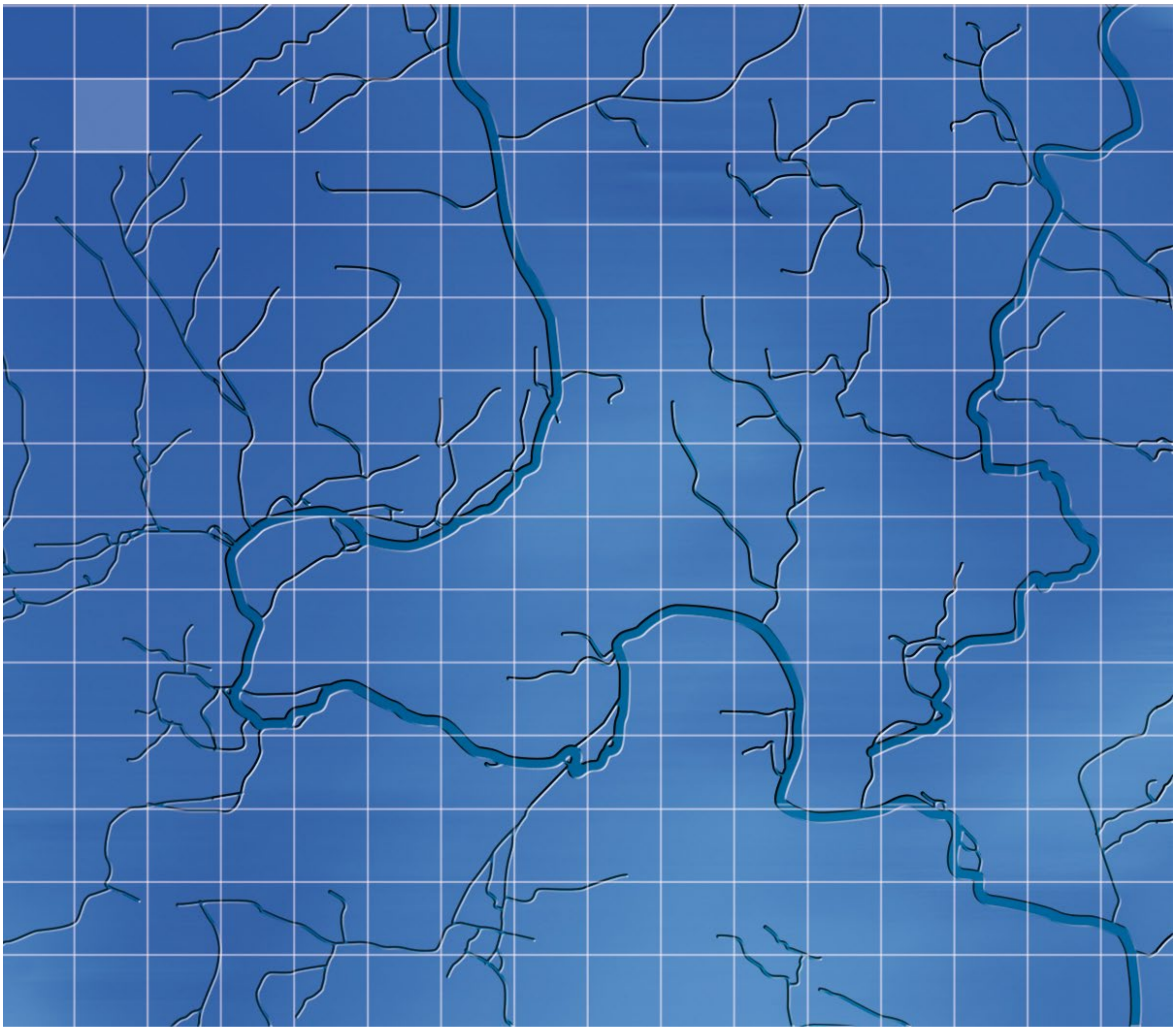
Swindon Borough Council

September 2026

Swindon Borough Council Detailed Water Cycle Study



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Document issue details

WHS10295

Version	Issue date	Issue status	Prepared By	Approved By
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Contents

Glossary

90th Percentile (90^{th}%ile)	The 90th percentile is a value that's greater than 90% of the numbers in a set. It is a useful statistic for measuring performance data and identifying anomalies.
95th Percentile (95^{th}%ile)	The 95th percentile is a value that's greater than 95% of the numbers in a set. It is a useful statistic for measuring performance data and identifying anomalies.
Abstraction licence	Authorisation granted by the Environment Agency to allow the removal of water from a source.
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. Sewage is also a source of ammonia.
Assessment Point (AP)	A significant point on a river, often where two major rivers join or at a gauging station.
Asset Management Period (AMP)	The AMP sets the framework for how water companies manage their assets, deliver services to customers, and invest in infrastructure over a five-year period. The AMP is regulated by Ofwat, the Water Services Regulation Authority in England and Wales. AMP 7 ran from 2020-2025, AMP8 runs from 2025-2030.
Biochemical Oxygen Demand (BOD)	BOD is a measure of how much oxygen is used to break down organic matter in water. It is 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.
Compliance Assessment Report (CAR)	A written report compiled by Environment Agency officers when assessing compliance with an environmental permit. The CAR is used to record the findings of the EA's site inspections, audits and monitoring activities. It also includes reviews of monitoring and other data/reports.
Deployable Output (DO)	The reliable output of an active source, or group of sources, or of a bulk supply of water, which is constrained by: environment; licence, if applicable; pumping plant and/or well/aquifer properties; raw water mains and/or aquifers; transfer and/or output main; treatment; water quality.
Discharge Permit	An environmental permit granted by the Environment Agency to discharge liquid effluent or waste water to a surface water or the groundwater body.
District Metering Area (DMA)	A DMA is a discrete area of the water distribution network that can be isolated by closing valves so that the quantities of water entering and leaving the area can be metered. The volume of water into and out of the DMA is measured by a district meter. The purpose of a DMA is to divide each WRZ into manageable sections to detect and determine the location of burst mains, calculate the level of leakage in each DMA and compare DMAs so that activities can be targeted to where they will have the greatest impact in reducing leakage.

Drainage and Wastewater Plan (DWMP)	Strategic plans where wastewater companies take a company-wide approach to managing their wastewater and drainage assets. DWMPs look at current and future capacity, pressures, and risks to their networks such as climate change and population growth over a 25-year period.
Drought Permit	An authorisation granted by the Environment Agency under drought conditions, which allows for abstraction/impoundment outside the schedule of existing licences on a temporary basis.
Dry Weather Flow (DWF)	DWF is the average daily flow to a WRC during a period without rain. The EA sets limits on the quality and quantity of treated effluent from a WRC so that the WRC do not cause an unacceptable impact on the environment. The flow that may be discharged in dry weather is one of these limits.
Dry Year Annual Average (DYAA)	The annual average value of water demand, deployable output or some other quantity over the course of a dry year.
Dry Year Critical Period (DYCP)	The water demand, deployable output or some other quantity during the time in a dry year when demand is greatest, often termed the peak week. Also commonly known as the summer peak period.
Environment Agency (EA)	The Environment Agency (EA) is a non-departmental public body, established in 1996 and sponsored by the UK government's Department for Environment, Food and Rural Affairs (DEFRA). Their responsibilities include water quality and resources, fisheries, inland river, estuary and harbour navigations, conservation and ecology, regulating major industry and waste, treatment of contaminated land and managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.
Environmental Impact Assessment (EIA)	EIA is a tool used to assess the significant effects of a project or development proposal on the environment.
Flood Zone 1	Areas situated in Flood Zone 1 have a low probability of flooding, with less than a 0.1% probability of river or sea flooding.
Flood Zone 2	Areas situated in Flood Zone 2 have a medium probability of flooding and have an annual probability of river flooding between 1.0% and 0.1% or an annual probability of sea flooding between 0.5% and 0.1%.
Flood Zone 3a	Areas situated in Flood zone 3a have a high probability of flooding, with a 1% or greater annual probability of river flooding or a 0.5% or greater annual probability of sea flooding.
Flood Zone 3b	The functional floodplain. This is where water from rivers or the sea has to flow or be stored in times of flood. Local authorities should identify areas of functional floodplain in their Strategic Flood Risk Assessment.
Flow to Full Treatment (FFT)	A measure of how much wastewater a treatment works must be able to treat at any time. All WRCs are built to be able to deal with a certain amount of wastewater, calculated depending on the area they serve, and many have a requirement in their environmental permit about the FFT level they must work to.
Good Ecological Potential (GEP)	GEP is the ecological quality that can be achieved in the affected water bodies without a significant adverse impact on the benefits provided by the uses or a significant adverse impact on the wider environment.

Groundwater Infiltration	Groundwater infiltration occurs when groundwater finds its way into the underground water and sewerage system. Small leaks, openings, defective joints and cracks are the main causes for infiltration.
Habitat Regulations Assessment (HRA)	A HRA is a process that determines whether development plans could negatively impact Local Plans on a recognised protected European site.
Hands off flow (HoF)	A condition attached to an abstraction license which states that if flow (in the river) falls below the level specified on the license, the abstractor will be required to reduce or stop the abstraction.
Headroom	The difference between the measured DWF and the consented DWF is termed headroom.
Household (HH) Consumption	Water consumed by household customers.
Leakage	Water that leaks from water mains and customer supplies pipes.
Load Standstill	An improvement in the quality of effluent, so that extra pollution load will not result in a deterioration in the water quality of the watercourse.
Monte Carlo Simulation	A Monte Carlo simulation is a way to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It involves repeatedly generating random input values within a defined probability distribution to model a complex system and analysing the range of possible outcomes.
Natural Flood Management (NFM)	NFM involves working with nature to reduce the risk of flooding for communities. It uses various techniques to restore or mimic the natural functions of rivers, floodplains and the wider catchment.
Non-Household (NHH) Consumption	Water consumed by businesses.
Olfactometry	Olfactometry is the process of measuring the concentration and intensity of odour. Olfactometry is often used for monitoring wastewater infrastructure, where controlling odorous emissions is important for environmental and health reasons.
Olfactometry	Olfactometry is the process of measuring the concentration and intensity of odour. Olfactometry is often used for monitoring wastewater infrastructure, where controlling odorous emissions is important for environmental and health reasons.
Orthophosphate	Orthophosphate is a phosphorus compound. It is commonly used for water treatment.
Price Review (PR)	The price determination process undertaken by Ofwat every five years. Each water and sewerage undertaker submits a business plan covering the five-year period for which Ofwat will determine cost and revenue allowances.
Sewage Pumping Stations (SPS)	SPS typically move sewage from lower to higher elevations. The stations pump raw sewage and wastewater into pipes transporting the waste to a WRC or other disposal site.
Sewage Treatment Works (STW)-	Sewage treatment works are plants designed to treat and clean sewage and wastewater before it is released into the environment. Treatment typically consists of three phases termed primary, secondary and tertiary water treatment.

Simulation of Catchments (SIMCAT)	SIMCAT is the EA's stochastic water quality river model. It is a crucial tool for setting and reviewing discharge permits at a catchment scale and to quantify the source apportionment of both point and diffuse pollutant load within the receiving watercourse. Driven by summary statistics of flow and quality, SIMCAT uses Monte Carlo simulation to predict in-river summary statistics for direct comparison with environmental quality standards.
Site of Specific Scientific Interest (SSSI)	A SSSI is a formal conservation designation. Usually, it describes an area that's of particular interest to science due to the rare species of fauna or flora it contains (Biological SSSI) - or important geological or physiological features that may lie in its boundaries (Geological SSSI).
Smarter Business Visit (SBV)	A location-based business programme that helps customers to fit water-saving devices, identify and potentially fix leaking toilets and fit free urinal controls if practical.
Source Protection Zones (SPZs)	SPZs are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.
Special Area of Conservation (SAC)	A site designated as being of special conservation value under the European Habitats Directive. It protects one or more special habitats and/or species – terrestrial or marine.
Storm Overflows	Many parts of England have a combined sewage system with clean rainwater and wastewater conveyed in the same pipe. During heavy rainfall the capacity of these pipes can be exceeded, which means possible backing up of the system and inundation of Sewerage Treatment Works (STWs) downstream. Storm overflows often also termed Combined Sewer Overflows (CSOs) were developed as overflow valves to reduce the risk of sewage backing up during heavy rainfall. They are a necessary part of the sewer system but where they regularly spill it can indicate underlying issues with the sewer system's condition and capacity.
Storm Overflow Assessment Framework (SOAF)	The SOAF written by the Environment Agency sets out how sewer systems comply with current statutory requirements. The framework shows that any overflow reported to exceed the spill frequency thresholds set out in this document should be investigated.
Strategic Overview of Long-term Assets and Resources (SOLAR)-	SOLAR is what Thames Water use to feed into their strategic upgrades plan, rather than waiting on approval of a site prior to undertaking modelling to understand what upgrades may be required.
Sustainable Drainage Systems (SuDS)	SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to transport (convey) surface water and slow runoff down (attenuate) before it enters watercourses. They provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).
Technically Achievable Limits (TALs)	Technically Achievable Limits (TALs) define the lowest numeric concentration of a given pollutant that conventional wastewater treatment technologies can reliably achieve. In the UK, TALs are central to environmental permits and nutrient neutrality regulations.

Total Phosphorous	Total phosphorus (TP) is the sum of all phosphorus in a sample, including dissolved and particulate forms. I' is a key measurement used to assess water quality and wastewater treatment. Sewage, fertilizer and urban runoff are key sources.
Urban Creep	Urban creep is the increasing density of development, due to extension, paving over of gardens and other permeable areas, which increases the impermeability of developed areas and causes rates and volumes of runoff to rise.
Water Available for Use (WAFU)	The overall amount of water that is available to use. This takes account of the total deployable output minus water lost through planned and unplanned events, sustainability reductions, climate change, water transferred out of a supply area to other companies (exports) and water received from other companies (imports).
Water Framework Directive (WFD)	The Water Framework Directive (WFD) 2000/60/EC is an EU directive to establish a framework for the protection of all water bodies. The WFD set a programme and timetable for Member States to set up River Basin Management Plans by 2009, which are then periodically updated every 5-years.
Water Resource Management Plan (WRMP)	WRMPs set out how water companies intend to achieve a secure supply of water for their customers and a protected and enhanced environment. Water companies in England or Wales, must prepare and maintain a WRMP every 5-years to align with the AMP.
Water Resource Zone (WRZ)	The largest possible zone in which all resources, including external transfers, can be shared and hence, the zone in which all customers will experience the same risk of supply failure from a resource shortfall.
Water Services Regulation Authority (Ofwat)	The Water Services Regulation Authority, or Ofwat, is the body responsible for economic regulation of the privatised water and sewerage industry in England.
Water Trading	An agreement with an existing licence holder to give part or all of their water abstraction right permanently or temporarily.
Water Treatment Works (WTW)	A facility which treats and cleans water to a specific standard.
Windfall Development	Development not specifically allocated in a development plan.

1 Introduction

1.1 Scope of Assessment

Wallingford HydroSolutions (WHS) has been commissioned by Swindon Borough Council (SBC) to undertake a detailed water cycle study in relation to their new Local Plan 2043[1].

This detailed study was completed due to recommendations in the Scoping Water Cycle Study[2] completed in July 2025 and because of changes in site allocations which have occurred during the Local Plan process.

This detailed study undertakes headroom assessments and water quality modelling for all sewage treatment works (STWs) in Swindon Borough expected to be impacted by development. In undertaking these assessments, the study considers how development proposed in the Local Plan period could affect water quality. This allows for steps to be put in place by Thames Water, the EA and SBC to enable development to proceed sustainably without compromising the environment. This supports Policy INF2: Wastewater, Sewage Infrastructure and Water Supply of the Local Plan 2043 which seeks to ensure new growth is sustainable and appropriately supported by adequate water supply and sewerage infrastructure.

The study will form part of the evidence base for the Local Plan and will inform polices and the infrastructure needed to support the delivery of sustainable future development.

1.2 Background

This detailed study has been requested by SBC to build on the findings and evidence gaps identified by Scoping Water Cycle Study[2] (completed by Stantec in July 2025). The detailed WCS considers the latest site allocations being brought forward in the Regulation 19 iteration of the Local Plan 2043. New homes and businesses are proposed in the Local Plan and will require clean water, the safe disposal of wastewater and flood protection.

The safe disposal of wastewater is the focus of this detailed study. Development has the potential to increase the volume of flow to the sewer network and downstream STWs. The allocation of development in certain locations may result in the capacity of existing available infrastructure being exceeded, a situation that could potentially cause service failures, adverse impacts to the environment and high costs for the upgrade of assets. Sustainable planning for water is therefore essential. It is important that there is engagement between the Council and Thames Water as the sewerage undertaker, so that Thames Water is aware of planned development. Once aware, it is Thames Water's responsibility to ensure that it upgrades its infrastructure so that developments can progress without presenting a risk to the environment.

