	✓	✓	✓
NHS OCCG	Clinical Commissioning Group	County-wide (Note Exception)		✓	✓	✓
NHS Swindon Clinical Commissioning Group	Clinical Commissioning Group	Western extent of Vale of White Horse		✓	✓	✓
Oxfordshire 20 Primary Care Networks	Primary Care Network	County-wide	✓			
Healthwatch Oxfordshire	Charitable Organisation	County-wide				✓
Private Healthcare Providers	Commercial	Location-Specific	✓	✓	✓	✓
Dental Practitioners	Commercial	County-wide	✓	✓	✓	✓
Charitable & Not For Profit Organisations	Charitable Organisation	County-wide	✓	✓	✓	✓
OCC	County Council	County-wide	✓	✓	✓	✓
Oxfordshire District Councils	District Council	District-wide				✓

Table 4-25: Summary of IF10 Infrastructure Responsibilities

4.11.1 Primary & Community Healthcare Infrastructure (IF10A)

4.11.1.1 Primary Healthcare Infrastructure

Primary healthcare infrastructure is the first point of contact for healthcare for most people and includes general practice, community pharmacy, dental and optometry services (NHS England, 2021). Primary care within Oxfordshire has recently been organised into 20 multi-disciplinary Primary Care Networks which were formed as an outcome of the NHS Long Term Plan (2019). They bring primary healthcare services together in a way which intends to provide more integrated primary health and social care closer to where people live.

General practice accounts for the bulk of primary care services and is delivered based on registered patients for individual practices (NHS England, 2016). There are a total of 67 GP surgeries in Oxfordshire (NHS Oxfordshire CCG, 2019) which comprises of 83 individual practice buildings (shown in Table 4-26 and Figure 4-33).

Primary Care Networks	GP Practices	GP Floor Area (m^2)	Registered Patients (2020)
Abingdon & District	4	1,513	30,040
Abingdon Central	2	812	34,454
Banbury Alliance	3	763	27,196
Banbury Cross	1	3,109	39,876
Bicester	3	2,890	50,669
Didcot	3	2,406	43,472
East Oxford	4	2,300	48,121
Eynsham & Witney	4	3,283	51,858
Healthier Oxford City Network	3	1,491	43,992
Henley SonNet	4	2,057	33,387
KIWY	4	2,210	35,326
NORA	5	3,642	45,562
OX3 Plus	2	2,079	46,985
Oxford City Central	4	1,649	39,935
Rural West	4	2,260	31,892
South East Oxford Health Alliance	3	2,725	41,250
Thame	3	1,858	30,656
Wallingford & Surrounds	3	1,619	32,503
Wantage	2	1,883	30,449
White Horse Botley	2	1,161	15,970
OXFORDSHIRE	67	41,712	753,523

Table 4-26: Summary of Oxfordshire's GP Practices & Registered Patients by Primary Care Networks (NHS Oxfordshire CCG, 2019)

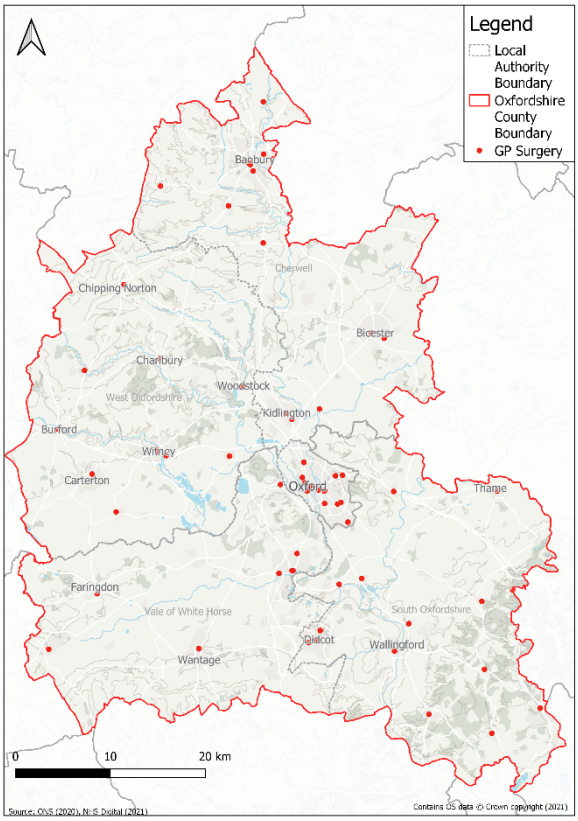

Figure 4-33: GP Surgeries in Oxfordshire (NHS Digital, 2021)

Alongside GPs, dentists, pharmacies and optometrists in Oxfordshire also play a key role in relation to primary care infrastructure in Oxfordshire. NHS England commissions a range of primary healthcare services, giving people a range of options in accessing primary healthcare depending on their needs.

