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Milton Keynes - Integrated Water Management Study - Phase 2

Final

A1-C03

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This report describes work commissioned by Milton Keynes City Council, by an instruction dated 07 July 2022. The Client's representative for the contract was Luke Gledhill of Milton Keynes City Council. Richard Pardoe and (name of second contributor) of JBA Consulting carried out this work.

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Abbreviations

ALS	Abstraction Licencing Strategy
AMP	Asset Management Plan
AMP8	Eighth Asset Management Plan period (runs 2025-2030)
AW	Anglian Water
BKTNEEC	Best Known Technology Not Entailing Excessive Costs
BNG	Biodiversity Net Gain
BRE	Building Research Establishment
CaBA	Catchment Based Approach
CAMS	Catchment Abstraction Management Strategy
CAPEX	Capital Expenditure
CFMP	Catchment Flood Management Plan
CIRIA	Company providing research and training in the construction industry
CIWEM	Chartered Institution of Water and Environmental Management
CSO	Combined Sewer Overflow (usually referred to as storm overflows)
DCG	Design and Construction Guidance
DEFRA	Department of the Environment, Food and Rural Affairs
DrWPA	Drinking Water Protected Areas
DWMP	Drainage and Wastewater Management Plan
DYAA	Dry Year Annual Average
EA	Environment Agency
EC	European Community
FCT	Favourable Condition Targets
FRA	Flood Risk Assessment
FWMA	Flood and Water Management Act
GEP	Good Ecological Potential
GES	Good Ecological Status
GIS	Geographical Information System
GWMU	Groundwater Management Unit
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HoF	Hands-off Flow
HoL	Hands-off Level
ID	Identifier
IWM	Integrated Water Management
JNCC	Joint Nature Conservation Committee

LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LNRS	Local Nature Recovery Strategy
LPA	Local Planning Authority
l/p/d	Litres per person per day
NBS	Nature Based Solutions
NE	Natural England
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
OEP	Office for Environmental Protection
OfWAT	Water Services Regulation Authority
PPG	Planning Practice Guidance
PR	Price Review
PTP	Package Treatment Plant
RBD	River Basin District
RBMP	River Basin Management Plan
rdWRMP	Revised Draft Water Resources Management Plan
REUL	Retained European Union Law
SABs	SuDS Approval Bodies
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SIMCAT	Catchment-scale wate quality model
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TAL	Technically Achievable Limit
TPS	Terminal Pumping Station
TW	Thames Water
UKWIR	UK Water Industry Research
uPBT	Ubiquitous, Persistent, Bioaccumulative or Toxic
UWWTD	Urban Wastewater Treatment Directive
WaSC	Water and Sewerage Company

WCS	Water Cycle Study
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WRC	Water Recycling Centre
WRE	Water Resources East
WRSE	Water Resources South East
WRMP	Water Resources Management Plan
WRZ	Water Resources Zone
WwTW	Wastewater Treatment Works

Definitions

Term	Description
Abstraction Point	The location where water is either taken or extracted from either a surface or groundwater waterbody.
Agricultural Management	The farming techniques and practices used to produce food and manage livestock.
Abstraction Licencing Strategy	The Abstraction Licencing Strategy sets out the Environment Agency's approach to managing new and existing abstraction and impoundments within their river management catchments.
Asset Management Plan (AMP) Period	Price limit periods in the water sector are sometimes known as Asset Management Plan (AMP) periods. The current period (2025-30) is commonly known as AMP 8 because it is the eighth price review period since privatisation of the water industry in 1989. AMP periods are five years in duration and begin on 1 April in the years ending in 0 or 5. Every five years the industry submits a Business Plan to OfWAT for a Price Review (PR). These plans set out the companies' operational expenditure (OPEX) and capital expenditure (CAPEX) required to maintain service standards, enhance service (for example where sewer flooding occurs), to accommodate growth and to meet environmental objectives defined by the Environment Agency. OfWAT assesses and compares the plans with the objective of ensuring what are effectively supply monopolies and operating efficiently.
Aquifer	An aquifer is a rock and/or sediment body that holds groundwater.
Pollutant	In a water quality assessment, a water sample may be tested to determine one or more properties of the sample or the environment it is taken from. The properties measured are called pollutants. A pollutant defines both the result that is measured (for example a concentration of ammonia), and the method for carrying out the measurement, including its unit.
Dry Weather Flow	Dry weather flow is the average daily flow of wastewater to a wastewater treatment works during a period without rain.
Effluent	Effluent discharge is the liquid waste produced from residential, commercial and industrial processes.
Environmental Flow Indicator	The Environmental Flow Indicator (EFI) is the proportion of natural flows that are required to support the environment of a waterbody.

Term	Description
Groundwater Body	A Groundwater Body is the management unit under the Water Framework Directive which represents a distinct body of groundwater with its own hydrogeological characteristics.
Lead Local Flood Authority	A county council or unitary authority which leads in managing local flood risks (i.e., risks of flooding from surface water, ground water and ordinary (smaller) watercourses). Their duties are outlined in the Flood and Water Management Act.
Natural Flood Management	Natural flood management is the use of natural processes to reduce the risk of flooding and coastal erosion.
Per Capita Consumption	The per capita consumption is the average volume of water used by one person in a day. It is defined as the sum of the measured household consumption of clean water and unmeasured household consumption of clean water divided by the total household population. This is often expressed in litres per person per day (l/p/d).
Permitted Headroom	The difference between the volume of treated wastewater a treatment works is allowed to discharge under its environmental permit, and volume it currently discharges. It can be used to estimate the number of properties that could be connected to a WwTW catchment before a flow permit is exceeded.
Sustainable Drainage Systems (SuDS)	Sustainable drainage systems are drainage solutions that provide a natural alternative to the direct channelling of surface water through an artificial network of pipes and sewers to nearby watercourses.
Technically Achievable Limit (TAL)	The lowest possible concentration of a pollutant that conventional wastewater treatment technology can currently achieve.
Waterbodies	Water bodies constitute areas of water – both salt and fresh, large and small – which are distinct from one another in various ways. All surface waters (including rivers, lakes, estuaries and stretches of coastal water) and groundwaters have been divided up into discrete units called water bodies. Water bodies are the basic unit that are used to assess the quality of the water environment and to set targets for environmental improvements.
Water Framework Directive (WFD)	The Water Framework Directive is a river basin management planning system which was implemented to help protect and improve the ecological health of the UK's rivers, lakes, estuaries and coastal and groundwaters.
Water Framework Directive Classification Status	Rivers, lakes, estuaries and coastal waters can be awarded one of five WFD statuses: High, Good, Moderate, Poor or Bad

Term	Description
	Groundwater can be awarded one of two statuses: Good or Poor.
Water Framework Directive – Reasons for not achieving good (RNAG)	Where a WFD element is classified as being at less than good status, a reason for the failure to meet the good status is attributed, including the sector deemed responsible or a pressure affecting a biological element.
Water Framework Directive objectives	The Water Framework Directive objectives are set out in Regulation 12 and Regulation 8 of the Water Environment Regulations 2017.
Water Industry National Environment Programme	The Water Industry National Environment Programme is the programme of work in which water companies in England must meet their obligations from environmental legislation and UK government policy.
Water Resource Management Plan (WRMP)	Water Resource Management Plans are statutory documents that all water companies must produce at least every five years. They set out how the water company intends to achieve a secure water supply for their customers while protecting and enhancing the environment.
Water Resource Zone (WRZ)	A Water Resource Zone is an area in which the abstraction and distribution of water is self-contained and is used to meet demand within that area.
Water Recycling Centre (WRC)	A water recycling centre receives flows from the sewerage system and treats it so it can be discharged back into a river. They may also be called Sewage Treatment Works (STWs) or Wastewater Treatment Works (WwTWs).

Executive Summary

Overview

JBA was commissioned by Milton Keynes City Council (MKCC) to undertake an Integrated Water Management Study (IWMS) for the administrative area of Milton Keynes.

This report is the second stage in the IWMS. It sets out how Milton Keynes is expected to grow up to 2050 and agrees a set of objectives that can be used in assessing future water management options. Following the IWMS guidance developed by CIRIA, Phase 1 presented a baseline showing Milton Keynes in the context of the wider catchment and presenting information on the status of water resources, wastewater infrastructure and water quality. Phase 2 builds on this work and undertakes an assessment of the growth strategy. It also assesses various integrated water management options that could be applied as part of the Milton Keynes City Plan 2050 (MKCP). It is intended to form part of the Plan's evidence base at Regulation 19 Consultation and Examination in Public.

The IWMS does not include cost estimates for new and upgraded water and wastewater infrastructure required to accommodate growth. The investment in water resources, water and wastewater treatment and strategic network infrastructure would be funded through the water companies business plans (paid for via water bills and private-sector borrowing). Funding for connections to water and wastewater networks and localised upgrades to increase capacity are funded through developer connection charges paid by developers to water companies. Some information on scheme costs is included within the viability study.

Water resources

Water resources in England are under considerable pressure. The Environment Agency has stated that "the scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand."[1]

The new National Water Resources Framework identified the Ruthamford Central Water Resource Zone (WRZ), which serves Milton Keynes, as having over 50% forecast growth between 2025 and 2055, the highest percentage growth of any WRZ in England. A comparison of the growth accounted for in Anglian Water's WRMP24 and the MKCP projections show the combined growth forecast of Buckinghamshire and Milton Keynes is within water company projections, however the trajectory of growth from Milton Keynes brings it close to the WRMP projections suggesting the combined growth could be ahead of AW's forecast between 2030 and 2037. Milton Keynes City Council and Buckinghamshire Council should engage early with AW to ensure all three plans are aligned.

Part G of Building regulations currently states that new build housing should achieve a minimum of 125 l/p/d. A tighter standard of 110l/p/d is allowed if the local authority can establish a clear need based on available evidence. The 110l/p/d standard was included as

1 A summary of England’s revised draft regional and water resources management plans - GOV.UK

policy in the current Local Plan for Milton Keynes - Plan:MK (2019). Many LPAs are now going further than this. The Written Ministerial Statement (WMS) by the former Secretary of State for Levelling Up, Housing and Communities (DLUHC) states that:

"…in areas of serious water stress, where water scarcity is inhibiting the adoption of Local Plans or the granting of planning permission for homes, I encourage local planning authorities to work with the Environment Agency and delivery partners to agree standards tighter than the 110 litres per day that is set out in current guidance."

A Shared Standard for Water Efficiency has been published as part of a collaborative and collective approach by Anglian Water, Cambridge Water, Essex and Suffolk Water, Affinity Water, the Environment Agency and Natural England. It is designed to help support LPAs to deliver sustainable growth by specifying a more stringent water efficiency policy than the contained in Building Regulations (110l/p/d). It recommends that new homes are built to a standard of 93l/p/d, supported by a non-household standard where development will aim to achieve full credits in the BREEAM water calculator with a minimum of 3 credits in WAT01.

Infrastructure assessment

A capacity assessment was undertaken by JBA comparing the future flow from each WRC (the current actual flow and the forecast additional flow from growth), with the permit limit. Cotton Valley WRC is the largest WRC in the study area and serves the majority of the planned development in Milton Keynes as well as an area in Central Bedfordshire and Buckinghamshire. This WRC has capacity to serve all of the growth planned in this catchment from MKCC, however once neighbouring authority growth is also included, the WRC may be close to or exceeding its permit limit by 2050 if no action is taken. There is sufficient time for AW to respond to this.

There are 1,047 houses planned in the catchment of Newport Pagnell WRC. This WRC currently has a descriptive permit and may not have capacity for this level of growth. However, Anglian Water have advised that the majority of growth from the Newport Pagnell catchment will be processed at Cotton Valley WRC, which has capacity to accommodate the planned growth.

Where new infrastructure or upgrades to existing infrastructure may be required, engagement between MKCC and AW is required to ensure that delivery of this infrastructure is aligned with delivery of development sites. Grampian conditions may be sought by the water company should development be in advance of the necessary infrastructure.

There are a number of poorly performing storm overflows on both the sewer network and on storm tanks at WRCs in Milton Keynes. Furthermore, this performance has got significantly worse in the last two years. Published plans to improve storm overflow performance are based on data from 2022 or earlier, so it is unclear what plans AW currently has to address this. Growth within these catchments could result in an increase in the operations of these overflows contributing to a worsening of water quality in the area. Action should be taken by the water companies to address these overflows prior to an increase in wastewater demand being generated by new development.

Water quality and environmental impact

The modelling indicates that growth during the MKCP plan period could result in a significant deterioration in ammonia at Cotton Valley, Lavendon, Newport-Pagnell, North Crawley, and Olney WRCs. The deterioration downstream of Cotton Valley, North Crawley, and Olney is predicted to occur for several kilometres downstream towards Bedford. Treatment to the Technically Achievable Limit (TAL) is shown to reduce deterioration to 0%.

Growth alone will not prevent good ecological status being achieved in the future should improvements in upstream water quality be made.

An assessment was also made of the impact downstream on protected sites (such as SSSIs, SAC and Ramsar sites). A significant deterioration in water courses adjacent to protected sites was predicted (Felmersham Gravel Pits SSSI and Stevington Marsh SSSI) but this can be prevented by improvements in treatment processes upstream.

Where a WRC is shared with a neighbouring authority, coordination of growth plans in collaboration with Anglian Water is essential to ensure that infrastructure is in place prior to development to prevent a breach of the environmental permit.

Integrated water management recommendations

Integrated Water Management (IWM) is focussed on creating a water management strategy beyond water itself and observing the interdisciplinary actions between energy, carbon, waste, biodiversity, agriculture, and ecosystem services.

In the Phase 1 study, nine different IWM measures were identified and scored against the overall objectives for the study. This list was refined with options outside of MKCC's control removed, and others combined to leave four main options:

- Diversification of water resources
- Efficient fixtures and fittings
- Green and blue infrastructure and Sustainable Drainage Systems (SuDS)
- Rainwater harvesting and greywater recycling

There is some overlap between the four options, for example rainwater harvesting can be considered as part of SuDS, and it could also be used to diversify a developments source of water.

Diversification of water resources can take the form of large-scale strategic resource options such as the new reservoir in South Lincolnshire, local scale in the form of small lakes, or an individual development obtaining its water from a non-potable source.

Efficient fixtures and fittings can include fitting low water use fittings in new build housing, retrofitting existing housing stock or using devices such as flow regulators to reduce the volume of water entering a property. These can be supported by household visits to identify opportunities to save water, or water audits in businesses.

Green Infrastructure (GI), Blue Infrastructure (BI) and SuDS can include green walls and roofs, de-culverting or re-naturalising watercourses, Natural Flood Management (NFM) as well as SuDS such as swales and permeable paving.

Rainwater Harvesting (RwH) is the capture of water falling on buildings, roads or pathways which can then be used for tasks such as flushing toilets or garden irrigation. Greywater Recycling (GwR) is the treatment and re-use of water used in home appliances, showers and hand basins for uses such as toilet flushing.

The following recommendations were made:

- Efficient fixtures and fittings are the most universally applicable measure to development in Milton Keynes. This could be driven in new development by an ambitious water efficiency target and supported in existing housing stock by a household visit scheme.
- In line with the Shared Standard for Water Efficiency, and the new National SuDS Guidance, Rainwater Harvesting should be encouraged on all sites where it is practical.
- On all sites, SuDS, GI and BI should be considered as early in the design of the site as possible so a suitable layout that maximises their benefits can be established.
- The **n**ational standards for sustainable drainage systems, the Local Nature Recovery Strategy and the Green Infrastructure Strategy should guide the design and implementation of SuDS, GI and BI in Milton Keynes.
- When designing GI and SuDS, consideration should be given to native plant species that require little or no water.
- For all major non-household development consideration should be given to the use of non-potable water where the type of water-use allows this to be viable.
- For data centres, water for cooling should come from a non-potable source. Applications for data centres using potable water should be resisted where alternative cooling methods are feasible.
- The lakes in Milton Keynes provide an opportunity that many neighbouring authorities do not have. Assets that can be used to manage flood risk, while providing the potential for use as a water resource, and other benefits such as biodiversity, and amenity. MKCC are planning an Asset Performance and Capacity Assessment – Balancing Lakes Study (APCA – BLS) which will include an assessment of the potential to use the balancing lakes beyond their original design function. This issues is not, therefore, assessed in this IWMS.

1 Introduction

1.1 Terms of reference

JBA Consulting was commissioned by Milton Keynes City Council (MKCC) to undertake an Integrated Water Management Study (IWMS) and a Strategic Flood Risk Assessment (SFRA) for the administrative area of Milton Keynes. The purpose of an IWMS is to form part of a comprehensive and robust evidence base for the preparation of the Milton Keynes City Plan 2050 (MKCP) to aid in coordinating development and management of water to help in the sustainable building of developments and inform current decision-making processes where appropriate.

Unmitigated future development and climate change can adversely affect the environment and water infrastructure capacity. An IWMS will provide the required evidence, together with an agreed strategy to ensure that planned growth occurs within environmental constraints, with the appropriate infrastructure in place in a timely manner so that planned allocations are deliverable.

This Phase 2 study builds on the Phase 1 study completed in 2024.

"Milton Keynes" in this report refers to the Local Planning Authority (LPA) area. "The City" refers to the city of Milton Keynes unless otherwise stated.

The IWMS does not include cost estimates for new and upgraded water and wastewater infrastructure required to accommodate growth. The investment in water resources, water and wastewater treatment and strategic network infrastructure would be funded through the water companies business plans (paid for via water bills and private-sector borrowing). Funding for connections to water and wastewater networks and localised upgrades to increase capacity are funded through developer connection charges paid by developers to water companies. Some information on scheme costs is included within the viability study.

1.2 Structure of the Phase 2 IWMS

The report is divided into the following sections.

Section 2 - Legislative and policy framework

Changes that have occurred since Phase 1 to relevant national, regional, and local policies relating to the environmental and water management that should be considered by the LPA, water companies and developers are presented. This section should be read in conjunction with Section 3 of the Phase 1 report.

Section 3 - Vision for growth

This section outlines how Milton Keynes is expected to grow during the plan period. It updates the information provided in the Phase 1 report with the latest forecast from MKCC and neighbouring authorities. It also summarises the objectives set in Phase 1 which should be born in mind when deciding on any Integrated Water Management (IWM) measures.

Section 4 - Water resources

Section four will set out the current water resources position and MKCC's place within the wider region. It will provide the evidence to support the recommended water efficiency target for development.

Section 5 - Infrastructure assessments

An assessment is provided of the impact of the MK Plan on the water supply network, wastewater network, storm overflows and wastewater recycling centres (WRC). Where additional infrastructure or upgrades to existing infrastructure are required, this is identified.

Section 6 - Water quality and environmental impact

The impact of the MK Plan on water quality is presented in Section 6. This includes an assessment both at the point of discharge for each WRC, and in the river downstream where it is adjacent to protected sites. Where an upgrade to treatment processes may be required in order to accommodate growth, this will also be stated.

Surface water runoff from development sites can also impact water quality.

Section 7 - Options appraisal

The analysis of the IWM options identified in Phase 1 is developed, and guidance provided on their implementation.

Section 8 - Conclusions and recommendations

Conclusions and recommendations from each section of the report are collated into a single table.

2 Legislative and Policy Framework

2.1 Overview

Section 3 of the Phase 1 IWMS outlined the main policy and legislation relating to the water environment that LPAs should consider when setting Local Plan policy. Since Phase 1 was completed, there have been a number of changes to policies, and new documents to consider. These are presented below. Unless stated, the remaining text in Section 3 of the Phase 1 report remains correct at the time of writing. A summary of the key points in each document is presented, but it is always recommended that the full text is reviewed.

2.2 Changes since Phase 1

2.2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was revised in December 2024. This is a significant update to the previous version, however as many of the changes relate to planning policy, and not to water, they are best discussed elsewhere.

Of note to the IWMS is the re-instatement of mandatory housing targets, and a change to the way housing need is calculated. In many LPA areas this has resulted in a large change from the previous target. However, in Milton Keynes the impact is minimal.

A new paragraph has been added (163) to emphasise that that climate change is an important consideration in decision making as well as plan making. The need to mitigate and adapt to climate change should also be considered in preparing and assessing planning applications, taking into account the full range of climate change impacts.

