Oxford City Council

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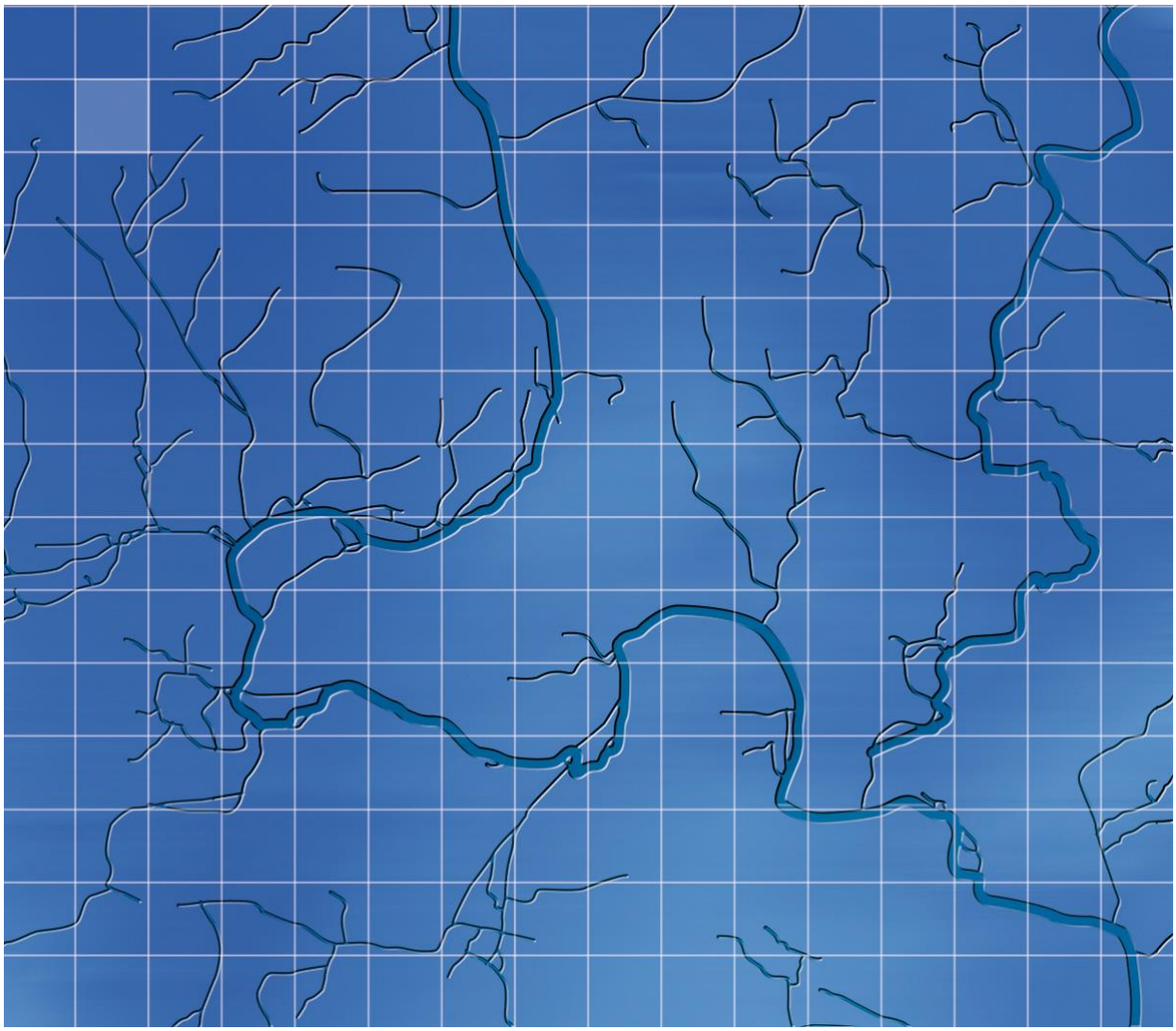
Oxford City Council Water Cycle Addendum



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For and on behalf of Wallingford HydroSolutions Ltd.

The WHS Quality & Environmental Management system is certified as meeting the requirements of ISO 9001:2015 and ISO 14001:2015 providing environmental consultancy (including monitoring and surveying), the development of hydrological software and associated training.

Registered Office Stables 4, Howbery Business Park, Wallingford, OX10 8BA
www.hydrosolutions.co.uk

Contents

1 Introduction 1
2 Methodology 2
2.1 Background 2
2.2 Data Sources 3
2.3 Headroom Assessment 3
2.4 Water Quality Modelling 4
3 Future Development 6
3.1 Oxford City 6
3.2 Cherwell District 6
3.3 South Oxfordshire and the Vale of White Horse 6
4.1 Results 8
4.2 Proposed STW Upgrades 9
5 Water Quality Assessment 10
5.1 Introduction 10
5.2 Baseline Model Results 10
5.3 Post-Development Model Results 11
5.4 Asset Management Period 8 Review 13
5.5 Summary 14
6 Conclusions & Recommendations 16

1 Introduction

Wallingford HydroSolutions (WHS) has been commissioned by Oxford City Council to produce an addendum to the Phase 1 Water Cycle Study (WCS) to summarise the data sources, methods, findings and limitations of the draft Cherwell District Phase 2 WCS[1] for the Oxford (Sandford) Sewage Treatment Works (referred to herein as Oxford STW).

