



*Water Cycle Study
scoping report
2023*

**Oxford Local Plan
2040**

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1. Introduction

1.1 National Planning Policy is clear that Local Plans should make sufficient provision for infrastructure for water supply, wastewater and flood risk. Supporting guidance sets out that Water Cycle Studies are a way of incorporating these considerations into planning for sustainable growth. Water Cycle Studies are a voluntary way of assessing in a holistic sense the capacity of all water-related infrastructure and the wider environment to support new development, identifying potential environmental issues/constraints and any necessary solutions that may need to be incorporated into the Local Plan's policies.

1.2 [Planning Practice Guidance](#) sets out that Water Cycle Studies ought to consider a range of information and evidence on factors that relate to the water environment and water infrastructure, but these can generally be designated into four key areas, namely:

- **Water quality** – including reviewing drainage and wastewater management plans and river basin management plans to assess issues such as capacity within the sewerage and wastewater treatment infrastructure, and proposals to address these issues, as well as environmentally sensitive waterbodies at risk of not meeting water quality targets, and opportunities to protect and improve them.
- **Water resources (supply)** – including reviewing areas of water stress classifications, water company water resource management plans as well as abstraction licensing strategies in order to identify areas of water stress; account for levels of abstraction, current water availability for abstraction and anticipated impact of climate change; as well as to get information on planned investment by the water company to address water stress and invest in new resources.
- **Flood risk** – including reviewing documents such as strategic flood risk assessments, flood risk management and catchment flood management plans in order to identify areas at risk of flooding from all sources (including surface water); account for the impact of climate change; and identify measures to manage flood risk at various scales.
- Any other relevant environmental considerations and constraints to development.

1.3 A detailed Water Cycle Study was previously published by Oxford City Council in 2019 to support the development of the Oxford Local Plan 2036 (LP2036). This study looked at all of the above factors in depth in the context of the development numbers/capacities being proposed in that Development Plan document. It is referred to in this document as the LP2036 WCS.

1.4 Since that work was undertaken the Council has been preparing a new Local Plan which covers development in the city to 2040. The City's new Local Plan 2040 has been drafted in a similar context to that of the extant Local Plan 2036, a such, many of the considerations that were assessed as part of the 2019 Water Cycle Study are still relevant. The reasoning for this is further explored in paras 3.3 to 3.5.

1.5 The purpose of this Water Cycle Study scoping report is to examine the proposals of the Local Plan 2040 on water resources, wastewater and the water

environment. The scoping report is divided into a number of sections which follow those key areas identified in para 1.2. These are followed by a conclusion which sets out the key findings/updates of relevance to the preparation of the Local Plan 2040 as well as a summary of the policies in the new Local Plan to address the protection of the water environment and the findings identified in the previous sections.

2. Water quality

2.1 The 2019 Oxford City Water Cycle Study assessed water disposal and quality issues against future housing growth to determine whether the environmental and infrastructural capacity exists in the Oxford area to manage the expected increase in wastewater discharges. This study incorporated modelling from South Oxfordshire District Council's Water Cycle Study (SODC WCS). The SODC WCS considered that growth in South Oxfordshire, together with a notional growth scenario for Oxford of 12,000 new homes had the potential to cause further deterioration of the Northfield Brook and River Thames. These watercourses were considered to be potentially more vulnerable to pollution as a result of the quantum of growth proposed by the future development plans of Oxford City and South Oxford District Councils. That assessment concluded there should be sufficient environmental capacity to manage the combined growth proposed by the two authorities. However, the correct measures would need to be followed by several stakeholders including Thames Water, Oxford City Council, neighbouring authorities, developers and the EA to ensure that the current statuses of the watercourses either stay the same or improve.

2.2 This section details updated information that relates to water quality issues in the city, firstly discussing wastewater infrastructure provision in Oxford and then going on to discuss environmental conditions.

Wastewater infrastructure in Oxford

2.3 Wastewater for Oxford is managed by Thames Water. They have produced a Drainage and Wastewater Management Plan (covering the period 2025 to 2050)¹, which is a long-term costed plan that sets out the future risks and pressures facing drainage and wastewater systems in the area and identifies the actions that are required to address wastewater management. The DWMP is supported by Catchment Strategic Plans (CSP) which provide a breakdown of the plan for specific areas in their region, one of which covers Oxfordshire.