Table 4-26, which provides a more detailed breakdown of the floor area of each GP practice and the individual practice population, indicates that the current number of registered patients in Oxfordshire is approximately 754,000. The ratio of patients to GP floorspace varies across the County with a ratio of around twelve patients per square metre at smaller practices to seventeen patients per square metre at large facilities (NHS Oxfordshire CCG, 2019). This ratio is also higher in more urban areas of the County, particularly in Oxford City.

4.11.1.2 Community Care

Community healthcare covers a wide range of care for all ages, providing care for people in small local hospitals or patients' homes (where most community care takes place). They have multi-disciplinary teams with highly skilled, specialist staff. Home care treatment generally allows a better quality of life for patients with serious complex illnesses or those who are receiving end-of-life care (NHS Federation, 2015).

Most community healthcare services are provided by the Oxford Health NHS Foundation Trust, including:

- Community nurses
- Those supporting recovery (e.g. physiotherapists, occupational therapists, stroke rehabilitation, speech and language therapists and podiatrists)
- Mental health and therapy services
- Those supporting healthy lives (e.g. school nurses, sexual health, smoking cessation, nutritionists)
- Specialist services or those supporting special needs (e.g. learning disability, dementia or providing disability equipment)

Services provided by the charitable sector also complement the above community services. This includes organisations such as Oxfordshire Mind which provide support for those with mental health problems and Age UK which supports older people living in Oxfordshire.

Alongside community care provided directly in home settings, many of Oxfordshire's community healthcare services are provided within Oxfordshire's eight community hospitals (see Table 4-27 and Figure 4-34). These are often used for patients who no longer require to be within acute hospitals but still require a more involved level of support beyond what is practical in people's homes.

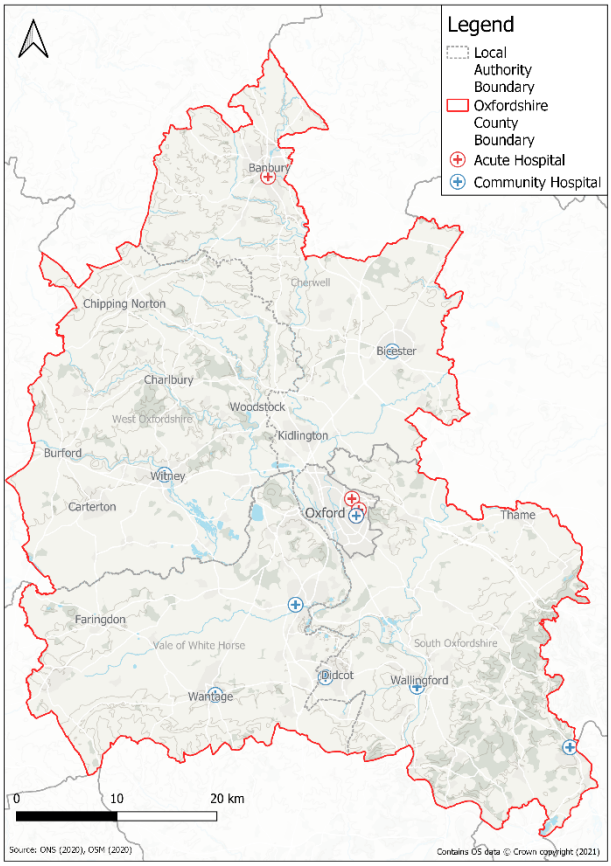

Figure 4-34: Community Hospital and Acute Hospitals (OSM, 2020)