This follows on from comments raised by the Environment Agency (EA) during regulation 18 consultation on Oxford City's phase 1 WCS. In these comments they raised concerns regarding the Dry Weather Flow (DWF) capacity at the Oxford STW and the potential water quality impacts of future growth.

As part of their phase 2 WCS Cherwell District council undertook a headroom assessment for Oxford STW, evaluating future changes in Q80 and Q90 flows resulting from growth against the current permitted DWF. The study also included an assessment of the water quality impacts resulting from growth in the context of current permitted limits and future technology. The growth scenarios assessed in both cases considered development in Oxford's Local Plan 2045, as well as growth from neighbouring authorities that also drain to Oxford STW.

Following on from the Regulation 18 consultation, this addendum brings together the findings of the Cherwell study with a specific focus on the proposals of the Oxford Local Plan. The study is considered appropriate in addressing the EA's concerns due to its recency (September 2025) and the quantum of development considered.

[1] Cherwell District Council (2025) *Cherwell District Water Cycle Study Detailed Report*

2 Methodology

2.1 Background

The catchment for the Oxford STW drains large areas of Oxford City as well as land within the districts of Cherwell, South Oxfordshire, and the Vale of White Horse (see Figure 1). As sites were proposed within the Oxford STW catchment in the Cherwell District Local Plan (2042), Oxford STW was one of five STWs selected for headroom assessments and water quality modelling as part of the Phase 2 Water Cycle Study. The results of these assessments showed how the development proposed within the districts' local plans could affect water quality, thereby informing the steps to be put in place by Thames Water, the EA, and the local district councils to enable development to proceed sustainably without compromising the environment. Cherwell's local plan period is from 2020 to 2042; this differs from the latest Oxford Local Plan which covers the years 2025 to 2045. However, the assessment remains appropriate for evaluating the likely water quality impacts associated with the Oxford plan, firstly, because it focused on the remaining years in the plan period (2025-2042) and secondly because it adopted precautionary assumptions regarding future development which cover the full housing provision being planned for in the Oxford Local Plan to 2045 (see section 3).

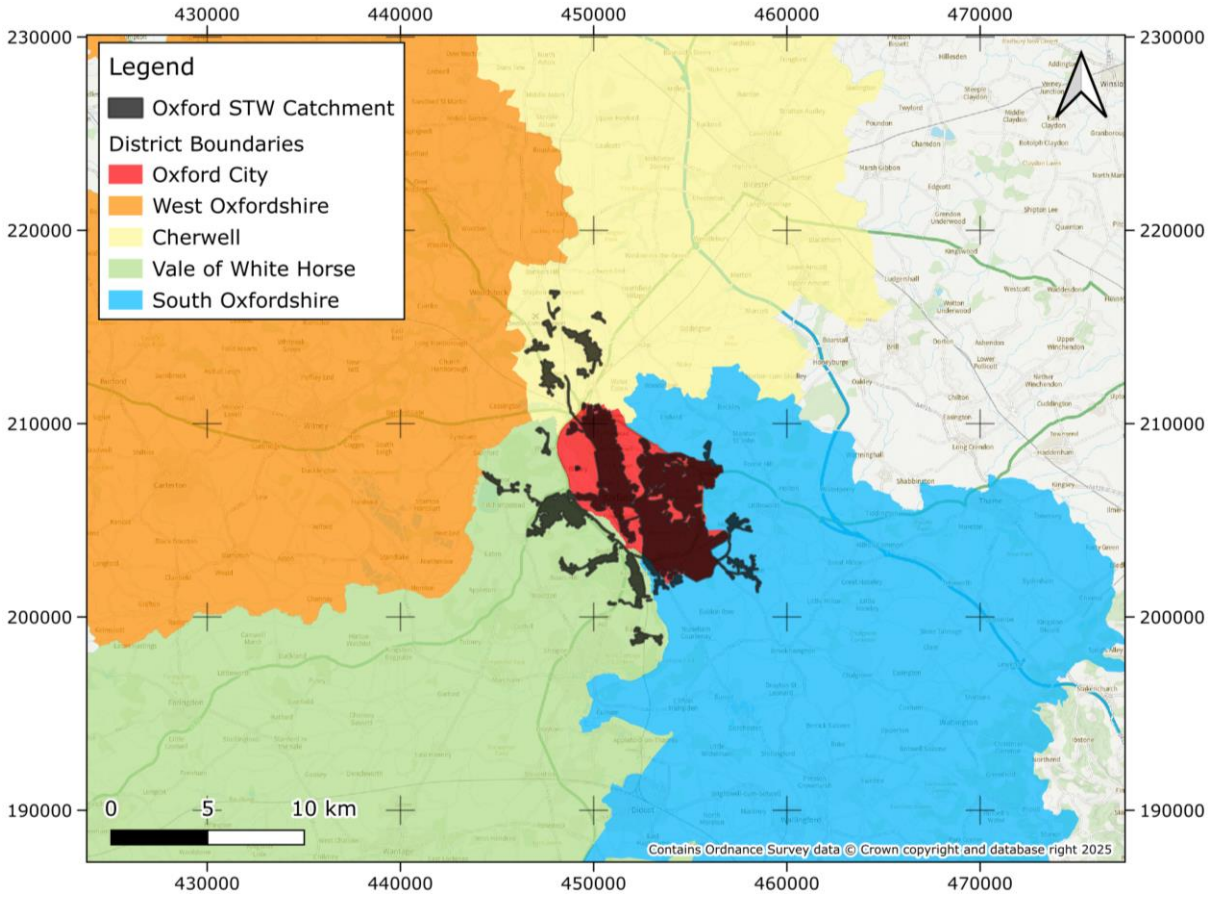

Figure 1 - Oxford STW Catchment

2.2 Data Sources

The primary data sources used within the Cherwell District Phase 2 WCS to assess the impact of proposed development on the Oxford STW include:

- Measured daily flow data supplied by Thames Water for the years 2023-2024, used to estimate Q80 and Q90 flows and estimate current headroom.
- Oxford STW catchment extent provided by Thames Water.
- Development allocations and estimates of windfall development within the districts of Cherwell, Oxford City, South Oxfordshire, and the Vale of White Horse.
- Thames Water's 2024 Water Resource Management Plan (WRMP)[2]
- The current discharge permit for the Oxford STW provided by the EA.
- The EA's SIMCAT model for the River Thames to undertake water quality modelling.
- EA proposed technically achievable limits (TALs).

2.3 Headroom Assessment

The EA regulates sewage discharges from STWs through Environmental Permits covering both treated effluent and untreated discharges from combined sewer overflows (CSOs). Permitted discharge rates are based on DWF, a statistic set by the EA. DWF is used to regulate effluent discharges, inform STW design, estimate base flow in sewerage modelling, and determine the Flow to Full Treatment (FFT). DWF is typically set at the Q80 flow, while the Q90 flow is also monitored for compliance. As Q90 is lower, it provides greater confidence that exceedances are due to operational issues rather than rainfall. Both were considered in the headroom assessments undertaken by Cherwell district council.

To complete the headroom assessment a baseline DWF was first set using measured data provided by Thames Water. Q80 and Q90 scenarios were assessed, using the 80th and 90th percentile annual exceedance flow values respectively (for 2023-2024) as the baseline DWF. Following this, the proposed development allocations (or total number of dwellings) located within the Oxford STW catchment were identified for the Cherwell District, Oxford City, South Oxfordshire, and the Vale of White Horse.

The future DWF was calculated by estimating the expected increase in flows from future development across the plan period. This considered both household consumption and consumption from employment land, assuming that 100% of the water used is returned to the sewer. In reality this is unlikely to be the case but guarantees that a precautionary approach was taken. There was still some uncertainty regarding development trajectories in Cherwell district, therefore a linear growth rate was assumed across the plan period (2020-2042).

Household consumption was calculated using the following equation:

$$\textit{Household Consumption} = \textit{Dwellings} \times \textit{Occupancy Rate} \times \textit{Per Capita Consumption}$$

For residential dwellings an occupancy rate of 2.429 people per house (p/h) and a per-capita consumption of 137.72 litres per day (l/p/d) were adopted. These values are based on the projected rates for the Swindon and Oxfordshire (SWOX) water resource zone (between 2024-2042) used in Thames Water's latest WRMP. This per capita rate only reflects water efficiency measures from AMP7

[2] Thames Water (2024) *Water Resource Management Plan 2024* https://www.thameswater.co.uk/about-us/regulation/water-resources

(2020–2025). Measures planned for AMP8 (2025–2030) and beyond are not included, meaning consumption estimates are precautionary and could reduce further as additional measures are implemented.

Employment consumption was calculated using the equation below. It was subject to greater uncertainty due to the range of potential employment uses.

Employment Consumption = Employment Area (ha) × Employees per Hectare × Per Capita Consumption

Within the sites brought forward within Cherwell District, the potential number of employees each site could support was provided. Where this was not provided for the other districts, the average number of employees per hectare across the Cherwell District local plan sites (250 employees per hectare) was adopted. A per-capita consumption rate of 50 l/p/d was used for employment land based on estimates made by South Staffs Water for office buildings[3] which is expected to make up the majority of the employment land in Oxfordshire. No equivalent rate is provided in Thames Water's WRMP. This consumption rate is higher than benchmark figures stated by Waterwise[4] of 15 l/p/d and is considered precautionary.

2.4 Water Quality Modelling

The EA's SIMCAT model for the River Thames was used to assess the potential water quality impacts from future development. SIMCAT (Simulation of Catchments) is the EA's water quality river modelling software and is a crucial tool for reviewing discharge permits and quantifying the point and diffuse pollutant loads within receiving watercourses.

The water quality modelling undertaken was used to assess the following criteria which tie into the requirements of the Water Framework Directive (WFD):

- Could the development cause a greater than 10% deterioration in water quality?
- Could the development cause a deterioration in WFD status for any element assessed?
- Could the development alone prevent the receiving watercourse from reaching Good Ecological Status (GES) when considering technically achievable limits (TAL)?

The water quality elements assessed included the overall WFD status of the waterbody and the WFD status for Biochemical Oxygen Demand (BOD), ammonia, orthophosphate and total phosphorous.

Initially, the Thames SIMCAT model was reviewed and ran using SIMCAT v15.7 and the default flows to confirm it was fit for purpose. The SIMCAT model used included all Asset Management Period 7 (AMP7) schemes. This refers to water quality measures and effluent limits set at STWs during the period 2020-2025. The model did not include any AMP8 schemes proposed between 2025-2030.