2.4 For the period to 2050, Thames Water's CSP identifies that for the Oxford Sewage Treatment Works (STW) catchment area they are seeking to reduce the number of customers at risk of sewer flooding; reduce storm discharges (where overflows are present); and achieve 100% STW permit compliance. They identify that a number of solutions will be needed to help address these targets including:

- Sewer lining to target infiltration hotspots
- Surface water management

¹ More information here: <https://www.thameswater.co.uk/about-us/regulation/drainage-and-wastewater-management/our-dwmp#csp>

- Property level protection measures to prevent individual buildings from hydraulic sewer flooding
- Network improvements
- Invest in our sewage treatment works to achieve 100% compliance

2.5 As part of work on Local Plan 2040, the City Council has been liaising with Thames Water on the current situation with wastewater capacity and treatment in Oxford as an ongoing part of the Local Plan preparation. Generally, Thames Water responded that they have a well-established network within Oxford and that where capacity concerns exist, these are identified and addressed through the planning process in consultation with developers as required

2.6 Regarding the proposed Local Plan 2040 site allocations, Thames Water highlighted that many of these developments are currently within the planning process, and as such have been dealing with and responding to them on a case-by-case basis. They have provided specific comments about capacity concerns at a number of sites, however, they also expressed that these could be handled through the development management process.

2.7 All wastewater from development in Oxford flows downstream to the Oxford Sewage Treatment Works (STW). In relation to current and future treatment capacity at these treatment works, Thames Water have confirmed that they are finalising plans for a major upgrade at Oxford STW. This will provide a significant increase in treatment capacity, larger storm tanks and a higher quality of treated effluent going to the river. A completion date could not at the time be confirmed as they are still within the planning and modelling phase for this upgrade however the funding for this project has been confirmed. There are no plans for a new or re-location of the sewage treatment works at this time.

2.8 In addition, Thames Water highlighted they are also investigating the impact of groundwater on the sewer network in this area. This will help inform long-term planning, and as such they will encourage all developers within this catchment to adhere to the disposal of surface water hierarchy when reviewing and submitting their surface water strategy documents.

Environmental water quality

2.9 Oxford is located within the Thames River Basin District which is covered by the [Thames River Basin Management Plan](#) (TRBMP) which was last updated by the Environment Agency in 2022. The aim of River Basin Management Plans is to enhance nature and the natural water assets that are the foundation of everyone's wealth, health and wellbeing, and the things people value, including culture and wildlife. The TRBMP describes the challenges that threaten the local water environment in the Thames River Basin District and how these challenges can be managed. It includes data on the condition of waterbodies within the river basin, with surface waters being assessed for ecological status or potential and chemical status, and groundwaters assessed for quantitative status and chemical status.

2.10 The Water Environment (Water Framework Directive) Regulations 2017 (WFD) provides the legislative basis for River Basin Management Plans. Water bodies are assessed based on the WFD indicator, which measures the health of the water environment assigning them a status. The assessment is based on a range of quality elements relating to the biology and chemical quality of surface waters as is shown in

Figure 1. The condition data for the different water bodies of most relevance to Oxford can be referenced directly through the digital mapping on the EA [catchment data explorer](#).

Status	Definition
High	Near natural conditions. No restriction on the beneficial uses of the water body. No impacts on amenity, wildlife or fisheries.
Good	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Moderate	Moderate change from natural conditions as a result of human activity. Some restriction on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
Poor	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries.
Bad	Severe change from natural conditions as a result of human activity. Significant restriction on the beneficial uses of the water body. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

Figure 1: Status description used by the EA to classify the condition of water bodies within the River Basin Management Plan, [source](#)

2.11 The most recent assessment data available for the waterbodies within the Oxford boundary is from 2019 (Cycle 3 of the River Basin Management Plans) and is summarised in the tables below (Figure 2). For reference, the previous condition assessments used in the 2019 study are also shown (these relied upon 2016 data from Cycle 2 of the River Basin Management Plans).

Water Body	2019 Water Cycle study recorded condition		Current condition assessment data	
	Water Body Ecological status	Water Body Chemical status	Water Body Ecological status	Water Body Chemical status
Thames (Evenlode to Thame)	Moderate	Fail	Moderate	Fail
Cherwell (Ray to Thames) and Woodeaton Brook	Poor	Good	Poor	Fail
Bayswater Brook	Poor	Good	Poor	Fail
Northfield Brook (Source to Thames) at Sandford	Poor	Good	Moderate	Fail

Water body	Reasons for not achieving good ecological status	Reasons for not achieving good chemical status
Thames (Evenlode to Thame)	Reason: Phosphate Cause: Poor nutrient management (agriculture and rural land management); Sewage discharge (Water Industry) Reason: Invertebrates Cause: suspect data; invasive non-native species (North American signal crayfish)	Reason: Suspected tributyltin compounds Cause: Sewage discharge (Water Industry) Reason: Perfluorooctane sulphonate (PFOS); Polybrominated diphenyl ethers (PBDE); Mercury and Its Compounds Cause: no local cause