Community Hospital	Occupational Therapy	Physiotherapy	Gerontology	Oxfordshire Stroke Rehabilitation	Minor Injuries Unit	First Aid Unit	Children's Physiotherapy	Children's Speech Therapy
Abingdon Community Hospital	✓	✓	✓	✓	✓			
Bicester Community Hospital	✓		✓			✓		
City Community Hospital (Oxford)	✓	✓	✓					
Didcot Community Hospital	✓		✓					
Townlands Memorial Hospital (Henley-on-Thames)[1]	✓	✓	✓		✓			
Wallingford Community Hospital	✓	✓	✓			✓		
Wantage Community Hospital							✓	✓
Witney Community Hospital	✓		✓					

Notes

[1] This hospital is operated by Royal Berkshire NHS Foundation Trust

Table 4-27: Summary of Oxfordshire's Community Hospitals and Key Services

4.11.1.3 Acute Hospital Infrastructure

Oxford University Hospitals NHS Foundation Trust operate four acute hospitals across Oxfordshire (see Figure 4-34):

- John Radcliffe Hospital (Oxford)
- Nuffield Orthopaedic Centre (Oxford)

- Churchill Hospital (Oxford)
- Horton General Hospital (Banbury)

John Radcliffe Hospital is the main accident and emergency hospital in Oxfordshire and is the largest of the four sites.

4.11.2 Adult Social Care Infrastructure (IF10B)

Social care is the provision of care, support and protection for adults or children in need or at risk. This includes needs arising from an illness, disability, old age, or poverty. Under the Care Act (2014), OCC is responsible for assessing people's needs and funding their care, however, most social care services are delivered independently by for-profit and voluntary sector organisations. Social care can take place in people's homes, care homes and nursing homes, or at day centres.

As of April 2019, Oxfordshire Councils provide 6,310 adults with ongoing long-term social care, 62% of which are aged 65 and over. Of this age category, 57% receive their care at home, with the remainder in care homes (1,685 clients) (OCC, 2020).

4.11.2.1 Care Homes

There are currently 130 care homes in Oxfordshire, comprising of 53 residential homes and 77 nursing homes (those offering nursing care by registered nurses). 65% of these care homes are owned by private organisations, with the remainder being not-for-profit or voluntary. Together they provide 5,634 bed spaces, ranging from small homes with 3 bed spaces to large homes with up to 120 bed spaces. As of February 2021, only 24 homes across the five Districts and City stated that they had vacancies (Care Home UK, 2021).

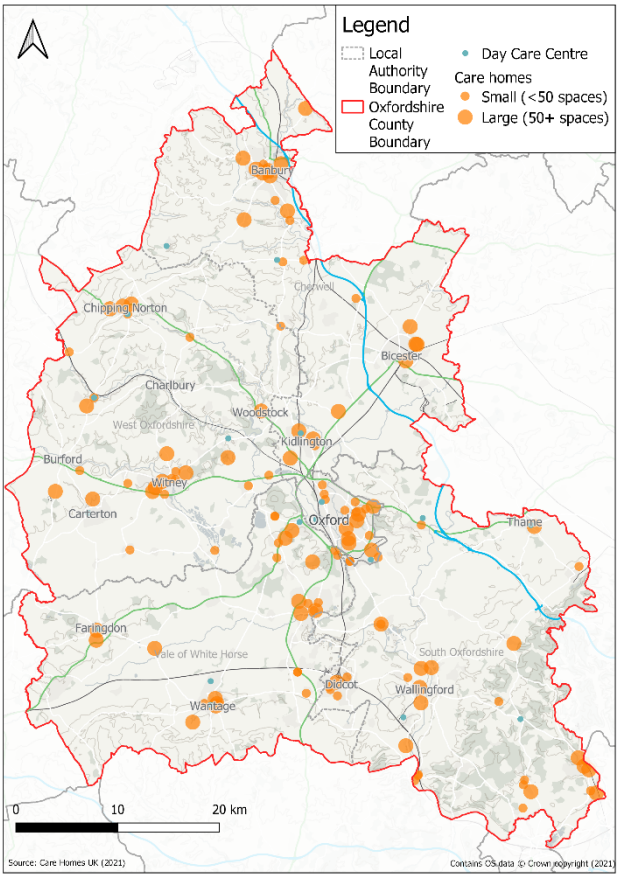

Figure 4-35: Adult Social Care Infrastructure in Oxfordshire (Care Home UK, 2021)

Local Authority	Care Homes	Care homes with nursing care	Capacity (bed spaces)
Cherwell	27	17	1,293
Oxford City	28	14	1,129
South Oxfordshire	29	16	1,089
Vale of White Horse	19	10	888
West Oxfordshire	27	20	1,235
OXFORDSHIRE	130	77	5,634

Table 4-28: Number of Care Homes and bed capacity by District in Oxfordshire (Care Home UK, 2021)

4.11.2.2 Day Care Centres

Aside from care homes, there are also 24 day-care centres in Oxfordshire (see Figure 4-35), all of which provide elderly care and some additionally providing mental health support services for all ages.

