

Flooding, Water Quality and Water Resources

This topic addresses:

SA Objective:

(1) To reduce the risk of flooding and the resulting detriment to the public well-being, the economy and the environment.

(12) To maintain and improve water quality; and manage water resources

SEA Theme: Water; Climatic factors

Introduction

The Oxford City Strategic Flood Risk Assessment (SFRA) was carried out in 2008 and reviewed in 2010. A new SFRA is to be undertaken to support the new Local Plan. This will be completed to support the development of policies in the plan and will look at flooding from all sources in Oxford.

The most recent flood events in Oxford were in 2007 (July), 2012 (November) and 2014 (January). These resulted in significant disruption across the City. The principal source of flood risk in Oxford is from fluvial flooding from the River Cherwell and the River Thames.

Water Quality issues have been brought to the forefront of planning since the introduction of the Water Framework Directive. This European Directive seeks to ensure that the biological and chemical quality of rivers reaches a good standard. The Environment Agency has responsibility for ensuring that relevant rivers and watercourses are of an appropriate standard.

Water Resources is about of drinking water. It is important that there are sufficient water resources for the existing population of Oxford as well as for the new population arising as a result of future planned developments. Thames Water is responsible for ensuring that there are sufficient water resources available throughout the plan period.

Plans, Policies and Programmes

National Planning Policy Framework (NPPF)

The NPPF suggests that Local Planning Authorities should adopt proactive strategies to mitigate and adapt to climate change, taking account of flood risk and water supply considerations.

NPPF flooding policy seeks to direct development away from areas at highest risk, and where development is necessary, to make it safe without increasing flooding elsewhere (sequential and exception tests).

The NPPF suggests that when determining planning applications it should give priority to sustainable drainage systems. In order to give priority to SuDS systems, in the absence of the implemented sections of the Flood and Water Management Act, Local Planning Authorities need to have appropriate policies in place.

The NPPF requires that Local Plans should be supported by an SFRA and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as Lead Local Flood Authorities.

Flooding

The Flood and Water Management Act, 2010

This piece of legislation establishes upper tier local authorities as Lead Local Flood Authorities and provides them with a range of duties. Not all sections of the Act have been implemented as yet.

Thames Catchment Flood Management Plan, Environment Agency, 2009

The Catchment Flood Management Plan proposes action to be taken for Oxford through a Flood Risk Management Strategy for Oxford.

According to the Thames Catchment Flood Management Plan, Oxford has between 2,000 and 5,000 properties at risk from flooding (from rivers).

Policy Paper – Oxford Flood Alleviation Scheme, CLG, 2016

The Oxford Flood Alleviation Scheme will reduce the number of properties at a 1% or higher annual risk of flooding from 4,500 to 1,800. The aim of the project is to reduce flood risk through the development of a flood relief channel. If all approvals and funding is secured, it is likely that work will start in spring 2018, with construction expected to take between 2-3 years.

Water Quality

Water Framework Directive, 2000/60/EC

Key piece of European Legislation designed to improve and integrate the way water bodies are managed throughout Europe. The Directive requires Member States to reach good chemical and ecological status in inland and coastal waters by 2015.

Thames River Basin Management Plans, Environment Agency 2015

The River Basin Management Plans are documents which set out the current state of the water environment, pressures affecting the water environment, environmental objectives for protecting and improving waters, and a programme of measures and actions needed to achieve the objectives as set through the Water Framework Directive.