Cherwell (Ray to Thames) and Woodeaton Brook	Reason: Macrophytes and Phytobenthos Cause: Sewage discharge (Water industry) Reason: Phosphate Cause: Urbanisation, Poor nutrient management (agriculture and rural land management), sewage discharge (water industry) Reason: invertebrates Cause: invasive non-native species (North American signal crayfish)	Reason: Perfluorooctane sulphonate (PFOS); Polybrominated diphenyl ethers (PBDE); Mercury and Its Compounds Cause: no local cause
Bayswater Brook	Reason: Invertebrates; Macrophytes and Phytobenthos Cause: arable land use (Agriculture and rural land management)	Reason: Perfluorooctane sulphonate (PFOS); Polybrominated diphenyl ethers (PBDE); Mercury and Its Compounds Cause: no local cause
Northfield Brook (Source to Thames) at Sandford	Reason: Invertebrates Cause: sewage discharge, urbanisation, invasive non-native species (North American signal crayfish), drought Reason: Macrophytes and Phytobenthos Cause: Sewage discharge Reason: Phosphate, dissolved oxygen, ammonia Cause: Sewage discharge (water industry)	Reason: Cypermethrin Cause: no data available Reason: Perfluorooctane sulphonate (PFOS); Polybrominated diphenyl ethers (PBDE); Mercury and Its Compounds Cause: no local cause

Figure 2: Summary of water body status for main watercourses in Oxford according to EA monitoring including reasons for not achieving good status (based on 2019 condition assessment – most current data available)

2.12 Water body ecological status is either poor or moderate within the city. Of the reasons for not achieving good status, some of the causes (such as agricultural land practices, invasive species and drought) are unlikely to be linked to population growth and development and therefore the Local Plan has limited influence. However, sewage discharge is a major factor contributing to the failure to reach good status in three of the waterbodies. Sewage discharges by Thames Water into waterbodies are regulated by the Environment Agency (EA) through a series of permits and licences. If these licences and permits are not properly managed there is a risk that population growth could impact the status of waterbodies where discharges are permitted. Urbanisation is also linked to the development process which the Local Plan has some influence over.

2.13 It should be noted that the chemical status of all waterbodies is now recorded as fail, though this assessment is not directly comparable to previous years. This is because the EA have changed their methodologies and increased their evidence base for the 2019 assessment of chemical status which has resulted in all water bodies now failing chemical status². Specifically, this is due to four groups of global pollutants (uPBTs) that cause the significant change in chemical classification. They note that there is little underlying change in chemical status for chemicals that are not uPBTs

² More information here: <https://environment.data.gov.uk/catchment-planning/help/usage#chemical-status>

and if uPBTs are excluded then chemical status assessment is generally comparable to previous years assessments.

2.14 The source of sewer discharges into the Cherwell and Woodeaton Brook catchment come from STWs serving areas upstream of Oxford, including the Banbury STW, Bicester STW and several smaller STWs serving isolated settlements. Significantly, discharges from these sites are unlikely to be influenced by development in Oxford City, which drains to the Oxford STW outside of the Cherwell catchment. Proposed development in Oxford should therefore not have an adverse effect on sewer discharges into the Cherwell, however it has the potential to increase urbanisation in the lower end of the catchment. To limit the impacts of urbanisation, the regulation of SuDS to limit surface water discharges and control water quality from developments will be important.

2.15 The reasons for the Bayswater Brook not achieving good status are considered to be solely due to agricultural land drainage which is largely independent from the development plans in Oxford City. The development sites currently proposed as part of Oxford City's Local Plan 2040 are outside of the catchment area of the Brook so are unlikely to have a significant impact on its current status. If development is sited within the catchment the same SuDS principles outlined above will be important to limit the effects of urbanisation.

2.16 The Northfield Brook and Thames are potentially more vulnerable to impacts as are result of sewage discharges from Thames Water, and regulated by the EA. It is worth noting that the ecological status of the Northfield Brook has improved from 'poor' to 'moderate status. As the Northfield Brook is a tributary of the River Thames, any discharges into the brook also have the potential to impact downstream.

Regarding environmental water quality, there are two main ways in which new development can affect this:

- Altered surface runoff flow and quality impacting on the ecology of the watercourses running through Oxford.
- Increase in treated foul effluent from Oxford STW affecting the hydrology and quality of the River Thames.

2.17 The first problem can be mitigated by the use of SuDS to ensure development does not affect or has minimal impact on water quality or flow regimes. The second depends on the available headroom for development in relation to both the environmental and infrastructural capacity. As detailed earlier, previous studies suggest that development proposed for the city can be sufficiently accommodated, there are also planned upgrades to STW which should support additional capacity.