The existing effluent quality values at the Oxford STW (contained in the SIMCAT data files provided by the EA) were then compared to the technically achievable limits (TAL) proposed by the EA. The EA's TALs represent levels consistently achievable using standard wastewater treatment processes. These values were used to model the potential capacity of STWs, regardless of existing treatment technology or the size of the works.

[3] South Staffordshire Water (2024) *Water Use in Your Business* https://www.south-staffs-water.co.uk/media/1509/waterusebusiness.pdf

[4] Waterwise (2023) *The Waterwise Guide for Offices* https://www.waterwise.org.uk/wp-content/uploads/2023/10/Waterwise-Guide-for-Offices-AND-POSTERS-FINAL.pdf

- Ammonia (95%-ile): 1mg/l
- BOD (95%-ile): 5mg/l
- Phosphorous (mean): 0.25mg/l

Following this, the baseline SIMCAT model was updated to include the averaged 2023/2024 Q80 values provided by Thames Water and ran with and without TALs applied. The impacts of applying TALs on water quality and the WFD status of receiving watercourses was then assessed.

The model was subsequently run for a post-development scenario which considered increased flows due to development within the Oxford STW catchment 2042. The model was once again run considering current technology and TALs. Including the baseline runs, four sets of results were generated.

The results for ammonia, BOD, orthophosphate and total phosphorous for the baseline runs were compared to the post-development results. The results were reviewed considering the environmental quality standards listed in Table 1. The ammonia and BOD values are universal standards that relate to the 90th percentile, whereas the orthophosphate values are specific to the WFD waterbody Oxford STW drains to (Northfield Brook (Source to Thames) at Sandford). The standards were used to determine the impacts on WFD status and individual WFD elements.

Table 1 - Environmental Quality Standards for Oxford STW

Element	High	Good	Moderate	Poor
Ammonia (90th Percentile, mg/l)	0.30	0.60	1.10	2.50
BOD (90th Percentile, mg/l)	4.00	5.00	6.50	9.00
Orthophosphate (Mean, mg/l)	0.044	0.080	0.195	1.055

3 Future Development

3.1 Oxford City

Oxford City Council provided the number of dwellings expected to be delivered in the city for the remaining plan period (2025-2042) as 10,836 dwellings. This figure includes the local plan allocations, adopted local plan allocations and an allowance for windfall development. Whilst this figure does not include the final 3-years of the Oxford Local Plan (2043-2045), importantly it does include additional 10% non-implementation buffer which is added to account for additional capacity becoming available. At the time of writing, Oxford City Council have confirmed that the number of dwellings applied in the Cherwell study is an upper bound estimate of future development in the city up to 2045. Specifically, the Local Plan 2045's Regulation 19 consultation provides a housing requirement of 9,267 homes for 2025-2045, well within the original 10,836 dwelling number that informed the Cherwell Level 2 study..

Oxford City Council also provided a range (8,847-11,417) for the number of jobs estimated to be delivered in the city to 2042. The average of this range (9,952 jobs) was used as the number of employees for the assessment. This value misses the last 3-years of the plan and could be considered an underestimate of potential non-household consumption. However, it should be noted that the consumption from households makes up a far greater proportion of future demand.

3.2 Cherwell District

No new local plan review sites from Cherwell District Council were proposed to drain to Oxford STW, however several existing strategic site allocations which have been "carried forward" from the previous adopted local plan are yet to be built out and will contribute additional flows to the STW. Therefore, these were included within the future development figures. There is the possibility that further allocations may come forward between 2042 and 2045, however the quantum of development is likely to be limited given that only a small part of Cherwell district falls within the Oxford STW catchment and the limited time available (i.e. 3 years) for large developments to be established.

The Cherwell Local Plan Review 2042 estimates that there will be 1,400 windfall dwellings across the district. It also identifies a total housing supply of 23,187 dwellings from all other sources. To estimate how many windfall dwellings fall within each STW catchment, the district-wide windfall total was apportioned based on the share of total planned dwellings in each catchment compared to the district-wide housing supply. This method was considered conservative because the windfall total covers the full plan period (2020–2042), while the assessment only considers the remaining period (2025–2042). It also covers a greater number of years (22 years) than the Oxford local plan (20 years).

3.3 South Oxfordshire and the Vale of White Horse

South Oxfordshire and the Vale of White Horse district councils are undertaking a joint local plan for 2025-2041. The councils provided the development allocations earmarked in their joint local plan which would drain to Oxford STW. Across the allocations there would be 6016 dwellings and 10 hectares of employment land coming forward across the plan period. Note, the dwelling numbers are up to 2041 and some of the sites will be expanded further beyond this date. To account for the additional year in Cherwell district council's local plan, a further 376 dwellings and 0.625 hectares of employment land is added; these equate to the figures per annum for 2025-2041.

The councils have also provided past windfall rates per annum (30.5 dwellings) for the Oxford STW catchment. This has been multiplied by the number of years (17-years) in Cherwell's plan period (2025-2042).

There is potential for additional allocations and windfall development to come forward between 2042 and 2045. The Oxford STW catchment extends more extensively within these districts than within Cherwell District, meaning that the scale of development occurring in the period immediately following the plan period could be greater.

This represents a limitation when applying Cherwell District's assessment to Oxford's Local Plan to 2045. However, this is expected to be balanced by the precautionary assumptions applied to development in other areas, including Oxford City.