Oxfordshire's future needs relating to health and social care infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. This includes a consideration of the existing capacity and its sufficiency to accommodate future use. Relevant sections include:

- H1: Reduce Health Inequalities (see Section 5.3.1)
- H3: Improve Health Service Access (see Section 5.3.2)
- H5: Enhance Mental Health & Wellbeing (see Section 5.3.5)
- PS1: Local & Liveable Communities (see Section 5.4.1)
- P2: Reduce Oxfordshire's Socio-Economic Inequalities (see Section 5.4.1.3)

4.12 Oxfordshire's Existing Waste & Recycling Infrastructure (IF11)

What is Waste & Recycling Infrastructure (IF11)?

IF11A: Waste and recycling infrastructure (e.g. efficient uplift, processing of waste) (see 4.12.1)

Who is Responsible for Oxfordshire's Waste & Recycling Infrastructure (IF11)?

Oxfordshire is a two-tier authority which means that responsibility for collection and processing of waste sits across OCC and the five Oxfordshire District Councils.

- The OCC is the Minerals & Waste Planning Authority, responsible for the Minerals & Waste Local Plan and Minerals & Waste Development Management. The OCC plans for waste management facilities to meet the needs of the current poulation and businesses of Oxfordshire including the planned grouth and development
- The Waste Collection Authority (WCA) is responsible for collecting all household waste and arranging for the recyclables to be processed. This includes Cherwell District Council, Oxford City council, South Oxfordshire District Council, Vale of White Horse District Council and West Oxfordshire District Council.
- The Waste Disposal Authority (WDA) is responsible for providing Household Wast Recycling Cnetres (HWRCs) and managing any rubbish collected. Oxfordshire County Council holds contracts for processing food waste, garden waste, hazardous waste, rubbish for energy recovery and landfill
- There are additionally several commercial waste operators within Oxfordshire, responsible for their own associated waste collection and processing infrastructure (see Table 4-29)

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF11 Infrastructure Responsibilities			
			Waste Collection Infrastructure Management	Waste Processing Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
OCC	County Council (as Minerals & Waste Authority)	County-wide	✓	✓	✓	✓
Oxfordshire District Councils	District and city Councils (As Waste Collection Authority)	District-wide	✓		✓	

Table 4-29: Summary of IF11 Infrastructure Responsibilities

4.12.1 Waste & Recycling Processing Facility (IF11A)

4.12.1.1 Key Performance Indicators & Recycling Rates

Oxfordshire has met and now exceeds the statutory recycling target of 50% of household waste by weight in every District (see Table 4-30). It is one of the best performing counties in England for the low amount of waste produced per household of 1.05 T (OCC Waste & Resources) and its low rates of disposal. COVID-19 has increased the amount of waste produced per household by circa 6% as residents are spending more time in their properties, recycling rates have remained consistently around 60% with notable increases in cardboard and glass bottles due to online deliveries. The recycling rates for each district also vary, with rural areas having higher recycling rates due to the greater amount of garden waste.

Local Authority	Local Authority	Recycling Rate (Reuse, Compost & Recycle)
Disposal	OCC	60.9%
Collection Only Authority	Cherwell	55.9%
	Oxford City	56.1%
	South Oxfordshire	66.7%
	Vale of White Horse	65.7%
	West Oxfordshire	62%
	Household Waste Recycling Centres	59.7%

Table 4-30: Recycling Rates Across Oxfordshire (Source: OCC Waste & Resources 2021)

4.12.1.2 Reuse, Compost & Recycling Infrastructure

As shown in Figure 4-36 and Table 4-31, Oxfordshire has seven Household Waste Recycling Centres all of which are privately operated. There are also two privately-owned anaerobic digesters in Oxfordshire with a capacity to manage 100,000T. of Oxfordshire's food and garden waste.