2.18 The EA catchment data explorer was also used to review the status of groundwater bodies, of which, the Headington Corallian is the only groundwater body which underlies Oxford³. Compared with the last WCS the Headington Corallian has moved from an overall good status to poor. The reasoning for this change of status relates to the chemical status condition assessment and appears to follow the same reasoning as the failure for chemical status measured for other waterbodies in the city

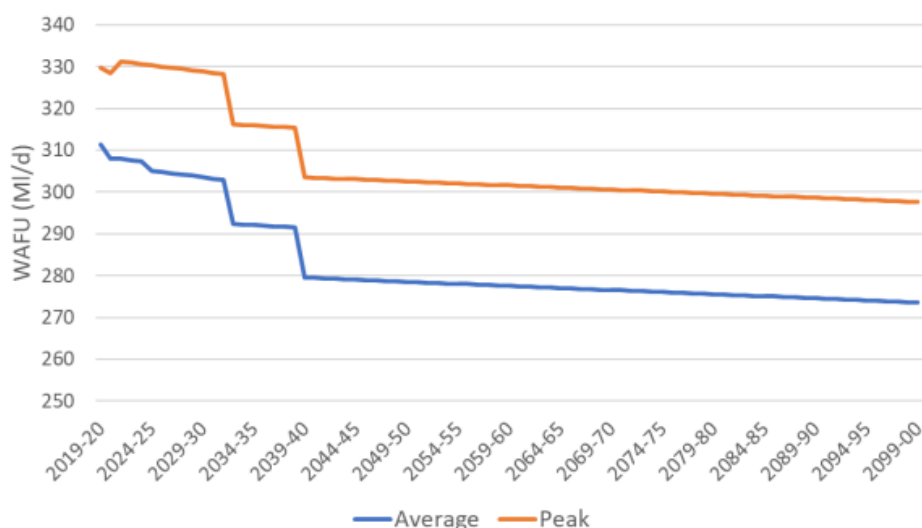
³ More information here: <https://environment.data.gov.uk/catchment-planning/WaterBody/GB40602G600700?cycle=3>

(as outlined in para 2.13 above). For quantitative condition, the waterbody remains good status as per last WCS assessment.

3. Water resources (supply)

3.1 This section discusses the availability of water resources to supply Oxford now and for the lifetime of the Local Plan. Oxford remains in an area that the Environment Agency has determined to be of serious water stress according to most recent update (2021). The EA advise that a serious water stress classification means that *they believe there are or, are likely to be, environmental impacts caused by public water supplies or the need for major water resources developments. It indicates where these could be reduced by improving water efficiency through metering. It does not indicate that there will not be enough water for supplies or reflect water company performance*⁴.

3.2 Oxford's water is sourced from the Thames Basin, the largest river basin in South-East England and Thames Water is responsible for water supply across the entire Oxford City Administrative area. Thames Water are currently preparing a new Water Resources Management Plan (WRMP) – the Water Resources Management Plan 2024⁵. According to this, Oxford falls within the SWOX Water Resource Zone (WRZ) where approximately 60% of water supplies comes from groundwater sources and around 40% from surface water. Baseline supply forecasts for water available for use in the SWOX WRZ, as set out in Thames Water's technical report accompanying the draft WRMP⁶, is anticipated to drop by about 10% by the end of the century, this is due to a combination of climate change reducing resources as well as changes to resilience that they are planning for (Figure 3).



⁴ More information here: <https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>

⁵ More information on the draft Water Resource Management Plan here: <https://thames-wrmp.co.uk/>

⁶ Available here: <https://thames-wrmp.co.uk/document-library/>

Figure 3: Water Available for Use forecast for the SWOX Water Resource Zone sourced from revised draft Water Resource Management Plan 2024 – Current and Future Supply technical report (2023)

3.3 In order to determine the availability of water and whether it was sufficient to accommodate future development, the LP2036 Water Cycle Study considered water supply issues under three different development scenarios for the Plan period (Figure 4). One scenario was based off a total provision of 105,485 dwellings across the region covered by Thames Water’s previous WRMP, which was then approximated to 15,800 new dwellings specifically for Oxford. Two other scenarios were also tested, using figures provided by the City Council, one being 8,000 new dwellings and another more precautionary estimate of 12,000 new dwellings.

Table 3- Estimated Household Consumption and DYCP Deficit for Development scenarios in Oxford

Scenario	Additional Household Consumption (MI/d)	DYCP Estimated Deficit (MI/d)
Thames Water (15,800 Dwellings)	2.73	2.85
12,000 Dwellings	2.07	2.19
8,000 Dwellings	1.38	1.50

Figure 4: no of dwellings assessed as part of the LP2036 Water Cycle Study

3.4 The new Local Plan covers the years 2020-2040. The Local Plan 2040 makes provision for 9,612 homes over the plan period. The LP2036 Water Cycle Study considered three different scenarios for growth in Oxford City. As the previous plan period started in 2016, there are four years which are unaccounted for. The City’s Authority Monitoring Report provides information housing completions every year. Net completions between the period from 2016/17 to 2019/20 are 1,934 dwellings. Figure 4 above shows the number of new dwellings anticipated by Thames Water and also shows the scenarios for the previous Local Plan that were assessed. The number of homes completed under the 2036 Local Plan in the period 2016-20 (1,934) and those proposed under the Local Plan 2040 (9,612) totals 11,456.