Key to understanding the potential impacts of development on the sewer network, STWs and the downstream water environment is the sewage treatment process. Wastewater first enters the sewer network via a series of drains, pipes and main sewer lines. The main sewer lines take the wastewater to a STW. At the STW, wastewater is passed through several cleaning and filtering processes which aim to return it safely into receiving waterbodies. Screening is the first step, where large solids are removed from the wastewater. This is followed by primary treatment, which largely involves removing finer solids from wastewater using sedimentation tanks.

[1] Swindon Borough Council. 2026. New Local Plan. Available at: https://www.swindon.gov.uk/newlocalplan [Accessed 07/05/2026]

[2] Stantec. 2025. Water Cycle Study Scoping Report.

Wastewater after primary treatment still contains organic solid matter. It is at the secondary treatment stage where the majority of this matter is removed through processes including biological treatment and disinfection. Secondary treatment looks to achieve a certain level of effluent quality for discharge into the receiving waterbody. Note, in some cases, a further treatment phase known as tertiary treatment is applied which uses more advanced treatment systems. This can be required when discharging to protected water bodies or to make water suitable for re-use.

The EA is responsible for regulating sewage discharge releases via a system of Environmental Permits which set out the required effluent quality for a range of metrics to protect the environment. Sewerage undertakers like Thames Water must ensure compliance against the permits set.

Future development is likely to lead to increased wastewater flows arriving at STWs. Where there is insufficient capacity or headroom to treat these flows, it can lead to a greater volume of untreated sewage being discharged into receiving watercourses than permitted. This presents a water quality risk and could lead to negative impacts on indicators used to assess a watercourse's health under the Water Framework Directive[3] (WFD).

The WFD seeks to protect and enhance surface waters including watercourses. It assigns each watercourse an overall, ecological and chemical status based on a range of indicators. Under the WFD a watercourse should not deteriorate from its current WFD status, either as an overall watercourse or for each of the individual indicators assessed. Paragraph 187e of the National Planning Policy Framework (NPPF, 2024) further requires that planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of water pollution. Development should, wherever possible, help to improve local environmental conditions such as water quality, taking into account relevant information such as river basin management plans, which implement the WFD at the river basin scale.

This study helps meet these requirements by elucidating the potential impacts of future development on headroom, water quality and WFD status. This supports the EA and Thames Water in planning for the future and carrying out their responsibilities effectively. It also helps the Local Plan meet its aim to protect and enhance the environment.

1.3 Water Cycle Study Detailed Report Objectives

Water cycle studies are voluntary studies that consider how strategic plans and development proposals will affect the water environment. The study's objectives are as follows:

- Engage with stakeholders including the EA, Thames Water and neighbouring authorities.
- Determine the proposed development located within each of the STW catchments relevant to Swindon Borough to 2043. Consideration given to site allocations proposed in the Local Plan, adopted Local Plans, sites under construction and undeveloped sites with planning permission provided by SBC.
- Undertake a headroom assessment for each of the STWs to determine projected changes in flows against permitted levels, identifying where there may be capacity concerns.
- Outline recommendations for future development and actions for regulators to manage projected changes in headroom.
- Review storm overflow data upstream of STWs to further determine available headroom and wider network capacity.

[3] European Commission (2000) *Water Framework Directive (WFD)*
https://environment.ec.europa.eu/topics/water/water-framework-directive_en

- Undertake water quality modelling considering the current technology at each STW to assess the impact of development on ammonia, biochemical oxygen demand (BOD), nitrate, orthophosphate and total phosphorous in the receiving watercourses drained to by the STWs.
- Undertake water quality modelling incorporating the Technically Achievable Limits (TAL) agreed with the EA at each STW to determine whether potential impacts on water body WFD status and deteriorations in water quality can be avoided when applying TAL. This assessment also considers any Asset Management Period 8 (AMP8) proposed at the STWs.
- Determine potential impacts on water body WFD status and identify where there is a 10% deterioration in water quality for all scenarios tested.
- Undertake an odour assessment of the proposed development, identifying allocations potentially at risk of odour issues.
- Outline recommendations for future development and actions for regulators, to manage projected changes in water quality.
- Inform wider policy planning requirements based on study’s findings.

2 Method Statement

The water cycle study has been completed using national EA guidance on water cycle studies[4]. It has also been guided by liaison with key stakeholders including SBC, the EA, Thames Water and neighbouring authorities. The EA, Thames Water and neighbouring authorities have been contacted to acquire the datasets required to progress the study and to gain a clear understanding of the water environment and water infrastructure for the borough.

The scope of this detailed study has been informed by the recommendations made in the Scoping WCS[2] completed by Stantec in July 2025.

2.1 Headroom Assessment

The EA is responsible for regulating sewage discharge releases via a system of Environmental Permits. Environmental permits can relate to treated sewage from STWs and untreated sewage from storm overflows on the sewer network. Permits for treated sewage are used alongside water quality limits as a means of controlling the pollutant load discharged from STWs to a receiving watercourse. Sewage flow rates must be monitored for all STWs where the permitted discharge rate is greater than 50 m^3/day in dry weather.

Permitted discharges from STWs in the majority of cases are based on a statistic known as the Dry Weather Flow (DWF). As well as being used in the setting and enforcement of effluent discharge permits, the DWF is used for STW design as a means of estimating the 'base flow' in sewerage modelling and for determining the flow at which discharges to storm tanks will be permitted (Flow to Full Treatment, FFT).

When setting a permitted DWF the EA typically use the Q80 flow (the flow exceeded for 80% of the time) provided they are confident that it will not lead to a significant water quality deterioration. However, the Q90 flow (the flow exceeded for 90% of the time) is monitored by the sewerage undertaker and the EA for compliance purposes. This is because, being a lower flow, it gives greater certainty of an exceedance of the permitted DWF. As it is important to understand how growth will affect measurements of DWF, the Q80 and Q90 are both used in the headroom assessments. For the water quality modelling, only the Q80 flow is used. This ensures that a worst-case approach is taken when assessing impacts on the environment and improves the clarity of the water quality results presented.

Environmental Permits also consent for maximum concentrations of pollutants, in most cases suspended solids, BOD, ammonia, orthophosphate and total phosphorous. These look to ensure that the receiving watercourse is not prevented from meeting its environmental objectives, with specific regard to its WFD status.

Increased domestic population and/or employment activity can lead to increased wastewater flows arriving at a STW. Where there is insufficient headroom at the works to treat these flows, this could lead to breaches in permitted flows leading to a greater volume of treated sewage being discharged into receiving watercourses, presenting a water quality risk. A lack of headroom at an STW can also lead to the capacity of the sewer network upstream being exceeded more regularly, in turn contributing to a greater number of untreated sewer discharges via storm overflows.

To overcome these issues, a STW can upgrade its treatment systems to improve effluent quality allowing for a higher DWF to be permitted by the EA. This will allow more flow to be discharged from

[4] Environment Agency (2021) *Guidance- Water Cycle Studies* https://www.gov.uk/guidance/water-cycle-studies

an STW freeing up capacity. However, in cases where the STW is already performing close or above technically achievable limits this can be a challenge and may not be possible. In these cases, an upgrade to the capacity of the works and its upstream drainage network may be required.

During the scoping study[2], headroom assessments were carried out at seven STWs located within Swindon Borough. These showed that Swindon and Blunsdon STWs exceeded their permitted DWF during the plan period. This assessment was based on the Regulation 18 housing allocations and the Regulation 18 employment land audit assessment. For the purposes of this detailed assessment, the headroom assessments need to be updated based on the Regulation 19 housing and employment allocations. For this study, relevant cross-border STWs in the form of Marlborough and Shrivenham STWs are also assessed, neither of these were included in the scoping study.

SBC noted that the dwelling numbers provided for the purposes of this WCS are subject to change. Should changes occur, they are likely to result in a reduction in dwelling numbers, as some of the sites identified by SBC are aspirational. These aspirational sites are included in the detailed study to represent a conservative assessment of the impacts of growth within the Borough.

Figure 2-1 illustrates the STWs which receive flows from SBC. Three of the STWs; Hannington, Castle Eaton and Sevenhampton serve populations of less than 10,000. Because of the low populations served; Q80, Q90 and effluent monitoring data are not monitored for these STWs, therefore it was not possible to complete headroom assessments or water quality modelling at these STWs. Further to this there is no planned development earmarked in the local plan residing in any of these catchment areas.

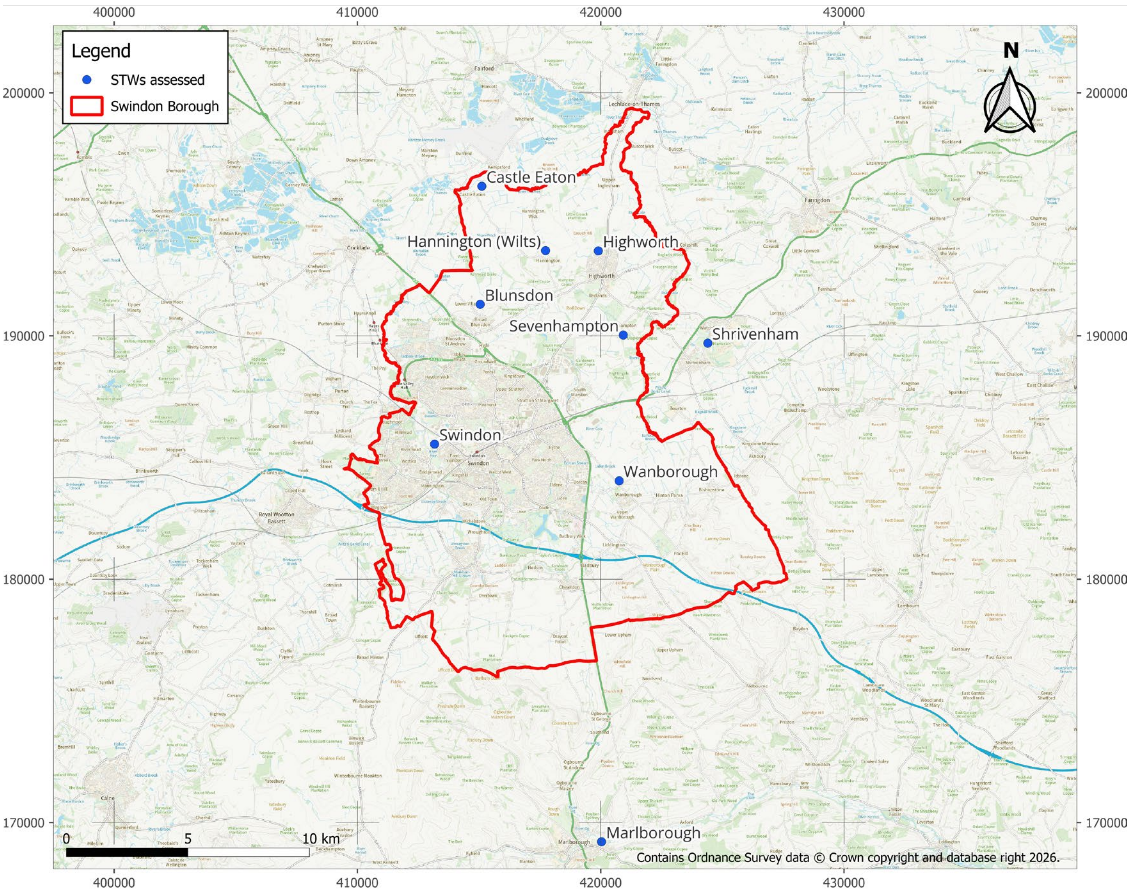

Figure 2-1 - Location of STWs Assessed in the Detailed Study

An assessment of whether the remaining 6 STWs have sufficient headroom to manage the future development proposed over the lifespan of the Local Plan (2025-2043) was carried out using the following data sources:

- Thames Water provided Q80 and Q90 data for each assessed STW from 2019 to 2024.
- STW catchment extent data provided by Thames Water.
- Site allocations in the Local Plan, undeveloped sites with planning permission and estimates of windfall development provided by SBC. This included information on the number of residential dwellings, office space and industrial area expected across the plan period. Appendix 1 provides more detail on the approach taken to assign the development earmarked to the STWs assessed in this study.
- Development figures for relevant neighbouring authorities. The four STWs potentially impacted by development in neighbouring authorities are Swindon, Castle Eaton, Marlborough and Shrivenham STWs. The relevant neighbouring authorities are outlined below. Appendix 1 provides more detail on the approach taken to assign development in these authorities to the STWs assessed in this study.

    i. Wiltshire Council - A small area of the Swindon STW catchment is located within Wiltshire. Furthermore, the village of Draycot Foliate in Swindon Borough drains into Marlborough STW (located within Wiltshire). Wiltshire was contacted and provided the total number of dwellings and jobs expected to be created in Wiltshire from 2025 to 2042.

    ii. Cotswold District Council- New development located near Castle Eaton could drain to the Castle Eaton STW. Cotswold District have provided the development trajectory for the district, which includes residential allocations and jobs expected to be created in the Cotswold District from 2025 to 2043.

    iii. Vale of White Horse District Council- Bishopstone, located in the east of Swindon Borough, drains to the Shrivenham STW (located within the Vale of White Horse District). Data on employment and residential allocations from the South Oxfordshire & Vale of White Horse Joint Local Plan (2023-2043) was used to determine future change in Shrivenham STW.

- The current discharge permits in place at each STW supplied by the EA, which provide the permitted DWF and permitted limits for water quality parameters.
- Storm Overflow Event Duration Monitoring (EDM) Data[5]. This data was used to complete a review of storm overflows potentially affected by future development.

To assess the capacity of each STW we first obtained the baseline DWF data from Thames Water. Thames Water provided both Q80 and Q90 flows for 2019-2024, this data was received in April 2026. Thames Water were not able to provide flows for 2025 and they had not been verified by the EA at the time of writing. Two scenarios have been assessed at each STW, Scenario 1 uses the Q80 flow values for the last five years (2020-2024) as the baseline DWF. Scenario 2 uses the Q90 flow values for the last five years (2020-2024) as the baseline DWF. Five years was the time period recommended by the EA.

The next step was to determine which STW each site allocation would drain into, to determine this, Thames Water has provided the catchment of each relevant STW. For each STW, the future DWF

[5] Environment Agency (2026) *Event Duration Monitoring - Storm Overflows - Annual Returns* https://environment.data.gov.uk/dataset/21e15f12-0df8-4bfc-b763-45226c16a8ac

was calculated by estimating the expected increase in flows from future development across the plan period. This considered household consumption and consumption from employment land. Household consumption was calculated using the equation below.

Household Consumption=Dwellings ×Occupancy Rate ×Per Capita Consumption

For residential dwellings, an occupancy rate of 2.22 people per dwelling (p/dw) was adopted, this is based on the Office of National Statistics population and household projections for 2043 and is the same approach adopted in the scoping WCS[2].

To determine the per-capita consumption to be used in this assessment, 95% of WRMP24 Final Plan PCC for the SWOX WRZ was used. A 95% factor has been applied on the basis that not all water supplied is returned to sewers. The PCC value adopted is 95% of the average across the plan period (2025-2043) a value of 113.05 litres per person per day. This accounts for planned improvements in water efficiency and aligns with the approach adopted in the scoping WCS.

In line with the scoping WCS[2], a further 18% increase in household consumption was applied. This increase reflects groundwater infiltration into the sewer network, where water enters through cracked, broken, or leaky sewer pipes. Thames Water provided the infiltration rate of 18% for the region as a part of the scoping WCS.

For sites which include employment allocations, a range of employment uses could come forward, each of which may result in different wastewater flows due to the number of employees required. For example, an office may have many more employees per hectare than a warehouse. Furthermore, some employment uses have additional water demands as part of their business operations. Nonetheless a reasonable estimate may be obtained using the formula below:

Employment Consumption = Employment Area x Employees per Hectare × Per Capita Consumption

The components of this formula and associated assumptions are as follows:

- *Employment area* - SBC allocations are split into two categories; office and industrial space. Each industrial employment site allocation has a hectarage of employment land associated with it. Whereas each office site allocation has a gross internal area of office floor space specified.
- *Employees per hectare* – The number of potential jobs at each allocation is not known at this stage. Therefore an estimate has been made for the number of jobs at each allocation. This has utilised the Employment Density Guide 2015[6], which approximates employment density based on the type of employment. For the site allocations containing office space, an assumption of 1 employee per 13m^2 of net internal area (estimated as gross internal area x 0.8) was used. For industrial space, the average density for B1c (light industrial) and B2 (industrial and manufacturing) employment uses was estimated from the guide. This translates to 1 employee per 41.5m^2 of gross internal area. When multiplied by the employment area these provide an estimate of the number of jobs expected at each allocation. Note since the guide's publication use class B1c has been replaced with Class E(g).
- *Per capita consumption* - A per-capita consumption rate was estimated based on the British Water document; Sizing Criteria, Treatment Capacity for Sewage Treatment Systems[7], which

[6] Homes & Communities Agency (2015) *Employment Density Guide https://www.kirklees.gov.uk/beta/planning-policy/pdf/examination/national-evidence/NE48_employment_density_guide_3rd_edition.pdf*
[7] British Water (2013) *Flows and Loads – 4 Sizing Criteria, Treatment Capacity for Sewage Treatment Systems https://www.theseptictankstore.co.uk/wp-content/uploads/British_Water_flows_and_loads.pdf*

estimates the average wastewater generated per person per day. A rate of 50 l/p/d has been applied to the office allocations, while a rate of 55 l/p/d has been applied to the industrial allocations; which is an average between the two relevant industrial categories: Factory without canteen and open industrial site[7].