The relevant paragraphs from the NPPF referenced in the Phase 1 report have changed as follows:

- Paragraph 35 (previously paragraph 34): "Plans should set out the contributions expected from development. This should include setting out the levels and types of affordable housing provision required, along with other infrastructure (such as that needed for education, health, transport, flood and water management, green and digital infrastructure). Such policies should not undermine the deliverability of the plan".
- Paragraph 162 (previously paragraph 158): "Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply…"
- Paragraph 187e (previously paragraph 180e): preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans".

2.2.2 Water resources planning

A new National Water Resources Framework was published in 2025, replacing the first National Framework published in 2020. This is reviewed in Section 4.2.1.

Anglian Water have published their final Water Resources Management Plan (WRMP). This is reviewed in Section 4.2.

2.2.3 Storm Overflow Assessment Framework

The 2018 Storm Overflow Assessment Framework (SOAF) was replaced in 2025 by an updated framework. This guidance builds on the implementation of the SOAF during the PR19 period (2020 to 2025) to improve and make the process more effective. Changes since the first framework include:

- a reduction in the trigger threshold for high spill frequency overviews to reflect requirements to improve storm overflow performance;
- linking to the most up to date process for water quality modelling investigations; and
- updates to related documentation including that on the process of the cost benefit assessment.

The SOAF investigation process is expected to be conducted outside of the Water Industry National Environment Programme (WINEP) process, although SOAF may identify requirements for future investment. The Environment Agency (EA) expects that investigations will be carried out over a "period that is as soon as reasonably practicable".

Since the original framework, all storm overflows are now monitored, increasing the amount of data that is available. A five-stage process is now in place:

Stage 1:

Storm overflows are identified for investigation based on the spill frequency triggers defined in Table 2-1 The threshold varies based on the number of years available data. The cause of the high spill frequency will also be identified.

Table 2-1 Storm overflow investigation trigger thresholds

Time period of available data	Investigation trigger (average number of spills per year)
1	Greater than 30
2	Greater than 20
3	Greater than 10

Stage 2: the level of environmental impact will be quantified.

Stage 3: improvement options are assessed, including analysis of the costs and benefits.

Stage 4: a decision is made based on the cost benefit results.

Stage 5: delivery of the identified "Best Known Technology Not Entailing Excessive Costs" (BTKNEEC) solution (subject to appropriate funding and prioritisation) to reduce environmental impact and reduce the frequency of discharges.

This methodology is currently focused on inland overflows. A methodology for overflows to transitional and coastal (TRaC) waters is expected to be created once ecological harm standards have been agreed.

2.2.4 Shared Standard for Water Efficiency

This is discussed in section 4.3.4.

2.2.5 National SuDS Guidance

From April 2015, Local Planning Authorities (LPA) were given the responsibility for ensuring that sustainable drainage is implemented on all major developments, including developments of 10 or more homes, or commercial developments creating 1,000m^2 of new floor space.

Previously SuDS guidance was developed by Defra to sit alongside the NPPF Planning Practice Guidance (PPG) and provide non-statutory standards as to the expected design and performance for SuDS.

As of July 2025, the Defra National standards for sustainable drainage systems (SuDS) (gov.uk) were brought in to comply with the principles of surface water drainage design.

The national standards contain two sets of standards. The first type (Standard 1) is known as the hierarchy standard and sets the criteria for the prioritisation of final surface water runoff destinations. The other standards (Standards 2-7) detail the minimum design criteria that SuDS should satisfy alongside how they are to be appropriately built, maintained, and operated.

Whilst remaining as a non-statutory specification, these now form a material consideration for LPAs when assessing planning applications. These standards aim to reflect and reinforce good practice and use of SuDS, reflecting the four pillars of SuDS design. All appropriate planning applications should demonstrate how the national standards have been met in the site design (Principle 10).

Standard 1: runoff destinations

Runoff from development shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:

Priority 1: collected for non-potable use (rainwater harvesting)

Priority 2: infiltrated to ground

Priority 3: discharged to an above ground surface water body

Priority 4: discharged to a surface water sewer, or another piped surface water drainage system

Priority 5: discharged to a combined sewer (a sewer intended to receive both foul sewage and surface runoff).

Further, it states that " Surface water runoff from the development shall not discharge to a foul drainage system."

Non-potable use

There is potential for rainwater harvesting for non-potable uses to decrease the water demand from new developments and help improve water efficiency.

Rainwater harvesting shall be considered in all circumstances where any of the following apply:

- There is a demand for non-potable water and available contributing catchment area that will deliver safe and efficient water savings.
  - Examples include industrial, commercial, horticultural, educational, public sector, residential and multiple-occupancy buildings.
- There is a need for landscape irrigation.
- The development is in an area identified as seriously water stressed - this includes the Anglian Water area.

2.2.6 The Independent Water Commission

The Independent Water Commission was set up in October 2024 to provide recommendations to Government on reforms to the water sector. The objectives are to ensure a sufficiently robust and stable regulatory framework in order to:

- attract the investment needed for the future
- speed up infrastructure delivery
- restore confidence in the sector

Chaired by Sir John Cunliffe, the resulting report which was published in June 2025 is often referred to as the "Cunliffe Report".

The full report can be found on the gov.uk website. It contains 88 recommendations centred around seven themes:

- Chapter 1: Strategic direction for the water system
- Chapter 2: Planning
- Chapter 3: Legislative framework
- Chapter 4: Regulator reform
- Chapter 5: Regulation reform
- Chapter 6: Company structures, ownership, governance, and management
- Chapter 7: Infrastructure and asset health

It should be noted that the recommendations in the Cunliffe report are not mandatory, and the Government will respond to the report in due course. In the meantime, these recommendations should be treated with the caution.

A simplification of the water planning system is recommended, with a comprehensive systems planning framework for England and Wales with responsibility for integrated and holistic water system planning. It goes on to recommend a review and update to the current legal framework, along with clearer targets to allow water companies to be held to account.

Chapter 4 of the Cunliffe report is designed to restore the confidence of both the public and regulated water companies in the regulatory framework. It recommends that the UK Government should establish a new integrated regulator in England. This should combine the functions of Ofwat, DWI, and water functions from the EA and Natural England (NE). Changes were also recommended to economic and environmental regulations, including strengthening abstraction permitting.

Following the recommendations set out in the Cunliffe Report, the Government announced that Ofwat would be abolished and replaced by "a new, single, powerful regulator" with the objective of cutting water pollution in England's rivers, lakes and seas, and protecting families from large increases in their water bills.

The new regulator will take responsibility for the water functions across Ofwat, EA, NE and Drinking Water Inspectorate (DWI). During the transition to the new regulator, Ofwat will remain in place, and following its creation, the EA and NE will retain their non-water role.

Until there is more information on the role of the new regulator and which other recommendations will be adopted by Government, the LPA should assume the current regulatory environment will continue.

Anglian Water, in their response to this IWMS report, stated that the Cunliffe Review has reinforced their Growth Teams' view that they should prepare annually updated growth trajectories and agree modelled scenarios, including national policy allowances with each LPA. AW is currently reviewing scenarios which may include an East West Rail corridor uplift and/ or New Town hotspots for growth for their next investment plan cycle, which will focus on 2030-2035 and plan to 2055.

3 Vision for Growth

3.1 Introduction

Section 2 of the Phase 1 IWMS provided an overview of the Milton Keynes Strategy for 2050 and developed a baseline growth scenario based on development sites that were already in the planning system. It went on to show to the eight Recommended Growth Options (RGOs), some of which were expected to meet the housing need in Milton Keynes.

A new baseline growth scenario was developed for Phase 2 using the latest planning commitments, recent completions, windfall allowance and neighbouring authority growth. Potential allocations provided by MKCC were then added to the growth scenario.

3.2 Growth within Milton Keynes

Table 3-1 shows a summary of the growth expected in Milton Keynes during the plan period.

Table 3-1 Summary of planned residential growth in Milton Keynes

Type	Total housing units to be delivered in plan period as @ 1 April 2024
Completions to date	5,095
Existing commitments (non-strategic)	2,584
Existing commitments (strategic)	15,026
New allocations	14,350
City centre areas	17,184
MRT Sites	2,500
Windfall	2,990
Total	59,729

Table 3-2 Summary of planned employment growth in Milton Keynes

Type	Approximate floor space (sqm)*
Completions	134,778
Existing commitments	659,900
New allocations	661,200
Total	1,455,878

* Note: In order to create a forecast of additional water demand from employment sites a number of assumptions are required. Where floorspace does not create a new water demand, these sites were excluded from the analysis. For this reason, the floorspace figures quoted in the table above may not match estimates within the MKCP.

Windfall sites are sites that have not been specifically identified in the MKCP. They normally comprise previously developed sites that have unexpectedly become available.

MKCC provided an estimate of 115 dwellings per year to account for windfall growth. By its nature, it is not known where windfall growth will occur, however in general, windfall growth will occur in built-up areas where other growth is planned. In the case of Milton Keynes, 98% of the growth identified is likely to be served by Cotton Valley WRC so it is assumed windfall will follow a similar patten. A small amount of windfall growth has also been assumed to be served by Newport Pagnell and Olney WRCs.

3.3 Growth outside of Milton Keynes

Where growth within a neighbouring LPA area may be served by infrastructure within or shared with Milton Keynes, the neighbouring LPA was contacted as part of a duty to cooperate request to provide information on growth within the WRC catchment areas which serve MKCC.

JBA Consulting are currently working on a Water Cycle Study for both Buckinghamshire and Central Bedfordshire. Growth information developed as part of these studies was used to inform the MKCC IWMS.

Forecast housing growth for each WRC shared with MKCC is summarised in Table 3-3. It should be noted that these figures are the total number of houses and employment land within each WRC catchment should all the sites identified there be delivered. It therefore represents a worse-case scenario for wastewater demand.

Table 3-3 Summary of neighbouring authority growth

LPA	Residential growth (No. dwellings)	Employment growth
Buckinghamshire	Commitments: 3,261 Recent completions: 58	None identified
Central Bedfordshire	Allocations: 5,000 Commitments: 15 Recent completions: 6	Allocations: 120,000sqm Commitments: 130,320sqm
Bedford*	None identified	None identified
North Northamptonshire*	None identified	None identified
West Northamptonshire*	None identified	None identified

* Growth within LPA would not be served by WRCs shared with Milton Keynes.

3.4 Development of the demand forecast

3.4.1 Water Demand from Housing

The estimate of water demand from each housing site was based on the number of houses, and per capita consumption and average occupancy statistics taken from the relevant water supply companies Water Resource Management Plan (WRMP24) tables. The base year

2024/25 was used and was assumed to stay the same throughout the plan period. This represents the baseline "business-as-usual" scenario, not accounting for water efficient design and supply and demand measures from the water companies' WRMPs.

3.4.2 Water Demand from Employment Sites

Demand from employment sites was calculated assuming a rate of 100l/d per employee. Where the forecast number of employees for a site was not specified, employment floorspace and assumed density based on employment use classes was used to calculate an indicative number of employees for a site. Table 3-4 below outlines the assumed densities of employment space derived from the Homes and Communities Agency (2015) Employment Density Guide 3rd edition. This guide pre-dates recent changes in working practices as a result of the Covid-19 pandemic, technological changes to support working from home and automation.

The water use from hotels and hospital was based on the number of beds, with a bed equivalent to one house.

Table 3-4 Employment use classes and assumed densities used to calculate water demand

Use class	Description	Density (m^2/employee)
B1	Mixed office and industrial (Mean of B1a, B1b and B1c)	32
B1a	Offices	8
B1b	R&D space	40
B1c	Light industrial	47
B2	Industrial and manufacturing	36
B8	Storage and distribution	70
Mixed B	Mixed (mean of B1a, B1b, B1c and B2)	32.75
B1, B2, B8	Mixed	38
SG	Data centres	180
A1	Retail	15
A2	Finance and professional services	16
A3	Restaurants and cafes	15
Mixed A	Mixed	15
C1	Hotels	Requires bed count
C2	Residential institutions	Requires bed count
D1	Cultural Attraction	36
D2	Leisure	65

4 Water resources

4.1 Introduction

4.1.1 Objectives

The aim of the water resources assessment is to ensure that sufficient water is available in the region to serve the proposed level of growth, and that it can be abstracted without a detrimental impact on the environment, both during the plan period and into the future.

The Phase 1 report characterised the study area, identifying the key surface water and groundwater bodies, and local geology, highlighting the pressures on water resources in the region. The revised draft Water Resource Management Plans were summarised, and a water efficiency target for the study area proposed.

Since Phase 1 was completed, further evidence has been published including the final WRMPs and a shared standard for water efficiency for the region. The water resources assessment has therefore been updated to reflect this new evidence, and a new water efficiency target recommended.

4.1.2 Water resources in the UK

It is important to set water resources in MKCC within the context of the overall national picture.

The Environment Agency has published a summary of the revised draft regional and Water Resources Management Plans which includes their view on the overall state of water resources in England and the challenges the country faces (Environment Agency, 2024). They state that:

"In England, our climate is changing, our population is growing, and as a nation we want an improved environment along with a thriving economy, enabled by resilient water supplied. Action is required now to meet these objectives".

"The scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand."

"Demand reductions are crucial, particularly in the short term. The Environment Act 2021 sets a target to reduce the use of public water supply in England, per head of population, by 20% by 2037-38 from the 2019-20 baseline."

"Government will be looking to water companies to act quickly and take significant steps forward on installing smart meters and delivering on their wider water efficiency commitments and reducing leakage. This will happen alongside the introduction of a mandatory water label which will enable water efficient decisions across the country. The government has also committed to review water efficiency requirements of building regulations which will be a key action to ensure new homes are water efficient."

There have been several important documents published in recent years, all highlighting the growing awareness and concern about this issue. The National Water Resources Framework led to the creation of the regional water resources planning groups and defined

the objective to achieve an average household water efficiency of 110l/p/d by 2050 (including existing housing). This has since been updated, and the 2025 framework puts a greater focus in multisector planning and catchment partnerships (UK Government, 2025).

The Government's Environmental Improvement Plan published in January 2023 contains a roadmap for improving water efficiency in new developments and retrofits and there is there is also now a shared standard for water efficiency that applies across the Water Resources East region recommending 85l/p/d for new build housing.

These documents will be explored in more detail in the sections below, alongside the Water Company and Regional planning documents.

4.2 Water Resources Planning

4.2.1 National Water Resources Framework

An updated National Water Resources Framework was published in 2025 replacing the previous 2020 framework. The first framework described the scale of the challenge facing water resources in the UK and led to the creation of the five regional planning groups. It also set an objective for per capita consumption to be reduced to 110l/p/d on average across the UK (including existing housing). The new National Framework:

- sets out the pressures and challenges for the water environment to 2055 and beyond;
- sets the ambition for a sustainable abstraction regime and a protected and improved water environment;
- explores potential new demands for water;
- sets greater ambition for integrated, joined-up planning between water using sectors and with drainage and wastewater planning;
- proposes actions and expectations for different sectors to rise to the challenge of planning for and improving the resilience of water supplies; and
- provides a steer for regional water resources groups to evolve and continue to innovate.

As well as the challenges of an increasing population, the 2025 Framework also outlines the challenge from non-household growth, and emerging sectors such as data centres which can require significant amounts of water for cooling servers, with large centres consuming millions of litres daily. Concrete production accounts for 9% of global industrial water withdrawals. Agriculture is significant with spray irrigation expected to increase due to the changing climate.

Of relevance to the IWMS is the strengthening of local water resources planning which includes supporting farmers to establish Water Abstractor Groups (WAGs) and to "identify, screen and prioritise collaborative 'local resource option' solutions to improve water supply resilience".

4.2.2 Water Resources East Regional Plan

The Phase 1 IWMS presented a summary of the draft Water Resources East (WRE) Regional Plan. Since then, the final plan has been published and is available on the WRE website.

WRE is one of the five regional planning groups in England and Wales, consisting of a multisector board including Anglian Water, Cambridge Water, Essex and Suffolk Water, and Affinity Water, as well as representation from major water users or umbrella groups representing sectors such National Farmers Union representing the agricultural sector. There are 200 members in total. The role of WRE is "to prepare a single, integrated regional plan that ensures there are resilient water resources available to meet the needs of the environment, the growing population and regional economy through to 2050 and beyond, taking full account of climate change".

Water Resources East's role is to prepare a single, integrated regional plan that ensures there are resilient water resources available to meet the needs of the environment, the growing population and the regional economy through to 2050 and beyond, taking full account of climate change.

The scale of the water resources challenge facing the region in outlined at the start of the plan which has been reproduced in full below:

"The whole of Eastern England is classified as 'seriously water stressed' by the Environment Agency. Yet the demand for water is growing with one of the highest rates of new housing development in the country. At the same time the region is experiencing less dependable weather patterns as a result of climate change, adding further pressure to the region's scarce water resources and the natural environment. This is compounded by significant environmental pressures, in the form of abstraction licence reductions and ambitious Environmental Destination outcomes, to ensure the environment is protected for future generations.

Unless urgent action is taken by all sectors, the region will face severe water shortages. This will constrain agricultural production and curtail economic growth, impacting the region's prosperity and endangering the east's iconic chalk rivers, peatlands and wetlands. Farmers and land managers, businesses, the power sector and water companies need to start planning for and investing in significant new sources of supply. All of us as individuals and across sectors will need to use water more efficiently.

Water companies will continue their drive to reduce leakage from their own networks and invest in smart metering and other demand management technologies. However, past investment in demand management and leakage control within the region means that there is less potential here than elsewhere in the country. Only with significant new investment in supply-side options can the projected shortages of water be met."

Figure 4.1 shows the baseline demand for water in the region with a illustrative breakdown of demand by sector. The average daily water consumption is 2,132 million litres of water per day. This is expected to increase to 2,538 million litres by 2050. This increase in driven by a combination of population growth (173Ml/d), an increase in irrigation for agriculture

(83Ml/d), and energy production (143Ml/d) (although there is considerable uncertainty in the volume of the increase)

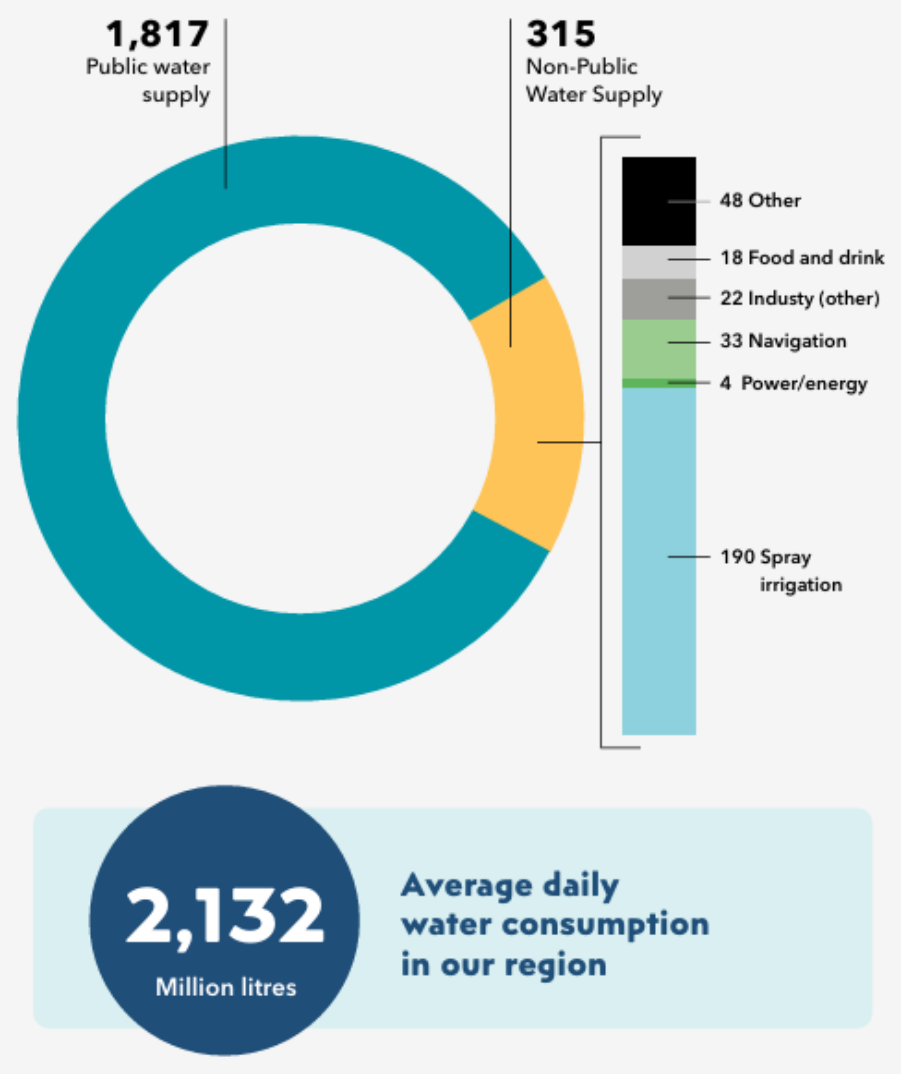

Figure 4.1 Baseline projection for water use in 2025

Source: WRE 2024

As well as there being a significant increase in water demand up to 2050, there is also predicted to be less water available in the region to meet that demand. The primary driver for the reduction in supply is meeting the environmental destination, capping licences to protect habitats and achieving flows that support good ecological status by 2050 (including further protections for European Protected Sites, riverine and Groundwater Dependent Terrestrial Ecosystems). There are no chalk streams in or downstream of Milton Keynes, and none of the City's public water supply is extracted from chalk aquifers which feed chalk streams.