3.5 This 11,546 dwellings figure which is expected delivery from 2016 to 2040 would still fall comfortably within the limits of the previous development scenarios. It is within the limits of the City Council “upper scenarios” of 12,000 and the Thames Water scenario of 15,800 dwellings.

3.6 The findings of the LP2036 Water Cycle Study concluded that there should be enough water to supply Oxford for the majority of the years up to 2036 and beyond. However, during periods of peak demand a deficit will begin in 2022 that will and continue to increase throughout the plan period to 2040 without corrective action. This would mean that the supply for Oxford could be less secure with a greater probability that demand restrictions would be required in dry years.

3.7 The draft WRMP 2024 continues and builds on the approach of the previous WRMP which was used to inform the last Water Cycle Study by proposing a selection of measures for addressing water supply shortages in future. These measures include demand reduction solutions, water supply solutions, and improving catchment areas (nature-based solutions). The demand reduction solutions are the focus in the short term and expected to provide the most significant reductions in deficit in the quickest amount of time.

3.8 Whilst new dwellings have a 'right to connect', it is important that they are designed in ways that seek to limit additional impacts on water supplies and the evidence set out above suggests this will be an imperative. National policy allows for local authorities to require new dwellings to meet the tighter Building Regulations optional requirement of 110 litres/person/day where there is evidence of clear local need⁷ and Oxford's serious water stress situation supports this. Equally, policy can require design to consider other means of water efficiency such as water saving measures. Thames Water have reviewed the proposed site allocations and expected capacities for the new Local Plan. As highlighted earlier, the majority of these were included in the previous Local Plan and there are a limited number of new allocations. Of the sites assessed, about a third were flagged as having capacity concerns, however a number of these sites were at the planning application stage, under construction or had recently been completed.

3.9 In terms of abstraction, licenses are limited in Oxford mainly due to the Oxford Meadows, which is a special area of conservation (SAC). This is to reduce the risk of drought, in turn protecting several plant and animal species which live in the meadows. The Council is not aware of any changes to abstraction licences since the last WCS and there is no further update to be provided here.

3.10 As Oxford is in an area of serious water stress and forecast projections from Thames Water suggest that water supplies will gradually decline over the Local Plan period it is important that new development is designed in a way that seeks to reduce additional demands on water supplies as much as possible and helps to preserve the water environment. The Local Plan's policies will help to support this e.g. through implementing water use limits in line with Building Regulations optional higher standard.

4. Flood risk

4.1 The Council's Strategic Flood Risk Assessment sets out the context of flood risk within the city and a level 1 and level 2 assessment has been produced to support the Local Plan 2040 which should be referred to for full details. In summary, it sets out that fluvial flooding continues to be the primary source of flood risk in Oxford in terms of flooding extent, the number of properties at risk and historical flood damages. This is because Oxford is located at the confluence of the River Thames and River Cherwell, and is at risk from both watercourses independently, as well as concurrently in large flood events (two most recent widespread flood events were in 2012 and 2014). The SFRA notes how fluvial flood risk arises from numerous other watercourses (either tributaries or backwaters of the rivers) which pose a risk to more specific areas of the city. For example, tributaries/backwaters including Botley Stream, Fiddler's Island Stream, Wytham Stream, Osney Ditch and Mill Stream, as well as Boundary Brook to the northeast, Littlemore and Northfield Brooks in south.

4.2 With climate change projections applied (e.g. central allowance and upper central allowance), the SFRA notes that there are significant increases in flood extents

⁷ More information here: <https://www.gov.uk/guidance/housing-optional-technical-standards#water-efficiency-standards>

in Jericho, Oxford railway station, along Thames Street and Grandpont which lead to increased risk to a number of properties. Notable increases in flood extents are also predicted along Castle Mill Stream as it runs through the city centre, with additional areas at fluvial flood risk shown near Hollybush Row and Oxpens Road. Elsewhere changes in flood extent are mostly isolated to open floodplain. For a 3.3% AEP event under the higher central allowance, large changes in extent are noted for River Cherwell, however most properties remain outside flood extents. The SFRA also discusses impacts under an upper end allowance (84%) which predicts more widespread impacts on flood extents.