When assessing capacity, the permitted DWF at the STWs were used as a substitute for actual designed hydraulic capacity for each STW being assessed. It should be noted that whilst the permitted flows will relate well to the actual designed hydraulic capacity of a STW in some cases, in other cases it may not.

2.2 Storm Overflows

A review of storm overflows has also been undertaken in relation to headroom and wider network capacity. For this review, the Event Duration Monitoring (EDM) dataset which monitors the performance of storm overflows in England has been utilised. Data available between 2020-2025 has been collated for storm overflows located within the catchment areas of STWs falling within the borough. Subsequently spill frequency, duration and trends have been analysed to determine current risk and potential constraints in terms of development.

2.3 Water Quality Modelling

To assess environmental capacity in more detail and determine potential water quality impacts on surface waterbodies from future development, the EA's SIMCAT (Simulation of Catchments) model for the River Thames has been used. SIMCAT is the EA's water quality river modelling software and is a crucial tool for reviewing discharge permits at a catchment scale and to quantify the source apportionment of both point and diffuse pollutant load within receiving surface waterbodies.

In this context, water quality impacts to receiving watercourses at 6 STWs have been measured against overall WFD status and the WFD status for individual determinants. The impacts of development in the Hannington STW, Castle Eaton STW and Sevenhampton STW catchments cannot be assessed using SIMCAT because Q80, Q90 and effluent monitoring data are not monitored for these STWs.

For this study, the WFD determinants are as follows: ammonia, biochemical oxygen demand (BOD) and orthophosphate. The impact of development on nitrates and total phosphorous is also assessed, despite them not being measured as part of the WFD.

The aims of the WFD[8] are to enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystem. In this regard, the water quality modelling undertaken is used to assess the following criteria:

- 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)?

To achieve this, the first task was to review and run the River Thames model to confirm it was fit for purpose. This was done using SIMCATv15.7 and applied the default flows already in the model. SIMCAT compares its modelled results to observed results recorded for flow and water quality at monitoring stations. The level of agreement between the modelled and observed results was used

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[8] European Commission, *Water Framework Directive (2000)*, http://ec.europa.eu/environment/water/water-framework/index_en.html

as a 'fit for purpose' test. It helps determine whether the model is appropriate for decision-making and identifies areas where uncertainty may affect the confidence of the resulting decisions.

Once the SIMCAT model was confirmed as fit for purpose, the technically achievable limits (TALs) proposed by the EA were reviewed. The EA advised that the permit values shown below are achievable using TALs, and that these values should be used for modelling all STW potential capacity irrespective of the existing treatment technology and size of the works. It is important to note that TALs are not theoretical maximums, but rather the levels that can be consistently achieved in practice using standard wastewater treatment processes.

- Ammonia (95%-ile): 1mg/l
- BOD (95%-ile): 5mg/l
- Nitrate and Nitrogen: 10mg/l
- Phosphorous (mean): 0.25mg/l

To review the appropriateness of the TALs involved comparing the existing effluent quality values at each STW (contained in the SIMCAT data files provided by the EA) to the TAL values.

Following this the model was run for a new baseline considering the averaged 2020-2024 Q80 values provided by Thames Water. Only the Q80 is assessed as this ensures that a conservative approach is taken when assessing impacts on the environment and improves the clarity of the water quality results presented. This baseline run assumed current wastewater treatment technology.

The model was then run for a post-development scenario which considered increased flows due to development in SBC and neighbouring authorities to 2043. Two post-development runs were completed; one with current technology and then another with TALs applied. The TALs applied for phosphorous align the phosphorous limit (0.25 mg/l) proposed for two AMP8 improvement schemes at Swindon STW and Highworth STW respectively. Therefore, the TAL run is also used to assess the impact of these improvement schemes. No other improvement schemes are proposed at other STWs.

The results for ammonia, BOD, nitrate, 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 2-1, the ammonia and BOD relate to the 90th percentile, whilst the orthophosphate are based on the mean. The orthophosphate values are reach specific and vary for each STW, the reach specific values are listed in Table 2-2. Note, for total phosphorous there are no universal environmental quality standards, however the standards achieved for orthophosphate can be used as a guide.

Table 2-1- Environmental Quality Standards for Ammonia and BOD

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)	0.039-0.0435	0.073-0.0805	0.181-0.195	1.023-1.0595

Table 2-2- Reach specific standards for Orthophosphate

STW Name	High Status (mg/l)	Good Status (mg/l)	Moderate Status (mg/l)	Poor Status (mg/l)
Swindon	0.04	0.075	0.185	1.031
Highworth	0.041	0.077	0.189	1.040
Wanborough	0.039	0.073	0.181	1.023
Blunsdon	0.042	0.078	0.192	1.046
Shrivenham	0.04	0.075	0.185	1.032
Marlborough	0.0435	0.0805	0.195	1.0595

It should be noted that there are also no WFD environmental quality standards for nitrates as they are not one of the determinants assessed for surface waterbodies under the WFD. To assess the modelled nitrate concentrations, the thresholds applied by FreshWater Watch have been used. FreshWater Watch is a global citizen science project and water quality monitoring program led by the environmental charity Earthwatch Europe. The thresholds for nitrates used by FreshWater Watch[9] are listed below:

- Natural/Good Status: < 1.0 mg/l
- Moderate Status: 1.0 – 2.0 mg/l
- Poor Status: >2.0 mg/l

Considering the environmental quality standards and thresholds for nitrates above, along with the percentage deterioration, the three criteria were assessed. Table 2-3 summarises the standards for passing or failing each criterion. The water quality results are provided in section 4.

Table 2-3- Environmental Quality Standards for Ammonia and BOD

Score	Criteria
Green	No Infrastructure upgrade required to achieve.
Amber	Infrastructure upgrade required, but achievable using TALs or by addressing other factors preventing criteria being met.
Red	Cannot be achieved using TAL. Environmental capacity could be a constraint on growth.

2.4 Odour Risk

The location of STWs in relation to developments is also discussed in the context of odour risk. Thames Water's distance thresholds for odour risk have been reviewed and applied to identify any sites falling within 800m of an STW. Detail is provided on the steps required if sites are at reasonable risk of odour from treatment works, presently or in the future.

[9] Freshwater Watch (2026) *Nitrates and Phosphates* https://www.freshwaterwatch.org/pages/nitrates-and-phosphates

3 Headroom Assessment

3.1 Introduction

Increased population and increased employment activity will likely lead to increased wastewater flows arriving at an STW. If there is insufficient headroom at the sewage treatment works to treat these increased flows, it could lead to breaches in permitted flows and therefore greater volume of treated sewage being discharged into receiving watercourses, which presents a water quality risk.

Insufficient headroom at a STW can also lead to the sewer network capacity being exceeded more often, contributing to a greater number of untreated sewer discharges via combined sewer overflows (CSOs).

3.2 Review of Dry Weather Flow (DWF) Data

An assessment of baseline headroom capacity at STWs was undertaken using flow monitoring data supplied by Thames Water for the last five years; 2020-2024. When setting a permitted DWF the EA typically use the Q80 flow (the flow exceeded for 80% of the time) provided they are confident that it will not lead to a significant water quality deterioration. Alongside the Q80 flow, the Q90 flow (the flow exceeded for 90% of the time) is also monitored by the sewerage undertaker and the EA for compliance purposes. The Q90 is monitored because it gives greater certainty of an exceedance of the permitted DWF. Both the Q80 and Q90 have been provided by Thames Water and are used to understand how growth affects both measurements of the DWF.

Under the Urban Wastewater Treatment Regulations, STWs are not required to measure and report DWF in the same manner if their population equivalent is less than 10,000. Three of the nine STWs present in Swindon Borough; Hannington, Castle Eaton and Sevenhampton have population equivalent values of less than 10,000. Therefore, Q80 and Q90 data is not available for these three sites meaning that it is not possible to assess their available or future headroom. Furthermore, these three STWs do not contain proposed site allocations within their catchments. Table 3-1 summarises the flows recorded for the STWs with catchments falling within Swindon Borough.

Table 3-1 - 80th and 90th percentile annual exceedance flow routes (2019-2024)

STW Name	Q80					
	2019	2020	2021	2022	2023	2024
Swindon	46697.3	49976.0	52568.2	41559.8	52326.9	51862.5
Highworth	2142.7	2347.5	1921.8	1594.8	1740.4	1831.7
Wanborough	590.1	482.6	565.6	448.1	610.1	680.2
Blunsdon	419.4	402.3	606.5	427.2	560.6	580.8
Shrivenham	1487.4	1769.1	1942.9	1395.5	2028.3	2256.0
Marlborough	7938.6	8320.2	8279.9	7391.8	9307.8	9995.6
STW Name	**Q90**					
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Swindon	44073.0	48265.7	49672.6	39119.3	48417.8	44645.8
Highworth	2073.5	2267.8	1799.6	1520.3	1648.6	1697.4
Wanborough	532.4	438.1	500.4	419.2	544.9	576.9
Blunsdon	384.9	382.7	545.4	394.6	526.5	541.8
Shrivenham	1400.2	1667.6	1732.1	1331.1	1831.5	1876.5
Marlborough	7626.9	7823.2	8075.3	7236.7	7834.7	8293.5

Figure 3-1 shows the trends in the Q80 values between 2019 and 2024. There was a drought in 2022, while 2023 and 2024 were notably wet years. The Q90 flows show a similar trend. To provide a representative assessment, the average Q80 and Q90 values for the period 2020–2024 has been adopted as the five-year average. The year 2019 was excluded because a 5-year average of the most recently available data is typically recommended by the EA. Table 3-2 presents the 2020-2024 average Q80 and Q90 flows. Table 3-2 presents the 2020-2024 average Q80 and Q90 flows.

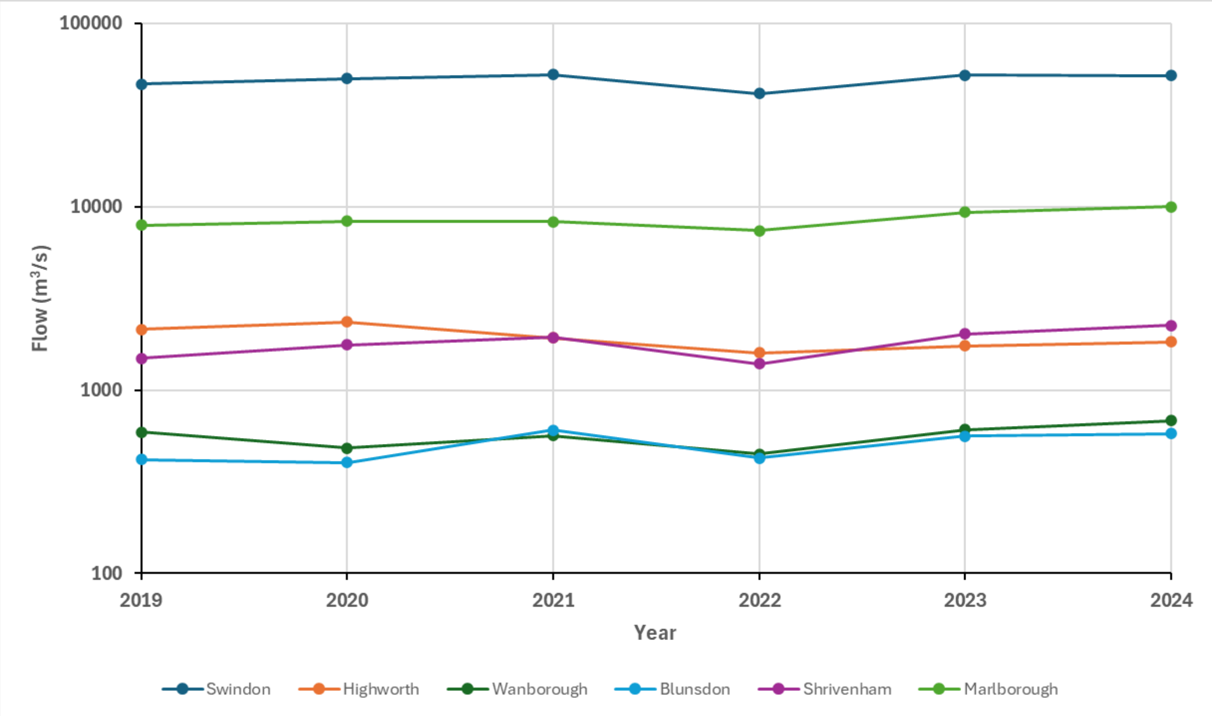

Figure 3-1 - Trends in 80th percentile annual exceedance flow values (2019-2024)

Table 3-2 - Comparison between adopted flows (average 2023/24) with longer term flows (average 2020-2024)

STW Name	Average Q80 (2020-2024)	Average Q90 (2020-2024)
Swindon	49658.7	46024.2
Highworth	1887.2	1786.7
Wanborough	557.3	495.9
Blunsdon	515.5	478.2
Shrivenham	1878.4	1687.8
Marlborough	8659.1	7852.7

3.3 Results

3.3.1 Swindon STW

Swindon STW is located in the west of Swindon borough, with a total catchment area of 50.5km^2, 49.7km^2 of which is located within the borough. Swindon STW outfalls to the River Ray at E: 412750, N: 186010 and has a permitted DWF of 48,275 m^3/s.

In total 45 of the regulation 19 allocations within Swindon Borough Council's emerging plan are expected to drain to the Swindon STW. These 45 allocations have a total of 21,421 dwellings. The largest of these are NEV05 (4,050 dwellings), NEV04 (2,380 dwellings) and WS01 (1,620 dwellings). Further to the Regulation 19 allocations; 7,830 more dwellings are expected to drain to Swindon

STW, these are extant planning applications. A total of 20.8ha of employment land is also being allocated within the Swindon STW (6.8ha of office space and 14ha of floor space).

The headroom assessment at the Swindon STW shows that the baseline Q80 flows are 2.9% higher than the permitted DWF, while the Q90 flows are 4.7% lower than the permitted DWF. The additional development proposed within the Swindon STW catchment causes the Q90 flows to exceed the DWF. At the conclusion of the Local Plan period, the forecasted Q80 and Q90 flow will exceed the permitted DWF by 22.3% and 15.8%, respectively (see Figure 3-2).

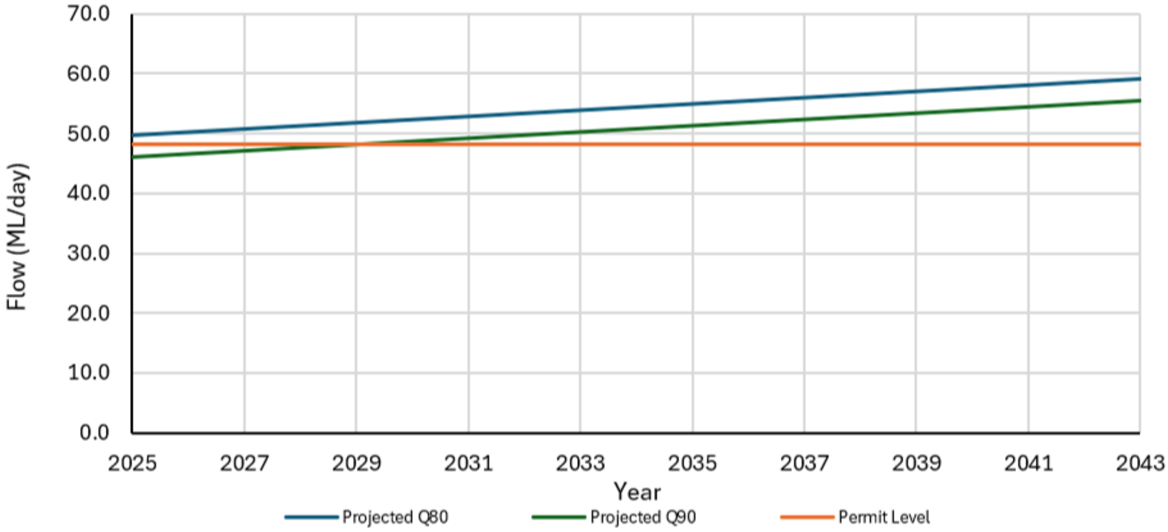

Figure 3-2 - Swindon STW DWF Headroom Assessment

The assessment indicates that the permitted DWF will be exceeded in both the Q80 and Q90 flow scenarios as a result of future development.

Two formal upgrades to the Swindon STW are currently planned by Thames Water[10]. The first scheme aims to improve the ability to treat incoming flows and the second scheme will increase the capacity of the sludge stream, which will improve the efficiency at the works. Thames Water are unable to provide an exact timing on this work. Increasing the treatment works' capacity and its ability to treat sewage should reduce the volume and frequency of discharges to the receiving environment.

Furthermore, as part of the water industrial national environment programme (WINEP) a phosphorus permit limit of 0.25 mg/l is proposed for AMP8 (2025-2030). This should improve effluent quality with respect to phosphorous helping reduce water quality pressures on the receiving waterbody.