4 Headroom Assessment

4.1 Results

The Oxford STW outfalls to the Pottery Stream at SP 5439 0223. It has a permitted DWF of 50,985 m^3/day.

When considering development across all districts, additional development draining to the STW would cause both the Q80 and Q90 flows to exceed the permitted DWF during the plan period (see Figure 2 and Table 2). Assuming linear growth, this occurs in 2026 for the Q80 flow and in 2031 for the Q90 flow. By the end of Cherwell's plan period (2042) the projected Q80 and Q90 are 15.8% and 10.7% higher than the permitted DWF respectively. Assuming growth continues at the same rate up to 2045, the projected Q80 and Q90 will be 18.5 and 15.6% higher than the permitted DWF respectively.

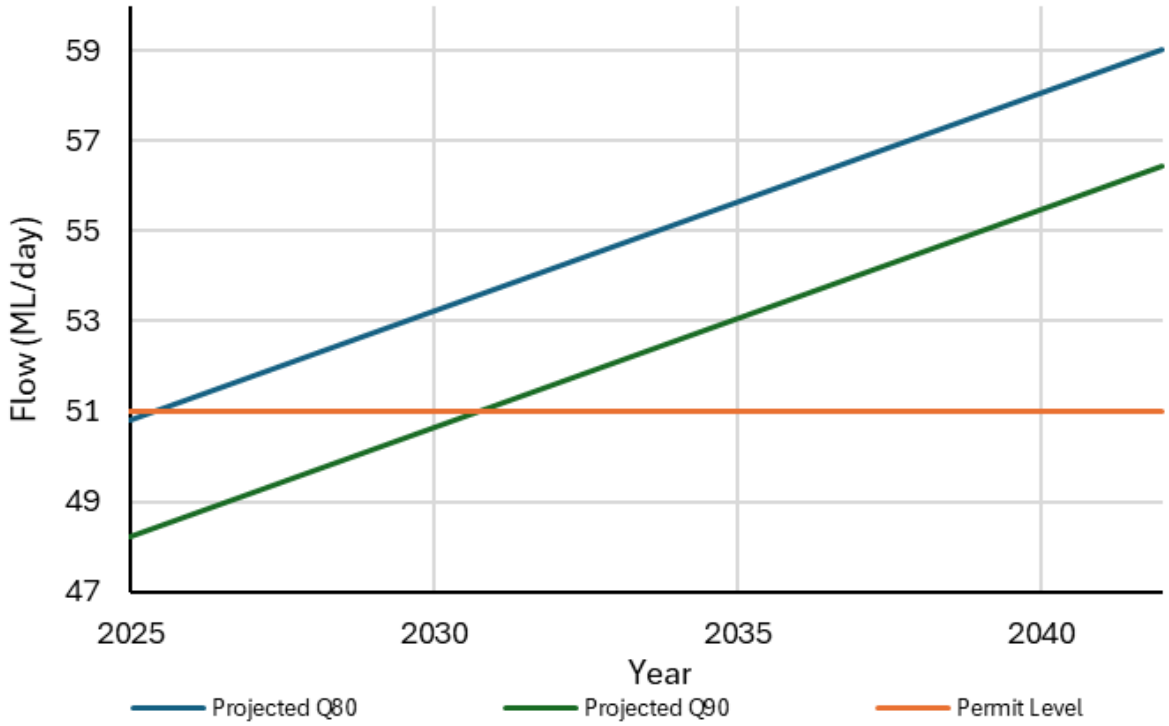

Figure 2 - Oxford STW DWF Headroom Forecast

Table 2 - Summary of Headroom Assessments (2025-2042)

Scenario	2023-2024 Average (ML/day)	Future Projection (ML/day)	Permitted DWF (ML/day)	Headroom Available (%)
Q80	50817	59067	50985	-15.8
Q90	48229	57637	50985	-10.7

The headroom assessment suggests the Q80 at Oxford STW is currently close to its permit level. Whilst the Q90 flow monitored for compliance purposes has substantially more headroom, both flows are set to exceed the permit level early in the plan period when considering the full quantum of development.

4.2 Proposed STW Upgrades

In recent years the Oxford STW has faced a number of issues. A Compliance Assessment Report (CAR) form was issued to Thames Water in November 2021. This outlined a number of significant and serious breaches of the Environmental Permit. The STW has also been in a position of having to 'catch up' because its FFT was considered too small for the population it serves. A plan was needed to deliver outstanding AMP7 (2020-2025) obligations, show evidence of coming back into compliance, and meet the demands of development outlined in local plans that propose development within the Oxford STW catchment.

Some progress has been made in this regard. Thames Water has a scheme underway which is expected to be completed by 2027. The first phase of this scheme has been delivered and includes an increase in the inlet capacity to receive a greater daily flow. Thames Water has stated that the increase in capacity provides the additional capacity required to treat domestic sewage from both the projected increase in non-residential development and the projected increase in the number of new houses driven by Local Plan trajectories provided by Oxford City Council, Cherwell District Council, and South Oxfordshire and Vale of White Horse District Councils, which according to Thames Water totals 9,534 new domestic properties between 2025 – 2031, and 10,902 between 2032-2041. Further phases will look to build resilience at the STW, including further flow improvements and the introduction of a new treatment process later this year. The improvements up to 2027 should collectively increase the headroom available, reduce spills to the surrounding water environment and improve effluent quality.