4.3 The SFRA discusses other types of flooding including from ordinary watercourses which include every passage through which water flows, above ground or culverted but that is not designated as a main river. These typically have catchments less than 3km² that are not represented in the fluvial flood maps provided by the EA. The key ordinary watercourses have been identified as follows:

- Marston Brook: A stream running towards Old Marston from the Northern Bypass road. A number of properties in Old Marston are at medium to high risk of flooding.
- Peasmoor Brook: This watercourse lies to the southeast of Marston Brook, it poses a risk in its upper reaches to properties to the east of Marsh Lane in New Marston which are sited in areas of medium to high risk. Now served by a flood alleviation scheme completed in mid-2017.
- Unnamed watercourse at Cutteslowe: A small unnamed watercourse and drainage ditch, both run through Cutteslowe Park towards Cutteslowe. The two channels appear to act as a conveyance route for flood water from the River Cherwell, putting many parts of Cutteslowe at medium to high risk of flooding.
- East and west branches of the Boundary Brook: Two upstream branches of the Boundary Brook located upstream of Churchill Hospital. They pose a risk to many parts of Headington which are shown to be at Medium to High Risk.

4.4 In addition, flood risk from a range of other sources is discussed, which are summarised as follows:

- **Surface water flooding** – this typically occurs as the result of high peak rainfall intensities, and/or insufficient capacity in the sewer network and is a significant flood risk in urban areas due to the high proportion of impermeable surfaces, which cause a significant increase in runoff rates. The SFRA identifies at-risk areas in Jericho, Headington, Summertown, Woodstock Road, and Oxford City Centre. Some historic records of flooding at Headington, Summertown, Woodstock Road.
- **Groundwater flooding** - local data is limited, but analysis based upon local geology/soils mapping. This showed that areas in the floodplain underlain by loamy and clayey floodplain soils with naturally high groundwater are considered likely to be high risk. Areas outside flood plain, including the majority of Oxford City Centre, Summertown and Jericho soils are freely draining lime-rich soils considered to be of moderate risk.
- **Sewer flooding** - Thames Water hold data on a total of 155 historic records of sewer flooding for the study area since records began, though this is likely to depend on reporting and is quite broad. Shows that, predominantly, built up

areas in New Hinksey and Grandpont (OX1 4), Botley and Osney (OX2 0) and Marston (OX3 0) generally have the most incidents. Incidents are generally less common in the built-up areas of Summertown (OX2 7) and Headington (OX3 7).

- **Reservoir flooding** – though reservoir failure is considered a rare event with a very low probability of occurrence, three main reservoirs that could present risk to city with flood extent likely to affect areas along the rivers Thames and Cherwell, particularly if they are already experiencing high flood. Areas affected within the Thames floodplain include parts of Wolvercote, New Botley, Osney, Grandpont and New Hinksey. Areas affected within the Cherwell floodplain include limited parts of Summertown, New Marston, Headington, St Clements and Iffley.
- **Canal flooding** - Canal and River Trust have recorded two isolated breaches of Oxford canal north of the city and overtopping in the Cherwell district and Northamptonshire historically, though these were upstream of the city and there are no identified historical breach occurrences within the city limits. Canal flooding is still considered a potential risk for Oxford, e.g. upstream of Hythe Bridge Street, close to Castle Mill Stream, where failure of the canal bank and subsequent spill into the stream could drain a large volume of the canal. Also, should any of the water control assets within Castle Mill Stream fail, e.g. upstream near Jericho, water within the stream could rise and overtop into the canal, which would form a conveyance route for flood water into Oxford city centre. Ongoing maintenance and management of the canal is important to mitigate such risks.

[Impact of flood risk on development and mitigation options where necessary](#)

4.5 Flood risk is a key factor in spatial planning. National policy sets out strong requirements for how flood risk is to be addressed to ensure any adverse impact on flood risk from development is negated. Local Plan policy has a role in setting more specific requirements that respond to Oxford's local context of flood risk and development needs taking guidance from the findings of the Strategic Flood Risk Assessment summarised earlier. The flooding background paper brings together the relevant policy context, the key findings from the SFRA and sets out how the Council has formulated its Local Plan policies to respond to flood risk – this should be referred to for full details on how local policies will address flood risks detailed above.

4.6 National policy seeks to ensure that all developments are safe with respect to flooding, and that floodplains are used for their natural purposes. Development on a floodplain is both at risk from flooding and has the potential to reduce the ability of the river corridor to convey and store flood waters without suitable mitigation measures. Where possible, that means that flood plains need to be preserved from inappropriate development which, where not adequately controlled, will have a detrimental effect on third party flood risk with the floodplain's capacity reduced and water displaced elsewhere.