Despite these earmarked improvements at the STW, there is set to be a significant increase in flows to the works as a result of future development. In this regard, Thames Water may also need to seek a permit variation to increase the authorised DWF. This may require further upgrades to the treatment works to improve effluent quality and maintain (or improve) pollutant loads. Any permit variation should be progressed in advance of planned development.

[10] Thames Water (2026) *Investment plans for storm discharge sites- Swindon STW* https://www.thameswater.co.uk/about-us/performance/river-health/frequently-asked-questions/information-about-specific-sites

3.3.2 Highworth STW

Highworth STW is located in the north of Swindon borough, it has a total catchment area of 2.1km^2, all of which is located within the borough. It discharges to Westrop Brook at E:419790, N:193770 with a permitted DWF of 1,900m^3/s.

Three Regulation 19 residential allocations are expected to drain to the Highworth STW (HW01, HW02 and HW03), with a total of 853 dwellings proposed. There are also several extant development permissions within the STW catchment, totalling 378 dwellings.

The headroom assessment at the Highworth STW shows that the baseline Q80 and Q90 flows are below the permitted DWF, being 0.7% and 6.0% lower respectively. Additional development draining to the STW would cause a significant increase in flows (see Figure 3-3), with the projected Q80 and Q90 flows forecast to exceed the permitted DWF, being 19.2% and 13.9% higher respectively.

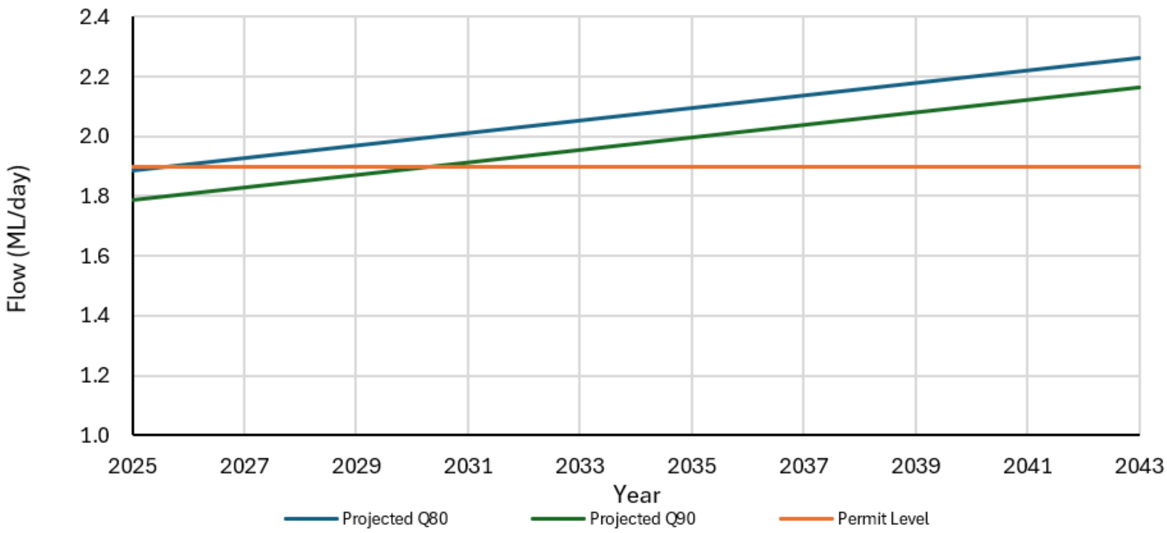

Figure 3-3 - Highworth STW DWF Headroom Assessment

The assessment indicates that the permitted DWF will be exceeded in both the Q80 and Q90 flow scenarios as a result of future development.

Thames Water have planned an upgrade to the Highworth STW[11], which will improve its ability to treat volumes of incoming sewage and reduce the need for untreated discharges in wet weather. Thames Water are not yet in a position to confirm the exact timing of the work. This will likely lead to a reduction in volume and frequency of discharges to the receiving environment.

As part of Thames Water DWMP23 they stated an intention to invest in the Highworth STW to ensure compliance between 2025-2030 and then from 2035-2050 to provide sewer network improvements.

Because there is set to be a significant increase in flows to the works as a result of future development, Thames Water may need to seek a permit variation to increase the authorised DWF. This may require further upgrades to the treatment works to improve effluent quality and maintain (or improve) pollutant loads. Any permit variation should be progressed well in advance of planned development.

[11] Thames Water (2026) *Investment plans for storm discharge sites- Highworth STW* https://www.thameswater.co.uk/about-us/performance/river-health/frequently-asked-questions/information-about-specific-sites

3.3.3 Wanborough STW

Wanborough STW is located in the south of Swindon borough, it has a total catchment area of 1.8km^2, all of which is located within the borough. It outfalls to Danes Brook near at E:420160, N:184500. It has a permitted DWF of 722m^3/s.

One Regulation 19 site allocation is expected to drain to Wanborough STW, this is the NEV08 site, where 450 dwellings are proposed. There are also extant development permissions for a total of 211 dwellings which are expected to drain to Wanborough STW.

The headroom assessment at the Wanborough STW shows that the baseline Q80 and Q90 flows are 22.8% and 31.3% below the permitted DWF, respectively. Additional development draining to the STW is predicted to cause a significant increase in flows (see Figure 3-4). By the end of the plan period, the projected Q80 and Q90 flows are 5.8% higher and 2.7% lower than the permitted DWF respectively.

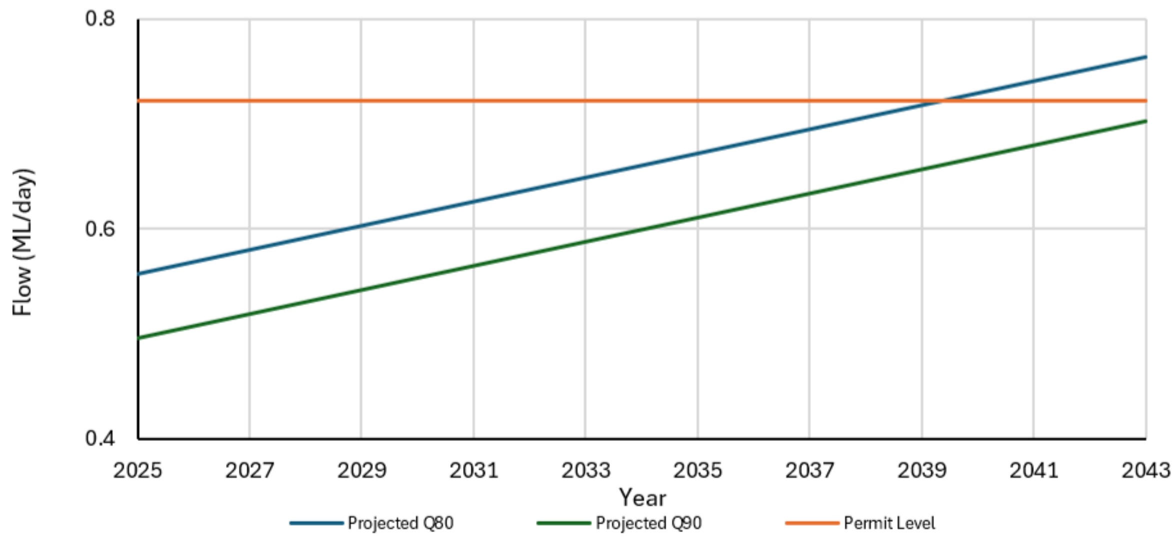

Figure 3-4 - Wanborough STW DWF Headroom Assessment

The assessment indicates that the permitted DWF will be exceeded in the Q80 flow scenario, but not the Q90 flow scenario, as a result of future development.

A formal upgrade to the Wanborough STW is planned by Thames Water[12]. The scheme aims to increase treatment capacity and reduce the reliance on untreated storm discharges during wet weather. This project is currently planned for completion in 2028.

As part of Thames Water DWMP23, Thames Water stated an intention to invest in the STW to ensure compliance up to 2030 and then provide sewer network improvements to meet growth requirements up to 2050.

It is expected that these earmarked upgrades should be able to ensure the STW has sufficient headroom to manage projected growth.

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[12] Thames Water (2026) *Investment plans for storm discharge sites- Wanborough STW* https://www.thameswater.co.uk/about-us/performance/river-health/frequently-asked-questions/information-about-specific-sites

3.3.4 Blunsdon STW

Blunsdon STW is located in the north of Swindon borough, it has a total catchment area of 1.0km^2, all of which is located within the borough. Blunsdon STW outfalls to an unnamed watercourse at E:415130, N:191680. It has a permitted DWF of 487m^3/s.

Four Regulation 19 site allocations are expected to drain to Blunsdon STW, namely the BB01, BB02, BB03 and BB04 allocations. These four allocations propose a total of 345 dwellings. There is also an extant development permission for 61 dwellings which is expected to drain to Blunsdon STW.

The headroom assessment at the Blunsdon STW shows that the baseline Q80 flows exceed the permitted DWF by 5.8%, while the Q90 flows does not exceed the DWF; being 1.8% lower. Additional development draining to the STW is predicted to cause a significant increase in flows (see Figure 3-5). By the end of the plan period, the projected Q80 and Q90 flows are 31.8% and 24.2% higher than the permitted DWF respectively.

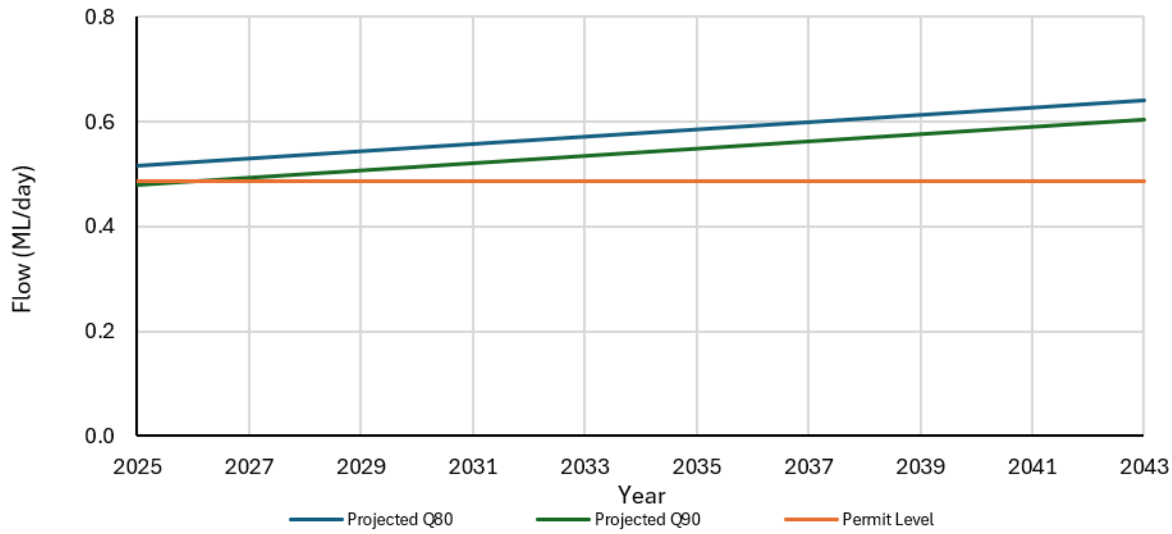

Figure 3-5 - Blunsdon STW DWF Headroom Assessment

Blunsdon STW is currently operating above its permitted DWF capacity under the Q80 flow scenario. This exceedance is set to increase with future growth, with the Q90 flow also starting to exceed the DWF early in the plan period.

Thames Water have a planned upgrade to the Blunsdon STW underway, the upgrade will ensure a higher quality of treated effluent, with a focus on reducing phosphorus levels entering the river to below an average level of 0.4mg/l. This scheme is due to complete in spring 2027. This should improve effluent quality, helping reduce water quality pressures on the receiving waterbody.

The existing Q80 and Q90 flows already exceed the permitted DWF and there is set to be a significant increase in flows to the works as a result of future development. In this regard, Thames Water may need to seek a permit variation to increase the authorised DWF. Associated and further upgrades to the treatment works are also likely required to accommodate more flow and maintain (or improve) pollutant loads. Any permit variation should be progressed well in advance of planned development.

3.3.5 Shrivenham STW

Shrivenham STW is located in the Vale of White Horse district, to the east of Swindon borough. Only 0.3 km^2 of the Shrivenham STW catchment area is within the borough. Shrivenham STW discharges to Tuckmill Brook at E:424600, N:189801. It has a permitted DWF of 2,842m^3/s.

No Regulation 19 allocations drain to the Shrivenham STW. There are two extant development permissions within the STW catchment, totalling 6 dwellings. Outside of Swindon BC, the VWH expects 141 additional dwellings and 1,496m^2 of additional employment land to drain to Shrivenham STW.

The headroom assessment at the Enstone STW shows that the baseline Q80 and Q90 flows are below the permitted DWF, being 33.9% and 40.6% lower, respectively. Additional development draining to the STW would cause a very minor increase in flows (see Figure 3-6), however importantly the projected Q80 and Q90 flows remain below the permitted DWF, being 32.5% and 39.2% lower, respectively.

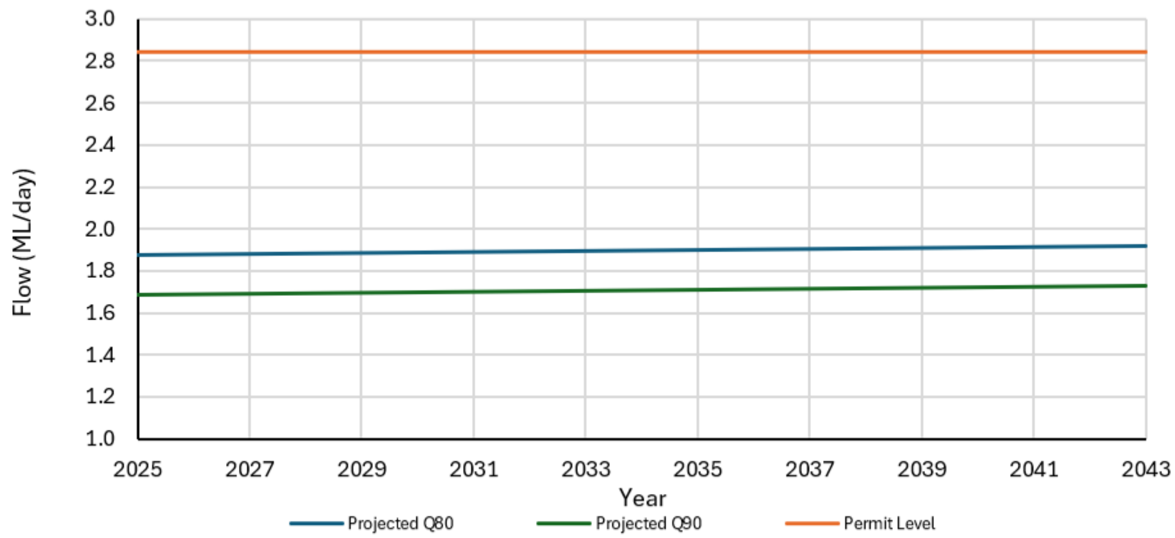

Figure 3-6 - Shrivenham STW DWF Headroom Assessment

The assessment indicates that the permitted DWF will not be exceeded during the plan period as a result of future development. Thames Water does not currently have any plans to upgrade the Shrivenham STW.

3.3.6 Marlborough STW

Marlborough STW is located to the south of Swindon borough in Marlborough, Wiltshire. Only 0.1km^2 of the STW catchment is located within the borough. Marlborough STW outfalls to the River Kennet at E: 420120, N:169200. It has a permitted DWF of 8,076m^3/s.

Note, none of the Regulation 19 allocations or extant planning permissions are expected to drain to this STW, however a small amount of windfall development may come forward in the catchment. In addition, Wiltshire Council have plans for 65 dwellings in the Marlborough STW catchment.

The headroom assessment at the Marlborough STW shows that the baseline Q80 exceeded the permitted DWF by 7.2%, while the Q90 flows were 2.8% less than the permitted DWF. Additional development draining to the STW by the end of the plan period would cause a very minor increase in flows (see Figure 3-7). By the end of the plan period, the projected Q80 and Q90 flows are 7.4% higher and 2.6% lower than the permitted DWF, respectively.