There is also a reduction in the availability of water predicted due to climate change and the requirement to increase drought resilience.

The increase in demand and the reduction in supply leads to a supply demand deficit in the region by 2030 if no action is taken. The increase in demand could be offset by demand

management measures, but the reduction in water availability due to sustainability reductions would need to be offset by new supply options.

The Regional Plan therefore contains a mix of demand management and new supply options:

Demand management:

- Government interventions (such as mandatory water labelling) - 114Ml/d
- Reduction in per capita consumption from 135 l/p/d to 110 l/p/d in 2050
- Reduction in regional distribution input per capita by 19.1% by 2038
- 39% leakage reduction
- Increase in metering penetration with full rollout of smart metering by 2030 in Anglian Water region, 2035 in Essex and Suffolk and Cambridge Water regions, and 2040 for the Affinity region
- Regional reduction in non-household demand by approx.13% (relative to growth) by 2050

Supply side options:

- Reservoir storage (Fens Reservoir by 2035-37 and Lincolnshire Reservoir by 2039-41 (280Ml/d)
- Desalination (110 Ml/d)
- Effluent water resource (23Ml/d)
- Smaller options and transfers (75Ml/d)

The Regional Plan is adaptive, with triggers in place that allow other measures to be considered. For example, should demand management measures not deliver as expected, the desalination supply option can be increased.

4.2.3 Water Resources Management Plans

In Phase 1, AW's revised draft Water Resources Management Plan 2024 (rdWRMP24) was reviewed. Since then, the final version (WRMP24) has been approved by the Secretary of State and published. This has been reviewed against the summary provided in Section 4.5.3 of the Phase 1 report, and no changes are required.

It was recommended in Phase 1 that further assessment was undertaken understand if sufficient growth has been accounted for in the WRMP24 to be able to serve all planned growth during the MKCP period.

Milton Keynes mostly obtains its water from the Ruthamford Central WRZ, with very small areas in the east served by Ruthamford South WRZ and the northwest by Ruthamford North. The Ruthamford Central WRZ does not have any water sources of its own, instead it obtains water via a transfer from Ruthamford North and South WRZs. Figure 4.2 shows the predicted percentage increase in the household population between 2025 and 2055 (slightly beyond the MKCP period). The Ruthamford Central WRZ has the highest percentage growth of any WRZ in England, growing by over 50% with growth mainly coming from Milton Keynes.

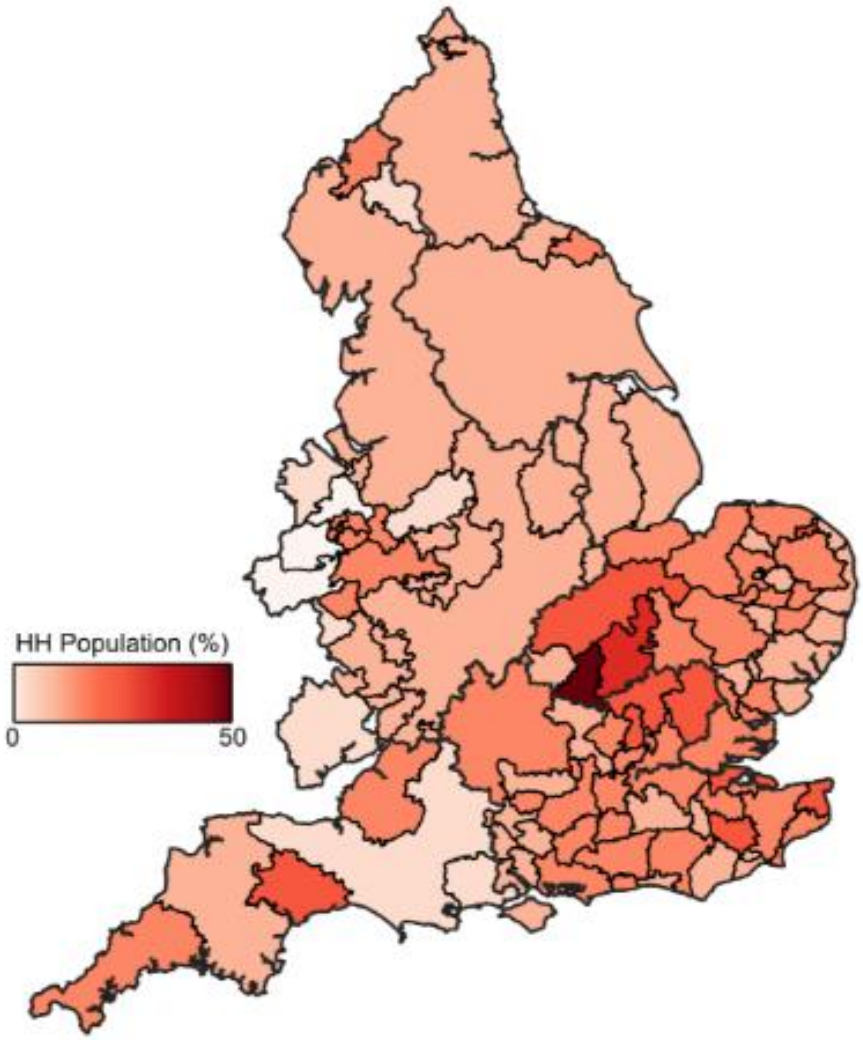

Figure 4.2 Household population percentage increase from 2025 to 2055 from WRMP24 forecasts

Source: National Framework for Water Resources (2025)

Figure 4.3 shows the baseline supply-demand balance for Ruthamford Central WRZ. This shows a small initial surplus in 2025-26 before this drops and supply meets demand (plus target headroom) up until 2048 when there is a small deficit. Figure 4.4 shows the final supply demand balance which has the same small initial surplus but then maintains supply demand through the plan period up to 2050. This is achieved by a combination of increasing the volume supplied from neighbouring WRZ via a strategic transfer, and demand and leakage reduction.

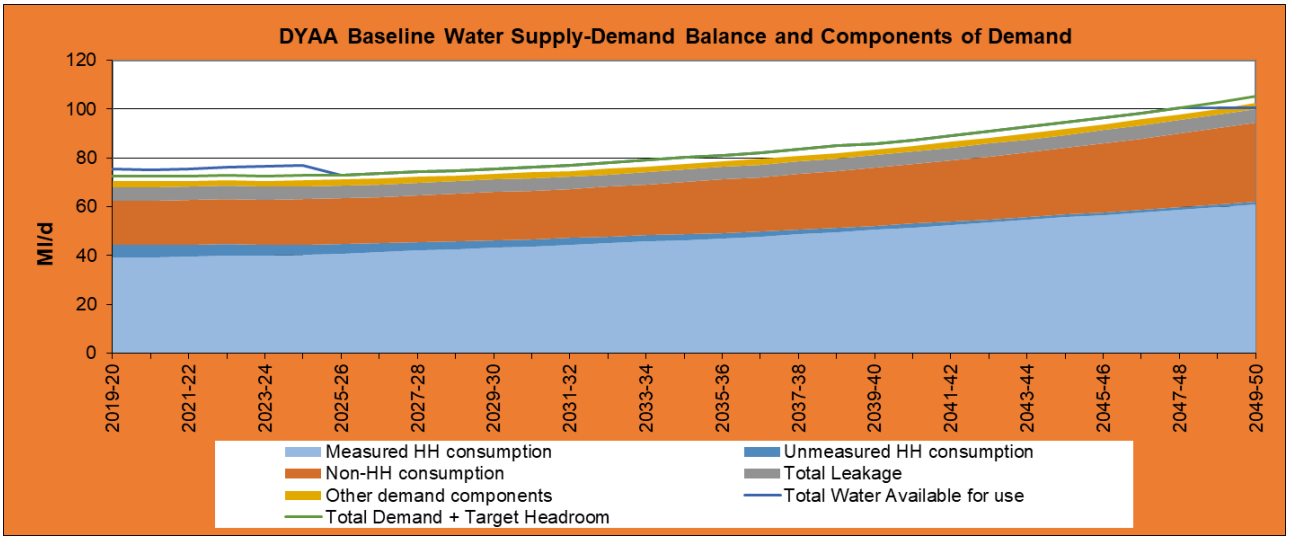

Figure 4.3 Baseline supply-demand balance for Ruthamford Central

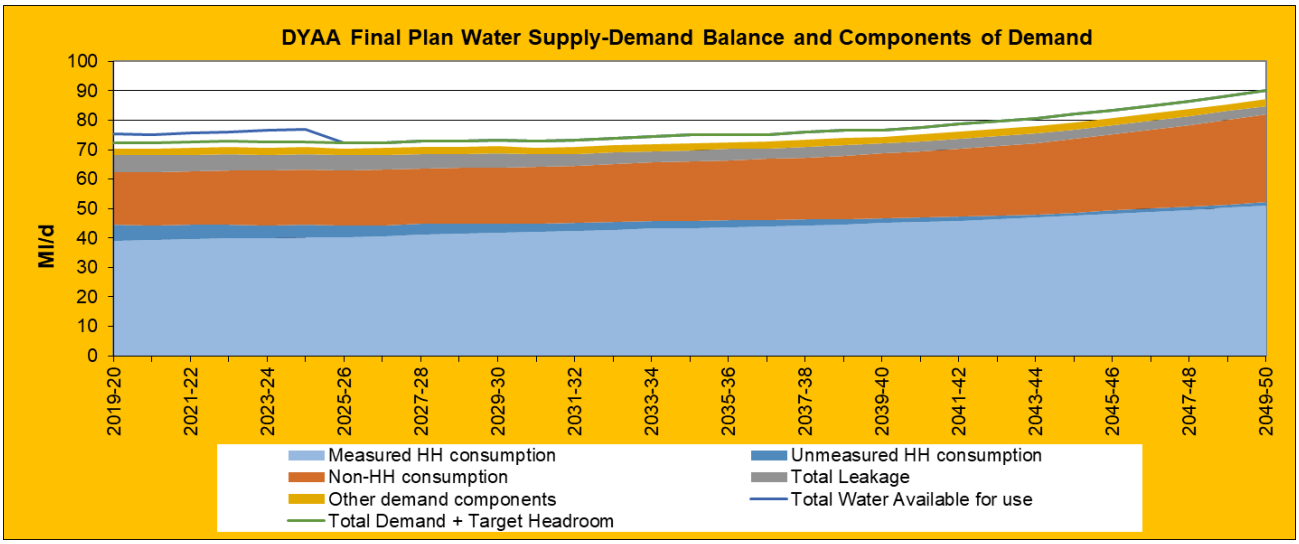

Figure 4.4 Final supply-demand balance for Ruthamford Central

The WRMP has accounted for an increase in the number of properties of 66,070 during the period 2025 to 2050. The WRZ mostly served Milton Keynes, but it also supplies water to the north of Buckinghamshire and some very small areas of Central Bedfordshire and West Northamptonshire. During the period 2025 to 2050, Milton Keynes is expecting to increase the number of properties by 52,568. Growth in Buckinghamshire is expected to be 95,500 properties however Buckinghamshire are still at an early stage in their Local Plan process, and it is not yet known how this will be distributed.

The OS Open CodePoint data set was used to provide an indication of the distribution of properties within Milton Keynes. It was found that roughly 8% of existing properties within Buckinghamshire are within the Ruthamford Central WRZ. If 8% of the growth during their Local Plan period (up to 2045) followed the same distribution, then there are likely to be 7,635 properties from Buckinghamshire in the WRZ.

Ignoring the small areas serving the West Northamptonshire and Central Bedfordshire, the total number of additional properties in the WRZ would be 60,203. This is within the current forecast from the WRMP24.

Figure 4.5 shows a comparison of the forecast trajectories from WRMP24 and Milton Keynes growth information. It can be seen that the Milton Keynes forecast remains below the forecast number of properties throughout the plan period. Whilst the total combined forecast of Milton Keynes and Buckinghamshire can be accommodated by the end of the plan period, between 2030 and 2037, the Milton Keynes trajectory is close to the WRMP24 trajectory suggesting planned combined demand from growth could be ahead of the supply. There is sufficient time to resolve this during preparation of the WRMP29, but early engagement between Buckinghamshire, Milton Keynes and Anglian Water is required to ensure all three plans are aligned.

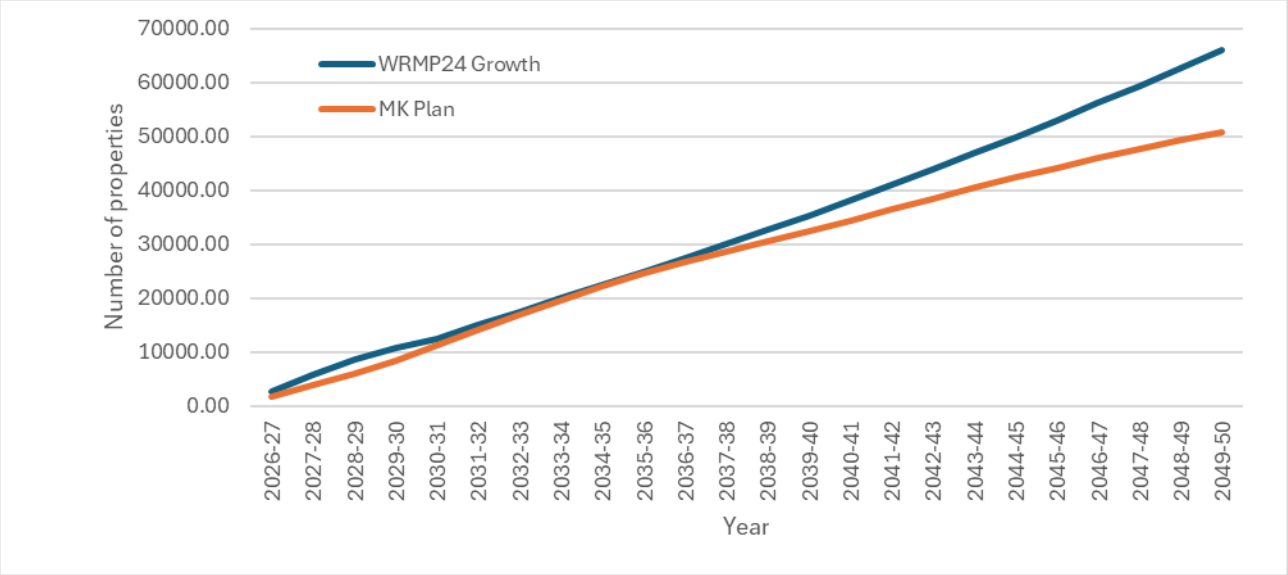

Figure 4.5 Growth trajectory of WRMP24 vs Milton Keynes City Plan

4.3 Water efficiency in Milton Keynes

4.3.1 Introduction

Part G of Building regulations (UK Government, 2016) currently state that new build housing should achieve a minimum of 125 l/p/d. A tighter target of 110l/p/d is allowed if the local authority can establish a clear need based on available evidence. Water resources are under significant pressure in England and the direction of travel in water resources planning is to reduce per capita consumption in new build development below the optional building regulations standard of 110 l/p/d.

Many LPAs are going further than the optional standard of 110l/p/d and specifying 100l/p/d or lower in their Local Plans.

This section will outline the evidence supporting a more stringent target than the optional target in Milton Keynes.

4.3.2 Environment Agency Classification of Water Stress

Water stress is a measure of the level of demand for water (from domestic, business and agricultural users) compared to the available freshwater resources, whether surface or groundwater. Water stress causes deterioration of the water environment in both the quality and quantity of water and consequently restricts the ability of a waterbody to achieve a “Good” status under the WFD.

The Environment Agency has undertaken an assessment of water stress across the UK (Environment Agency, 2021). This defines a water stressed area as where:

- “The current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand; or
- The future household demand for water is likely to be a high proportion of the effective rainfall available to meet that demand."

In the Environment Agency's assessment, all of the WRZs covering Milton Keynes are classified as being at serious water stress.

It should be noted that this work was published in 2021 and used data from the WRMP19 - itself based on published growth data from several years prior to publication. Climate change is tending to increase the stress on the water environment as time progresses. The Environment Agency's assessment also precedes the current mandatory housing targets introduced nationally by the Government in December 2024 through the updated NPPF. As a result of these changes many local planning authorities must now plan for significantly increased levels of housing need.

4.3.3 Environmental Improvement Plan

Through their Plan for Water (Defra, 2023) Defra has signalled its intention to review the water efficiency standards for new homes, including consideration of a new national 105l/p/d standard and 100l/p/d where there is a clear local need.

The Future Homes Hub was established to "facilitate the collaboration needed within and beyond the new homes sector to help meet the climate and environmental challenges ahead" (Future Homes Hub, 2024). It consists of representatives from the building industry, regulators, water companies, and environmental groups. Defra asked them to support the creation of the roadmap towards greater water efficiency. They have proposed a road map for water efficient homes in England and sets out a framework for the homebuilding sector to work in partnership with other stakeholders such as the water sector, local authorities and regulators to deliver it. The proposed roadmap is shown in Figure 4.6 below and outlines a staged approach to reducing per capita consumption. It also allows for a tighter figure of 90l/p/d by 2025 in seriously water stressed areas to enable sustainable growth.

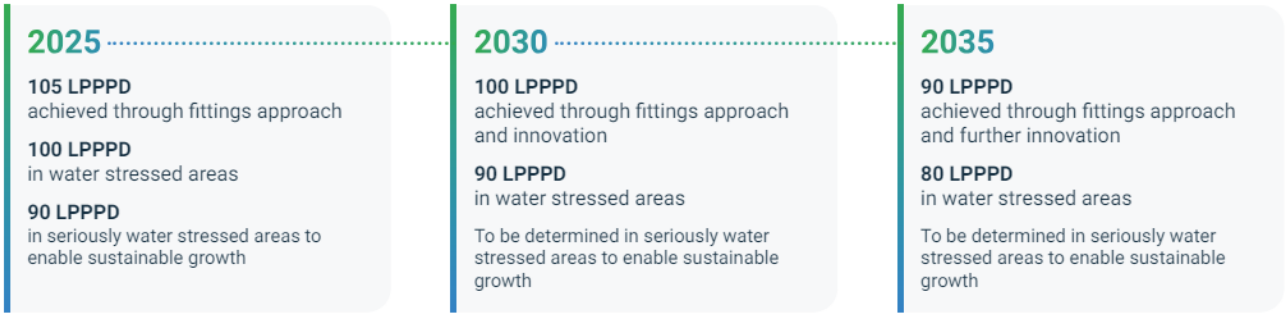

Figure 4.6 Future Homes Hub proposed water efficiency roadmap

The Environment Act 2021 (and Environmental Improvement Plan 2023 (EIP)) introduces a National Water Target that requires 20% reduction in public water supply in England per head of population by 2038, against a 2019 to 2020 baseline — with interim targets of 9% by 2027 and 14% by 2032. These targets cannot be achieved by new development alone. This guidance is aimed to complement other demand management measures, including leakage reduction, to support delivery of these targets alongside sustainable growth and nature recovery. The government has an ambition to tighten Building Regulations water efficiency standards.