Collection of recycling in Oxfordshire is arranged by Oxfordshire's five District Councils who secure their own contracts for recycling at the kerbside. Oxfordshire has a mixture of co-mingled and source segregated waste collection systems in place. Overall, around 70% of household recycling is processed within Oxfordshire, with 80% remaining in the UK and the additional 20% exported abroad - this figure changes depending on world markets.

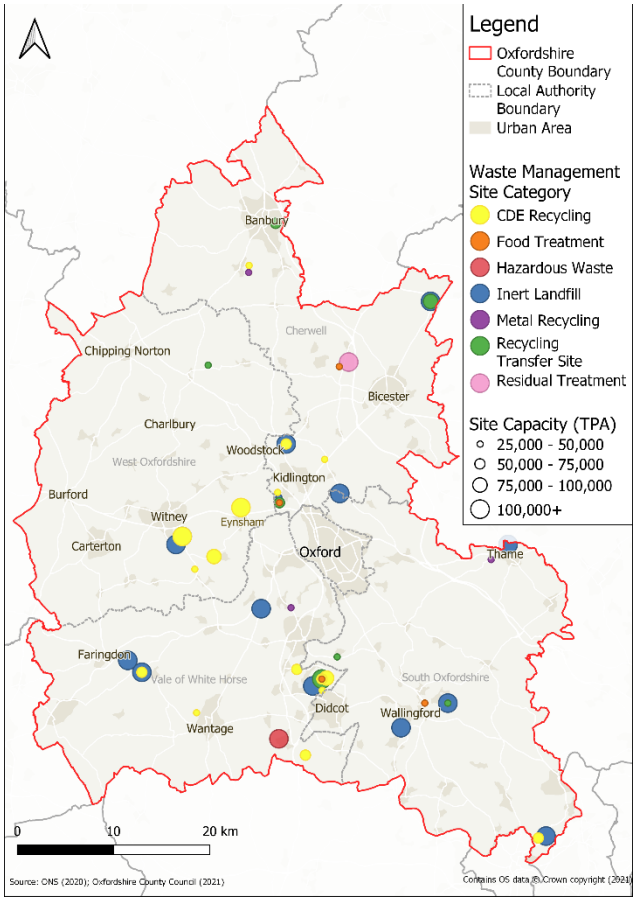

Figure 4-36: Oxfordshire waste management sites

4.12.1.3 Recover & Disposal Infrastructure

OCC has a contract with Ardley Energy Recovery Facility for Local Authority Collected Municipal Waste until 2045. The contract has contingency plans in case of breakdown or disruption. Ardley has the capacity to manage 326,300 T per year and currently produces enough energy to power 59,616 homes. At current predictions, there is enough capacity to manage the increase in waste associated with housing growth to 2040. OCC also manages 10 closed landfills and has continuous aftercare liabilities at a cost of £155,000 per year.

Oxfordshire's future needs relating to waste and recycling infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- E4: Waste and Recycling (see Section 5.2.4)