Subsequent upgrades are also set to be delivered for 2031. These are focused on improving the quality of the final effluent further. Alongside this Thames Water are also finalising plans for a major upgrade at Oxford STW which will provide a significant increase in treatment capacity, larger storm tanks, and a higher quality of treated effluent discharging to the river. This work is planned to be delivered during AMP9 (2030-2035).

The future upgrades at Oxford STW should allow for the developments proposed to be accommodated at the STW. However, it should be noted that many of the upgrades are yet to be fully realised, and it is unclear what the changes in discharge volume will be at the STW. Development, particularly early in the plan period, needs to take this into account to ensure it is phased correctly to avoid any exceedance in infrastructural capacity and/or environmental capacity. It is likely that a new DWF permit will be required along with further upgrades to the STW later into the plan period. Application for the permits should occur well in advance of developments being built out.

In its response to Ofwat's PR24 draft determinations[5] [6] Thames Water has committed to achieving 100% compliance with all permits to discharge wastewater in AMP8. However, it has stated that this will be challenging due to climate change and the inclusion of DWF assessment under AMP8. Currently, EA assessment of compliance with DWF permit conditions at each STW is ad-hoc. The EA has stated that it will be formalising and standardising its DWF compliance assessment for application in AMP8.

[5] Ofwat (2024) *PR24 draft determinations: Sector summary* https://www.ofwat.gov.uk/publication/pr24-draft-determinations-sector-summary/

[6] Thames Water (2024) *TMS-DD-039: Thames Water PR24 DD response – Outcomes* https://www.thameswater.co.uk/media-library/home/about-us/regulation/our-five-year-plan/draft-determination-2024/thematic-chapters/TMS-DD-039-Thames-Water-PR24-DD-response-Outcomes.pdf

5 Water Quality Assessment

5.1 Introduction

An increase in the discharge of effluent from STWs due to development can lead to a negative impact on the water quality of the receiving watercourse. Under the WFD, a watercourse should not deteriorate from its current WFD status either as an overall watercourse or for each of the individual elements assessed. Table 3 gives a description of how the WFD defines each status. The elements assessed within the Cherwell District Phase 2 WCS included:

Ammonia- Ammonia is an inorganic chemical compound of nitrogen and hydrogen with the formula NH_3. It is used as a fertilizer, cleaning product and in the production of plastics. Sewerage is also a source of ammonia.

Biochemical Oxygen Demand (BOD)- BOD is a measure of how much oxygen is used to break down organic matter in water. It's an important indicator of water quality and organic pollution. A high BOD indicates that there is more organic pollution in the water. BOD is used to measure the level of organic pollution in wastewater before it's released to a watercourse.

Total Phosphorous- Total phosphorus is the sum of all phosphorus in a sample, including dissolved and particulate forms. It's a key measurement used to assess water quality and wastewater treatment. Sewage, fertilizer and urban runoff are key human-made sources.

Orthophosphate- Orthophosphate is the most readily used form of phosphorous. It is a phosphorus compound commonly used in water treatment of lead and copper. Sewage, fertilizer and urban runoff are key sources.

Table 3 - Definition of status in Water Framework Directive

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 because 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 because 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 because 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 because 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.

The impact of development on these elements has been determined by undertaking water quality modelling using the EA's SIMCAT of the Thames catchment.

5.2 Baseline Model Results

The SIMCAT model was run for a new baseline considering the averaged 2023-2024 Q80 values provided by Thames Water. The existing flow in SIMCAT for the Oxford STW was 54.380 ML/day whereas the averaged 2023-2024 Q80 was 50.817 ML/day, a decrease of 3.563 ML/day.

The model was run first with current technology and then with TALs applied. It should be noted that total phosphorus and orthophosphate levels are not linked within the model, and so orthophosphate is insensitive to the application of TAL. However, if total phosphorous within STW effluent is improved it should also lead to a lowering of orthophosphate as it is a form of readily available phosphorus which makes up a proportion of the total phosphorus value.

To obtain an estimate of the impact of the TALs on orthophosphate concentrations and WFD status at each STW (noting that total phosphorous has no defined standard in the WFD), the ratio of orthophosphate to total phosphorous in the baseline runs was estimated. It was then multiplied by the total phosphorous estimated following the application of TALs. It should be noted that the relationship between total phosphorous and orthophosphate is complex, so the orthophosphate values derived using this method are subject to greater uncertainty.

The results for the Oxford STW are presented in Table 4 with the colours showing the WFD status. There are no WFD Environmental Quality Standards for total phosphorous, hence its values are not colour coded. The baseline results without TALs applied, indicates the receiving waterbody for the Oxford STW has a poor WFD status for Ammonia and Orthophosphate and a Moderate status for BOD. When applying TALs, the baseline water quality improves for all four indicators, with WFD status improving for BOD (Moderate to Good) and Orthophosphate (Poor to Moderate).

Table 4 - Comparison of Baseline (Current) and Baseline (TALs applied) water quality results

Parameter		Baseline Water Quality (mg/l)	Baseline Water Quality, with TAL applied (mg/l)
Ammonia	(90-percentile)	1.420	1.060
BOD	(90-percentile)	5.380	4.890
Orthophosphate	(Mean)	0.308	0.162
Total Phosphorous	(Mean)	0.489	0.257

WFD Status
High
Good
Moderate
Poor
Bad

5.3 Post-Development Model Results

5.3.1 Current Technology

The SIMCAT model was run considering future development (up to 2042) within the STW catchment area. The model runs applied the projected increased Q80 flow as estimated within the headroom assessment (Table 2).