Water Resources

Thames Water Resources Management Plan 2015-2040

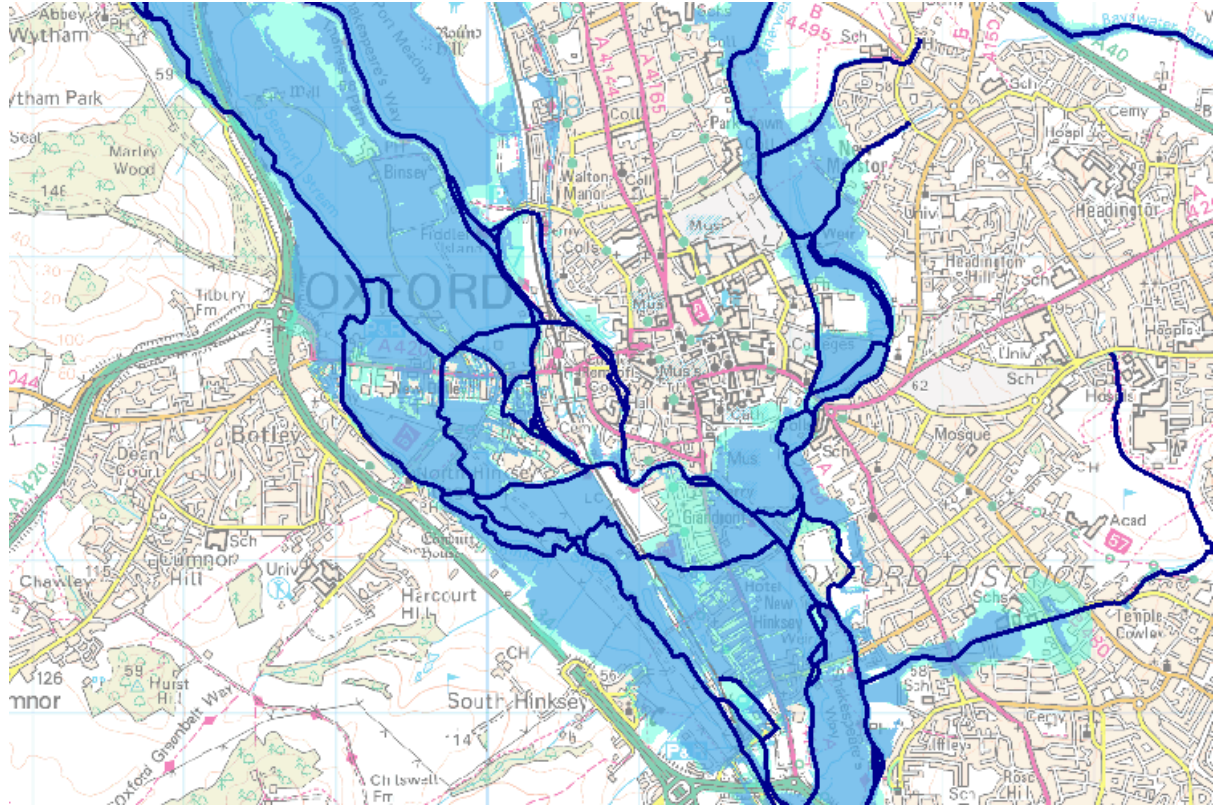
The Thames Water Resources Management Plan 2015-2040 sets out the preferred programme for managing water resources in the Thames Water area up to 2040. It sets out forecasts of supply and demand, alongside options to manage demand and provide supply of water resource across the Thames Water area. It finally sets out a programme of investment to ensure that water resources within the Thames Water area are appropriately managed to ensure that water supply is provided to existing homes as well as the development planned within the Thames Water supply area.

Current Situation

Flood Risk

There are around 4,500 properties at a 1% or higher risk from flooding within Oxford. This figure could rise to nearly 6,000 by 2080 with the predicted impacts of climate change¹.

Figure 5.1.1 – Map of River Flooding in Oxford (Environment Agency)



Once the Strategic Flood Risk Assessment (SFRA) is completed, the City Council will have a clear understanding of how new development will be impacted upon by different sources of flooding, including fluvial (river), groundwater, surface water, and sewerage flooding. The SFRA will also show how Oxford will be impacted upon by flooding in the future through the inclusion of a “climate change” scenario.

The most recent flood (January 2014) affected homeowners, businesses and recreation spaces as shown in the photos overleaf:

¹ Policy Paper – Oxford Flood Alleviation Scheme <https://www.gov.uk/government/publications/oxford-flood-risk-management-scheme/oxford-and-abingdon-reducing-flood-risk>

Figure 5.1.2: Photos of Oxford under flood conditions



Photo 1: Abingdon Road (Jan. 14)



Photo 2: Angel and Greyhound Meadow (Jan. 14)

Water Quality

River Basin Management Plans provide information at the National level. The following table shows the number of water bodies in England.

Figure 5.1.3 Number of water bodies in England

Water Body Category	Natural	Artificial	Heavily modified	Total
Rivers, canals and surface water transfers	2,549	268	1,107	3,924
Lake	93	171	325	589
Coastal	34	2	26	62
Estuarine	24	11	69	104
Surface Water Total	2,700	452	1,527	4,679
Groundwater	271	0	0	271
Total	2,971	452	1,527	4,950

The Following table shows the ecological and chemical 2015 classification for all surface waters in England. This table shows that the majority of surface water bodies in England are in Good chemical status and moderate ecological status.

Figure 5.1.4: Ecological and chemical 2015 classification for surface water in England

No. of water bodies	Ecological Status or Potential					Chemical Status	
	Bad	Poor	Mod	Good	High	Fail	Good
4,679	136	765	2,966	805	7	137	4,542

The following table shows the chemical and quantitative 2015 classification for groundwater in England.

Figure 5.1.5: Chemical quantitative 2015 classification for groundwater in England

No of water bodies	Quantitative Status		Chemical Status	
	Poor	Good	Poor	Good
271	84	187	128	143

Figure 5.1.5 shows that in terms of the groundwater in England, the majority are in good quantitative status and just over half of all groundwater are in good chemical status.

Figure 5.1.6 shows the number of water bodies across the River Thames Basin District.