Category	Site	Operator	End Date	Capacity (TPA)
Construction, Demolition, Excavation Recycling	Appleford Sidings	Hanson	Non-op / Perm	100,000
	Dix Pit Complex	Sheehans	2028	95,000
	Drayton Depot	OCC	Permanent	75,000
	Gill Mill Quarry	Smiths of Bletchington	2040	120,000
	Grove Industrial Park	Aasvogel	Permanent	40,000
	Lakeside Park	Ethos Recycling	Non-op / Perm	25,000
	New Wintles Farm	David Einig Contracting Ltd	Permanent	170,000
	Newlands Farm	Smiths of Bloxham	Permanent	32,000
	Old Brickworks Farm	R Miller	Non Operational	40,000
	Playhatch Quarry	Grabloader	Permanent	70,000
	Prospect Farm	Raymond Brown	2022	75,000
	Shellingford Quarry	Earthline	2019	60,000
	Shipton Quarry	Earthline	2025	75,000
	Stonepitt Barn	S.Belcher	Permanent	75,000
	Sutton Courtenay Asphalt Recycling	Hanson	2030	50,000
	Sutton Courtenay Landfill	Hanson	2030	62,500
	Worton Farm (Cresswell Field)	David Einig Contracting Ltd	Permanent	48,000
Compost/ Food Treatment	Ashgrove Farm/Ardley Green site	ST Green Power	Permanent	35,000
	Battle Farm/Wallingford AD	ST Green Power	Permanent	45,000
	Battle Farm/Wallingford Composting	ST Green Power	Permanent	45,000
	Sutton Courtenay Landfill	FCC	2030	40,000
	Worton Farm	ST Green Power	Permanent	48,500
Hazardous	Harwell Western Storage	Magnox	Permanent	500,000
Inert Landfill	Bowling Green Farm	Hills	Commitment	920,000
	Cassington Quarry	Hanson Quarry Products Ltd	Commitment	50,000
	Caversham	Lafarge	Commitment	860,000
	Ewelme No.2 Landfill	Grundon	Temporary, 2032	133,000+
	Finmere Quarry	Opes Industries	Temporary, 2028	470,100
	Gill Mill	Smiths	Temporary 2041	850,000
	New Barn Farm	Grundon	2039	140,000,024
	Shellingford Quarry	Earthline	temporary , 2028	1,480,000
	Shipton Quarry Landfill	Earthline	Temporary, 2025	1,520,000
	Sutton Courtenay	FCC	Temporary, 2030	3,889,805
	Thame Football Club	Thame Football Partnership	2021	1,190,025
	Upwood Quarry	Hills	2029	368,000
	Woodeaton Quarry	McKenna	Commitment	266,463
Metal Recycling	Menlo Industrial Park	ASM	Permanent	25,000
	Newlands Farm	Smiths	Permanent	50000
	Whitecross Metals	Alumini Holdings	Permanent	25,000
Recycling Transfer Site	Allotment Land, Thorpe Meade	Grundon	Committed	60,000
	Culham No.1	Green Star	Permanent	50,000
	Ewelme No.2	Grundon	2032	25,000
	Finmere Quarry	Opes Industries	Not operational	90,000
	Sutton Courtenay Transfer Station	FCC	2030	160,000
	Unit 1, Enstone Airfield	Viridor	Permanent	30,000
	Worton Farm	M&M Skip Hire	Permanent	60,000
Residual Treatment	Ardley Landfill	Viridor	2049	326,300

Table 4-31: Oxfordshire waste management sites

4.13 Oxfordshire's Existing Potable Water Supply & Wastewater Infrastructure (IF12)

What is Potable Water & Wastewater Infrastructure (IF12)?

Potable water and wastewater infrastructure relate to the physical assets that permit both the secure supply of mains water to properties alongside the safe and efficient treatment of wastewater. The infrastructure types considered within OxIS include:

- **IF12A: Potable Water Infrastructure** (e.g. pumping stations, connections, reservoirs) (see Section 4.13.1)
- **IF12B: Wastewater Treatment Infrastructure** (e.g. treatment plants, sewage connections) (see Section 4.13.2)

Who is Responsible for Oxfordshire's Water Supply & Wastewater Infrastructure (IF12)?

- Thames Water, which supplies over 15 million customers in over 3.4 million properties, is the provider of potable water as well as being responsible for wastewater in Oxfordshire. Thames Water is split into six water resource zones (WRZ); with most of Oxfordshire in the Swindon and Oxfordshire WRZ which is Thames Water's second largest in population and the largest by geographical area
- Thames Water is regulated by the Government Department Ofwat who oversee the long-term resilience of potable water supplies and wastewater infrastructure
- The Environment Agency are also involved in the regulation of Thames Water's wastewater infrastructure to review performance against discharge compliance limits and abstractions
- Oxfordshire's five District and City Councils (in their capacity as planning authorities) work in partnership with Thames Water to identify future infrastructure needs through the planning process
- Oxfordshire County Council are the Planning Authority for Wastewater Infrastructure, working with Thames Water to plan future infrastructure needs. Oxfordshire's district councils work with Thames Water and the Environment Agency on the supply and disposal of water through the planning policy and delivery process for planned development, especially housing and employment