4.7 In line with the NPPF and the sequential test, efforts should be made to steer new development to areas with the lowest probability of flooding (from all sources). Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The issue faced in Oxford is that there are a limited number of available sites in areas with low probability of flooding. This means that it is likely that following

application of the sequential test it may not be possible for a development to be located in zones with lower risk of flooding. The exception test provides a method of managing flood risk while still allowing development to occur as long as it can demonstrate that it:

- provides wider sustainability/amenity benefits to the community that outweigh flood risk, and
- can be made safe for the lifetime of the development taking account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible reduce flood risk overall. This will need to be informed by site specific flood risk assessment and is likely to require a range of mitigation measures incorporated into design (e.g. flood resistance/resilience, SuDS and safe access routes).

4.8 Development can have significant impacts on flood risk in Oxford in other ways if it is not properly managed. Overuse of impermeable/artificial surfaces that increase run-off has potential of increasing surface water flooding, particularly in already urbanised parts of the city, whilst changes to watercourses such as culverting can impact upon flows of water and introduce additional flood risks. Inappropriate design choices such as location of basement accommodation in flood zones can have direct impacts on life for occupants and emergency services at times of flooding where these can not be evacuated in time.

4.9 The impacts of climate change are likely to exacerbate these different flood risks in future. This means that it is important for new development to be designed with future risks in mind so that it is safe for the lifetime of the development.

4.10 The Environment Agency is working with partners on a major new flood alleviation scheme to reduce flood risk to many homes and businesses in Oxford. The scheme is designed to manage flood risk to Oxford over the next 100 years. It will reduce flood risk to a number of areas including Botley, Osney, New Hinksey and Grandpont. The application is currently being considered by Oxfordshire County Council who are the Lead Local Flood Authority for the city. Whilst this will be an important strategic flood risk measure benefitting areas of the city, it will not reduce remove flood risk entirely, as such, site-specific measures will be important regardless.

5. Other environmental constraints

5.1 Further environmental constraints which can have direct/indirect influences on the water environment in Oxford come mainly from the protected status of a number of designated sites across the city. These include ecological designations such as the Oxford Meadows Special Area of Conservation (SAC). Any developments that are close to or within the boundary of a SAC may require a project level habitat regulations assessment if they are likely to have an adverse effect on the site. A Habitat Regulations Assessment has been carried out to assess the impacts of the Oxford Local Plan 2040 on the Oxford Meadows SAC.

5.2 In addition to being designated a SAC the majority of the Oxford Meadows are part of the functional floodplain, therefore any form of development is highly unlikely.

The meadows also put constraints on development outside of the SAC boundary in that they limit what can be abstracted from the Thames as water levels need to be maintained. Groundwater contamination in North Oxford is also a potential issue for the meadows therefore developments here will need account for this risk.

5.3 There are 12 Sites of Special Scientific Interest (SSSI) within the Oxford administrative boundary, with many also located in the surrounding area. Four of the sites are geological SSSIs, with the remaining 8 biological SSSI. All SSSIs are protected by law to conserve their wildlife or geology. Local planning authorities are required to consult the appropriate conservation body over planning applications which might affect the interest of an SSSI. The owners or occupiers of SSSIs are also required to obtain consent from the relevant nature conservation body if they want to permit potentially damaging activities. These activities are unique for each site, but examples include grazing, the storage of materials, tree management, draining, the use of vehicles and burning.

5.4 Many of the SSSIs are sited in the meadows alongside the Thames and Cherwell. These are biological SSSIs and if development is not properly managed it could lead to a deterioration in water quality or changes in the flow regime at the SSSIs. Care needs to be taken both during and after construction to ensure that runoff from development sites is adequately treated before entering the local drainage network. The City Council has produced a Source Pathway Receptor Analysis (SPRA) which assesses the impact of development proposed in the plan on the city's network of SSSIs.

5.5 As well as these national designations, there are a number of locally designated sites (e.g. Oxford City Wildlife Sites, Local Wildlife Sites and Local Nature Reserves). Whilst these do not benefit from national protection, protections through local policies restrict what development can occur on or around these sites including considerations of impacts that could affect water quality (where it is important to the features which support their designation).

5.6 In addition to the ecological designations above, there are a number of designations which impose restrictions intended to preserve the built environment of Oxford (particularly in relation to heritage). These are related to the water environment as they have an impact on building footprints leading to potential issues with land availability. These include numerous listed buildings as well as conservation areas. Planning permission affecting these designations will only be granted where it is appropriate in terms of its scale and location and does not conflict with the special features/characteristics for which they have been designated. Building heights are also limited in the city where they could impact protected views. All of this makes it more challenging to build high density multiple storey developments in Oxford, which is problematic given the limited amount of land availability caused by extensive floodplains in the city.

6. Conclusions

6.1 This Water Cycle Study Scoping Report sets out the current situation with the water environment in Oxford. It acts as the key piece of evidence supporting the Local Plan 2040 to address issues related to water in the city.