The Plan also includes a commitment to introduce a water efficiency labelling scheme for fittings (e.g. taps and showers) and white goods (e.g. washing machines and dishwashers), in order to assist consumers and developers to make water-efficient purchases. The government consulted on a scheme in 2022. As of the time of writing, full details of the scheme and an implementation date have not been confirmed.

4.3.4 Shared Standards for Water Efficiency for Local Plans

A Shared Standard for Water Efficiency has been published as part of a collaborative and collective approach by Anglian Water, Cambridge Water, Essex and Suffolk Water, Affinity Water, the Environment Agency and Natural England. It is designed to help support LPAs to deliver sustainable growth by specifying a more stringent water efficiency policy than the contained in Building Regulations (110l/p/d).

There are three key recommendations in the Shared Standard:

Require new homes to be built to more stringent standards for water efficiency than the optional Building Regulations (part G) standard of 110 litres per person per day (l/p/d). Evidence indicates that a design standard of up to 85 litres/person/day (l/p/d) for residential developments is feasible.

Require new, extended or redeveloped non-domestic development to aim to achieve full credits in the BREEAM water calculator.

Require new, for major non-domestic developments to include water saving measures and water reuse in their designs.

The Shared Standard contains four annexes:

Annex A - Evidence that the supply-demand balance requires demand management

Annex B - Evidence that environmental obligations could be compromised unless growth is water efficient

Annex C - Evidence and advice about the feasibility and viability of more stringent water efficiency standards

Annex D - the policy and legislative framework that supports more stringent water efficiency policies

These should be reviewed alongside this document.

4.3.5 Supply demand balance risks

In order to achieve a supply-demand balance, the WRMP relies on a combination of demand management techniques and restrictions on non-domestic supply until new large strategic supply options come online (which is not until the 2030s). Demand management measures that rely on customer behaviour such as raising awareness of water scarcity can be uncertain. If the forecast benefit is not realised, may not be able to move to more sustainable licences and the water company may have to abstract more water to maintain their supply-demand balance. This may be above sustainable limits, risking damage to the environment.

Anglian Water (AW) have a statutory duty to supply water for domestic purposes to non-household development, but do not have to supply water for non-domestic purposes. In their position statement on non-domestic water requests, AW state that "…where new and unplanned non-domestic requests are received, which exceed 20,000 litres per day (0.020 Ml/d) (this may be less, dependent on the availability of water in that area) AW will need to decline the request for more water, in order to protect existing supplies and the environment. Whilst this can contribute towards maintaining the supply-demand balance, it can also restrict non-household development impacting on economic growth."

It is therefore important that new development, both household and non-household is as water efficient as possible to mitigate the risk that demand management is not successful, and to support non-household development.

4.3.6 Environmental obligations

The Phase 1 IWMS identified protected sites in the region that may be sensitive to changes in river flow or groundwater levels and therefore could be impacted by increases in abstraction (either from surface water or groundwater) to support growth in Milton Keynes. In the WRE area, there are 239 Sites of Special Scientific Interest (SSSIs) which have water dependent features, some of which are also designated at Special Areas of Conservation (11), Special Protection Areas (11) or Ramsar sites (13). The Shared Standard states that 96 of these have water abstraction identified as an active pressure.

Natural England have a "plan-led" approach to water scarcity through which they are robustly responding to WRMPs and negotiating licence changes with the EA. The third element of their approach is to provide advice to LPAs on water efficiency, encouraging LPAs to adopt more stringent water efficiency targets.

4.3.7 Consideration of viability and feasibility

Any water efficiency target adopted has to be feasible: i.e., do the products exist that allow a particular standard to be met, and viable, i.e., can the standard be achieved without making the development financially unviable.

Annex C of the Shared Standard provides examples of products that are available on the market that can achieve an efficiency standard of 85l/p/d based on the capacity and flow rates they deliver.

The Future Homes Hub provides some indicative costs for achieving different water efficiency targets. It states that there is no additional cost to achieve 110l/p/d. The cost of achieving daily per person consumption of 93l/p/d is estimated to be £350 per unit (Future Homes Hub, 2024).

Research undertaken for the devolved Scottish and Welsh governments by the Energy Saving Trust indicated potential annual savings on water and energy bills for householders of approximately £31 per year as a result of water efficiency measures that would allow a target of 100l/p/d to be met (Energy Saving Trust, 2020). Water efficiency is therefore not only viable but of positive economic benefit to both private homeowners and tenants. In addition, financial incentives are available from the water companies to developers to encourage water-efficient design.

Research published by Building Research Establishment (BRE) on the delivery of sustainable buildings reports that the cost of achieving lower BREEAM ratings incurs little or no additional cost, and targeting higher BREEAM ratings incurs a typical cost of less than 2% above the baseline for that development. The same study reports that the cost of achieving 3 credits in WAT01 (a 40% reduction in water consumption for baseline) would be £13,361 and payback could be achieved between 1 and 2.5 years depending on the price of water (BRE, 2018).

4.3.8 Impact of water efficiency standards

Table 2-1 shows that a significant proportion of the expected growth during the plan period is from commitments, i.e., sites that already have planning permission in some form. It may not be possible for a new water efficiency policy to influence those sites if full planning permission has been granted. It is assumed in the analysis below that a tighter efficiency standard can only be applied to the preferred allocations and windfall sites. Opportunities may exist on sites with outline permission for a tighter standard to be required which may result in a higher demand saving.

Three scenarios are presented in Table 4-1 with their resulting water demand saving by the end of the plan period. The first is a "business as usual" scenario based on the Building Regulations Optional Standard of 110l/p/d and no target applied for employment sites. The second and third scenarios have residential water efficiency targets of 100l/p/d and 85l/p/d supported by employment sites achieving three credits in Wat01 of the BREEAM New Construction Standard (a 40% reduction from the baseline). If the tighter water efficiency target of 85l/p/d is adopted, a saving of nearly 3Ml/d could be achieved by the end of the

plan period compared to a "business as usual" baseline. This provides additional resilience in the water resources system, and potentially reduces the volume of water that would need to be abstracted in neighbouring WRZs.

Once a house has been built to a water efficiency standard of 110l/p/d or even 125l/p/d, it is difficult and expensive to retrospectively reduce water demand and would rely on homeowners voluntarily making changes to their property. An approach which sets the 110l/p/d target in the Local Plan will lock in a large number of new homes which will not contribute to the national target. The most cost effective and simplest stage within the life cycle of a building to implement water efficiency is during construction.

Table 4-1 Water demand saving in different efficiency scenarios

Scenario	Residential demand (Ml/d)	Employment demand (Ml/d)	Total demand (Ml/d)	Demand saving by 2050	Percentage reduction
Business as usual - 110/l/p/d	14.51	4.15	18.66	-	-
100l/p/d and BREEAM WAT01 (3 credits)	13.71	3.25	16.96	1.70	9%
85l/p/d and BREEAM WAT01 (3 credits)	12.50	3.03	15.53	3.13	19%

4.3.9 Summary and Recommendations

Water resources in England are under considerable pressure. The Environment Agency has stated that "the scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand."

The new National Water Resources Framework identified the Ruthamford Central WRZ which serves Milton Keynes as having the highest percentage growth of any WRZ in England. A comparison of the growth accounted for the in Anglian Water's WRMP24 and the MKCP projections show the combined growth forecast of Buckinghamshire and Milton Keynes is within water company projections, however the trajectory of growth from Milton Keynes brings it close to the WRMP projections suggesting the combined growth could be ahead of AW's forecast between 2030 and 2037. Milton Keynes City Council and Buckinghamshire Council should engage early with AW to ensure all three plans are aligned.

Part G of Building regulations currently states that new build housing should achieve a minimum of 125 l/p/d. A tighter target of 110l/p/d is allowed if the local authority can

establish a clear need based on available evidence. This target was included in the current Local Plan for Milton Keynes - Plan:MK (2019). Many LPAs are now going further than this. The Written Ministerial Statement (WMS) by the former Secretary of State for Levelling Up, Housing and Communities (DLUHC) states that:

"…in areas of serious water stress, where water scarcity is inhibiting the adoption of Local Plans or the granting of planning permission for homes, I encourage local planning authorities to work with the Environment Agency and delivery partners to agree standards tighter than the 110 litres per day that is set out in current guidance."

A Shared Standard for Water Efficiency has been published as part of a collaborative and collective approach by Anglian Water, Cambridge Water, Essex and Suffolk Water, Affinity Water, the Environment Agency and Natural England. It is designed to help support LPAs to deliver sustainable growth by specifying a more stringent water efficiency policy than the contained in Building Regulations (110l/p/d). It recommends that new homes are built to a standard of 93l/p/d, supported by a non-household standard where development will aim to achieve full credits in the BREEAM water calculator with a minimum of 3 credits in WAT01. The proposed 93l/p/d target reflects the viability challenge of targeting 85l/p/d, whilst also improving on the existing Plan:MK policy and the optional building regulations target of 110l/p/d.

Table 4-2 Recommendations for water resources

Recommendation	Responsibility	Timescale
Annually review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	Anglian Water	Ongoing
Provide yearly updates of projected housing growth to water companies to inform WRMP updates.	MKCC	Ongoing
Use planning policy to require a water efficiency standard of 93l/p/d to be achieved using the fittings-based approach. The policy should allow for a future reduction in the water efficiency target if required.	MKCC	In MKCP
This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.	MKCC	In MKCP
Larger residential developments and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting	MKCC	Ongoing

Recommendation	Responsibility	Timescale
into development at the master planning stage in order to reduce water demand.		

5 Infrastructure assessment

5.1 Water supply network

An increase in water demand due to growth can exceed the hydraulic capacity of the existing supply infrastructure. This is likely to manifest itself as low pressure at times of high demand. An assessment is required to identify whether the existing infrastructure is adequate or whether upgrades will be required. The time required to plan, obtain funding and construct major pipeline works can be considerable and therefore water companies and planners need to work closely together to ensure that the infrastructure is able to meet growing demand.

Anglian Water commented that water supply network modelling is currently being undertaken for the Ridgemont Pumping Station and strategic supply pipeline upgrades to the east of Milton Keynes, which will be delivered in 2026/27.

5.2 Wastewater network

5.2.1 Introduction

Anglian Water (AW) is the Sewerage Undertaker (SU) for the study area. The role of the SU includes the collection and treatment of wastewater from domestic and commercial premises, and in some areas, it also includes the drainage of surface water from building curtilages to combined or surface water sewers. It excludes, unless adopted by the SU, systems that do not drain building curtilages, including highway drainage and land drainage systems.

5.2.2 Wastewater network assessment

AW were provided details of the potential allocations and asked to assess the impact of these sites on the wastewater network. The following red/amber/green definition was used by AW to score each site:

GREEN	AMBER	RED
Network improvements unlikely to be required	Network improvements may be required	Network improvements likely to be required

The assessment was divided into foul sewer network and surface water sewer assessments.

A red assessment does not mean that a site cannot or should not be developed (unless stated in the comments) and instead reflects the requirement for extensive new infrastructure to order to accommodate the site. It should be remembered that the water companies have a statutory duty to serve new development under the Water Industry Act 1991.

5.3 Storm overflows

5.3.1 Introduction

Storm overflows are an essential component in the sewer network – however when they operate frequently, they can cause environmental damage. They occur on combined sewer systems where the sewer takes both foul flow (sewage from homes and offices) and rainwater runoff. In normal conditions, see Figure 5.1, all of this flow passes through the sewer network and is treated at a wastewater treatment works.

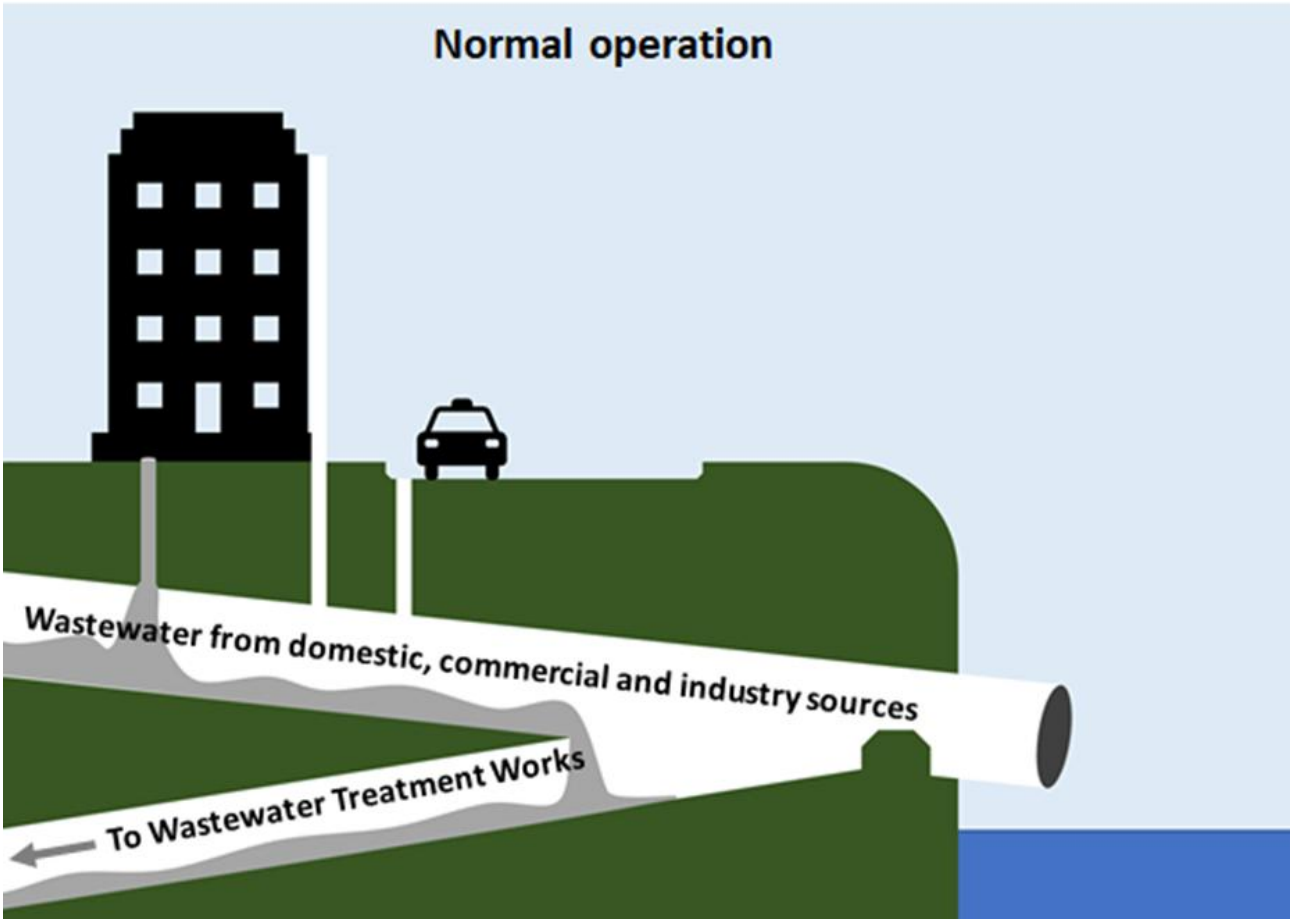

Figure 5.1 Storm overflow operation in normal conditions

In periods of exceptional rainfall, see Figure 5.2, the capacity in a combined sewer may be used up by the additional flow from rooftops and storm drains. Once the capacity is exceeded, wastewater would back up into homes, businesses and on to roads. A storm overflow acts as a relief valve, preventing this from happening.

Storm overflows become problematic when they operate frequently in moderate or light rainfall, or for long periods because of groundwater infiltration in the sewerage system – possibly in breach of their permit.

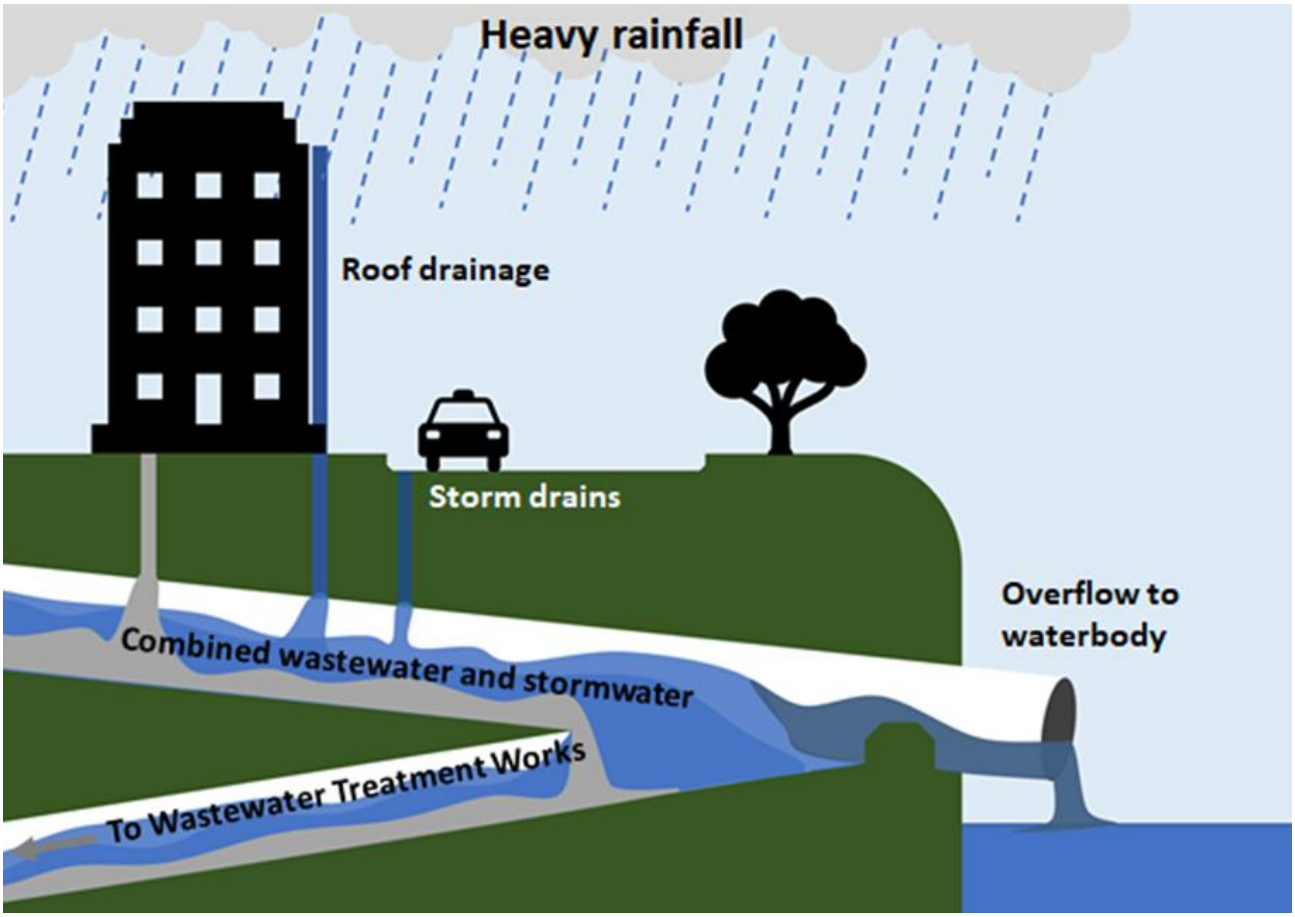

Figure 5.2 Storm overflow operation in exceptional rainfall

5.3.2 Storm overflow assessment

The Phase 1 IWMS presented the storm overflow performance of the six storm overflows that were monitored at the time of writing. Since then, all storm overflows within Milton Keynes have had monitoring installed and have at least one year of data. As outlined in 2.2.3, an updated Storm Overflow Assessment Framework has been published. This has reduced the trigger points for an investigation.

The following red/amber/green scoring was applied to each overflow based on the new trigger points in Table 2-1.

Table 5-1 Scoring criteria for storm overflows

Category	Investigation trigger (average number of spills per year)
Green	Greater than 30
Amber	Greater than 5 and less than 10 if based on 3 years' data Greater than 10 and less than 20 if based on 2 years' data Greater than 20 and less than 30 if based on 1 years' data
Red	Greater than 10 if based on 3 years' data

Category	Investigation trigger (average number of spills per year)
	Greater than 20 if based on 2 years' data Greater than 30 if based on 1 years' data

The performance of each storm overflow in Milton Keynes is summarised in Table 5-2. This is also shown graphically in Figure 5.5.