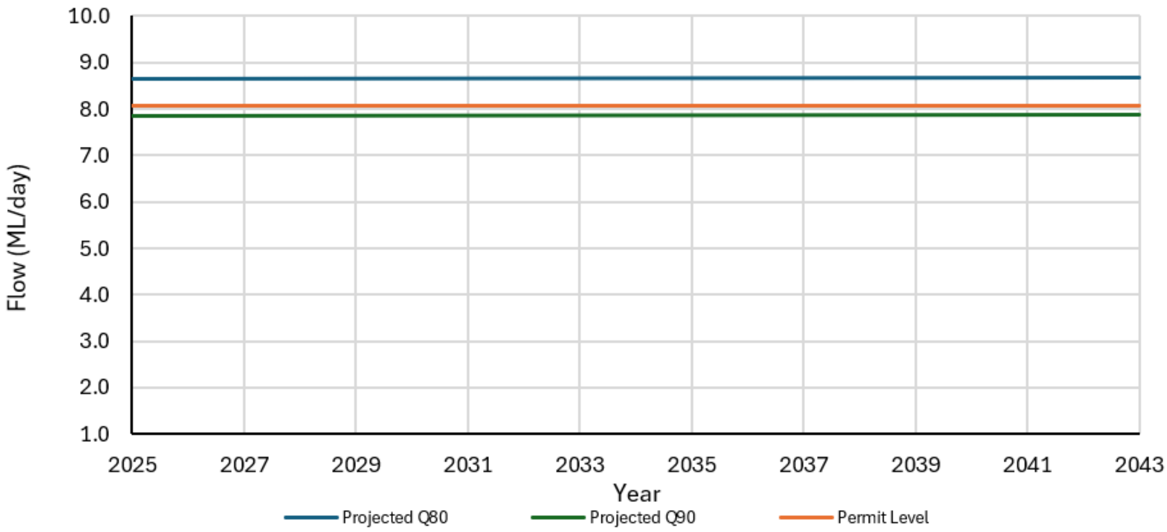

Figure 3-7 - Marlborough STW DWF Headroom Assessment

The assessment indicates that there are existing issues with headroom at the STW, but that these are not set to be significantly exacerbated by future development.

A formal upgrade to the Marlborough STW is planned by Thames Water[13]. The scheme aims to improve the ability of the Marlborough STW to treat the volumes of incoming sewage, reducing the need for discharges in wet weather. Thames Water are unable to confirm the exact timing of this upgrade. In tandem with the treatment works upgrade, Thames Water is investigating the impact of groundwater infiltration on the local sewer network to help inform long-term planning.

As part of Thames Water DWMP23; in the short term (2025-2030) Thames Water intend to invest in the STW to ensure compliance, in the medium and long term (2030-2050), Thames Water are looking to provide sewer network improvements and greater sewer resilience from groundwater flooding up to 2050.

3.4 Summary

Table 3-3 and Table 3-4 summarise the headroom findings for the Q80 and Q90 flow respectively.

At Blunsdon STW the current DWF permits will be exceeded by more than 25% by the end of the plan period (highlighted in red) when considering the Q80 flow. The exceedance sits slightly below 25% when considering the Q90 flow (highlighted in amber). Thames Water have a planned upgrade to the Blunsdon STW underway, the upgrade will ensure a higher quality of treated effluent. Whilst this scheme should improve effluent quality and help reduce water quality pressures on the receiving waterbody, it does not increase the capacity of the works so breaches in the site's DWF permit remain a significant risk.

At 4 of the 6 STWs (Swindon, Highworth, Wanborough and Marlborough STWs), the current permitted DWF will be exceeded by the end of the plan period when considering the Q80 flow, albeit by less than 25% (highlighted in amber). For the Q90 flow, with the exception of Wanborough an exceedance is also predicted.

[13] Thames Water (2026) *Investment plans for storm discharge sites- Marlborough STW* https://www.thameswater.co.uk/about-us/performance/river-health/frequently-asked-questions/information-about-specific-sites

Thames Water has planned upgrades at Swindon, Highworth, Wanborough and Marlborough STWs to increase treatment capacity and reduce reliance on untreated storm discharges during wet weather. These upgrades are expected to increase available headroom and reduce the volume and frequency of discharges to the receiving environment. The Wanborough upgrade is currently planned for completion in 2028, while timings for the other schemes remain unconfirmed.

At Shrivenham STW the current DWF will not be exceeded (highlighted in green) when considering both the Q80 and Q90 flows. Thames Water does not currently have any plans to upgrade the Shrivenham STW.

Table 3-3 – Summary of Headroom Assessments, Q80 flow (m^3/day)

STW Name	Q80 (5-yr average 20-24)	Projected Q80 (All Authorities)	Permitted DWF	Headroom Available Projected (%)
Swindon	49,657	59,064	48,275	-22.3
Highworth	1,887	2,264	1,900	-19.18
Wanborough	557	764	722	-5.8
Blunsdon	515	642	487	-31.8
Shrivenham	1,878	1,919	2,842	32.5
Marlborough	8,659	8,676	8,076	-7.4

Table 3-4 - Summary of Headroom Assessments, Q90 flow (m^3/day)

STW Name	Q90 (5-yr average 20-24)	Projected Q90	Permitted DWF	Headroom Available Projected (%)
Swindon	46,024	55,429	48,275	-14.8
Highworth	1,787	2,164	1,900	-13.9
Wanborough	496	703	722	2.7
Blunsdon	478	605	487	-24.2
Shrivenham	1,688	1,729	2,842	39.2
Marlborough	8,064	8,081	8,076	2.6

It should be noted that the assessments are precautionary, SBC has provided details of the proposed site allocations in its emerging Local Plan and it assumed that all of these will be built out within the plan period. Furthermore, SBC have emphasized that several of the allocations are aspirational and may not be built within the 2025-2043 plan period. The assessments also do not account for planned or longer-term increases in DWF and treatment capacity.

In its response to Ofwat's PR24 draft determinations[14] [15] Thames Water has committed to achieving 100% compliance with all permits to discharge wastewater in AMP8. However, Thames Water 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.

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

[15] 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

The EA has stated that it will be formalising and standardising its DWF compliance assessment for application in AMP8.

Upgrades have been completed recently or are planned for many of the STWs assessed, however the specific impacts these upgrades have on headroom is yet to be confirmed. Thames Water may need to invest in further upgrades and apply for new permits to ensure compliance up to 2043. The EA will need to consider development against infrastructural and environmental capacity in agreeing these permits to ensure that development can progress sustainably without presenting a risk to the water environment.

Once funding has been obtained for upgrading and/or building new infrastructure, there remain significant lead times for planning and construction before infrastructure can be considered functional. In this respect, wastewater companies require detailed information on likely housing development well in advance. Table 3-5 outlines the lead in time estimates provided by Thames Water.

Table 3-5- Thames Water estimate of infrastructure lead in time

Resource	Lead in time
Sewerage network upgrades	1-3 Years
Wastewater treatment upgrade	3-5 Years
Major resource development (new reservoir, new STW etc)	8-10 Years

In developing their Local Plan, SBC have proposed Policy INF2: Wastewater, Sewage Infrastructure and Water Supply which seeks to ensure new growth is sustainable and appropriately supported by adequate water supply and sewerage infrastructure.

Further to this policy, it is recommended that SBC take the following actions:

- In liaison with Thames Water, consider available STW capacity in the assessment of planning applications and seek to align the delivery of development and infrastructure upgrades. This is particularly the case for large scale developments (>1000 Dwellings).
- Share their Annual Monitoring Reports and Housing Land Supply Statements, which details projected housing growth in their administrative areas, with Thames Water.
- Provide a copy of the WCS to planning colleagues at neighbouring local authorities, Thames Water, the EA, and Wiltshire Council as the borough's waste planning authority partner.
- SBC should promote the use of SuDS at development sites and where appropriate sewer separation. This is in accordance with Policy CSE12 which makes SuDS mandatory in all major developments and non-major developments involving new buildings.

In response to these actions, Thames Water will need to assess growth demands as part of their wastewater asset planning activities and feedback to SBC if concerns arise. Thames Water will also need to secure relevant planning permissions to upgrade its wastewater facilities. Thames Water should work proactively with the EA as the principal environmental regulator for the water industry and SBC and Wilshire Council as the joint waste planning authority to do this.

4 Storm Overflows

4.1 Background

Many parts of England have a combined sewerage system which transports both clean rainwater and wastewater. During heavy rainfall the capacity of these pipes can be exceeded, which means possible inundation of STWs and backing up of network infrastructure. Storm overflows were developed as overflow valves to reduce the risk of sewage backing up during heavy rainfall.

These overflows are intended to only discharge diluted untreated sewage during heavy rainfall. However, where STW sites are operating close to their capacity or network capacity is limited, it increases the risk of water backing up in the sewer network. In these cases, storm overflows act as emergency release valves to prevent this water from backing up enough to enter the streets and homes. Insufficient system capacity can result in spills occurring under all conditions more frequently and for longer durations.

Future development will increase the flow draining to STWs. If mitigative action is not taken, future development could increase the risk of storm overflows spilling.

4.2 Storm Overflows Discharge Reduction Plan

The national government's Storm Overflows Discharge Reduction Plan (SODRP) sets targets for regulators and water companies to prioritise improving the water environment. The overarching targets of the SODRP are:

- By 2035, water and sewerage companies (WaSCs) will have improved all overflows discharging into or near every designated bathing water and improved 75% of overflows discharging into or near high priority sites
- By 2045, WaSCs will have improved all remaining storm overflows discharging into or near high priority sites
- By 2050, no storm overflows will be permitted to operate outside of unusually heavy rainfall or to cause any adverse ecological harm

Note, for a storm overflow to be considered as improved, it must meet the following criteria:

- It must be demonstrated that discharges from the storm overflow have no local adverse ecological impact.
- The storm overflow will not be permitted to discharge above an average of 10 rainfall events per year.
- The storm overflow has screening controls that avoid pollution by limiting discharge of persistent inorganic material. Disinfection may be required in some cases to reduce harmful pathogens.

The overall aim of the SODRP is to ensure that storm overflows operate as originally intended; only during periods of unusually heavy rainfall. It also seeks to ensure that when storm overflows discharge, they should not have an adverse ecological impact.

Meeting the targets of the SODRP may require improved maintenance, sewer separation, and the deployment of SuDS and smart monitoring in the upstream catchment. Sewer separation and SuDS are both potential options for development coming forward over the plan period.

The storm overflow assessment framework[16] (SOAF) is an investigative tool which supports the SODRP. It outlines the procedure and technical details which guide the priorities for the investigation and improvement of individual sewage overflow assets. It sets out a five stage framework for identifying, assessing, and delivering solutions to improve the most poorly performing storm overflow assets. Stage 1 consists of identifying high frequency spillers and the reason for the high frequency; high frequency spillers are identified as storm overflows with an annual average of 10 or more spills (if 3+ years of data are available). High frequency spillers continue onto Stage 2 of the process if hydraulic capacity is the reason for the high spill frequency.

4.3 Storm Overflows serving Swindon Borough

Future development will increase the flow draining to STWs. If mitigative action is not taken, future development could increase the risk of storm overflows spilling. The Event Duration Monitoring (EDM) dataset was used to assess the number of spills that typically occur in each STW catchment. Data available between 2020-2024 has been collated for storm overflows located upstream of and within the catchment areas of the 9 STWs serving the borough.

Table 4-1 summarises the spill count and duration for all of the storm overflows within each STW catchment. Across all eight STWs which had spills recorded (Castle Eaton STW has none), Marlborough STW has the highest number of recorded spills, with 650 spills, followed by Sevenhampton (493), Wanborough (477) and Highworth (436). Swindon (370), Shrivenham (352) and Hannington (82) recorded fewer spills, while Blunsdon STW had by far the lowest number, with 49 spills. In terms of total spill duration, Marlborough again recorded the highest figure at 10,077.4 hours, followed by Sevenhampton (9,796.8 hours), Wanborough (7,879.8 hours) and Shrivenham (5,671.2 hours). Highworth recorded 4,155.3 hours, Swindon 3823.3 hours, Blunsdon 389.0 hours, and Hannington the lowest at 213.0 hours. Overall, Marlborough stands out as the most significant spilling site across both measures, while Blunsdon and Hannington have substantially lower levels of spilling. Table 4-2 provides the spill statistics for each individual storm overflow monitored within the borough, the majority of the storm overflows summarised already bypass the required number of annual spills to be considered a high frequency spiller sites, with many sites substantially above the 10 annual spills threshold.

[16] Storm overflow assessment framework 2025. 2026. Available at: https://www.gov.uk/government/publications/storm-overflow-assessment-framework-2025/storm-overflow-assessment-framework-2025#overview-of-assessment-framework

Table 4-1 - Summary of the storm overflows at each STW

STW Name	Total Counted Spills Across All Sites	Total Spill Duration Across All Sites	Average Annual Spill Count (2020 - 2025)	Average Annual Spill Duration (2020 - 2025)
Swindon STW	370	3823.3 hrs	61.7	637.2 hrs
Highworth STW	436	4155.3 hrs	72.7	692.6 hrs
Wanborough STW	477	7879.8 hrs	79.5	1313.3 hrs
Blunsdon STW	49	389.0 hrs	8.2	64.8 hrs
Shrivenham STW	352	5671.2 hrs	58.7	945.2 hrs
Marlborough STW	650	10077.4 hrs	108.3	1679.6 hrs
Sevenhampton STW	493	9796.8 hrs	82.2	1632.8 hrs
Hannington (Wilts) STW	82	213.0 hrs	13.7	35.5 hrs

Table 4-2 - Collated storm overflow spill data (2020-2024) within the STW catchments.

Storm Overflow Name	Watercourse	Total Counted Spills (2020-2025)	Total Spill Duration (2020 2025)
Swindon STW			
Swindon WWTW	River Ray	**236**	**2805.9 hrs**
Stanton Fitzwarren STW*	Trib Of Bydemill Brook/Land	**31**	**51.5 hrs**
Chisledon storm tanks*	N/A	**43**	**451.8 hrs**
Broome (attenuation tank)	River Ray/Ditch	**60**	**514.1 hrs**
Highworth STW			
Highworth WWTW	Westrop Brook	**297**	**3961.7 hrs**
Kilda Road (Highworth) SPS	Westrop Brook	**0**	**0 hrs**
Highworth Eastrop CSO (GWA site)	N/A	**139**	**193.6 hrs**
Wanborough STW			
Wanborough WWTW	Danes Brook	**477**	**7879.8 hrs**
Blunsdon STW			
Blunsdon WWTW	Tributary of Share Ditch	**49**	**389 hrs**
Shrivenham STW			
Shrivenham WWTW	Tuckmill Brook	**352**	**5671.2 hrs**
Marlborough STW			
Draycott Foliat SPS	River Ray	**1**	**8 hrs**
London Road (Marlborough) SPS	Kennet	**16**	**63.2 hrs**
Marlborough WWTW	Kennet	**633**	**10006.2 hrs**
Sevenhampton STW			
Sevenhampton Village WWTW	Trib. Of the River Cole	**493**	**9796.8 hrs**
Hannington (Wilts) STW			
CSI at Hannington	Bydemill Ditch	**82**	**213 hrs**

**Monitoring for storm overflow was installed and began in 2023*

Figure 4-1 and Figure 4-2 plot the annual spill count and annual spill duration respectively for each of the storm overflows listed in Table 4-2. Storm overflows with relatively low spill counts generally show no clear trend, with only minor annual fluctuations in spill frequency. In contrast, storm overflows with higher spill frequencies show a general decrease in spill counts between 2021 and 2022, followed by an increase between 2023 and 2024 and another reduction in 2025.

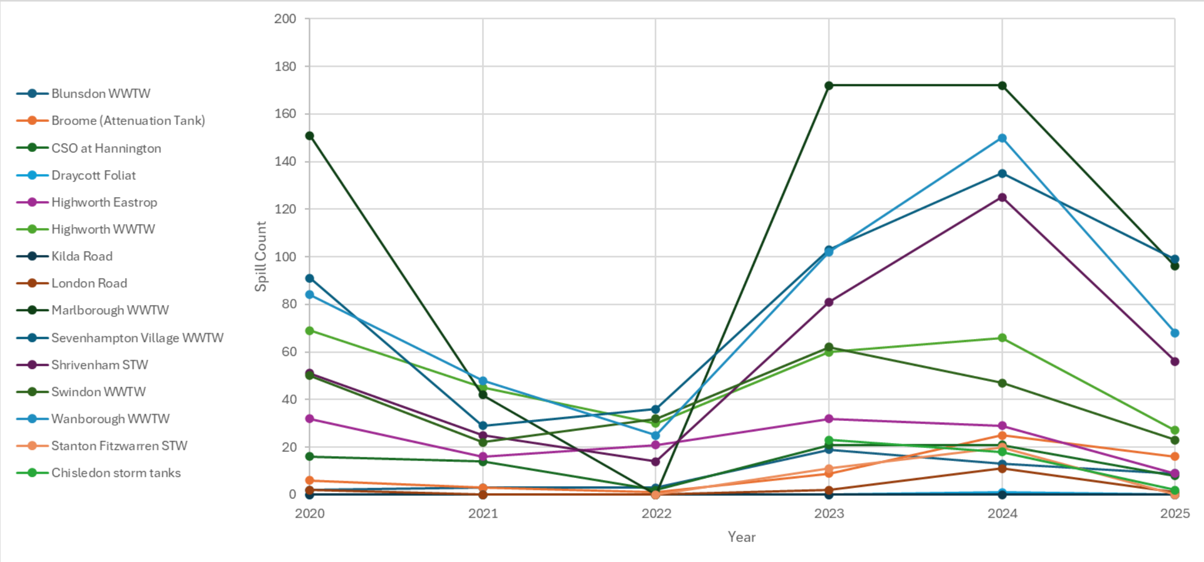

Figure 4-1 - Plot showing spill count (2020-2025) for storm overflows within STW catchments.