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF12 Infrastructure Responsibilities			
			Potable & Wastewater Infrastructure Management	Regulation of Potable & Wastewater Infrastructure	Delivery of New Potable & Wastewater Infrastructure Schemes	Future Infrastructure Scheme Planning
Thames Water	Private Organisation	County-wide	✓		✓	✓
Anglian Water	Private Organisation	Limited coverage in east Cherwell	✓		✓	✓
Severn Trent Water	Private Organisation	Limited coverage of wastewater in west of West Oxfordshire and Vale of White Horse	✓		✓	✓
Ofwat	Government Department	County-wide		✓		✓
Environment Agency	Government Agency	County-wide		✓		✓
Oxfordshire District Councils	District and City Councils	District-wide				✓
Oxfordshire County Council	County Council (as Minerals & Waste Disposal Authority)	County-wide				✓

Table 4-32: Summary of IF12 Infrastructure Responsibilities

4.13.1 Potable Water Infrastructure (IF12A)

The Swindon and Oxfordshire WRZ is primarily supplied by groundwater (60%) with additional supply from surface water abstractions and the Farmoor Reservoir. The key sources of water are the 'Gatox' mains transfer of water from Goring Gap towards Oxford, Farmoor Reservoir, Chalk groundwater serving the Upper Kennet Valley and water transferred from the Slough, Wycombe and Aylesbury WRZ to serve eastern Oxfordshire. Henley is served by groundwater from the Henley WRZ and has a simple distribution network. While there is some connectivity between Kennet Valley (south) and Swindon and Oxfordshire WRZ (west) under normal operations there is no movement of water across the WRZ boundary.

4.13.2 Wastewater Treatment Infrastructure (IF12B)

There are 97 wastewater treatment facilities throughout Oxfordshire. Sewage is processed at each site, but the sludge from smaller sites is transported to larger facilities such as Oxford, Banbury and Didcot or Reading and Swindon depending on haulage optimisation. The sludge is then processed through an Anaerobic Digestion plant, producing energy before the biosolids are used as fertiliser.

Faringdon Sewage Treatment Upgrades 2020

Faringdon sewage treatment works has recently undergone a £3.6 million upgrade by Thames Water to protect the environment and cater for the estimated extra 11,200 households by 2026.

- Faringdon sewage works is responsible for treating the wastewater of around 8,000 households and businesses in Faringdon and Coxwells.
- The upgrades include two new sewage filters and a standby power generator to provide energy for seven days in the event of a power interruption.
- Sludge from the site will be transported to the Swindon sewage works to be turned into renewable energy and fertiliser.

Oxfordshire's future needs relating to potable water supply & wastewater infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- E5: Reduce Water & Noise Polution (see Section 5.2.5)
- E4: Efficient Waste & Recycling (see Section 5.2.4)
- C3: Secure Water Supply & Wastewater (see Section 5.6.3)

4.14 Oxfordshire's Existing Emergency Services Infrastructure (IF13)

What is Emergency Services Infrastructure (IF13)?

Emergency services infrastructure relates to the physical assets that enable emergency services (incorporating Thames Valley Police, NHS South Central Ambulance Trust and Oxfordshire Fire & Rescue) to effectively promote safer communities and respond effectively to emergency incidents when they arise. The following infrastructure types have been applied within OxIS (see Section 4.14.1):

- **IF13A: Oxfordshire Fire & Rescue Infrastructure** (e.g. Fire Stations)
- **IF13B: Thames Valley Police Infrastructure** (e.g. Police Stations)
- **IF13C: NHS South Central Ambulance Service Trust** (e.g. Ambulance Depots)

Who is Responsible for Oxfordshire's Emergency Services Infrastructure (IF13)?

- The responsibility for emergency services infrastructure in Oxfordshire is split across Thames Valley Police, Oxfordshire Fire & Rescue Service and NHS South Central Ambulance Service. Each of these organisations is responsible for the future planning, delivery and operation of their own relevant infrastructure
- Both Thames Valley Police and the Oxfordshire Fire & Rescue Service are members of the Safer Oxfordshire Partnership, led by OCC and Oxfordshire's five District Councils. The Safer Oxfordshire Partnership provides strategic oversight of crime prevention and establishes infrastructure investment priorities across the County
- In their capacity as planning authorities, Oxfordshire's five District Councils also work closely with the emergency services to identify future infrastructure needs through the planning process (see Table 4-33)