There are nine network storm overflows, and six storm tank overflows at WRCs in the study area. Of these eleven have been given a "red" rating indicating that they are above the threshold for an investigation. One further overflow is given an "amber" score indicating that whilst it is currently below the trigger threshold, it is close enough that further unmitigated growth in the catchment may cause the trigger to be met in the future.

Three of the storm overflows (Sherington WRC and two overflows at Weston Underwood STW) spilled for a duration of more than 1000 hours (over 40 days) in 2024.

According to Water UK, there are 14 storm overflows in Milton Keynes (Water UK, 2024). Analysis in this report shows 15, which may be because there are additional overflows now monitored since the Water UK data was published. None of these overflows have spill improvements planned according to the Water UK dataset however, there has been a significant worsening of performance in 2023 and 2024 and the threshold for an investigation on eleven of these has been reached.

The plan is not expected to prevent any spills by 2030 (the data indicates the number of spills may increase) but 71 spills by 2050, a 50% reduction respectively, relative to a 2020 baseline. However, as the performance of many of these overflows has worsened significantly in the last two years, this plan should be reviewed by Anglian Water.

The new minimum requirement for all overflows is that they meet a 'rainfall target' of 10 spills per year. Figure 5.3 shows the percentage of storm overflows in Milton Keynes meeting this target in 2022, and (forecast) in the period up to 2050 as improvements are made. Other improvements may occur at the same time, as necessary, to further reduce spills. Anglian Water commented that “the position should not be worsened before 2030 and after 2030 current overflow monitoring will enable targeted investment".

Anglian Water recommend that the Plan includes a policy requiring early engagement with their Development Services team, in part to ensure a ‘sustainable point of connection’ to the sewerage network is feasible. In responding to planning applications Anglian Water Development Services are advising LPAs that where a sewer connection would increase the risk of sewer flooding or the potential harm to the environment from wastewater or surface waters causing increased storm overflows incidents, then the application should not be permitted unless mitigation measures are included with the application.

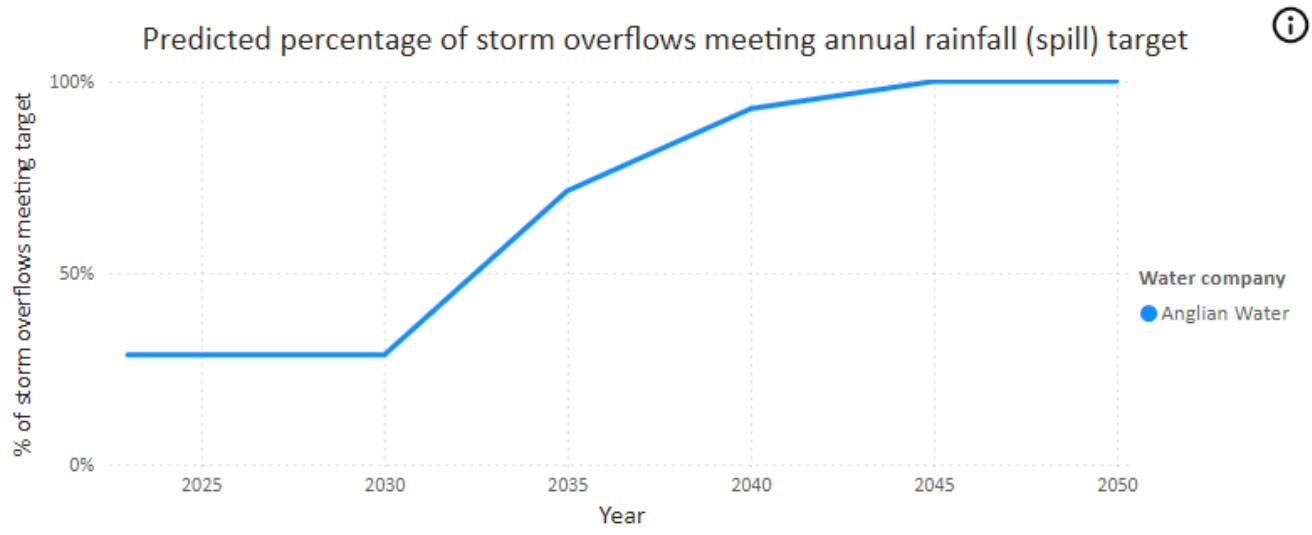

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Figure 5.3 Percentage of storm overflows in Milton Keynes meeting annual spill targets (2022)

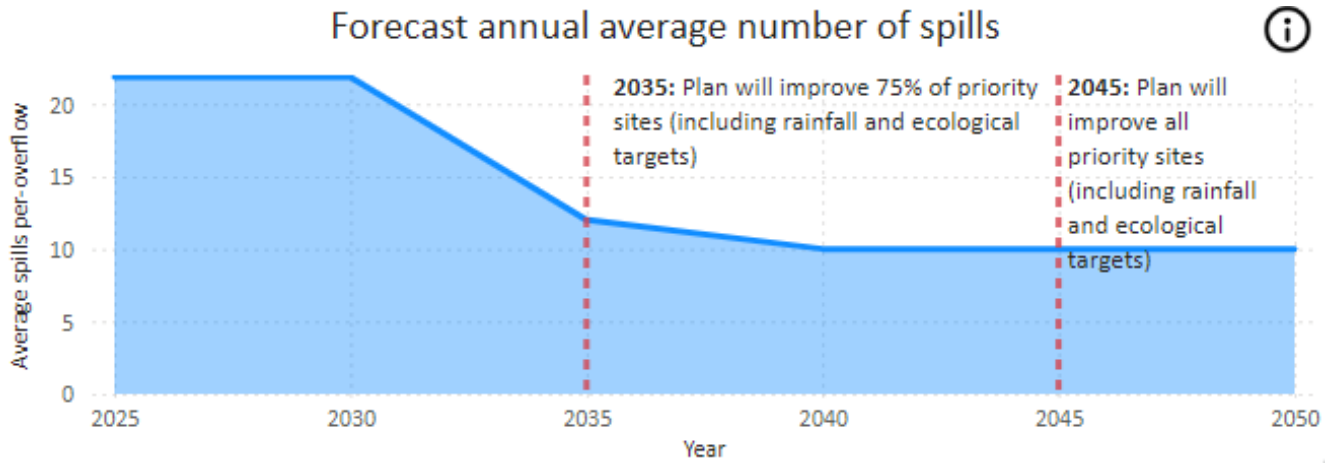

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Figure 5.4 Forecast number of spills

Table 5-2 Storm overflow performance in MKCC

Overflow	Number of operations in 2022	Duration of operation in 2022 (hours)	Number of operations in 2023	Duration of operation in 2023 (hours)	Number of operations in 2024	Duration of operation in 2024 (hours)	Average number of operations per year	RAG
Castlethorpe SO/ AW1NF86	n/a	n/a	n/a	n/a	1	0.75	1.00	Green
Cotton Valley Water Recycling Ctr/ AWCNF10296	1	0.5	8	74.5	30	361.5	13.00	Red
Filgrave Sewage Treatment Works/ AW1NF3012	n/a	n/a	n/a	n/a	15	161.25	15.00	Green
Hanslope STW/ AW1NF1066A	32	409.5	88	1360.68	n/a	n/a	60.00	Red
Lavendon Water Recycling Centre/ AW1NF1012A	7	23.25	67	340.25	102	599.75	58.67	Red
Selbourne Avenue Pumping Station/	7	8.75	10	16	23	101	13.33	Red

Overflow	Number of operations in 2022	Duration of operation in 2022 (hours)	Number of operations in 2023	Duration of operation in 2023 (hours)	Number of operations in 2024	Duration of operation in 2024 (hours)	Average number of operations per year	RAG
AW1NF1881								
Sewers in Bradwell Road/ AW1NF1140	n/a	n/a	13	21.75	21	57.5	17.00	Amber
Sherington Water Recycling Centre/ AW1NF1079	10	54.75	27	267.65	68	1071.73	35.00	Red
Stony Stratford/ AW1NF1091	n/a	n/a	1	0.25	72	497.75	36.50	Red
Turvey (Cottages) STW/ AWCNF2089	2	0.5	4	3.23	43	60.37	16.33	Red
Water Lane CSO, Sherington/ AWCNF11337	n/a	n/a	2	1.25	2	8	2.00	Green
Weston Underwood STW/	n/a	n/a	n/a	n/a	80	1155	80.00	Red

Overflow	Number of operations in 2022	Duration of operation in 2022 (hours)	Number of operations in 2023	Duration of operation in 2023 (hours)	Number of operations in 2024	Duration of operation in 2024 (hours)	Average number of operations per year	RAG
AWCNF11026								
Weston Underwood STW/ AWCNF11086	n/a	n/a	2	20	83	1495	42.50	Red
Willen Road PS/ AW1NF3235	n/a	n/a	1	4.25	46	740.75	23.50	Red
Wolverton Rail Freight CSO/ AW1NF121	10	3.25	19	6.75	17	38.75	15.33	Red

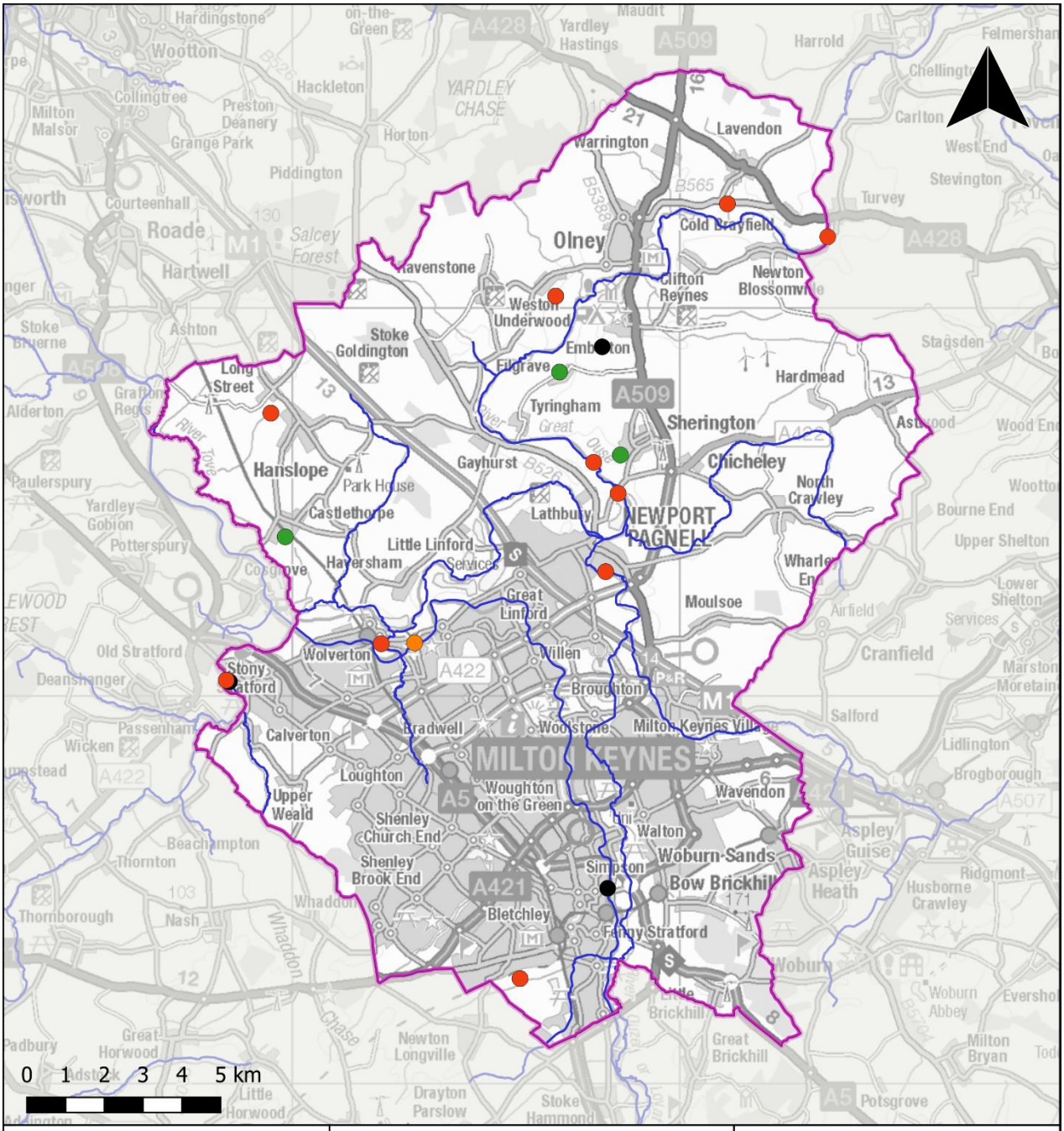


Figure 5.5 Storm overflow performance in MKCC

5.4 Wastewater treatment

5.4.1 Water Recycling Centres in Milton Keynes

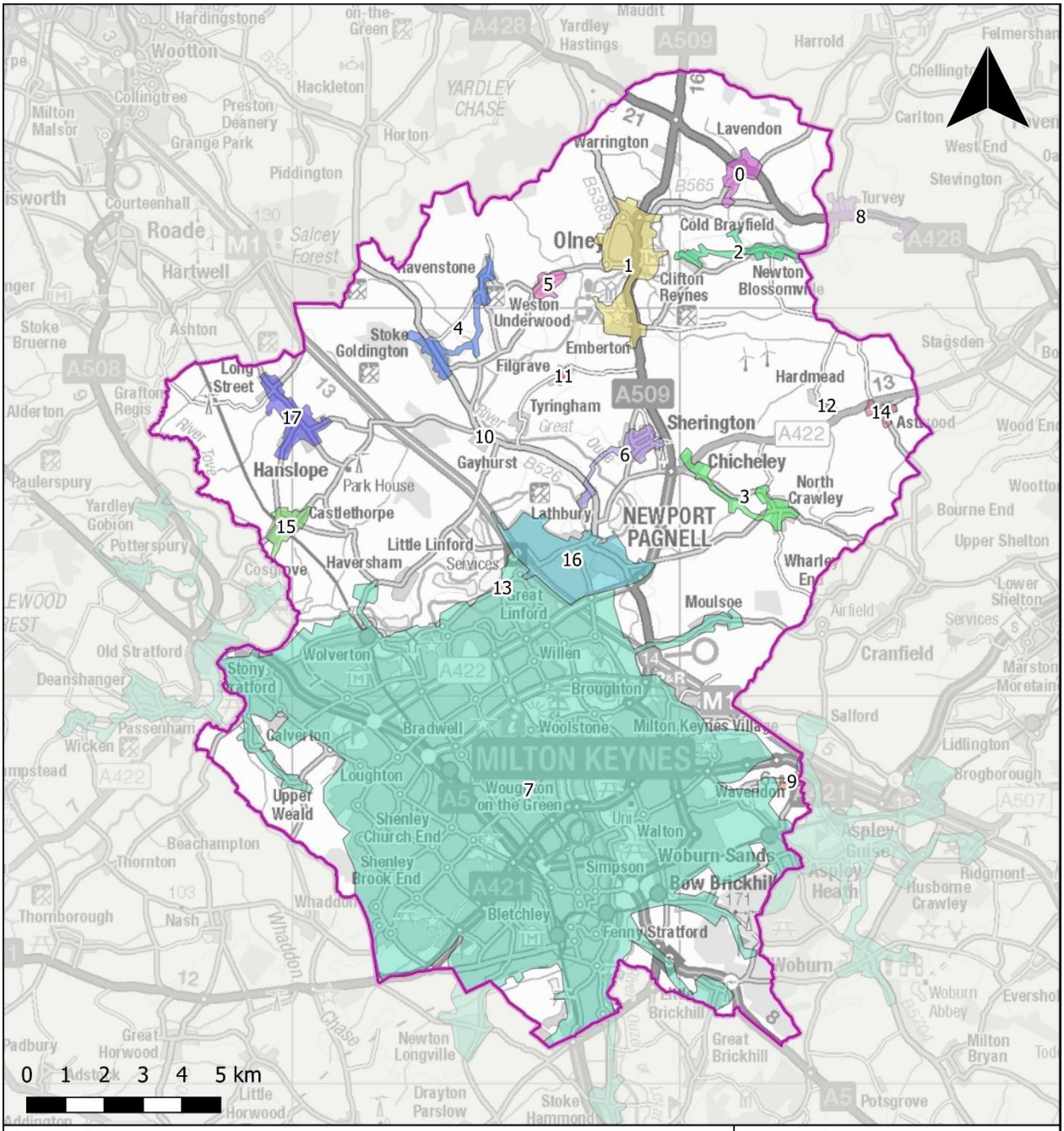
AW provide wastewater services for development in Milton Keynes. Anglian Water refer to their Wastewater Treatment Works (WwTW) as Water Recycling Centres (WRCs). They may also be referred to as Sewage Treatment Works (STW) in some documents and data sources. For this report, they will be referred to as WRCs. There are 18 WRCs that are within or currently serving communities in Milton Keynes. Six of these are expected to serve growth from commitments or adopted plans. The WRCs and catchments they serve are shown in Figure 5.6.

The Phase 1 IWMS investigated the remaining capacity at WRCs once all planned growth had been built. In Phase 2, the updated growth forecast containing potential allocations was used to update this assessment. Each development site was assigned to a WRC using the sewerage drainage area boundaries provided by AW to set a baseline for WRC capacity. Actual connection of a development site to a particular WRC may be different and will depend on the capacity of the receiving works, and the local sewer network.

Historically, wastewater from very small communities or isolated individual properties is managed by septic tanks. Discharge from septic tanks directly to surface waters is no longer permitted and both existing and new systems must either connect to the public sewer, use a small sewage treatment plant also known as a Package Treatment Plan (PTP), or install a drainage field (an array of pipes set in a permeable bedding material). Discharges to groundwater may use septic tanks or PTPs, but in either case the discharge should also be via a drainage field.

Very small developments in rural areas may be suitable for on-site treatment and discharge, however the Environment Agency will not usually permit this where there is a public sewerage system within a distance calculated as 30m per dwelling. There is therefore a localised risk to water quality if all of these small developments were to be served by septic tanks, especially where there are clusters of small-scale new development.

A summary of Anglian Water's Drainage and Wastewater Management Plan (DWMP) was provided in Phase 1 (Section 4.7.2). This was based on the DWMP published in 2023 which is still the latest version, so this summary has not been updated in Phase 2.



Source: INK-JBAU-XX-XX-MX-Z-0033-WwTW

0 - Lavendon
1 - Olney
2 - Newton Blossomville
3 - North Crawley
4 - Ravenstone-Stk Goldington
5 - Weston Underwood
6 - Sherington
7 - Cotton Valley
8 - Turvey-Cottage - N Blovil R
9 - Wavendon-Lower End
10 - Gayhurst
11 - Filgrave
12 - Hardmead (New)
13 - Great Linford
14 - Astwood
15 - Castlethorpe
16 - Newport Pagnell-London Rd
17 - Hanslope

Figure 5.6 Water Recycling Centres in Milton Keynes

5.4.2 Wastewater Treatment Works Flow Permit Assessment

Water companies currently monitor operational compliance, and the EA monitor Environmental Permit (EP) compliance by the water company and undertake enforcement and prosecution when this passes the EAs expediency rules. This may change following the Independent Water Commission's review, which recommended a new regulator take responsibility for monitoring operational compliance. Figure 5.7 summarises the different types of wastewater releases that might take place, although precise details vary from works to works depending on the design.

During dry weather, the final effluent from the WRC should be the only discharge (1). With rainfall, the storm tanks fill and eventually start discharging to the watercourse (2) and storm overflows (referred to on the diagram as Combined Sewer Overflows (CSOs)) upstream of the storm tanks start to operate (3). The discharge of storm sewage from treatment works is allowed only under conditions of heavy rain or snow melt, and therefore the flow capacity of treatment systems is required to be sufficient to treat all flows arising in dry weather and the increased flow from smaller rainfall events. After rainfall, storm tanks should be emptied back to full treatment, freeing their capacity for the next rainfall event.