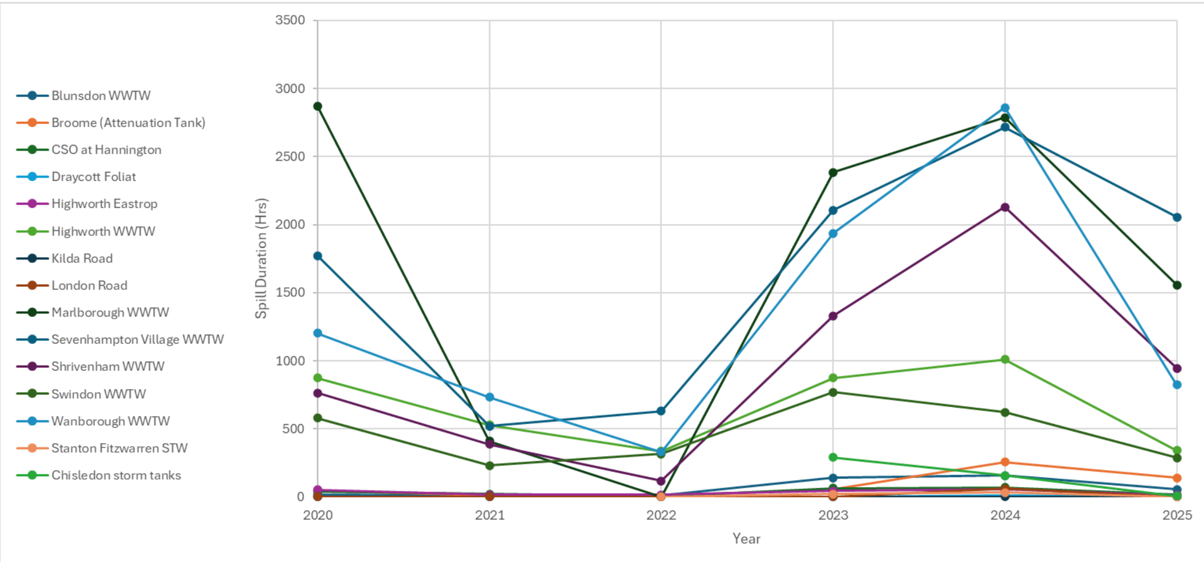

Figure 4-2 - Plot showing spill duration (2020-2025) for storm overflows within STW catchments.

The trends observed are likely to be influenced by the amount of rainfall each year, where 2023 and 2024 were wet years and 2021, 2022 and 2025 were dry. However the volume of spills annually highlight potential pressures on certain STWs serving the borough. It should be noted that in general the highest spilling sites cumulatively are located within the Marlborough, Sevenhampton, Wanborough and Highworth STW catchments. Marlborough only drains the village of Draycot Foliate in the Borough and largely serves areas in Wiltshire. Sevenhampton serves a limited area and no Local Plan development is proposed within its extent. In the Wanborough and Highworth catchments, a number of developments are planned, therefore development poses a greater risk to spill count and frequency. The same is true for the Swindon STW catchment where the largest quantum of development is proposed.

From Thames Water's perspective, planned infrastructure upgrades to increase capacity, combined with potential increases in permitted DWF, could improve headroom and reduce the frequency of storm overflow spills. Further opportunities to reduce storm overflow spills include the use of remote sensors and smart technologies to monitor flows and optimise the distribution of wastewater within the sewer network, thereby reducing the risk of sewer flooding and spills. Thames Water, in conjunction with the EA, is responsible for monitoring storm overflow performance and identifying opportunities to address poorly performing overflows.

For SBC, it is important that development is appropriately phased to allow the necessary infrastructure upgrades to be implemented and to avoid development exceeding available network capacity. In addition, the implementation of effective SuDS within new developments can help to reduce the volume of surface water entering the sewer network, thereby reducing hydraulic pressures and the potential for storm overflow spills. Opportunities for sewer separation could also be explored.

5 Water Quality Modelling

5.1 Introduction

An increase in the discharge of effluent from STWs because of 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 water body or for each of the individual elements assessed. Table 5-1 defines each WFD classification status description. For this study, the elements assessed include the following:

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. Sewage 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 is 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.

Nitrates– Nitrates are inorganic chemical compounds composed of nitrogen and oxygen, with the chemical formula NO_3. Human-made contamination stems heavily from fertilizers, livestock manure and sewage. It is not one of the individual elements assessed by the WFD.

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.

Total Phosphorous- Total phosphorus is the sum of all phosphorus in a sample, including dissolved and particulate forms. It is a key measurement used to assess water quality and wastewater treatment. Sewage, fertilizer and urban runoff are key human-made sources. It is not one of the individual elements assessed by the WFD.

The impact of development on these elements has been determined by undertaking water quality modelling.

Table 5-1 - Definition of status in Water Framework Directive

Status/Class	Definition
High	Near natural conditions. No restriction on the beneficial uses of the waterbody. 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 waterbody. 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 waterbody. 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 waterbody. 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 waterbody. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

When the scale of development is predicted to cause a significant deterioration in water quality, a variation in the STW’s Environmental Permit to improve the quality or reduce the volume of the final effluent and prevent deterioration will be required. In addition to safeguarding against deterioration, the WFD aims for all surface water bodies to achieve good ecological status. Consequently, the EA considers this objective, alongside the need to meet other river quality targets when setting or varying a permit.

The standard framework for how the requirements and aims of the WFD should be implemented on inland waters has been set out by the EA. The potential impact of development is assessed in relation to the following criteria:

- **Could the development cause a deterioration in WFD status of any element assessed?** This is a requirement of the WFD to prevent a deterioration in status of individual contaminants.
- **Could the development alone prevent the receiving watercourse from reaching good ecological status?**

  This is a requirement of the WFD, it assesses whether good ecological status is possible after development with current technology or is technically possible when considering technically achievable limits (TALs) for wastewater treatment.
- **Could the development cause a greater than 10% deterioration in water quality?** This objective is to ensure that all the environmental capacity is not taken up by one stage of development and ensure there is sufficient capacity for future development. It is assessed against current technology and TALs.

To assess these three criteria, the EA's SIMCAT model for the River Thames has been used. This has included a review of the model, baseline model runs, post-development model runs with current technology, and post-development model runs considering TALs.

5.2 Review of EA SIMCAT River Thames Model

The EA's water quality river model SIMCAT (Simulation of Catchments) is a crucial tool for setting and reviewing discharge permits at a catchment scale and to quantify the source apportionment of both point and diffuse pollutant load within receiving watercourses.

In terms of wastewater, SIMCAT has been used for calculating the impact of discharges from STWs at a catchment scale and is often used to determine the permit standards required to meet the WFD's targets and requirements.

Driven by summary statistics defining the mean and standard deviations of flow and quality, SIMCAT uses Monte Carlo simulation to predict in-river summary statistics. Monte Carlo Simulation uses repeated random sampling to obtain the likelihood of a range of results of occurring.

In this study, the EA provided the SIMCAT model for the River Thames in April 2026. It has been run using SIMCAT v15.7. The EA has confirmed that the model has been calibrated, focusing on model structure, travel times, and river flow and diffuse loading methodologies. While calibration has been undertaken at sub-catchment and waterbody scales, the EA cannot guarantee that all river reaches are fully calibrated.

To assess whether the model was fit for purpose at the reach scale, the modelled results were compared to the observed results at the water quality points closest (in terms of distance downstream) to each of the 6 STWs assessed.

The modelled and observed mean and 90th percentile values for Ammonia, BOD, nitrate, orthophosphate and total phosphorus were compared and in general showed a good level of agreement, confirming that the model is fit for purpose (see Table 5-2).

Table 5-2 - Modelled and Observed Water Quality Values (mg/l)

Determinant	Swindon Model	Swindon Obs	Highworth Model	Highworth Obs	Wanborough Model	Wanborough Obs	Blunsdon Model	Blunsdon Obs	Shrivenham Model	Shrivenham Obs	Marlborough Model	Marlborough Obs
Mean												
Ammonia	0.15	0.06	0.73	0.30	0.18	.18	0.09	0.09	0.10	0.09	0.05	0.04
BOD	2.32	2.72	3.62	3.98	1.86	N/A	0.57	N/A	1.31	N/A	0.96	N/A
Nitrate	19.70	N/A	15.50	N/A	9.22	9.15	10.20	15.00	9.07	11.20	6.08	7.53
Phosphate	0.63	0.24	1.95	1.27	0.80	1.33	1.22	1.47	0.70	0.70	0.05	0.06
Total P	0.59	0.68	2.19	1.61	1.31	N/A	0.73	N/A	0.91	N/A	0.22	N/A
90th Percentile												
Ammonia	0.20	0.11	1.68	0.67	0.36	0.37	0.19	0.19	0.19	0.17	0.09	0.06
BOD	3.42	4.07	6.05	6.97	2.85	N/A	0.92	N/A	1.91	N/A	1.47	N/A
Nitrate	30.80	N/A	22.60	N/A	16.00	12.90	20.90	26.00	15.10	15.80	10.00	8.19
Phosphate	1.60	0.48	3.27	2.44	1.40	2.33	2.36	3.13	1.26	1.33	.094	0.09
Total P	0.98	1.54	3.58	2.98	2.43	N/A	1.32	N/A	1.56	N/A	0.40	N/A

In terms of the WFD classifications, the 2019 classifications already contained in the EA's SIMCAT model have been used. However, a review has been undertaken at all the STWs comparing the latest 2025 classifications against the 2019 classifications applied. This has identified whether there has been a change in WFD class for any of the metrics assessed. Where a change is identified, the potential implications on water quality and development are considered. Table 5-3 lists the receiving watercourses and associated WFD waterbody for each STW.

Table 5-3 - Receiving watercourse and WFD waterbody for each STW

STW Name	Receiving Watercourse	WFD Waterbody
Swindon STW	River Ray	Ray (Wiltshire) source to Lydiard Brook
Highworth STW	Westrop Brook	Westrop Brook
Wanborough STW	Danes Brook	Liden Brook, Swindon
Blunsdon STW	Tributary of share ditch	Share ditch
Shrivenham STW	Tuckmill Brook	Tuckmill Brook and tributaries
Marlborough STW	Kennet	Middle Kennet (Marlborough to Hungerford)

The overall ecological classification and the specific classifications for the determinants assessed in this study are reviewed where possible. Note, at the majority of the water bodies, BOD is not monitored. The 2019 and 2025 chemical classifications are not compared, given changes to assessment method between the two cycles.

Table 5-4 compares the 2019 and 2025 WFD classifications, where class changes have occurred, these are highlighted in bold text.

Table 5-4 - Comparison between 2019 and 2025 WFD Classifications

WFD Waterbody	Classification	Ecological	Ammonia	Phosphate	BOD
Ray (Wiltshire) source to Lydiard Brook	2019	Poor	High	Moderate	-
	2025	Poor	High	Moderate	High
Westrop Brook	2019	Moderate	Poor	Bad	-
	2025	Moderate	**Good**	Bad	Good
Liden Brook, Swindon	2019	Poor	Good	Bad	-
	2025	Poor	**Moderate**	**Moderate**	High
Share ditch	2019	Moderate	High	Bad	-
	2025	Moderate	High	Bad	-
Tuckmill Brook and tributaries	2019	Poor	High	Poor	-
	2025	Poor	High	**Good**	High
Middle Kennet (Marlborough to Hungerford)	2019	Good	High	Good	-
	2025	Good	High	Good	High

Of the six assessed WFD water bodies: The Ray (Wiltshire), Share ditch and Middle Kennet (Marlborough to Hungerford) saw no change in WFD status of the assessed elements between 2019 and 2025. These are the receiving watercourses for Swindon STW, Blunsdon STW and Marlborough STW, respectively.

The Westrop Brook WFD water body (associated with the Highworth STW) saw an improvement from poor to good in ammonia concentrations between 2019 and 2025. The cause of this improvement is likely due to improvements in effluent discharge from the Highworth STW, where a major plant overhaul occurred in 2018, which may have caused the betterment in ammonia.

The Liden Brook, Swindon WFD water body, which is associated with the Wanborough STW, experienced a deterioration in ammonia concentrations, from good to moderate, alongside an improvement in phosphate concentrations, from bad to moderate. The improvement in phosphate status may be associated with a reduction in the phosphate load discharged from Wanborough STW between 2019 and 2025. In 2019, sewage discharge was identified as a reason for the water body failing to achieve good status. Diffuse agricultural pollution was also identified as a contributing factor and may have influenced the observed changes in phosphate concentrations.

For ammonia, the reasons for the water body not achieving good status in 2025 have not been provided. However, the deterioration could also be associated with changes in sewerage and agricultural loads. Continued management of both point-source sewage and diffuse agricultural pollution will therefore be important to safeguard and improve water quality within the catchment.

The Tuckmill Brook and tributaries WFD water body (associated with the Shrivenham STW) saw an improvement in phosphate concentrations from poor to good between 2019 and 2025, with the ecological and ammonia classifications remaining the same. The catchment data explorer cites point discharges from STWs as responsible for phosphate quality.

Overall, there is good agreement for 2019 and 2025 classification and where there are difference the 2019 classifications tend to represent a worst-case scenario allowing for a precautionary approach.

5.3 Review of TALs against existing effluent quality

Once the model had been confirmed as fit for purpose, the existing effluent quality values at each STW (contained in the SIMCAT data files provided by the EA) were compared to the proposed TAL values for ammonia, BOD, nitrate and total phosphorous. Orthophosphate was not included as there are no proposed TAL values for this determinant. The proposed TALs for ammonia and BOD relate to the 95th percentile whilst the TALs for nitrate and total phosphorous are related to the mean values.

The SIMCAT model provides a mean value and standard deviation for each determinant. To allow a comparison of the existing effluent quality to the TALs for ammonia and BOD, it was necessary to estimate the 95th percentile values for the existing effluent quality. This was achieved using the RQP software[17], it applies Monte Carlo methods which consider the mean, standard deviation and number of samples associated with a determinant before estimating the relevant percentiles. For the determinants assessed in this study a log-normal distribution was assumed.

The results of this exercise are shown in Table 5-5. These show that in most cases the TAL values for effluent quality were better than the existing effluent quality values at the STWs, these are marked as green in the table. There were some exceptions, at Swindon STW, Blunsdon STW and

[17] Environment Agency. 2025. *RQP_v6c. Available at:* https://github.com/DEFRA/rqp-mper/tree/main/executables/Files

Shrivenham STW the existing effluent concentrations are lower than the TAL values for some of the determinants. These are marked in red in the table. In these cases, it is important to note that TALs are not theoretical maximums, but rather the levels that can be reliably achieved in practice using standard wastewater treatment processes. At certain sites, the incoming pollutant loads for certain determinants may be lower than elsewhere, meaning effluent quality could exceed the TALs.

The approach taken updates all existing effluent values to the TAL values even where the existing values show lower concentrations. This means that applying the standard TAL values at such sites represents a deterioration in effluent quality for some determinants, potentially leading to a decline in water quality in the receiving watercourse.

Table 5-5 - Comparison of the existing STW effluent quality and TAL Values

STW Name	Determinant	Existing effluent (mg/l)	TAL values (mg/l)
Swindon STW	Ammonia (95-percentile)	0.18	1.0
	BOD (95-percentile)	4.56	5.0
	Nitrate (Mean)	25.00	10.0
	Total Phosphorous (Mean)	0.78	0.25
Highworth STW	Ammonia (95-percentile)	2.29	1.0
	BOD (95-percentile)	8.32	5.0
	Nitrate (Mean)	17.53	10.0
	Total Phosphorous (Mean)	2.26	0.25
Wanborough STW	Ammonia (95-percentile)	2.68	1.0
	BOD (95-percentile)	15.20	5.0
	Nitrate (Mean)	23.70	10.0
	Total Phosphorous (Mean)	6.00	0.25
Blunsdon STW	Ammonia (95-percentile)	0.46	1.0
	BOD (95-percentile)	3.25	5.0
	Nitrate (Mean)	25.65	10.0
	Total Phosphorous (Mean)	6.00	0.25
Shrivenham STW	Ammonia (95-percentile)	0.68	1.0
	BOD (95-percentile)	5.78	5.0
	Nitrate (Mean)	11.51	10.0
	Total Phosphorous (Mean)	3.14	0.25
Marlborough STW	Ammonia (95-percentile)	1.70	1.0
	BOD (95-percentile)	6.26	5.0
	Nitrate (Mean)	12.03	10.0
	Total Phosphorous (Mean)	0.32	0.25

5.4 Model Results

The SIMCAT model was subsequently run for three scenarios, i). a baseline considering the averaged 2020-2024 Q80 values with current technology applied, ii). a post-development scenario considering growth up to 2043 with current technology applied and iii). a post-development scenario considering growth up to 2043 with TALs applied.

Table 5-6 compares the existing flows in the SIMCAT model against the updated 2023-2025 baseline Q80 flows and the post-development flows.