Organisation	Organisation Type / Function	Oxfordshire Geographical Coverage	IF13 Infrastructure Responsibilities		
			Infrastructure Management	Delivery of New Infrastructure Schemes	Future Infrastructure Scheme Planning
Thames Valley Police	Police Force	County-wide	✓	✓	✓
Oxfordshire Fire & Rescue Service	Fire & Rescue Service	County-wide	✓	✓	✓
NHS South Central Ambulance Trust	NHS Trust	County-wide	✓	✓	✓
Thames Valley Air Ambulance	Charity	County-wide			✓
OCC	County Council	County-wide			✓
Oxfordshire District Councils	District Council	District-wide			✓

Table 4-33: Summary of IF13 Infrastructure Responsibilities

4.14.1 Oxfordshire Blue Light Services (IF13A, IF13B, IF13C)

Blue light services consist of police, fire and ambulance emergency response services and, in Oxfordshire, this is formed by:

- Thames Valley Police Force Area, operating from six stations (see Figure 4-37), located in Central Oxford, Bicester, Witney, Banbury, Kidlington and Abingdon
- Oxfordshire Fire and Rescue Service, operating from 25 stations well-spread across the county (see Figure 4-37), with stations in key settlements including Oxford City (with two stations), Chipping Norton, Didcot, Witney, and Thame. Three of the stations are 24-hour crewed (in Oxford and Deddington). Stations such as those in Oxford City, Banbury, Eynsham and Didcot have added facilities such as Incident Support Units and additional rescue engines
- South Central Ambulance Service, serving around 7 million people across the South of England, covering the Thames Valley area, Hampshire, Berkshire, Surrey, and Sussex. Accident and emergency services requiring ambulances in Oxfordshire are coordinated from one of two centres, with one located in Bicester (see Figure 4-37)

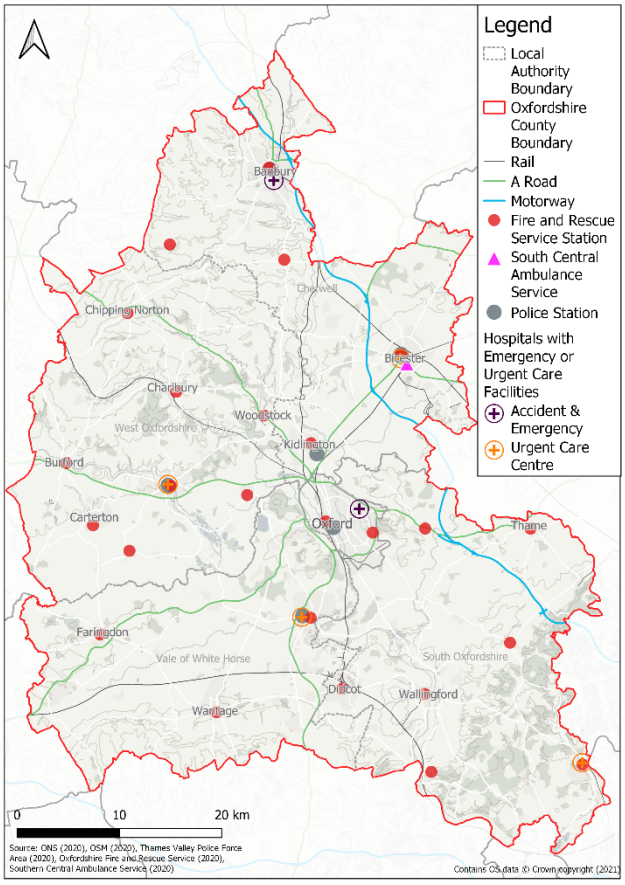

Figure 4-37: Emergency Service Infrastructure in Oxfordshire

Oxfordshire is part of the Thames Valley Collaboration, a collaboration with Berkshire and Buckinghamshire between their blue light services (OCC, 2021).

Oxfordshire's future needs relating to emergency infrastructure to 2040 are considered in further detail within Chapter 5 and to 2050 in the forthcoming OxIS Stage 2 Report. Relevant sections include:

- H3: Health Service Access (see Section 5.3.3)
- PS2: Community Safety & Security (see Section 5.4.1.3)
- P2: Reduce Oxfordshire's Socio-Economic Inequalities (see Section 5.5.2)