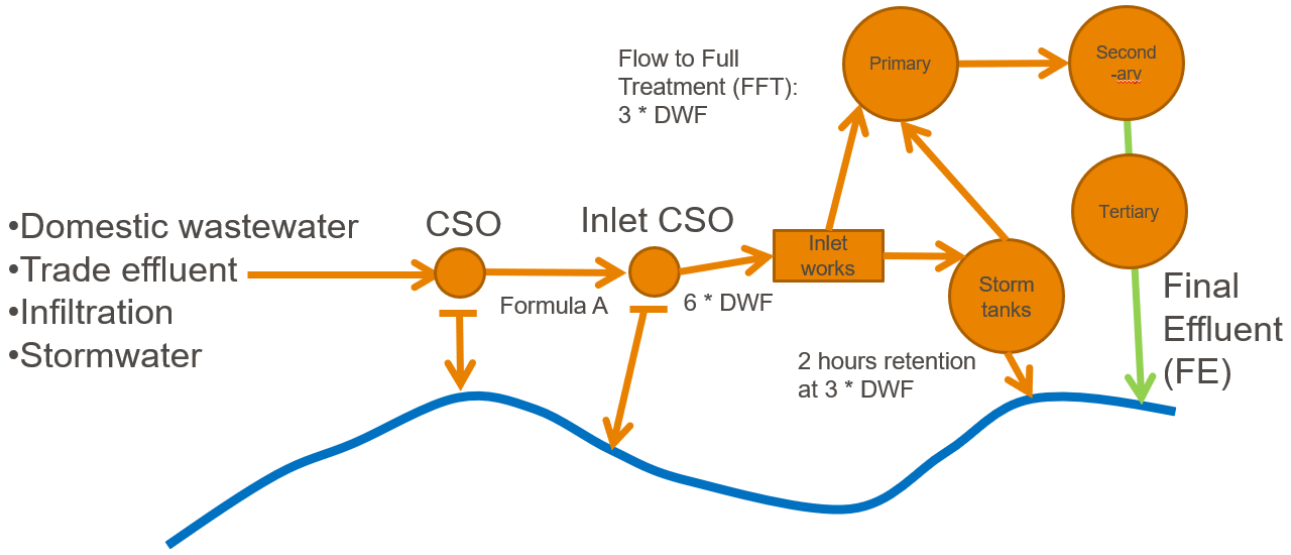


Figure 5.7 Overview of a typical combined sewerage system and WRC discharges

Environmental permits are used alongside water quality limits as a means of controlling the pollutant load discharged from a water recycling centre to a receiving watercourse. Sewage flow rates must be monitored for all WRCs where the permitted discharge rate is greater than 50 m^3/day in dry weather.

Permitted discharges 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 WRC 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 by the permit (Flow to Full Treatment, FFT).

WRC Environmental Permits also consent for maximum concentrations of pollutants, in most cases Suspended Solids (SS), Biochemical Oxygen Demand (BOD) and Ammonia (NH4). Some works (usually the larger works) also have permits for Phosphorous (P). These are determined by the Environment Agency with the objective of ensuring that the receiving watercourse is not prevented from meeting its environmental objectives and that the water quality is improved over time. There is also specific regard to the Chemical Status element of the Water Framework Directive (WFD) classification.

Increased domestic population and/or employment activity can lead to increased wastewater flows arriving at a WRC. Where there is insufficient headroom at the works to treat these flows, this could lead to failures in flow consents.

AW provided data on the performance of their WRCs over the last five years (2020 to 2024). From this, the 80th percentile exceedance flow statistic was calculated. This is current flow at each WRC.

The development sites contained in the growth scenario were assigned to each WRC using the sewerage drainage area boundaries provided by AW. For each site, the future DWF was calculated using the occupancy rates and per-capita consumption values obtained from the Water Resource Management Plans, and the assumption that 95% of water used is returned to sewer. Permitted headroom was used as a substitute for actual designed hydraulic capacity for each WRC being assessed.

For employment sites, wastewater demand was estimated based on the predicted number of new employees. Floor space, employment use types, and employment densities were used to estimate the number of employees.

The predicted water demand from growth during the plan period was then added to the current observed flow at each WRC and then compared to the permitted flow. An estimated remaining capacity at the end of the plan period (before an increase in permit and/or upgrades are required) was then calculated. This is summarised in Table 5-3. A red-amber-green assessment of headroom was then applied to each WRC. Sites with more than 10% of their flow permit remaining were given a "green" score. Sites within 10% of their flow permit or exceeding their permit were given an amber score. Smaller WRCs with no flow monitoring or a descriptive permit were also given an amber score reflecting their limited capacity to accommodate growth. A WRC with an amber score may require an increase in its permit, and / or upgrades to treatment processes in order to accommodate further

growth within the catchment. A red score would be applied where there were significant constraints to providing those upgrades. These scores are shown in Table 5-3 and Figure 5.8.

The majority of growth from Milton Keynes is expected to be served by Cotton Valley WRC. An assessment of its current flow against its permitted flow shows that there is capacity for all the growth from Milton Keynes during the plan period. However, when growth from neighbouring authorities is taken into account (from Central Bedfordshire and Buckinghamshire) the WRC is likely to be close to or exceeding its permit value by 2050 if no action were taken before then. Once growth from the three Local Plans is confirmed, AW will be able to plan additional capacity at this WRC and have time to incorporate this into future plans.

Newport Pagnell WRC has a descriptive permit and currently serves a small population. During the plan period there are 1,047 houses planned within the catchment. It is likely that this WRC would need to be converted to a numeric permit and upgrades carried out to serve the expected growth. The majority of this growth is from one committed development site (Tickford Fields - 930 dwellings). This is expected to be delivered between 2026/27 and 2031/32. However, Anglian Water have advised that the majority of growth from the Newport Pagnell catchment will be processed at Cotton Valley WRC, which has capacity to accommodate the planned growth. There is an existing terminal pumping station (TPS) which pumps the majority of Newport Pagnell's wastewater directly to Cotton Valley WRC, Anglian Water doesn't foresee an issue if proposed developments in Newport Pagnell drain to the TPS, but recommend that developers should engage early with their Development Services team to confirm the capacity of this pumping station.

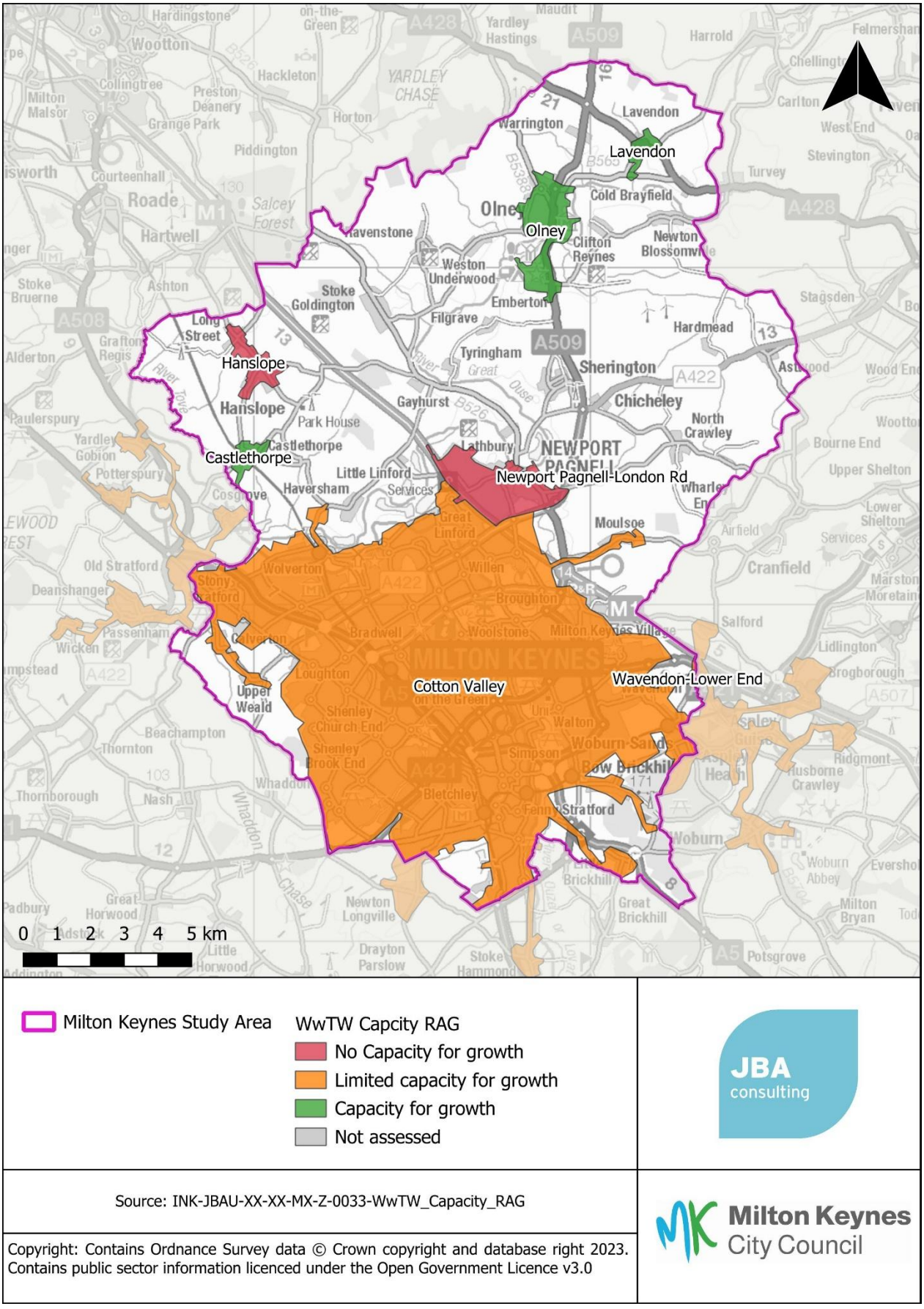


Figure 5.8 WRC Capacity assessment

Table 5-3 WRC capacity assessment

WRC	Current permit limit (m^3/d)	Observed 80%ile DWF (m^3/d) 2020-2024	Expected growth during plan period (no. of dwellings)	Comments
Astwood	50	22	0	No growth currently planned - unlikely to have capacity for any significant growth
Castlethorpe AW1NFA31A	151	148	0 - employment only	Data suggests this WRC is close to or exceeding its permit limit. Due to the size of this WRC, it is unlikely to serve significant growth.
Cotton Valley AWCNF10296	78,000	59,537	55,288	Large headroom available for growth
Filgrave	N/A	N/A	0	Descriptive permit - not expected to serve significant growth
Gayhurst	N/A	N/A	0	Descriptive permit - not expected to serve significant growth
Great Linford	N/A	N/A	0	Descriptive permit - not expected to serve significant growth
Hanslope AW1NF1066A	840 (since 28/11/2024)	574	26 (completions)	Headroom available for growth. Anglian Water has investment planned during AMP8, and advise that any planning permissions include pre-occupation conditions that the upgrades are completed ahead of occupation.
Hardmead	9	N/A	0	Unlikely to serve significant growth
Lavendon AW1NF1012A	295	160	18	Headroom available for small development.
Newport Pagnell-London Rd	N/A	N/A	1,047	This WRC currently has a descriptive permit and is unlikely to have capacity for growth planned within its catchment. Wastewater solution needed for these sites.
Newton Blossomville	75	N/A	0	Unlikely to serve significant growth

WRC	Current permit limit (m^3/d)	Observed 80%ile DWF (m^3/d) 2020-2024	Expected growth during plan period (no. of dwellings)	Comments
North Crawley AW1NF352	123	100	1	Headroom available for small development
Olney AW1NF1165A	1822	1,351	172	Headroom available for small development
Ravenstone-Stk Goldington	160	142	0	Limited headroom available
Sherington AW1NF1079	206	262	0	WRC is currently at or close to its permit limit.
Turvey-Cottage N Blovil R	236	250	0	WRC is currently at or close to its permit limit.
Wavendon - Lower End	N/A	47	N/A	Descriptive permit - not expected to serve significant growth
Weston Underwood	N/A	N/A	0	Descriptive permit - not expected to serve significant growth

5.4.3 AW planning response

Anglian Water have circulated a "Planning Response List" to all LPAs in their area showing how they will respond to planning applications in each catchment going forward. The possible responses are outlined in Table 5-4.

Table 5-4 Anglian Water possible planning responses

Planning Response	Explanation
Approve	There is capacity for growth and a planning application within this catchment is unlikely to be objected to by AW.
Pre-Occupation Condition	An upgrade is planned in this catchment within this AMP period (2025-2030) but has not yet been built. Development can proceed, but a condition should be applied to ensure upgrade is complete prior to occupation.
Object - Descriptive	"Descriptive" refers to where the WRC has a descriptive permit, i.e., the permit isn't a numeric flow or concentration, rather it is a visual check of the effluent being discharged. These are usually very small works and likely to be unsuitable for a significant development to connect into. It is possible that a developer could pay for a period of flow monitoring to persuade the EA that the WRC has capacity for a limited number of homes.
Object - SSD	There are constraints on the local wastewater network rather than the WRC itself (for example a pumping station requires an upgrade). AW are likely to object to this planning application.
Object	There is no capacity within this catchment for further growth and AW are likely to object to this planning application.

For allocations planned within a catchment with an "object" response. The lack of capacity and the need for upgrades would be noted within the IWMS and in AW's representations on the Local Plan. Once it is within a published plan, it would be taken into account for funding within the next AMP period (2030-35). The planning response would then change to "Approve" or "Pre-occupation condition".

Table 5-5 Anglian Water planning response by catchment

WRC	Planning Response
Astwood	Approve
Castlethorpe	Approve
Cotton Valley	Approve
Filgrave	Object - Descriptive
Gayhurst	Object - Descriptive
Great Linford	Object - Descriptive
Hanslope	Pre-Occupation Condition
Hardmead (New)	Object - Descriptive
Lavendon	Approve
Newton Blossomville	Approve
North Crawley	Approve
Newport Pagnell-London Rd	Object - Descriptive
Olney	Approve
Ravenstone-Stk Goldington	Approve
Sherington	Approve
Wavendon-Lower End	Object - Descriptive
Weston Underwood	Object - Descriptive

5.5 Conclusions and recommendations

A capacity assessment was undertaken by JBA comparing the future flow from each WRC (the current actual flow and the forecast additional flow from growth), with the permit limit. Two WRCs (Sherington and Turvey Cottages) are currently exceeding their permit limits, although no further growth is planned in either catchment during the plan period. Cotton Valley WRC is the largest WRC in the study area and serves most of the planned development in Milton Keynes as well as an area in Central Bedfordshire and Buckinghamshire. This WRC has capacity to serve all the growth planned in this catchment from MKCC, however once neighbouring authority growth is also included, the WRC may be close to or exceeding its permit limit by 2050 if no action is taken. There is sufficient time for AW to respond to this.

There are 1,047 houses planned in the catchment of Newport Pagnell WRC. This WRC currently has a descriptive permit and may not have capacity for this level of growth. Anglian Water have advised that the majority of growth from the Newport Pagnell

catchment will be processed at Cotton Valley WRC, which has capacity to accommodate the planned growth.

Where new infrastructure or upgrades to existing infrastructure may be required, engagement between MKCC and AW is required to ensure that delivery of this infrastructure is aligned with delivery of development sites. Grampian conditions may be sought by the water company should development be in advance of the necessary infrastructure.

There are a number of poorly performing storm overflows on both the sewer network and on storm tanks at WRCs in Milton Keynes. Furthermore, this performance has got significantly worse in the last two years. Anglian Water commented that “the position should not be worsened before 2030 and after 2030 current overflow monitoring will enable targeted investment".

. Growth within these catchments could result in an increase in the operations of these overflows contributing to a worsening of water quality in the area. Action should be taken by the water companies to address these overflows prior to an increase in wastewater demand being generated by new development. Anglian Water recommend that the Plan includes a policy requiring early engagement with their Development Services team, in part to ensure a ‘sustainable point of connection’ to the sewerage network is feasible. In responding to planning applications Anglian Water Development Services are advising LPAs that where a sewer connection would increase the risk of sewer flooding or the potential harm to the environment from wastewater or surface waters causing increased storm overflows incidents, then the application should not be permitted unless mitigation measures are included with the application.

Table 5-6 Wastewater infrastructure recommendations

Recommendation	Responsibility	Timescale
Annually update LPA growth trajectories and undertake network modelling where appropriate to ensure adequate provision of water supply to new sites without detriment to existing customers and feedback to MKCC on implications for phasing of sites.	Anglian Water	Early in MKCP plan period
Early engagement is required with AW to ensure infrastructure is in place prior to occupation.	Developers and MKCC	Early in MKCP plan period
MKCC and developers should obtain infrastructure maps from AW to ensure existing water supply infrastructure is taken into account in site layout.	MKCC and Developers	At master planning stage
Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	MKCC and AW	During MKCP plan process

Recommendation	Responsibility	Timescale
Developers will be expected to work with the sewerage undertaker closely and early in the planning promotion process to develop an Outline Drainage Strategy for sites. The Outline Drainage strategy should demonstrate the wastewater assets required, their locations including points of connection to the public foul sewerage, whether the site drainage will be adopted by the water company and if any sewer requisitions will be required. Where a sewer connection would increase the risk of sewer flooding or the potential harm to the environment from wastewater or surface waters causing increased storm overflows incidents, The applicant should demonstrate how this will be mitigated.	MKCC, AW and developers	Ongoing
Developers will be expected to demonstrate to the Lead Local Flood Authority (LLFA) that surface water from a site will be disposed using a sustainable drainage system (SuDS) with connection to surface water sewers seen as the last option. New connections for surface water to foul or combined sewers will be resisted by the LLFA, Anglian Water and Thames Water. Surface water runoff from development shall not discharge to a foul drainage system.	LLFA and developers	Ongoing
Early engagement between MKCC and AW is required to ensure that where strategic infrastructure is required, it can be planned in by AW and will not lead to any increase in discharges from sewer overflows.	MKCC, Developers, AW	During MKCP plan process
Early engagement with Anglian Water is required to ensure that provision of WRC capacity at Cotton Valley is aligned with delivery of development.	MKCC	Ongoing
Provide Annual Monitoring Reports to Anglian Water detailing projected housing growth.	MKCC	Ongoing
AW should ensure that the growth forecasts used for planning upgrades at WRCs take into account a sufficient level of growth.	AW	Ongoing
Anglian Water to assess growth demands as part of their wastewater asset planning activities and feedback to the Council as concerns arise.	AW	Ongoing

6 Water quality and environmental impact

6.1 Introduction

An increase in the discharge of effluent from Water Recycling Centre (WRC) because of development and growth in the area in which they serve can lead to a negative impact on the quality of the receiving watercourse. Under the Water Framework Directive (WFD), a watercourse is not allowed to deteriorate from its current WFD classification (either as an overall watercourse or for individual elements assessed).

It is Environment Agency (EA) policy to model the impact of increasing effluent volumes on the receiving watercourses. Where the scale of development is such that a deterioration is predicted, a variation to the Environmental Permit (EP) may be required for the WRC to improve the quality of the final effluent, so that the increased pollution load will not result in a deterioration in the water quality of the watercourse. This is known as "no deterioration" or "load standstill". The need to meet river quality targets is also taken into consideration when setting or varying a permit.

The Environment Agency operational instructions on water quality planning and no-deterioration are currently being reviewed. Previous operational instructions (Environment Agency, 2012) (now withdrawn) set out a hierarchy for how the no-deterioration requirements of the WFD should be implemented on inland waters. The potential impact of development should be assessed in relation to the following objectives:

- Could the development cause a greater than 10% deterioration in water quality? This objective ensures that all the environmental capacity is not taken up by one stage of development and there is sufficient capacity for future growth.
- Could the development cause a deterioration in WFD class of any element assessed? This is a requirement of the Water Framework Directive to prevent a deterioration in class of individual contaminants. The "Weser Ruling" (European Court of Justice, 2015) by the European Court of Justice in 2015 specified that individual projects should not be permitted where they may cause a deterioration of the status of a water body. If a water body is already at the lowest status ("bad"), any impairment of a quality element was considered to be a deterioration. Emerging practice is that a 3% limit of deterioration is applied.
- Could the development alone prevent the receiving watercourse from reaching Good Ecological Status (GES) or Potential? Is GES possible with current technology or is GES technically possible after development with any potential WRC upgrades.