Table 5-6 - Comparison between existing, baseline (20-24) and post-development Q80 flows (m^3/day)

STW Name	Existing	Baseline (2020-2024)	Post-Development (2043)
Swindon	52857	49659	59064
Highworth	1804	1887	2264
Wanborough	707	557	764
Blunsdon	516	516	642
Shrivenham	2075	1878	1919
Marlborough	8833	8659	8676

For the final post-development run with TALs applied, the effluent quality at each STW was updated to match the TALs for ammonia, BOD, nitrate and total phosphorous. Total phosphorus and orthophosphate levels are not linked in the model, so orthophosphate is insensitive to the application of the TAL for phosphorous. However, in reality if the removal of total phosphorous is improved at a STW it should also lead to a lowering of orthophosphate which is a phosphorous compound which is included in the measurement of total phosphorous.

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 post-development runs with current technology has been estimated. It has then been 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. Table 5-7 shows the orthophosphate to total phosphorous ratios estimated and applied at each of the STWs.

Table 5-7 - Orthophosphate/Total Phosphorous Ratios

STW Name	Parameter	Post-Development water quality (mg/l)	Orthophosphate/ Total Phosphorous
Swindon	Orthophosphate (Mean)	0.642	1.165
	Total Phosphorous (Mean)	0.551	
Highworth	Orthophosphate (Mean)	1.97	0.89
	Total Phosphorous (Mean)	2.21	
Wanborough	Orthophosphate (Mean)	0.848	0.624
	Total Phosphorous (Mean)	1.36	
Blunsdon	Orthophosphate (Mean)	2.60	0.893
	Total Phosphorous (Mean)	2.91	
Shrivenham	Orthophosphate (Mean)	0.655	0.762
	Total Phosphorous (Mean)	0.860	
Marlborough	Orthophosphate (Mean)	0.0621	0.289
	Total Phosphorous (Mean)	0.215	

Table 5-8 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. Values are presented in bold where there has been a WFD status change relative to the baseline WFD status. The key findings from the post-development runs with TALs applied are summarised after the table.

Table 5-8 - Comparison of Baseline, Post-Development (Current) & Post-Development (TALs applied) results.

STW Name	Parameter	Baseline Existing water quality (mg/l)	Post-Dev water quality (mg/l)	Post-Dev water quality TALs applied (mg/l)
Swindon	Ammonia (90-percentile)	0.195	0.193	**0.906**
	BOD (90-percentile)	3.430	3.520	2.450
	Nitrate (Mean)	19.700	20.400	8.490
	Orthophosphate (Mean)	0.619	0.642	0.407
	Total Phosphorous (Mean)	0.552	0.551	0.349
Highworth	Ammonia (90-percentile)	1.900	1.910	1.540
	BOD (90-percentile)	6.610	6.660	**3.480**
	Nitrate (Mean)	17.100	17.200	9.850
	Orthophosphate (Mean)	1.960	1.970	**0.227**
	Total Phosphorous (Mean)	2.200	2.210	0.255
Wanborough	Ammonia (90-percentile)	0.331	0.369	**0.277**
	BOD (90-percentile)	2.570	2.990	1.940
	Nitrate (Mean)	8.830	9.370	7.640
	Orthophosphate (Mean)	0.664	0.848	0.398
	Total Phosphorous (Mean)	1.180	1.360	0.638
Blunsdon	Ammonia (90-percentile)	0.321	0.323	**0.663**
	BOD (90-percentile)	2.110	2.150	2.210
	Nitrate (Mean)	16.000	17.000	9.430
	Orthophosphate (Mean)	2.320	2.600	**0.132**
	Total Phosphorous (Mean)	2.600	2.910	0.148
Shrivenham	Ammonia (90-percentile)	0.178	0.180	**0.318**
	BOD (90-percentile)	1.880	1.880	1.410
	Nitrate (Mean)	9.000	9.010	8.700
	Orthophosphate (Mean)	0.642	0.655	**0.158**
	Total Phosphorous (Mean)	0.847	0.860	0.207
Marlborough	Ammonia (90-percentile)	0.216	0.216	0.184
	BOD (90-percentile)	1.670	1.670	1.480
	Nitrate (Mean)	7.380	7.380	7.100
	Orthophosphate (Mean)	0.062	0.062	0.060
	Total Phosphorous (Mean)	0.215	0.215	0.206

WFD Status
High
Good
Moderate
Poor
Bad

Baseline Results

- The baseline model results for ammonia indicate that the WFD status achieved by the 6 STWs is mixed; with three waterbodies achieving high status, two achieving good status, and one (Westrop Brook, associated with Highworth STW) achieving a poor status for ammonia.
- The baseline model results for BOD indicate that for five of the six STWs the receiving watercourse achieves high WFD status. The one outlier is again the Westrop Brook, associated with Highworth STW, where the baseline modelled results showed a poor WFD status.
- The baseline results for Nitrate indicate that for all 6 STWs, the receiving watercourses would be classified as Poor based on the Freshwater Watch standards (Nitrate is not defined in the WFD).
- The baseline model results for orthophosphate indicate that for only 1 STW (Marlborough), the receiving watercourse achieves a High WFD status. Receiving watercourses downstream of Shrivenham, Wanborough and Swindon STWs have a poor status, while receiving watercourses for Blunsdon and Highworth STWs have a bad WFD status.

Post- Development Results

- The post-development modelling results for ammonia indicate a modest increase in ammonia concentrations downstream of 4 of the 6 STWs (Highworth, Wanborough, Blunsdon and Shrivenham). The WFD status remains unchanged from the baseline in all four scenarios. At the remaining two STWs, there is either no change in ammonia concentration or a reduction in concentration. This is attributed to the effluent's ammonia concentration being similar to, or lower than, that of the receiving watercourse.

- The post-development modelling results for BOD indicate modest increases downstream of 4 of the 6 STWs (Swindon, Highworth, Wanborough and Blunsdon STWs). In all of these cases, the WFD status remains unchanged from the baseline. At the remaining two STWs, BOD is unchanged from the baseline value. This is attributed to the effluent's BOD being similar to that of the receiving watercourse.
- The post-development modelling results for nitrate indicate modest increases downstream of 5 of the 6 STWs. At the remaining STW (Marlborough) there is no change in nitrate concentrations. This is attributed to only a small change in flow volume given the scale of development in this catchment. All receiving watercourses remain at Poor status according to the Freshwater Watch standards.
- The post-development model results for orthophosphate show an increase in concentrations at 5 of the 6 STWs. In all cases, the WFD status remains unchanged from the baseline. At the Marlborough STW, there is no change in orthophosphate, this is thought to be due to limited new development draining into the STW
- The post-development model results for total phosphorus shows an increase in concentrations at 4 of the 6 STWs. At the Marlborough STW, there is no change in total phosphorous for similar reasons to those outlined above. At the Swindon STW, there is a small decrease in concentration of total phosphorus, this is attributed to the effluent's phosphorus concentration being smaller to that of the receiving watercourse.

Post-Development Results with Application of TALs

- The post-development modelling results with TALs applied indicate a reduction or no change in downstream ammonia concentrations compared with the baseline scenario at 3 of the 6 STWs (Highworth, Wanborough and Marlborough STWs). For the Wanborough STW, application of the TAL results in a change in WFD status from good to high, the remaining two STWs where a decrease in concentration occurs see no change in WFD status.
- For the remaining 3 STWs (Swindon, Blunsdon and Shrivenham) downstream ammonia concentrations increase under the TAL scenario relative to both the baseline and post-development scenario. This is expected because they have existing effluent ammonia quality that is better than the applicable TAL. As such, the TAL scenario represents a deterioration in effluent quality and is not considered representative of future treatment potential at these sites.
- The post-development modelling results with TALs applied indicates a reduction or no change in downstream BOD compared with the baseline scenario at 5 of the 6 STWs. The determinant's WFD status downstream remains the same at Swindon, Wanborough, Shrivenham and Marlborough STWs. However, a betterment in WFD status from poor to good is modelled at Highworth STW.
- Blunsdon STW predicts an increase in BOD following the application of the TALs. This is expected because Blunsdon STW has existing effluent BOD quality that is better than the applicable TAL. As such, the TAL scenario represents a deterioration in effluent quality and is not considered representative of future treatment potential at these sites.
- The post-development modelling results with TALs applied indicate a reduction in downstream nitrate concentrations relative to the baseline scenario at all six of the STWs. However, they would be classified as Poor based on the Freshwater Watch standards
- The post-development modelling results with TALs applied indicate a reduction or no change in downstream total phosphorus and orthophosphate concentrations relative to the baseline scenario at all 6 STWs. At Highworth, Blunsdon and Shrivenham STWs, these reductions result in an improvement in the baseline WFD status for orthophosphate.

5.5 Water Quality Deterioration

Following the generation of the model results, the percentage change in the five assessed parameters (ammonia, BOD, nitrate, orthophosphate and total phosphorous) was calculated to determine if development caused a greater than 10% deterioration in water quality. This is a key requirement when assessing water quality with respect to the WFD. The level of deterioration has been estimated both with current technology and with TALs applied. Table 5-9 presents the water deterioration results at each of the STWs. Values highlighted in yellow denote where there has been a greater than 10% deterioration. The key findings are summarised after the table.

Table 5-9 - Comparison of Baseline, Post-Development (Current) & Post-Development (TALs applied) results

STW name	Parameter	BSC-PDP % change	BSC-PDP (TALs) % change
Swindon	Ammonia (90-percentile)	-1.03	**364.62**
	BOD (90-percentile)	2.62	-28.57
	Nitrates (Mean)	3.55	-56.90
	Orthophosphate (Mean)	3.72	-34.25
	Total Phosphorous (Mean)	-0.18	-36.78
Highworth	Ammonia (90-percentile)	0.53	-18.95
	BOD (90-percentile)	0.76	-47.35
	Nitrates (Mean)	0.58	-42.40
	Orthophosphate (Mean)	0.51	-88.42
	Total Phosphorous (Mean)	0.45	-88.41
Wanborough	Ammonia (90-percentile)	**11.48**	-16.31
	BOD (90-percentile)	**16.34**	-24.51
	Nitrates (Mean)	6.12	-13.48
	Orthophosphate (Mean)	**27.71**	-40.06
	Total Phosphorous (Mean)	**15.25**	-45.93
Blunsdon	Ammonia (90-percentile)	0.62	**106.54**
	BOD (90-percentile)	1.90	4.74
	Nitrates (Mean)	6.25	-41.06
	Orthophosphate (Mean)	**12.07**	-94.31
	Total Phosphorous (Mean)	**11.92**	-94.31
Shrivenham	Ammonia (90-percentile)	1.12	**78.65**
	BOD (90-percentile)	0.00	-25.00
	Nitrates (Mean)	0.11	-3.33
	Orthophosphate (Mean)	2.02	-75.39
	Total Phosphorous (Mean)	1.53	-75.56
Marlborough	Ammonia (90-percentile)	0.00	-14.81
	BOD (90-percentile)	0.00	-11.38
	Nitrates (Mean)	0.00	-3.79
	Orthophosphate (Mean)	0.00	-3.23
	Total Phosphorous (Mean)	0.00	-4.19

Results Summary

- When considering current technology, four of the receiving water bodies associated with the following STWs: Swindon, Highworth, Shrivenham and Marlborough STWs show no downstream water quality deteriorations of >10% as a result of future development.
- The two exceptions to this are the Wanborough and Blunsdon STWs. The receiving watercourse for the Wanborough STW shows over a 10% increase in ammonia, BOD, orthophosphate and total phosphorus concentrations, while the receiving watercourse for the Blunsdon STW sees an >10% increase in concentrations for orthophosphate and total phosphorus.
- With application of TALs the deteriortaton observed at Wanborough and Blunsdon STWs are reversed with an improvement in water quality.
- The runs which include the TAL show a more than 10% deterioration ammonia concentration at Swindon, Blunsdon and Shrivenham STWs. The changes are because the current-technology effluent quality is better than the applicable TAL. Consequently, the TAL scenario does not provide a realistic representation of future treatment performance at these sites.

5.6 Review against WFD Criteria

The aims of the WFD are to enhance the status and prevent further deterioration of water bodies and their ecosystems. The water quality modelling results have been used to assess the following criteria:

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

Table 5-10 summarises the modelling results for each of these criteria. A green, amber, or red rating has been assigned to each criterion, reflecting the extent of the barriers to future development at each STW. As noted previously, the WFD does not specify environmental quality standards for nitrate. Consequently, nitrate results are not assessed against the criteria presented in the table; instead, they are discussed separately following the table.

Table 5-10 - Summary of modelling results in relation to water quality objectives

Key	
Key (green)	No infrastructure upgrade required to achieve water quality objective.
Key (amber)	Infrastructure upgrade required to achieve water quality objective, but achievable using TALs or other factors preventing objectives.
Key (red)	Water quality objective cannot be achieved using TALs. Environmental capacity could be a constraint on growth.

STW name	Could development cause a greater than 10% deterioration in water quality?	Could development cause a deterioration in WFD Class of any element?	Could development prevent the receiving waterbody from achieving Good Status?
Swindon	Predicted deterioration is <10%.	No WFD class deterioration is predicted.	The receiving water body currently is classified as having a High status for ammonia and BOD, with Poor status for orthophosphate. These statuses remain the same following development which has a limited impact on concentrations. Because of this development is not thought to prevent Good Status for orthophosphate, rather it is not achievable due to existing levels in the catchment.
Highworth	Predicted deterioration is <10%.	No WFD class deterioration is predicted.	The receiving water body currently is classified as having a Poor status for ammonia and BOD and Bad status for orthophosphate. These statuses remain the same following development which has a limited impact on concentrations. Because of this development is not thought to prevent Good Status, rather it is not achievable for ammonia and orthophosphate due to existing levels in the catchment. A good status for BOD is achievable if TALs are applied.
Wanborough	Predicted deterioration is greater than 10% for ammonia, BOD, orthophosphate, and total phosphorus. Deterioration is reversed with application of TALs.	No WFD class deterioration is predicted.	The receiving water body is currently classified as Good for ammonia, High for BOD, and Poor for orthophosphate. These classifications are expected to remain unchanged following the development, which is predicted to have a limited impact on receiving water concentrations. Development is therefore not considered to prevent the achievement of Good Status for orthophosphate; rather, this is currently constrained by elevated existing concentrations in the catchment. SIMCAT outputs indicate that urban runoff and agriculture are also significant sources of orthophosphate. Therefore, management of these sources, alongside improvements to the STW, will be important to support future achievement of Good Status.

Blunsdon	Predicted deterioration is greater than 10% for orthophosphate and total phosphorus. Deterioration is reversed with application of TALs.	No WFD class deterioration is predicted.	The receiving water body currently is classified as having a Good status for ammonia, a High status for BOD and a Bad status for orthophosphate. These statuses remain the same following development which has a limited impact on concentrations. Because of this development is not thought to prevent Good Status for orthophosphate, rather it is not achievable due to existing levels in the catchment.
Shrivenham	Predicted deterioration is <10%.	No WFD class deterioration is predicted.	The receiving water body currently is classified as having a High status for ammonia and BOD and a Poor status for orthophosphate. These statuses remain the same following development which has a limited impact on concentrations. Because of this development is not thought to prevent Good Status for orthophosphate, rather it is not achievable due to existing levels in the catchment.
Marlborough	Predicted deterioration is <10%.	No WFD class deterioration is predicted.	The receiving water body is currently classified as having a High Status for ammonia, BOD and orthophosphate. This remains the case following development.

In terms of nitrate, based on the Freshwater Watch thresholds, all the receiving watercourses have Poor status (>2.0 mg/l) across the scenarios assessed. This runs counter to the High WFD status achieved for the other determinants.

The high levels of nitrate in the watercourses across the borough are thought to be partly caused by many of the stream catchments being groundwater-fed and agricultural runoff in the Upper Thames catchment. Nitrate levels are frequently higher in groundwater than surface water due to slower natural breakdown, direct downward leaching from fertilisers and lack of sunlight and oxygen required for denitrification.

The impact of future development on nitrate is limited; the most significant deterioration is at Blunsdon STW where there is a 6.25% increase in nitrate concentration. At many of the STWs, concentrations remain unchanged or increase negligibly. This is attributed to the effluent's nitrate concentration being similar to that of the receiving watercourse.

Taking all of this into account, although nitrate concentrations indicate Poor status, future development is not considered to be a significant barrier to improving these. Instead, agricultural sources, together with the groundwater-fed nature of many of the borough's watercourses, are considered the primary constraints on reducing nitrate concentrations.

5.7 AMP8 Schemes

Table 5-11 below lists the proposed AMP8 schemes affecting each of the nine STWs within Swindon Borough. Where an STW is not included in the table, no AMP8 schemes have been identified for that STW. The majority of the AMP8 schemes identified for the relevant STWs comprise investigations into storm overflows or updates to monitoring equipment. While these schemes are potentially important, their impact on downstream water quality is currently unknown and cannot be determined using the assessments undertaken as part of this study.

As part of AMP8, four STW improvement schemes have been identified: one at Swindon STW, two at Highworth STW and one at Shirivenham STW. The schemes at Swindon STW and Highworth STW focus on improving phosphorus removal. Two of the schemes, one at Swindon STW and one at Highworth STW, aim to reduce phosphorus concentrations to 0.25 mg/L at the 95th percentile. This is the same phosphorus concentration applied in the TAL runs; therefore, the water quality modelling outputs with TALs applied can be considered representative of the expected water quality following completion of these AMP8 schemes.