Figure 5.1.6 showing the number of water bodies in the River Thames Basin District

Water body categories	Natural	Artificial	Heavily modified	Total
Rivers, canals and surface water transfers	287	21	106	414
Lake	7	47	19	73
Coastal	0	0	1	1
Estuarine	1	4	5	10
Groundwater	47	0	0	47
Total	342	72	131	545

Figure 5.1.7 shows the ecological and chemical 2015 classification for surface waters.

Figure 5.1.7: Ecological and chemical 2015 classification for surface waters in the Thames River Basin District

No. of water bodies	Ecological Status or Potential					Chemical Status	
	Bad	Poor	Mod	Good	High	Fail	Good
498	27	112	320	39	0	5	493

Figure 5.1.8 shows the chemical and quantitative 2015 classification for groundwaters in the River Thames Basin District.

Figure 5.1.8: Chemical and quantitative 2015 classification for groundwaters in the River Thames Basin District.

No of water bodies	Quantitative Status		Chemical Status	
	Poor	Good	Poor	Good
47	22	25	18	29

The Thames River Basin Management Plan (EA, 2015) provides the following series of objectives and how these can be managed.

- Where good status has already been achieved, to maintain this status to comply with the requirement to prevent deterioration

- In other cases to aim to achieve good or better by 2021
- In addition, where first cycle objectives for 2015 have not been met these must be met as soon as practicable.

It is suggested that some of the objectives are considered by Local Authorities when making spatial plans. The following should be considered, according to the Environment Agency when Local Planning Authorities are preparing spatial plans:

- **Physical Modifications:** Physical changes such as widening, deepening and straightening rivers, estuaries and coasts help to meet the needs of society and the economy. Physical modifications allow the water environment to be used and valued for many purposes, including for navigation, flood risk management, fishing and other recreational activities that improve people's wellbeing and quality of life. These changes have helped towns and cities to develop and the economy to grow, but this can sometimes be at the expense of the water environment. Local government should consider any impacts on the physical characteristics of the shape, boundaries and content of a water body when preparing spatial plans;
- **Managing Pollution from wastewater:** Pollutants in waste water can affect the dissolved oxygen levels within the receiving waters and can impact on ecology. Nutrients can disturb the natural ecological balance of a water body and cause excessive growth of vegetation and algae, which may starve the water of oxygen. Other pollutants such as metals and everyday chemical used in products around the home which are discharged in sewage may be directly toxic to plants or animals. Humans can also be affected, for example, through chemicals that accumulate in food or bacteria and viruses in waste water affecting bathing waters. Local government should consider the impact on water quality when preparing spatial plans;
- **Managing pollution from towns and cities:** Rainwater draining from roads and pavements carries many pollutants. These include metals, vehicle emissions, silt, grit, bacteria from animal faeces and oil. Other issues arise from pollution from households and business, for example, misuse of the drainage network. Pollution can enter surface water sewers that discharge to rivers, estuaries and coastal waters, causing harm to animals and plants. Local government should consider pollution arising from land-use activities (both urban and rural) that is dispersed across a river catchment, or sub-catchment, and does not arise as an effluent discharge, when developing spatial plans. Local government should make sure that new development addresses potential pollution problems by using sustainable drainage systems. Local government should incorporate green and blue infrastructure into regeneration schemes where possible;
- **Changes to natural flow and levels of water:** Taking too much water from freshwater or tidal rivers, canals, lakes and groundwater damages the environment. Changes in the natural flow and level of water could affect some Natura 2000 sites; particularly water dependent Special Areas of Conservation such as the Oxford Meadows SAC. Improving the way water resources are managed will make sure that there is enough good quality water for a healthier water environment and secure supplies of water for people, businesses and agriculture. It will also provide more leisure opportunities and increase the amenity value of natural environments, leading to health benefits for people. Local government should set Local Plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of the Building Regulations 2010. Local government should commissions water cycle studies to inform spatial planning decisions around local water resources

Water Resources

The Thames Water Resources Plan 2015-2040 breaks down the Thames Water area into several distinct water resource zones. Oxford is within the SWOX water resource zone which covers Swindon, Oxford and London.

The Environment Agency has developed a methodology for identifying and classifying relative levels of water stress in England. The Government has used this information to designate areas of serious water stress for the purpose of accelerating water metering. Oxford is within an area of serious water stress. The South East of England is considered to be an area of serious water stress. This includes the Thames Water Area in which Oxford lies. Average water consumption in the UK is 150l/p/d per capita consumption.

By 2030, the government is committed to reducing per capita water consumption to 130l/p/d per capita consumption, or possibly even 120 l/p/d per capita consumption depending on new technological developments and innovation²

Likely trends without a new Local Plan

Flood Risk

Over the plan period, the climate is likely to continue to change. This is likely to result in hotter, drier summers and milder, wetter winters, with more extreme weather events such as droughts or flooding. Increased storm events may lead to increased flood risk.