The overall WFD classification of a water body is based on a wide range of ecological and chemical classifications. This assessment focuses on three physico-chemical quality elements; Biochemical Oxygen Demand (BOD), Ammonia, and Phosphate as set out in the EA guidance (Environment Agency, 2014).

BOD – Biochemical Oxygen Demand

BOD is a measure of how much organic material – sewage, sewage effluent or industrial effluent – is present in a river. It is defined as the amount of oxygen taken up by micro-organisms (principally bacteria) in decomposing the organic material in a water sample stored in darkness for 5 days at 20°C. Water with a high BOD has a low level of dissolved oxygen. A low oxygen content can have an adverse impact on aquatic life.

Ammonia

Nitrogen is an essential nutrient required by all plants and animals for the formation of amino acids. In its molecular form nitrogen cannot be used by most aquatic plants, and so it is converted into other forms. One such form is ammonia (NH_3). This may then be oxidized by bacteria into nitrate (NO_3) or nitrite (NO2). Ammonia may be present in water in either the unionized form NH_3 or the ionized form NH_4. Taken together these forms care called Total Ammonia Nitrogen.

Although ammonia is a nutrient, in high concentrations it can be toxic to aquatic life, in particular fish, affecting hatching and growth rates.

The main sources in rivers include agricultural sources, (fertilizer and livestock waste), residential sources (ammonia containing cleaning products and septic tank leakages), industrial processes and WRCs.

Phosphate

Phosphorus is a plant nutrient and elevated concentrations in rivers can lead to accelerated plant growth of algae and other plants. Its impact on the composition and abundance of plant species can have adverse implications for other aspects of water quality, such as oxygen levels. These changes can cause undesirable disturbances to other aquatic life such as invertebrates and fish.

Phosphorus (P) occurs in rivers mainly as Phosphate (PO_4), which are divided into Orthophosphates (reactive phosphates), and organic Phosphates.

Orthophosphates are the main constituent in fertilizers used in agriculture and domestic gardens and provide a good estimation of the amount of phosphorus available for algae and plant growth and is the form of phosphorus that is most readily utilized by plants.

Organic phosphates are formed primarily by biological processes and enter sewage via human waste and food residues. Organic phosphates can be formed from orthophosphates in biological treatment processes or by receiving water biota.

Although it is phosphorus in the form of phosphates that is measured as a pollutant, the term phosphorus is often used in water quality work to represent the total phosphorus containing pollutants.

6.2 Water quality modelling

6.2.1 General approach

SIMCAT (Simulation Catchment) is a tool used by the Environment Agency to model and help to understand water quality in rivers and water bodies. It helps to identify where changes to discharge permits might be needed to prevent a deterioration in water quality, or to support an improvement. It also supports decisions about where new developments should go to reduce environmental harm. SIMCAT is a one-dimensional 1D model which means it looks at how water and pollutants move along the length of river in one direction, from upstream to downstream. It examines pollution from both point-source effluent discharges and diffuse (indirect) sources such as runoff from agricultural land and urban areas, and it simulates how substances behave as they flow through the river. The simulation shows how water quality changes as the river flows downstream.

The model results are assessed by comparing the predicted mean and ninetieth percentile concentrations of pollutants against Environmental Quality Standards set by the Environment Agency.

The study area is covered by the Wash SIMCAT model which covers a large area of eastern England, the catchment area of all rivers which drain to The Wash.

Within SIMCAT, the pollutants modelled were Biochemical Oxygen Demand (BOD), Ammonia (NH4) and Phosphorus (P). In fresh waterbodies, phosphate is usually the limiting nutrient for algal growth. However, in marine environments, nitrogen is the limiting nutrient.

The methodology followed is summarised in Figure 6.1 below. In this flow chart, all of the questions in the top row must be answered.

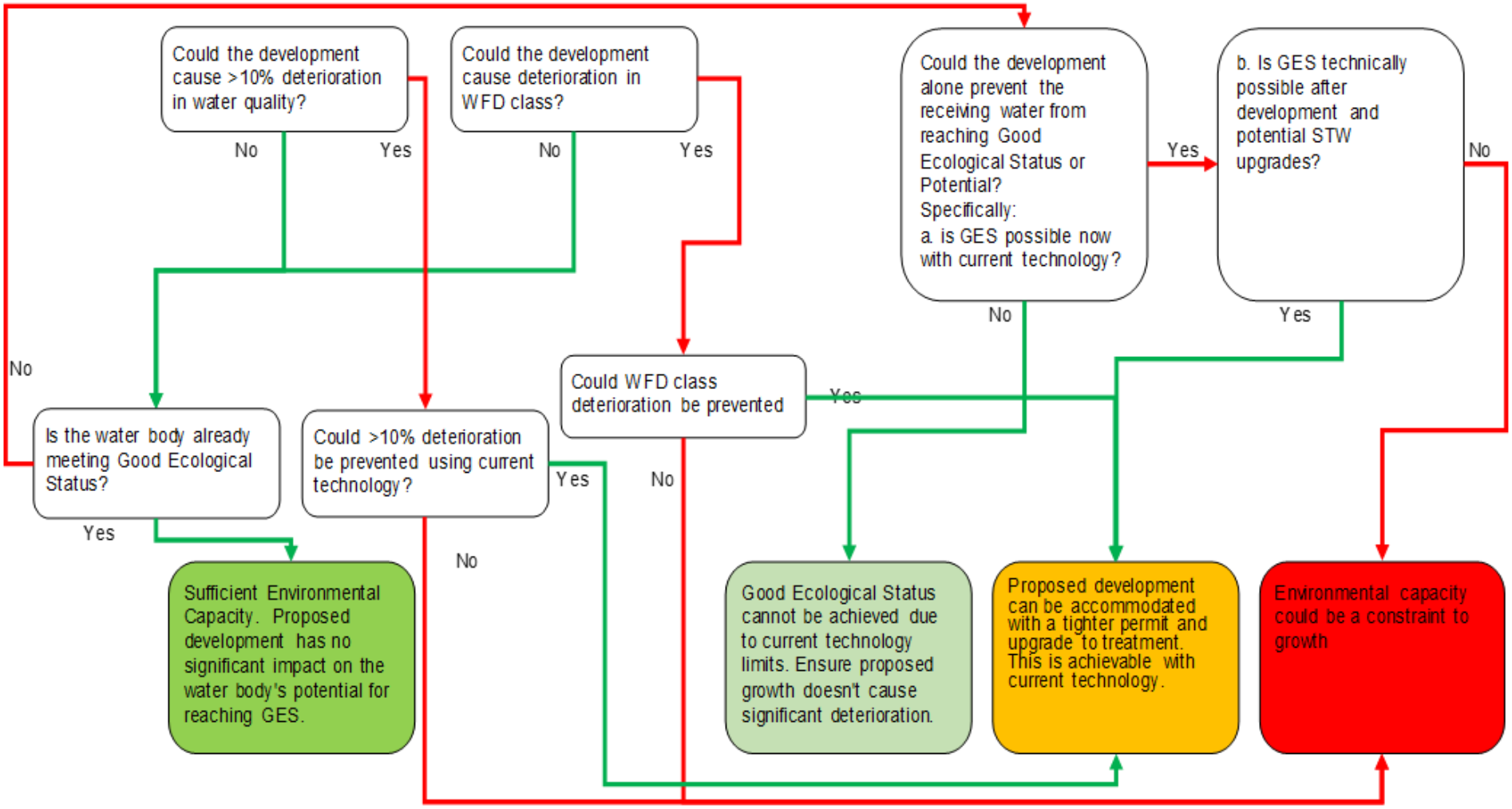


Figure 6.1 Water quality impact assessment following EA guidance (All questions in the top row need to be answered)

Where modelling indicated that growth may lead to a deterioration in the watercourse, or where the watercourse is not currently meeting at least a 'Good' class for each determinant, the models were used to test whether this could be addressed by applying stricter discharge limits. In such cases, a Technically Achievable Limit (TAL) was considered.

The EA advised that the following permit values are achievable using treatment at TAL, and that these values should be used for modelling all WRC potential capacity irrespective of the existing treatment technology and size of the works:

- Ammonia (90%ile): 1 mg/l
- BOD (90%ile): 5 mg/l
- Phosphorus (mean): 0.25 mg/l

This assessment did not take into consideration whether it is feasible to upgrade each existing WRC to TAL due to constraints of costs, timing, space, carbon costs etc. Funding and private-sector borrowing for upgrades of WRCs to prevent deterioration or achieve environmental improvements are funded through water company business plans, which are paid for via water bills.

6.2.2 Methodology

The study area is covered by the Wash SIMCAT model developed by the Environment Agency. The models have been largely based on observed flow and quality data for the period 2014-2020. A widespread update of the models, and the resultant recalibration were not within scope of this project. It was therefore agreed with the EA to update just the effluent flow at WRCs receiving growth in the study area. Consequently, the modelling work presented should be used to identify areas at risk of water quality deterioration, but not for permit setting.

Flow data from the last three years for each WRC in the study area was supplied by Anglian Water (AW) and used to update the model. Several of the WRCs in the study area already had upgrades completed in AMP7 or planned in AMP8, which would be expected to improve water quality at those locations. These were therefore factored into the model by applying the updated permit limit where it was less than the current discharge in the model. The model was then run in its updated form to set a 2024 baseline. It is expected that further upgrades to WRCs will be planned in AMP9 (2030-35) which will be defined in the AMP9 WINEP and the business plans for AW. As these documents have not yet been published, AMP9 schemes have not been factored into the modelling.

Additional effluent flow from growth during the MKCP plan period was added to current flow at WRCs receiving growth and the model re-run as a future scenario.

The modelling presented in this section was based on the 2022 Wash SIMCAT model, which was updated to reflect AMP7 and AMP8 Anglian Water schemes and used to establish a 2024 baseline scenario. We note that the Environment Agency has referenced a newer 2024 baseline SIMCAT model; however, this was not used in this assessment.

Some smaller WRCs within the model have "descriptive permits" which do not set specific numerical limits for DWF and effluent quality, and these WRCs do not have flow monitoring

in place. The models are calibrated to observed water quality measurements and represent the overall water quality in the catchment well, however at a local scale some of these smaller WRCs are not well represented and do not have discharge data or have pollutant discharges modelled as a load in kilograms rather than an effluent flow and concentration.

No deterioration test

The results from the baseline and future versions of the model were compared to assess the predicted percentage deterioration for each of the modelled pollutants. WFD targets for each river reach were provided by the EA and used to determine if there was a risk of a class deterioration.

Where a deterioration of 10% or greater was predicted or a change in class (considered to be a significant deterioration under WFD) a further test was conducted to see if this deterioration could be prevented by upgrades to treatment processes. This used another version of the model with each WRC set to operate at their Technically Achievable Limit (TAL).

Good Ecological Status assessment

Where treatment at TAL and reductions in diffuse sources in the present day could improve water quality to achieve Good Ecological Status (GES), it is important to understand whether this could be compromised as a result of future growth within the catchment.

Guidance from the EA suggests breaking this down into two questions:

a) Is GES possible now with current technology?

b) Is GES technically possible after development and any potential WRC upgrades?

If the answer to questions a) and b) are both ‘Yes’ or both ‘No’ then the development can be assessed as having no significant impact on the water bodies potential for reaching GES, i.e., the development alone is not preventing GES from being achieved. An "amber" score is given where GES could be achieved with improvements in treatment technology reflecting the need for an intervention at that WRC, but growth is not preventing this. It is given a "yellow" score where a WRC would need to be upgraded beyond the current technically achievable limit in order to achieve GES, but as for the amber rating it is not growth that is preventing this.

If the answer to a) is ‘Yes’ and the answer for b) is ‘No’ then development is having a significant impact, i.e., before development GES could be achieved with upstream improvements, and after growth the additional effluent from growth prevents GES being achieved - so it is growth that is preventing GES from being achieved leading to a "red" score.

The possible answers are summarised in Table 6-1.

Run type 9 within SIMCAT was used which assumes that upstream flow at each treatment works is at good ecological status. This simulates improvements being made in upstream water quality. The water quality of the discharge from each WRC to maintain GES is then calculated by the model.

Table 6-1 Possible GES assessment results

Predicted to achieve GES after growth	Could achieve GES today with improvements in upstream water quality? (a)	Could achieve GES in the future with improvements in upstream water quality? (b)	Assessment Result
YES	N/A	N/A	GREEN - Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.
NO	YES	YES	AMBER - Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology.
NO	NO	NO	YELLOW - Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration.
NO	YES	NO	RED - Environmental capacity could be a constraint to growth.

6.2.3 Results

The first test applied compares the future scenario to the baseline and assesses whether a significant deterioration in water quality occurs: either a 10% deterioration in water quality or a deterioration in WFD class. Where a significant deterioration is predicted, the TAL scenario then assesses whether this deterioration could be prevented by improvements in treatment processes.

Table 6-2 below summarises the results of the water quality assessments. Where a "green" score is given, deterioration was less than 10% for each pollutant, and no change in WFD class is predicted. Where an "amber assessment is given, a 10% deterioration or change in WFD class is predicted, but this could be prevented by improvements in treatment technology. In these cases, upgrades may therefore be required at that WRC or at WRC upstream.

A "red" assessment would be given where a significant deterioration in water quality is predicted, and it cannot be prevented by improvements in treatment processes.

Five of the eight WRCs serving growth areas during the plan period are predicted to experience a significant deterioration for Ammonia. At Newport Pagnell and Lavendon, the significant deterioration downstream is generally a short distance before returning to moderate deterioration. However, the significant deterioration downstream of Cotton Valley remains significant towards Bedford where it becomes moderate. No changes in WFD class are predicted at the eight WRCs serving growth. Deterioration is reduced to 0% at all eight WRCs with TAL.

In this assessment, improvements in treatment processes have been modelled by assuming the WRC is operating at TAL. It has not investigated the feasibility of upgrading individual WRCs. This should be performed by STW who have the detailed knowledge of their assets, and the Environment Agency who are responsible for setting permit limits at WRC.

Appendix A maps the predicted deterioration in water quality visually for Ammonia, BOD and Phosphate in the future, and the predicted deterioration if WRCs were performing at the technically achievable limit.

The first set of maps in Appendix A.1 show the modelled results if wastewater discharges were increased by the volume predicted during the MKCP plan period. They show the result at the point of mixing (i.e., where the WRC discharges) and the results downstream in the river. These are colour coded based on whether deterioration is greater (red) or less than (amber) 10%. Areas where no deterioration is predicted are coloured green.

The second set of maps in Appendix A.2 shows the modelled results in the TAL scenario, where each WRC has been upgraded to the technically achievable limit. This shows areas where deterioration could not be prevented. In each case this is less than 10%.

The growth stated in Table 6-2 includes recent completions and neighbouring authority growth as well as growth from within Milton Keynes.

Anglian Water advised that they and other water companies have commissioned research into of higher concentrations of pollutants in raw sewage as a result of higher water efficiency. This will investigate whether this leads to higher concentrations in treated effluent discharged to watercourses, and consequently whether investment will be required to address this. This is a long-term issue as it depends upon the companies achieving their targets for an overall reduction in per capital consumption towards the 2050 target of 110l/p/d across all homes, not just new ones.

Table 6-2 Water quality modelling results

WRC	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in water quality for one or more of BOD, Ammonia or Phosphate?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?
CASTLETHORPE STW	0	42	No	No	Yes
COTTON VALLEY STW	55,288	1,445,844	Yes - (Ammonia deteriorates by 22%)	No	Yes
HANSLOPE STW	26	0	No	No	Yes
LAVENDON STW	18	0	Yes - (Ammonia deteriorates by 19%)	No	Yes
NEWPORT PAGNELL STW	1,047	0	Yes - (Ammonia deteriorates by 23%)	No	Yes
NORTH CRAWLEY STW	1	408	No	No	Yes
OLNEY STW	172	9,584	Yes - (Ammonia deteriorates by 19%)	No	Yes

WRC	Housing growth over plan period (dwellings)	Employment growth over plan period (m^2)	Could the development cause a greater than 10% deterioration in water quality for one or more of BOD, Ammonia or Phosphate?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL?
WAVENDON STW	47	0	Yes - (Ammonia deteriorates by 12%)	No	Yes

Table 6-3 summarises the results of the GES assessment. Four different assessments are possible which are shown in Table 6-1 above.

- If good ecological status is predicted to be achieved within the receiving waterbody following growth during the plan period, a green assessment is given. In this case, it can be said that there is environmental capacity to accommodate growth.
- Where GES is not currently being achieved but could be achieved if upstream water quality were improved, then an amber score is given – growth could be accommodated without preventing a waterbody achieving GES in the future.
- Where GES cannot be achieved either today or in the future, despite upgrades in treatment processes, and improvements in upstream water quality, then a yellow assessment is given – and it can be said that GES cannot be achieved due to the limits of current technology. Growth alone is not predicted to prevent GES being achieved in the future.
- Should GES be achievable today, but not in the future due to growth, a red assessment would be given, and it can be said that environmental capacity could be a constraint to growth, i.e., growth alone could prevent good ecological status being achieved in the future.

Table 6-3 Good Ecological Assessment (GES) results

WRC	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
CASTLETHORPE STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
COTTON VALLEY STW	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
HANSLOPE STW	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration
LAVENDON STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
NEWPORT PAGNELL STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology

WRC	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
NORTH CRAWLEY STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
OLNEY STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
WAVENDON STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology

Results of the GES assessment show that proposed development will not prevent good ecological status being achieved. For the majority of treatment works, there is sufficient environmental capacity for ammonia and BOD. However, for phosphate, a tighter permit or upgrade would be required at most WRCs. At Hanslope WRC, GES cannot be achieved for phosphate due to technological limits.

6.3 Priority substances

As well as the physico-chemical water quality elements (BOD, Ammonia, Phosphate etc.) addressed above, a watercourse can fail to achieve Good Ecological Status due to exceeding permissible concentrations of hazardous substances. Currently 33 substances are defined as hazardous or priority hazardous substances, with others under review. Such substances may pose risks both to humans (when contained in drinking water) and to aquatic life and animals feeding in aquatic life. These substances are managed by a range of different approaches, including EU and international bans on manufacturing and use, targeted bans, selection of safer alternatives and end-of-pipe treatment solutions. There is considerable concern within the UK water industry that regulation of these substances by setting permit values which require their removal at wastewater treatment works will place a huge cost burden upon the industry and its customers, and that this approach would be out of keeping with the "polluter pays" principle.

We also consider how the planning system might be used to manage priority substances:

- Industrial sources – whilst this report covers potential employment sites, it doesn't consider the type of industry and therefore likely sources of priority substances are unknown. It is recommended that developers should discuss potential uses which may be sources of priority substances from planned industrial facilities at an early stage with the EA as the regulator of the environmental permitting regulations, and, where they are seeking a trade effluent consent, with the sewerage undertaker.
- Agricultural sources - There is limited scope for the planning system to change or regulate agricultural practices. UK water companies are involved in a range of “Catchment-based Approach” schemes aimed at reducing diffuse sources of pollutants, including agricultural pesticides.
- Surface water runoff sources - some priority substances e.g., heavy metals, are present in urban surface water runoff. It is recommended that future developments would manage these sources by using SuDS that provide water quality treatment, designed following the CIRIA SuDS Manual.
- Domestic wastewater sources - some priority substances are found in domestic wastewater as a result of domestic cleaning chemicals, detergents, pharmaceuticals, pesticides or materials used within the home. Whilst an increase in the population due to housing growth could increase the total volumes of such substances being discharged to the environment, it would be more appropriate to manage these substances through regulation at source, rather than through restricting housing growth through the planning system.

No further analysis of priority substances will be undertaken as part of this study.

6.4 Environmental impact assessment

6.4.1 Screening

To identify which of the protected sites may be at risk, Flood Zone 2 from the Risk of Flooding from Rivers and the Sea mapping was used to define an area that was either beside a river or could be reasonably expected to receive surface water from a river during times of flood. This is a precautionary approach, since Flood Zone 2 is based on the 1 in 1,000 year flood return period. Where a WRC serving growth in the plan period was present in the catchment upstream of the protected site, this site was taken forward for further assessment.