The post-development modelling results with TALs applied indicate reductions in downstream total phosphorus and orthophosphate concentrations at both STWs. At Highworth, these reductions result in an improvement in the baseline WFD status for orthophosphate, from Bad to Moderate. At Swindon, despite the improvement in effluent quality, the baseline WFD status for orthophosphate remains unchanged.

The second scheme at Highworth also aims to limit phosphorus concentrations, but this is not defined in terms of the 95th percentile. Instead, the scheme relates to the maximum allowable phosphorus concentration during high-flow events. The AMP8 scheme aims to reduce the maximum allowable concentration to 2 mg/L.

The scheme at Shrivenham STW relates to a storm overflow upstream of the STW with improved storage planned as mitigation against overspilling. This scheme was reviewed in section 3.5.

Table 5-11 - Planned AMP8 Schemes

Location	Type	Description
Swindon STW		
Chisledon Storm Tanks	Investigation	Storm Overflows Investigation
Swindon STW	Investigation	Emerging substances investigation
Swindon STW	Monitoring	Storm overflow monitoring
Swindon STW	Monitoring	Urban flow monitoring
Swindon STW	Improvement	Reduce phosphorus loadings to 0.25 mg/l
Highworth STW		
Highworth STW	Investigation	Storm Overflows Investigation
Highworth STW	Monitoring	Storm overflow monitoring
Highworth STW	Monitoring	Urban flow monitoring
Highworth STW	Improvement	Reduce phosphorus loadings. 0.25 mg/l
Highworth STW	Improvement	2mg/l P limit.
Wanborough STW		
Wanborough STW	Monitoring	Storm overflow monitoring
Wanborough STW	Monitoring	Increased frequency in urban flow monitoring
Blunsdon STW		
Blunsdon STW	Monitoring	Storm overflow monitoring
Blunsdon STW	Monitoring	Urban flow monitoring
Shrivenham STW		
Shrivenham STW	Monitoring	Storm overflow monitoring
Shrivenham STW	Monitoring	Increased frequency in urban flow monitoring
Marlborough STW		
Draycott Foliat	Investigation	Storm Overflows Investigation
London Road, Marlborough SPS	Investigation	Storm Overflows Investigation
Marlborough STW	Monitoring	Storm overflow monitoring
Marlborough STW	Monitoring	Increased frequency in urban flow monitoring
Sevenhampton STW		
Sevenhampton STW	Investigation	Storm Overflows Investigation
Sevenhampton STW	Improvement	Storm Overflows Solution: 1,285m^3 storage.

5.8 Summary

The findings show that at all the STW the WFD objectives can be met either with no infrastructure improvements or infrastructure upgrades within current TALs. In many cases, timely interventions implemented by Thames Water and the EA are required to prevent deterioration; this will include improving the technology currently employed at the STWs. Before these improvements, environmental capacity could be a constraint on development in the immediate future, however through upgrades to wastewater infrastructure, development phasing and mitigation against other pollution sources, development should be possible moving through the plan period.

The assessments undertaken to date adopt a precautionary approach and assume that all development will come forward and be built out. Additionally, the assessments do not take into account any planned or longer-term increases in treatment capacity at the STW sites, which could allow STWs to store effluent for longer and maintain existing discharge volumes. The TALs applied are based on present day technology and technology may improve over the plan period to 2043. The timing of development will therefore be an important factor.

For many of the receiving watercourses, other pollution sources (e.g. agriculture, urban runoff) are also contributing reasons for the waterbodies not achieving Good Status. Therefore, reducing the contribution of other pollution sources should be 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[18].

In developing their Local Plan, SBC have proposed Policy INF2: Wastewater, Sewage Infrastructure and Water Supply which seeks to ensure new growth is sustainable and appropriately supported by adequate water supply and sewerage infrastructure. It is also recommended that SBC take the following actions:

- Consider potential impacts on WFD status when assessing planning applications in liaison with the EA and Thames Water. This is particularly the case for larger scale developments (>1000 Dwellings) where current environmental capacity could be a constraint on development.
- Development phasing and liaison with the EA and Thames Water should also be a key consideration when assessing planning applications for larger scale developments (>1000 Dwellings) in STW catchments draining to receiving watercourses with Bad to Poor Status. This includes the Dorn (Source to Glyme), the Evenlode (Glyme to Thames), Shill Brook and Tributaries and Thames (Evenlode and Thame) WFD waterbodies.
- Share Annual Monitoring Reports and Housing Land Supply Statements, which detail projected housing development in their administrative areas, with Thames Water.
- Provide a copy of the WCS to planning colleagues at neighbouring local authorities, Thames Water, the EA, and Wiltshire Council as the borough’s waste planning authority partner.

In response to these actions, Thames Water will need to assess growth demands as part of their wastewater asset planning activities and feedback to SBC if concerns arise. Thames Water will also need to secure relevant planning permissions to upgrade its wastewater facilities. Thames Water should work proactively with the EA as the principal environmental regulator for the water industry and SBC and Wilshire Council as the joint waste planning authority to do this.

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[18] 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 Odour Risk

STWs and other wastewater sites, like pumping stations and storm tanks, can sometimes be odour sources. They were originally built a significant distance away from urbanised areas; however, population growth means these once remote sites are now potential locations for development. Thames Water have guidance[19] for developments proposed near STWs and large pumping stations.

Thames Water aim to ensure all proposed developments near their wastewater sites are risk assessed and, where necessary, that developers fund any mitigation needed to enable them to build there. Developers should contact Thames Water to discuss any encroachment close to STWs prior to their submitting a planning application. In general, Thames Water will look closely at any proposals within either 800 metres of a STWs or 15 metres of a large sewage pumping station. The degree of odour complaint levels at the wastewater site will also be considered. This initial screening will then recommend whether further modelling work is needed.

In terms of the sites being brought forward in the Local Plan, Figure 6-1 shows the proposed site locations relative to each STW (with an 800m buffer added).

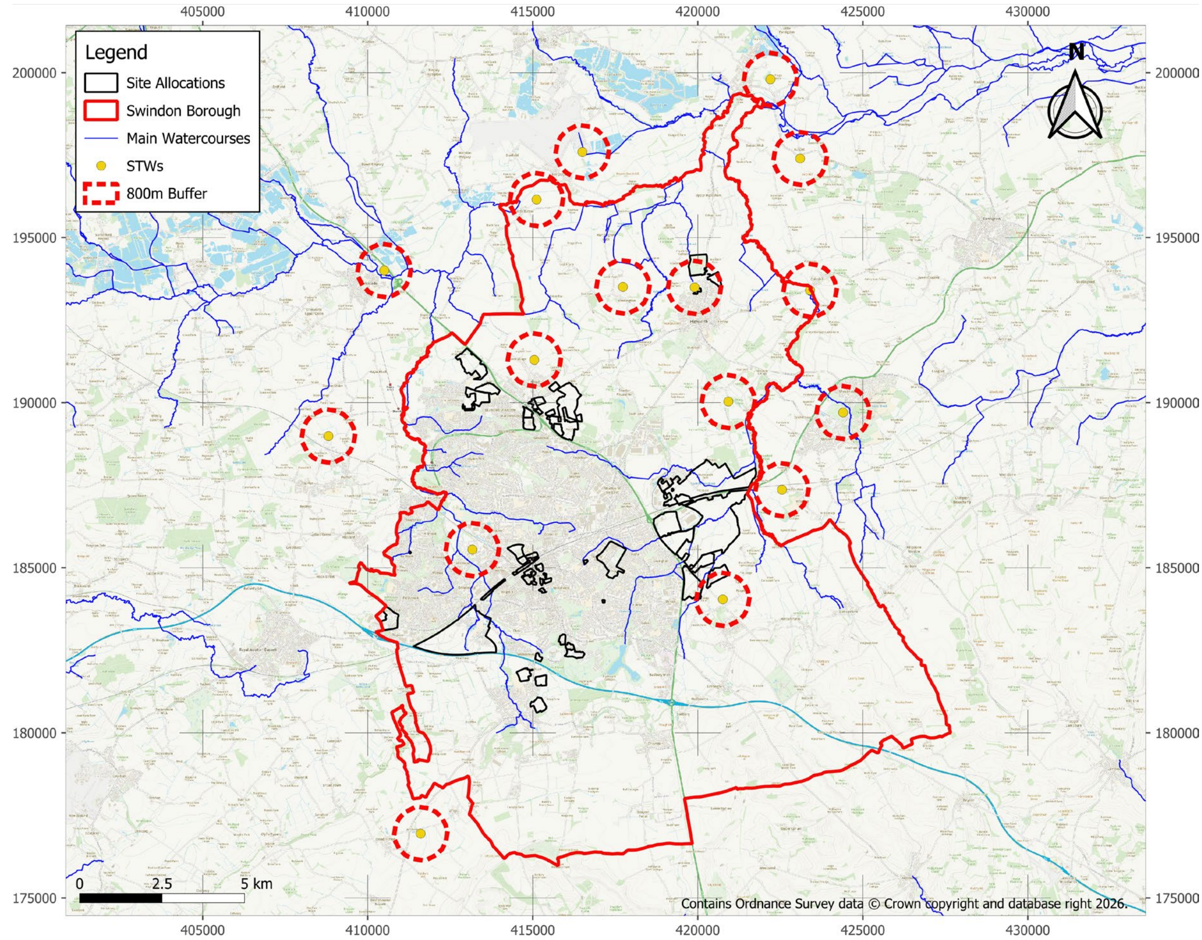

Figure 6-1- STWs with 800m buffer relative to site allocations

[19] Thames Water (2020) *Risk of Odour Encroachment* https://www.thameswater.co.uk/media-library/home/developers/larger-scale-developments/planning/water-and-wastewater-capacity/odour-encroachment-guidance.pdf

It has been estimated that 5 sites identified in the Local Plan falls within 800m of a Thames Water STW. Table 6-1 lists the sites falling within 800m of specific STWs.

Table 6-1- Sites within 800m of STWs

STW Name	Sites
Highworth	HW01, HW02 and HW03.
Wanborough	NEV07 and NEV08

At these sites odour risk could be a concern, and it should be assessed before the planning application stage. This will enable issues to be identified and resolved where possible, meaning fewer delays at the planning and construction stages. Typically, Thames Water undertake risk assessments in phases first by desktop and then sample surveys. If this shows the development is at odour risk based on their assessment criteria, they will object to the development. The developer must then submit an odour modelling assessment, in consultation with Thames Water. This assessment should typically consist of a full sample survey including source measurements at all relevant sources by olfactometry, followed by dispersion modelling. The odour assessment should be submitted to the Local Planning authority in support of the developer's planning application.

Where mitigation is required, the developer must fund this. It can be costly to reduce and treat odour. Two options are available to the developer, at-source and at-receptor solutions. At-source measures include increased maintenance of STW plant and equipment, covers for tanks, the use of enclosure and venting and end of pipe treatments (i.e. dilute, disperse or abatement). Mitigation options at-receptor include mechanical ventilation and design considerations; these considerations could include strategically placing sensitive buildings facing away from the odour source and implementing buffer zones, placing high sensitivity receptors (i.e. houses) outside the offending area.

7 Conclusions & Recommendations

Conclusions - Headroom Assessment and Storm Overflows

A headroom capacity assessment at 6 STWs within the borough has been undertaken. The assessment has sought to determine whether the STWs have sufficient headroom under current permits and capacity to process the predicted additional wastewater flows to 2043. To support the headroom assessments an accompanying review of storm overflows within each STW catchment was also undertaken.

- Blunsdon STW: Current DWF permit is forecast to be exceeded by >25% under Q80 by the end of the plan period (red). Under Q90, the exceedance is slightly below 25% (amber), indicating a significant risk of permit breaches.
- Swindon, Highworth, Wanborough and Marlborough STWs: Current DWF permits are forecast to be exceeded under Q80, although by less than 25%. Under Q90, exceedances are also predicted at all sites except Wanborough.
- Shrivenham STW: Current DWF permit is not forecast to be exceeded under either Q80 or Q90.
- Thames Water has planned capacity upgrades at Swindon, Highworth, Wanborough and Marlborough STWs. With the exception of Wanborough (planned for 2028) the timescales for the other schemes remain unclear.
- At Blunsdon STW an upgrade is underway to improve effluent quality, but it will not increase treatment capacity. No upgrades are planned at Shrivenham STW.
- The storm overflows within the STW catchments show spillage trends are influenced by the amount of rainfall each year. The total number of spills and total spill duration is considered high for many of the assessed storm overflows, with >10 spills annually being surpassed by a number of storm overflows. This tallies with the known issues with headroom at some of the STWs.

Recommendations - Headroom Assessment and Storm Overflows

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

- SBC will seek to protect and enhance water quality and to align the delivery of development with wastewater infrastructure being in place in accordance with Policy INF2 of the emerging Local Plan.
- SBC should consider the available STW capacity when phasing development in liaison with Thames Water. This is particularly important for larger scale developments (>1000 dwellings) in the STW catchments where capacity is most limited.
- SBC should provide Housing Land Supply Statements and Annual Monitoring Reports to Thames Water detailing projected housing growth in their administrative areas and larger scale developments coming forward.
- SBC should provide a copy of the WCS to planning colleagues at neighbouring authorities. A copy should also be provided to Thames Water and the EA.
- SBC should promote the use of SuDS and where appropriate sewer separation. This is in accordance with Policy CSE12 which makes SuDS mandatory in all major developments and non-major developments involving new buildings.
- Thames Water will need to invest in many of the STWs assessed to ensure compliance to 2043. Some of the STWs have been identified for upgrades in the early plan period, however further investment may be required later into the plan period.

- Thames Water will need to assess growth demands as part of their wastewater asset planning activities and feedback to SBC 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.

Conclusions - Water Quality Assessment

A water quality assessment at 6 STWs within the borough has been undertaken. The assessment sought to determine whether the proposed development is predicted to cause deterioration in water quality parameters. A baseline, post-development and post-development with TALs run was completed so that the difference in quality caused by the development could be simulated. The TALs run then simulates what could be achieved when applying the technically achievable limits to the treatment works.

- In terms of percentage deterioration, future development does not lead to a deterioration greater than 10% at 4 of the 6 STW.
- There are two STWs which are an exception; Wanborough and Blunsdon. Wanborough STW results show a >10% deterioration in all measured parameters bar nitrate, while Blunsdon showed a >10% deterioration for orthophosphate and total phosphorus. This result is reversed when TALs are applied.
- In terms of WFD deterioration, future development does not lead to a deterioration in WFD status for any of the elements assessed at all 6 of the STWs. The implementation of TALs results in betterment of WFD parameters for many of the sites.
- In terms of prevention from meeting Good WFD Status in the future, Good or High status remain for a number of parameters when factoring in development.
- Where this is not the case, the baseline status for the parameter is already below Good and development has a limited impact on concentrations. Therefore, development is not considered a barrier to preventing the receiving water body from achieving good status, instead it is existing pollutant levels within the WFD catchment.
- AMP8 schemes at Highworth and Swindon STWs reflect the modelled TAL values; therefore, no additional modelling was required. The schemes are expected to reduce downstream total phosphorus and orthophosphate concentrations. At Highworth, this improves the baseline WFD status for orthophosphate from Bad to Moderate, while the status at Swindon remains unchanged.
- Nitrate is not assessed as part of the WFD, however high nitrate levels are present in all assessed watercourses. This is primarily associated with agricultural sources and groundwater-fed catchments rather than future development, meaning agricultural management should be a key focus for improving environmental capacity.

Recommendations- Water Quality Assessment

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

- SBC, in liaison with the EA and Thames Water, should consider WFD status when assessing planning applications to ensure the water environment is protected. This is particularly relevant for large scale developments (>1000 Dwellings).
- SBC will need to share their Annual Monitoring Reports and Housing Land Supply Statements detailing projected housing development in their administrative areas with Thames Water.
- SBC should provide a copy of the WCS to planning colleagues at neighbouring authorities. A copy should also be provided to Thames Water and the EA.

- Where other pollution sources are contributing reasons for the waterbodies not achieving Good Status, the EA and other stakeholders including SBC should work to ensure measures to reduce their contributions are explored.
- 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.
- Thames Water will need to assess development demands as part of their wastewater asset planning activities and feedback to SBC if concerns arise.

Conclusions and Recommendations – Odour Risk

- Five sites identified in the Local Plan are located within 800 m of a Thames Water STW and may therefore be subject to odour risk. Further assessment may be required to determine whether development at these sites could be affected by odour from nearby wastewater infrastructure.
- Potential odour risks should be assessed before planning applications are submitted, with developers engaging Thames Water at an early stage.
- Where the initial assessment identifies a potential odour risk, detailed odour modelling should be undertaken and any necessary mitigation funded by the developer.
- Mitigation could include measures at the wastewater treatment works or design measures within the development, such as buffer zones and the positioning of sensitive receptors away from odour sources.

Appendix 1 – Development Technical Note