6.2 The key findings of to inform the Local Plan 2040 are as follows:

Water quality

- Thames Water have notable investment plans in place to improve wastewater infrastructure provision in the city including an upgrade to the Wastewater Treatment Works to improve its capacity, as well as measures set out within their Drainage and Wastewater Management Plan.
- Ongoing engagement with Thames Waters has not flagged up any significant capacity concerns for the site allocations however some sites may require upgrading in due course, which will need to be managed through careful pre-planning as and when applications arise.
- Water quality of the water bodies in the city is generally poor or moderate for a number of reasons. Some of these reasons are outside of the influence of the planning system (e.g. agricultural practices) however others will be influenced by planning decisions e.g. additional urbanisation and additional inputs into sewerage system. Local Plan can help mitigate impacts through policies such as SuDS, broader greening in new developments, water use limits.
- Impacts of additional development planned within the city over the Local Plan 2040 period is considered unlikely to have significant additional impacts on waterbodies as long as careful mitigations are put in place where required.

Water supply

- Water supply for the city is handled by Thames Water who are currently preparing a new Water Resource Management Plan for their region which addresses water provision up to 2100.
- Oxford remains in an area of serious water stress. The findings of the LP2036 Water Cycle Study that water supply is expected to run into deficits towards the end of the Local Plan period are still considered relevant for the Local Plan 2040. This is supported by the forecasts Thames Water set out in their Water Resource Management Plan which flag various reasons for declines in water supply including climate change and the need for better resilience planning.
- Thames Water set out various measures for how they intend to address water supply issues in the region in the future, which are expected to focus particularly on demand reduction measures in the near term.
- It will be important that the Local Plan supports water efficiency measures in new development to help ensure that additional demands on water supply are limited as much as possible.

Flood risk

- The Strategic Flood Risk Assessment for the city supports the Local Plan 2040 and provides a detailed assessment of different types of flood risk facing Oxford now and in the future.
- The city is at risk primarily from fluvial flooding due to proximity to rivers, however there are issues with other types of flooding including surface water, sewers, and groundwater.
- The highly constrained nature of the city and the need for new development such as housing means that it may not be possible to always avoid development in areas of flood risk. It is important however that Local Plan follows national policy and steers development towards taking a sequential approach to avoiding areas of highest flood risk wherever possible.
- The EA is working on a strategic flood risk reduction project in the form of the Oxford Flood Alleviation Scheme, the planning application for this is currently

being considered by the County Council. The project will be helpful in reducing flood risk in parts of the city but will not negate flood risk entirely.

- Local Plan policies have a role in ensuring that new development incorporates other measures to reduce flood risk such as flood resistance and resilience measures as well as SuDS.

Other environmental issues

- There are a number of sensitive ecological designations throughout the city which can be impacted by changes to the water environment. These designations also limit where new development can occur.
- Equally there are other types of constraints, such as on building heights which further limit development opportunities which creates additional pressures on open spaces that may be subject to flood risk.

Approach to addressing the water environment through Local Plan 2040 policies

6.3 The earlier sections of this study have discussed where the new Local Plan could have a role in addressing issues that have been identified. The Local Plan 2040 includes a number of policies which are intended to mitigate impacts on the water environment from new development (and to improve it wherever possible). A summary of the key areas addressed across the policies is set out below:

- **Policy G9** includes requirements for new dwellings to meet the more stringent water use target of 110 litres per person per day and for non-residential development to set out the measures they have taken to conserve water use. The policy includes as part of its resilience checklist requirements for other types of water conservation measures where appropriate, such as rainwater harvesting.
- **Policy G7** sets out the approach applicants will need to take to addressing flood risk in the city. It includes various requirements for different types of development including taking a sequential approach to development and the requirements for site-specific flood risk assessments. The background context helping to inform this policy is explored further in the flood risk background paper as well as the Strategic Flood Risk Assessment which supports the Local Plan consultation.
- **Policy G8** meanwhile sets out expectations for provision of Sustainable Drainage Systems (SuDS) which are important not only for reducing surface water run-off and ensuing flooding at times of heavy rainfall, but also for protecting water quality through filtering out pollutants and clean up water before it drains into watercourses. This is particularly important in reducing the impacts of pollutants in urban run-off (e.g. from road surfaces).
- **Policies G2** and **G3** support similar objectives to G8 through encouraging new green infrastructure more broadly as well as requiring development to meet a minimum target for natural surface cover as assessed via the Urban Greening Factor.
- **Policy G1** sets out a hierarchy of protection for green spaces across the city to preserve a green infrastructure network across Oxford from inappropriate development. This is supported by **policy G6** which sets out additional protections from various impacts of development on the ecological sites such as the SAC, SSSIs as well as local sites.