The Oxford Flood alleviation scheme is likely to reduce the number of properties at a 1% or higher risk of flooding from 4,500 to 1,800. This is likely to happen without any new policies in the new Local Plan as it is a project which is being led by the Environment Agency.

Water Quality

The River Basin Management Plan for the River Thames outlines some key measures (which need funding secured) that would benefit the river water quality throughout the Local Plan period. These include aspirations to undertake action on the River Cherwell between Banbury and Oxford, involving landowners, BBOWT and community groups. The aims of the project (subject to funding) are to re-naturalise the river corridor, attenuate water flow and provide habitat for fish and invertebrate species. There are also aspirations to undertake a major project to restore degraded ecosystems along the river between the Thames source and Oxford. Again this is an aspirational project should funding become available within the plan period.

The River Basin Management Plans predict improvements in water quality for surface and groundwater bodies at the national and river basin district level. There is limited information that is readily accessible within the River Basin District Management Plans pertaining to locally relevant information such as statistics for Oxford itself. This is because the River Basin Management Plans are separated by catchments which are often not aligned directly with localities. For instance, Oxford sits in both the Cherwell catchment and the Cotswold catchment.

Figure 5.1.9 shows the predicted 2021 ecological and chemical status of surface water bodies in England.

² Future Water – The Government’s water strategy for England (2008)

Figure 5.1.9: Ecological and chemical status of surface water bodies in England

	Ecological Status or Potential				Chemical Status	
	Bad	Poor	Mod	Good or better	Fail	Good
Current	136	765	2,966	812	137	4,542
2021	113	661	2,926	979	136	4,543
Change	-23	-104	-40	167	-1	1

Figure 5.1.10 shows the current and predicted 2021 quantitative and chemical status of groundwater bodies in England.

Figure 5.1.10: Current and predicted 2021 quantitative and chemical status of groundwater bodies in England

	Quantitative Status		Chemical Status	
	Poor	Good	Poor	Good
Current	84	187	128	143
2021	68	203	119	152
Change	-16	16	-9	9

Figure 5.1.11 Current and predicted 2021 ecological and chemical status of surface water bodies in the Thames River Basin District.

Figure 5.1.11: Current and predicted 2021 ecological and chemical status of surface water bodies in the Thames River Basin District

	Ecological Status or Potential				Chemical Status	
	Bad	Poor	Mod	Good or better	Fail	Good
Current	27	112	320	39	5	493
2021	22	109	317	50	5	493
Change	-5	-3	-3	11	0	0

Figure 5.1.12 shows the current and predicted 2021 quantitative and chemical status of groundwater bodies in the Thames River Basin District

Figure 5.1.12 current and predicted 2021 quantitative and chemical status of groundwater bodies in the Thames River Basin District

	Quantitative Status		Chemical Status	
	Poor	Good	Poor	Good
Current	22	25	18	29
2021	19	28	18	29
Change	-3	3	0	0

Water Resources

Water supply in the Thames Valley comes from surface water abstraction (70%) and groundwater abstraction (30%). Within the SWOX water resource area Thames Water predict a dry year critical period from 2020 growing from less than 1MI/ day in 2020 to -32MI/ day in 2040. The dry year critical period is the time in the year when water demand is greatest – it is also known as the “Summer Peak Period”. These changes are principally driven by the impact of climate change on

groundwater sources and therefore reflect a reduction in the amount of water available (known as the deployable output).

The Thames Water Resources Plan 2015-2040 considers that as a result of planned growth in the SWOX area:

- Demand for household water is likely to increase by 250MI/ day
- Demand for non-household water is likely to remain static

Figure 5.1.13 shows the supply demand balance in the SWOX water resources area.

Figure 5.1.14: Supply demand balance in the SWOX water resources area

Water Resource Zone	2011	2015	2020	2025	2030	2035	2040
Swindon and Oxfordshire	37.34	27.08	- 0.14	-12.05	- 21.30	- 26.70	- 32.66

Potential implications of these trends are that either strategic infrastructure could be required in order to meet the deficit, or demand could be reduce through planning policies that require tighter water efficiency standards (e.g., 110 litres per person per day as described in Part G of the Building Regulations 2010, or a combination of these and other demand reduction measures.

Without new policies in the new Local Plan, water demand will continue to rise as projected by Thames Water above. This could result in an increased need for strategic infrastructure to support development within the SWOX area, for instance a new reservoir.

Sustainability/Plan Issues

- There is likely to be increased pressure to locate development in areas of a higher risk of flooding; increasing levels of development may have an adverse impact on water quality due to increased levels of run-off.
- Climate change is likely to result in increased storm events and increased risk of flooding.
- Increased demand for water will put pressure on water resources so a focus on water efficiency measures is required.