The model was run first with current technology. Table 5 shows the results for Oxford STW with the colours showing the WFD status. The post-development model results show small changes in baseline water quality for all four indicators, BOD, Orthophosphate, and Total Phosphorus all show slight increases in concentrations, however there are no changes in WFD status.

Table 5 - Comparison of Baseline and Post-Development water quality results

Parameter		Baseline Water Quality (mg/l)	Post-Development Water Quality (mg/l)
Ammonia	(90-percentile)	1.420	1.400
BOD	(90-percentile)	5.380	5.450
Orthophosphate	(Mean)	0.308	0.313
Total Phosphorous	(Mean)	0.489	0.492

WFD Status
High
Good
Moderate
Poor
Bad

5.3.2 TALs Applied

The model was subsequently run with the post-development flows applying the agreed TALs.

Table 6 shows the changes in the relevant parameters between the baseline run with current technology, the post-development run with current technology and the post development run with TALs applied. The colours show the WFD status. The results show that applying TALs improves water quality across all four indicators relative to the baseline, with a WFD class improvement for Ammonia, BOD, and Orthophosphate.

Table 6 - Comparison of Post-Development (Current) and Post-Development (TALs applied) water quality results

Parameter		Baseline Water Quality (mg/l)	Post-Development Water Quality (mg/l)	Post-Dev Water Quality TALs applied (mg/l)
Ammonia	(90-percentile)	1.420	1.400	1.050
BOD	(90-percentile)	5.380	5.450	4.910
Orthophosphate	(Mean)	0.308	0.313	0.162
Total Phosphorous	(Mean)	0.489	0.492	0.257

5.3.3 Water Quality Deterioration

Following the generation of the model results, the percentage change in the four parameters (ammonia, BOD, orthophosphate and total phosphorous) assessed was estimated to determine if development caused a greater than 10% deterioration in water quality. This has been estimated with current technology and with TALs applied. A summary of these results are shown in Table 7 with values highlighted in green denoting an improvement relative to the baseline. The results indicate that there would be no water quality deteriorations of 10% or greater due to future development. Furthermore, it highlights that applying TALs would significantly improve water quality, as shown by the improved WFD statuses indicated in Table 6.

Table 7 - Percentage change in Baseline (BSC) and Post-Development (PDP) water quality results

Parameter	BSC-PDP % change	BSC-PDP with TALs applied % change
Ammonia	**-1.41**	**-26.06**
BOD	1.30	**-8.74**
Orthophosphate	1.62	**-47.40**
Total phosphorus	0.61	**-47.44**

5.4 Asset Management Period 8 Review

The draft Cherwell study does not include future AMP8 schemes, including those planned at Oxford STW. The EA have confirmed that the SIMCAT model supplied does include all AMP7 schemes. In this regard the baseline and post-development runs without TAL only include the impact of AMP7 schemes on effluent quality. The runs with TALs apply the limits agreed with the EA.

The PR24 Water Industry National Environment Programme[7] has been reviewed to determine the proposed AMP8 schemes and the likely changes in the permit limits at Oxford STW which will follow. Table 8 compares the limits for Ammonia, BOD and total phosphorous between AMP7, AMP8 and the TALs agreed with the EA.

Table 8 – Comparison of emission limits

Element	AMP7	AMP8	TALs
Ammonia (95th Percentile, mg/l)	3.00	1.00	1.00
BOD (95th Percentile, mg/l)	10.00	10.00	5.00
Phosphorous (Mean, mg/l)	1.00	0.25	0.25

As shown in Table 8 the AMP8 limits match the TALs with the exception of BOD. The baseline and post-development runs with TALs applied therefore provide a good proxy of the impact of AMP8 limits on Ammonia and Phosphorus concentrations. The baseline results with TAL applied reflect the water quality that needs to be protected with the introduction of AMP8 schemes and the post-development results show the future impact of development when accounting for AMP8 schemes. Table 9 compares these two sets of results. Negligible changes are seen in the parameters assessed with the WFD status remaining unchanged in all cases. Note, the results for BOD in the table are those without TALs. These are considered a better proxy for the impacts of AMP8 on this parameter given that the AMP7 and AMP8 limits for BOD are the same at 10 mg/l.

[7] DEFRA (2025) PR24 Water Industry National Environment Programme
https://environment.data.gov.uk/dataset/39b11ea0-3cfa-4cbb-b3a1-b5950019f169

Table 9 – Comparison of emission limits

Parameter		Baseline Water Quality, with TAL applied (mg/l)	Post-Dev Water Quality TALs applied (mg/l)
Ammonia	(90-percentile)	1.060	1.050
BOD	(90-percentile)	5.380*	5.450*
Orthophosphate	(Mean)	0.162	0.162
Total Phosphorous	(Mean)	0.257	0.257

*without TALs applied

5.5 Summary

The aims of the WFD are to enhance the status and prevent further deterioration of surface water bodies, groundwater bodies, and their ecosystem. The criteria used to inform the assessment are displayed below including a summary of the modelling results at Oxford STW in relation to each criterion.

Could the development cause a greater than 10% deterioration in water quality?

- Predicted deterioration is less than 10%.

Could the development cause a deterioration in WFD status of any element assessed?

- No deterioration in WFD status is predicted.

Could the development alone prevent the receiving watercourse from reaching Good Ecological Status (GES) when considering TALs?

- The Oxford STW site currently has Moderate status for BOD, with Poor status for Ammonia and Orthophosphate. Despite minor deteriorations in some parameters (without TALs applied) future development causes no WFD status changes.
- The application of TALs improves all parameters relative to the baseline values (without TALs), with BOD moving to Good Status and Ammonia and Orthophosphate moving to Moderate status.
- If the baseline results with TALs are considered there are negligible changes in all parameters with WFD status remaining unchanged in all cases.

Overall, the results indicate that development in Oxford and in neighbouring authorities is not considered a barrier on its own preventing the receiving water body from achieving Good Status. However, as the application of TALs does not result in Good Status for either Ammonia or Orthophosphate, it indicates that additional infrastructure upgrades will be required or that there are other factors preventing the waterbody from achieving Good Status. Therefore, ensuring development does not exacerbate existing water quality issues should be a priority. This may include phasing development to allow upgrades to wastewater infrastructure and ensuring sustainable design principles are followed.

Note, the assessment assumes that all local plans, previously adopted local plans, undeveloped sites with planning permission, and windfall sites will be built out. It does not take into account any planned or longer-term increases in treatment capacity at the Oxford STW, which could allow it to store effluent for longer and maintain existing discharge volumes. The TALs applied are also based on present day technology and technology may improve over the plan period. In this regard the results are considered precautionary.

It is important to mention that other pollution sources (e.g. agriculture, urbanisation and industry) are additional contributing reasons for the WFD waterbody not achieving Good Status. Therefore, reducing the contribution of other pollution sources is a key priority to safeguard environmental capacity. The measures to achieve this should be set out by the EA through liaison with other stakeholders in the Thames River Basin Management Plan[8].

[8] Thames Water (2022) *Thames river basin district management plan* https://www.gov.uk/guidance/thames-river-basin-district-river-basin-management-plan-updated-2022

6 Conclusions & Recommendations

Summary

This addendum summarises the Cherwell phase 2 WCS findings at Oxford STW. These are considered relevant to the Oxford Local Plan 2045. Firstly, due to the recent completion of the Cherwell study (September 2025). Secondly, because the scenarios tested include development from Oxford's Local Plan 2045 and in neighbouring authorities draining to Oxford STW.

As part of the Phase 2 WCS, a headroom assessment and water quality modelling was undertaken for Oxford STW.

The headroom assessment indicates that Oxford STW is close to its permitted capacity and could exceed headroom without upgrades. However, a Thames Water scheme due for completion by 2027, and further upgrades planned in AMP9 (2030–2035), are expected to provide sufficient capacity to accommodate planned growth.

The water quality modelling results show that development in isolation, should not prevent the receiving water body at Oxford STW from achieving Good Status. However, the phasing of development is important to allow for STW upgrades to take place and safeguard water quality.

Headroom Assessment

The results of the headroom assessment suggest the Q80 at Oxford STW is currently close to its permit level. Whilst the Q90 flow monitored for compliance purposes has substantially more headroom, both flows are set to exceed the permit level early in the plan period when considering the full quantum of development. However, upgrades are scheduled throughout the plan period at Oxford STW, including a scheme expected to be completed by 2027.

To help protect water quality and to support the timely delivery of necessary infrastructure upgrades, the following actions and recommendations are provided:

- Oxford City Council should consider STW capacity when phasing development in liaison with Thames Water. This is particularly important for larger scale developments (>500 dwellings).
- Oxford City Council should provide Annual Monitoring Reports to Thames Water detailing projected housing growth and larger scale developments coming forward.
- Thames Water will need to invest in the Oxford STW to ensure compliance to 2045. Upgrades have been identified for AMP8 (2025-2030) and AMP9 (2030-2035), however some upgrades planned for AMP7 (2020-2025) are currently outstanding.
- Thames Water will need to assess growth demands as part of their wastewater asset planning activities and feedback to Oxford City Council if concerns arise.
- The EA will need to consider development against infrastructural and environmental capacity in setting future environmental permits which allow development to progress sustainably without presenting a risk to the water environment.

Water Quality Assessment

The results of the water quality assessment at Oxford STW indicate that the predicted deterioration in water quality due to the proposed development is less than 10% and does not result in the deterioration in the WFD status of any of the elements assessed. The Oxford STW site currently has Moderate status for BOD, with Poor status for Ammonia and Orthophosphate. The application of TALs improves all parameters relative to the baseline values, with BOD moving to Good Status and

Ammonia and Orthophosphate moving to Moderate status. If the baseline results with TALs are considered there are negligible changes in all parameters.

To help protect water quality and to support the timely delivery of necessary infrastructure upgrades, the following actions and recommendations are provided:

- Oxford City Council will need to share their Annual Monitoring Reports and Housing Land Supply Statements detailing projected housing development with Thames Water.
- If it is identified that other pollution sources are contributing reasons for the receiving WFD waterbody not achieving Good Status, the EA and other stakeholders including Oxford City Council should work to ensure measures to reduce their contributions are explored.
- Thames Water will need to assess growth demands as part of their wastewater asset planning activities and feedback to Oxford City Council if concerns arise.
- The EA will need to consider development against infrastructural and environmental capacity in setting future environmental permits which allow development to progress sustainably without presenting a risk to the water environment.