Where there was no WRC serving growth upstream, these protected sites were discounted as no deterioration would be predicted in a water quality model, and the impact would be expected to be minimal. However, in these cases the overall catchment water quality should be considered where for example they are designated for migratory fish species that may spend part of their lifecycle elsewhere in the catchment.

Whilst deterioration in water quality may not always lead to a significant impact at a protected site such as a SSSI, modelled deterioration can be used to highlight areas of risk for further analysis in the Habitat Regulations Assessment.

Table 6-4 contains a list of protected sites (SSSIs, SACs, SPAs and Ramsar sites) that are within or downstream of Milton Keynes, and adjacent to a watercourse, and have a WRC serving growth during the plan period upstream.

Table 6-4 Results of screening study of protected sites

Receptor Name	Reference	WRC Upstream further assessment required? Y/N
Felmersham Gravel Pits SSSI	1003101	Y
St. Neot's Common SSSI	1002840	Y
Berry Fen SSSI	1002793	Y
Portholme SSSI	1002838	Y
Houghton Meadows (SSSI)	1003079	Y
Stevington Marsh (SSSI)	1003113	Y
Ouse Washes SSSI	1002701	Y
Little Paxton Pits SSSI	1002740	Y
Godmanchester Eastside Common SSSI	1003156	Y
Setchey SSSI	1001984	Y
Islington Heronry SSSI	1001918	Y

Receptor Name	Reference	WRC Upstream further assessment required? Y/N
Wiggenhall St. Germans SSSI	1001653	Y
River Nar SSSI	1001656	Y
The Wash SSSI	1002998	Y
Portholme SAC	UK0030054	Y
Ouse Washes SAC	UK0013011	Y
The Wash & North Norfolk Coast SAC	UK0017075	Y
Ouse Washes SPA	UK9008041	Y
The Wash SPA	UK9008021	Y
Ouse Washes Ramsar	UK11051	Y
The Wash Ramsar	UK11072	Y

6.4.2 Impact Assessment

The predicted deterioration in water quality in the river adjacent to each of the protected sites screened into the assessment is shown in Appendix C. An 18% increase in ammonia concentration was predicted in the river adjacent to Felmersham Gravel Pits SSSI, and a 13% increase at Stevington Marsh SSSI. All other predicted deterioration was less than 5%. In all cases deterioration could be prevented by an improvement in upstream treatment processes.

6.5 Conclusions and Recommendations

6.5.1 Conclusions

The modelling indicates that growth during the MKCP plan period could result in a significant deterioration in ammonia downstream of Cotton Valley, Lavendon, Newport-Pagnell, North Crawley, and Olney WRCs. The deterioration downstream of Cotton Valley, North Crawley, and Olney is predicted to occur for several kilometres downstream towards Bedford. Treatment to TAL is shown to reduce deterioration to 0%.

Growth alone will not prevent good ecological status being prevented in the future should improvements in upstream water quality be made.

An assessment was also made of the impact downstream on protected sites (such as SSSIs, SAC and Ramsar sites). A significant deterioration in watercourses adjacent to protected sites was predicted (Felmersham Gravel Pits SSSI and Stevington Marsh SSSI), but this can be prevented by improvements in treatment upstream, including but not exclusively at the WRCs serving Milton Keynes .

Where a WRC is shared with a neighbouring authority, coordination of growth plans in collaboration with Anglian Water is essential to ensure that infrastructure is in place prior to development to prevent a breach of the environmental permit.

6.5.2 Recommendations

Table 6-5 Recommendations from the water quality section

Actions	Responsibility	Timescale
Provide annual monitoring reports to AW detailing projected housing growth in the Local Authority.	MK	Ongoing
Take into account the full volume of growth (from MK and neighbouring authorities) within the catchment.	AW	Ongoing
Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	MKCC	MKCP development
The Local Plan should include policies that require all development proposals with the potential to impact on areas with environmental designations to be considered in line with the relevant legislation and where stated, in consultation with Natural England (for national and international designations and priority habitats).	MKCC	MKCP development
The Local Plan should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	MKCC	MKCP development
In partnership, identify opportunities for incorporating SuDS into open spaces and green infrastructure, to deliver strategic flood risk management and meet WFD water quality targets.	MKCC, Developers, Anglian Water, Environment Agency.	Ongoing
Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme.	Developers	Ongoing
Opportunities for Natural Flood Management that include schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution within Milton Keynes.	MKCC, Environment Agency, Natural England.	Ongoing

7 Options appraisal

7.1 Introduction

7.1.1 Objectives

A workshop was held with spatial planners from Milton Keynes City Council to identify objectives against which the potential values of IWM approaches could be scored. It was agreed that the objectives should be aligned with those of the Milton Keynes Strategy for 2050:

- Reduced water stress
- Healthy water environment
- Reduced risk of flooding
- Resilience to climate change
- Carbon neutral by 2030
- Enabling healthy places
- Delivery of viable housing
- Reduced consumption of resources and a sustainable green economy
- Net gain in biodiversity

For each IWM approach the question should be asked - to what extent can the approach contribute towards the objectives.

It was decided to give the objectives equal weighting.

Phase 1 presented a range of potential water management options for consideration and scored them against the objectives of the IWMS, using a Multi-Objective Decision Analysis (MODA) approach demonstrating the potential benefit of each option. The scoring system for the MODA is shown in Table 7-1. Phase 1 scoring for IWM options is shown below in Table 7-2.

Table 7-1 Scoring system for the MODA

Rank	Description
2	Significant potential to contribute to this objective.
1	Some potential to contribute to this objective.
0	Neutral
-1	Some potential to cause detriment to this objective.
-2	Significant potential to cause detriment to this objective.

Table 7-2 Phase 1 scoring for IWM options

Objectives	Diversify water resources	Efficient fixtures and fittings	Green Infrastructure	Blue Infrastructure	Rainwater harvesting	Greywater recycling	SuDS	Education	Leakage reduction	Average
Reduced water stress	**2**	**2**	1	**2**	**2**	**2**	**2**	1	**2**	1.8
Healthy water environment	**2**	1	1	**2**	1	1	**2**	1	1	1.3
Reduced risk of flooding	**2**	0	**2**	**2**	**2**	1	**2**	1	0	1.3
Resilience to climate change	**2**	**2**	**2**	**2**	1	**2**	**2**	1	**2**	1.8
Carbon neutral by 2030	-1	**1**	0	0	0	0	**1**	**1**	-1	0.1
Enabling healthy places	0	0	**2**	**2**	0	0	**2**	0	0	0.7
Delivery of viable housing	**1**	**2**	0	0	**1**	0	**1**	0	0	0.6
Reduced consumption of resources and a sustainable green economy	**2**	**2**	1	1	**2**	**2**	0	**2**	**2**	1.6
Net gain in biodiversity	0	0	**2**	**2**	0	0	**1**	**1**	0	0.7
Total	**10**	**10**	**11**	**13**	9	8	**13**	8	6	9.8

In Phase 2 the focus was on how these options might be delivered through Local Plan policy to maximise the potential benefit. A short-list was created, removing options that are outside of the control of Milton Keynes City Council and combining others. Leakage reduction is best delivered through Anglian Water and education[2] (which includes advice on

2 There is potential for the Council to collaborate with Anglian Water to promote water efficiency, for example through schools, community facilities and Council communication channels. Anglian Water's Demand Management Steering Group will be taking forward measures to support existing customers to value water more highly, and they also have a school's team.

water saving) could be partly incorporated into "efficient fixtures and fittings"). These options, whilst important components of the wider water management strategy will not be considered further within the IWMS.

Below, each option is discussed with recommendations for implementation provided.

7.2 Diversify water resources

7.2.1 Overview

Diversifying water resources can take the form of large-scale strategic resources options (SROs), such the new reservoir in South Lincolnshire, local scale sources of water such as small lakes, or it can be an individual development obtaining all or part of its water from non-potable supply. The development of alternative sources of water, can increase resilience in a water resources plan. It can also reduce the demand for potable water where local sources are found.

The Phase 1 report outlined a number of options for diversification of water resources, most of which were the responsibility of Anglian Water, such as a new reservoir in South Lincolnshire. In Phase 2 further options are identified at a smaller, more local scale than the SROs.

The radar plot (Figure 7.1) below indicates that this option has the largest benefit against the objectives of reducing water stress, resilience to climate change, reduced risk of flooding (when considering the balancing lakes), reduced consumption of resources and a sustainable green economy. It has a negative impact on the objective of being carbon neutral by 2030 as many of these options require something to be built, and often energy / chemicals once in operation.

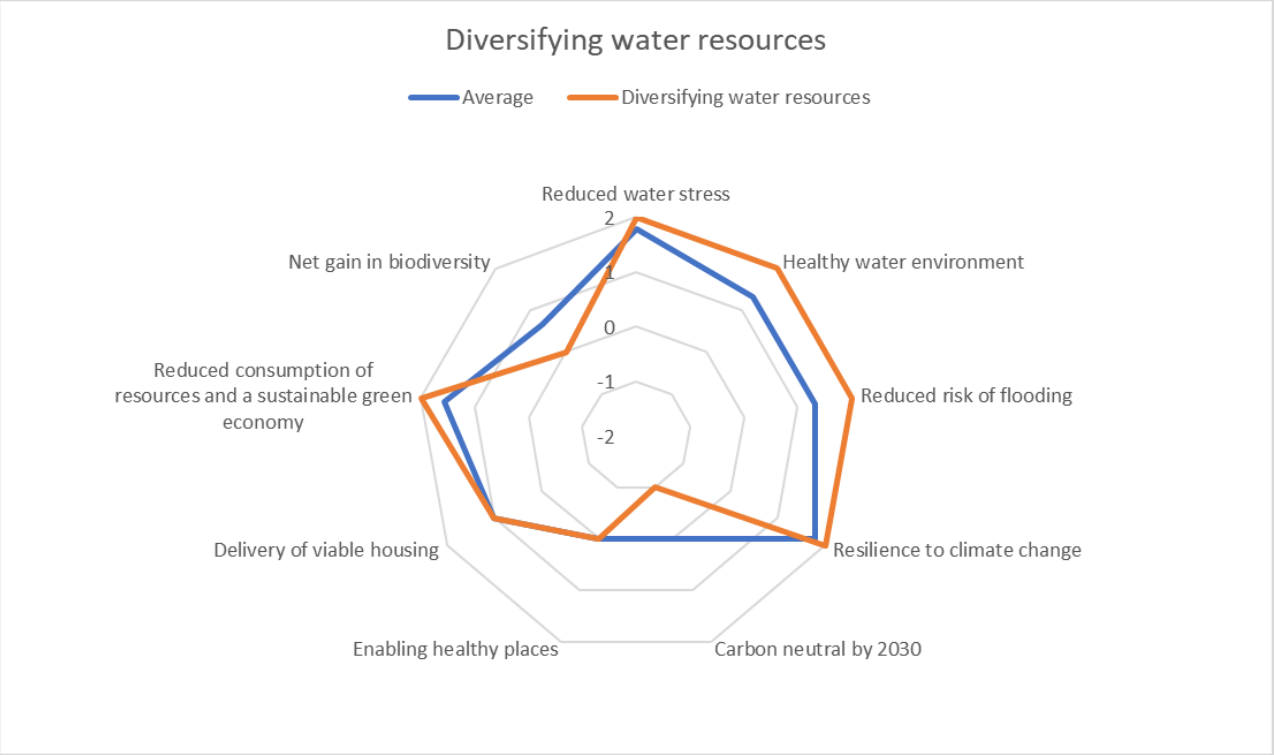


Figure 7.1 Radar plot showing the MODA for Diversifying water resources

7.2.2 Large scale strategic resources

Anglian Water's WRMP24 contains a new reservoir in South Lincolnshire which is a key component of the future supply-demand balance for the Ruthamford Central WRZ. There are no SROs within the study area itself.

SROs are largely the responsibility of the water company and there is little opportunity for MKCC to influence their creation and design via Local Plan policy, however there may be opportunities to support larger schemes at the consultation stage. The SRO will benefit MKCC in terms of resilience to climate change and a reduced consumption of resources, however the other benefits would largely be felt outside of Milton Keynes.

7.2.3 Local schemes

Milton Keynes boasts a large number of manmade lakes including online lakes in parkland managed by the Parks Trust, and offline lakes along the Great Ouse valley to the north of the city. Many of these are "balancing lakes" designed to reduce the risk of flooding. During periods of peak river flow, water can be diverted into these lakes, reducing the volume of water in the rivers and with it the likelihood of flooding. These are controlled by a complex system of sluice gates and weirs which are the responsibility of the EA and Anglian Water. Some of these are "offline" lakes, such as Willen Lake and Caldecotte Lakes which are separated from the River Ouzel. Furzon Lake, Lodge Lake and Teardrop Lakes are "online" lakes built on the watercourse itself with fixed level weirs that hold water back when flow rates increase.

Milton Keynes City Council are planning an Asset Performance and Capacity Assessment – Balancing Lakes Study (APCA – BLS). The study objective is to gain a better understanding of the current and future flood risk in Milton Keynes. The study will also assess the potential to use the Milton Keynes balancing lakes beyond their original design function. The study is being led by Milton Keynes City Council but developed in partnership with Anglian Water and the Environment Agency. AW is the operational manager for the lakes.

The main purpose of the balancing lakes is to manage flood risk, and they also provide significant amenity value for local residents, including water sports and nature walks. Adding water resources to the function of the lakes adds to the complexity of the system. In order to be a useful flood defence asset, there must be sufficient capacity in the lake to divert flow into the lakes to manage peak river flow. This is at odds with the lakes being used as a water resource where it is usually preferable to keep water levels high to maximise storage.

To combine the lakes purpose as a flood defence and its existing amenity value, with a new purpose as a water resource, careful management of water levels in the lake as well as updated rules and protocol for how and when water is diverted in or emptied will be required. For example, it may be necessary to reduce water levels prior to a predicted major rainfall event to ensure sufficient storage capacity. Following a flood event, where the lakes are full, opportunities to drain down the lakes to a normal water level while using that

water should be taken, for example, rather than releasing water contained in an offline lake back to the river, can this water be transferred to a reservoir not required for flood defence.

Another consideration when using the lakes as a water resource is water quality. During a flood event, the concentration of pollutants in the river may increase as it is receiving a greater volume of runoff. Water subsequently abstracted from the lake may therefore require more intensive treatment. There are opportunities to use natural treatment methods such as wetlands to provide some of the treatment. This may also help biodiversity and support the Local Nature Recovery Strategy (LNRS).

At present the potential for changing the management of the lakes to enhance flood defences and water resources is only a concept which remains to be investigated. This concept does not appear in Anglian Water's WRMP24.

7.2.4 Residential sites

The water demand from a residential development site will typically be served by the water company via the water supply network. A small component of demand (for example water for gardening) may be met from a rainwater collected in water butts. There is little opportunity to diversify sources of water at this scale as much of the demand is for potable water. However, toilet flushing and washing machine use does not require potable water, and this could be met from Rainwater Harvesting (RwH) or Greywater Recycling (GwR). This is discussed further in section 7.5

An alternative to mains water provided by the water company is for a development (either an individual property or multiple properties) to have its own borehole. An abstraction licence would be required if more than 20,000 litres per day is taken, however this would be sufficient for several properties (the Ruthamford Central WRZ has an average per capita consumption of 137l/p/d and occupancy of 2.38 persons per dwelling - up to 60 dwellings could be served before a licence is required). The feasibility of small boreholes would depend on the local geology and may be subject to further investigation by the EA, especially if several were clustered together. Maintenance also needs to be considered. Water abstracted from the borehole would still require treatment and testing, and should equipment break down, then a mains supply would then be required. If the borehole is shared between several properties, then costs may be shared, but an agreement on long term maintenance and operation would be required.

7.2.5 Non-household development

Water companies have a statutory duty to provide water for domestic purposes to both household and non-household development. However, this duty does not extend to non-domestic purposes, and Anglian Water may object to non-household development that requires a significant non-domestic water demand (more than 20,000 litres per day).

There may be more opportunities to diversify water resources for non-household sites. Business premises often have large roof areas which lend themselves well to RwH and car parks provide opportunities for storage tanks. A large proportion of the non-potable demand

for water such as toilet flushing could be met from a RwH system (see section 7.5). This can also assist a new buildings rating under the BREEAM New construction Standard.

A borehole could also be employed to provide water for a non-household site, either for domestic or non-domestic purposes. Issues of maintenance may be easier to resolve for a business.

Water Recycling Centres (WRCs) discharge large volumes of treated effluent, which is treated to the standard defined on their environmental permit. This water would not be suitable as a source of potable water without further treatment; however, it could be a valuable source of non-potable water for use in industrial processes, or data centres (see 7.2.6 below). If using this source, consideration would have to be given to the impact on the river system if a large volume of water that was previously discharged to the river is now diverted elsewhere. For example, there is a risk that if the volume is significant, it may cause a "Hands Off Flow" condition to be met more often reducing the water available for abstraction downstream. The temperature of the water would also need to be considered if it was used for cooling and then discharged.

7.2.6 Data centres

Data centres have now been classified as Critical National Infrastructure by the Government (UK Parliament, 2024) and are a significant emerging user of water. There are an estimated 477 data centres currently in the UK, with a further 100 planned with the majority to be built within the next five years (BBC, 2025). Within a data centre, water is used for cooling, and the requirement for cooling is increasing in line with the need for processing power to support Artificial Intelligence (AI). A number of different cooling methods are available, but one of the more common types is for water to be sprayed into the air flowing past the servers or evaporated to reduce the temperature of the air. The Thames Water PR24 Business Plan state that a large data centre may use between four and 19 million litres of water per day, and make the comparison to the water use for housing with 19 million litres being sufficient for over 50,000 homes (Thames Water, 2024).

To accommodate data centres, without placing a strain on water resources, cooling technologies such as closed loop systems should be considered. Anglian Water have suggested that treated effluent from WRCs could be used as cooling water with data centres built next to WRCs. This may be feasible in some locations, however in many inland locations, rivers are dependent upon treated effluent to maintain flows during dry weather, so diversion of effluent may not always be possible where it would negatively impact the downstream water environment or abstractors. Similarly, rainwater harvesting (using the large roofs of data centres and neighbouring industrial buildings) has a potential to provide water for cooling, however any use of water which involves evaporation results in a net loss of water entering groundwater and surface waters.

Concern regarding the water consumption of data centres is an emerging issue, and the government's decision to make data centres NSIP development requires plan makers to have regard to "the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which

may include the National Planning Policy Framework) (NPPF Para. 5). The NPPF itself (para 86) requires planning policies to "pay particular regard to facilitating development to meet the needs of a modern economy, including by identifying suitable locations for uses such as … data centres", and (para 97) to make provision for "clusters or networks of knowledge and data-driven, creative or high technology industries." However (para 162) "plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating and drought from rising temperatures." Within this context, it is recommended that the Council gives further consideration to the issue in its plan making, bearing in mind the relevance of the NSIP thresholds and role of other statutory requirements such as environmental permits.

7.3 Efficient fixtures and fittings

7.3.1 Overview

Water demand from domestic uses for both household and non-household properties can be reduced using more efficient fixtures and fittings. The Phase 1 report contained a list of consumer water efficiency measures which is reproduced in Table 7-3.

Table 7-3 Consumer water efficiency measures

Measure	Examples
Water-efficient measures for toilets	• Cistern displacement devices to reduce volume of water in cistern • Retro-fit or replacement dual flush devices • Retro-fit interruptible flush devices • Replacement with low-flush toilets
Water-efficient measures for taps	• Tap inserts, such as aerators • Low flow restrictors • Push taps • Infrared taps
Water-efficient measures for showers and baths	• Low-flow shower heads • Aerated shower heads • Low-flow restrictors • Shower timers • Reduced volume baths (e.g., 60 litres)
Rainwater harvesting and water reuse	• Large-scale rainwater harvesting • Small-scale rainwater harvesting with water butt • Grey water recycling
Water-efficient measures addressing outdoor use	• Hosepipe flow restrictors • Hosepipe siphons • Hose guns (trigger hoses) • Drip irrigation systems • Mulches and composting

The radar plot (Figure 7.2) below shows these measures meet the objectives of reducing water stress, resilience to climate change as well as the deliverability of viable housing.

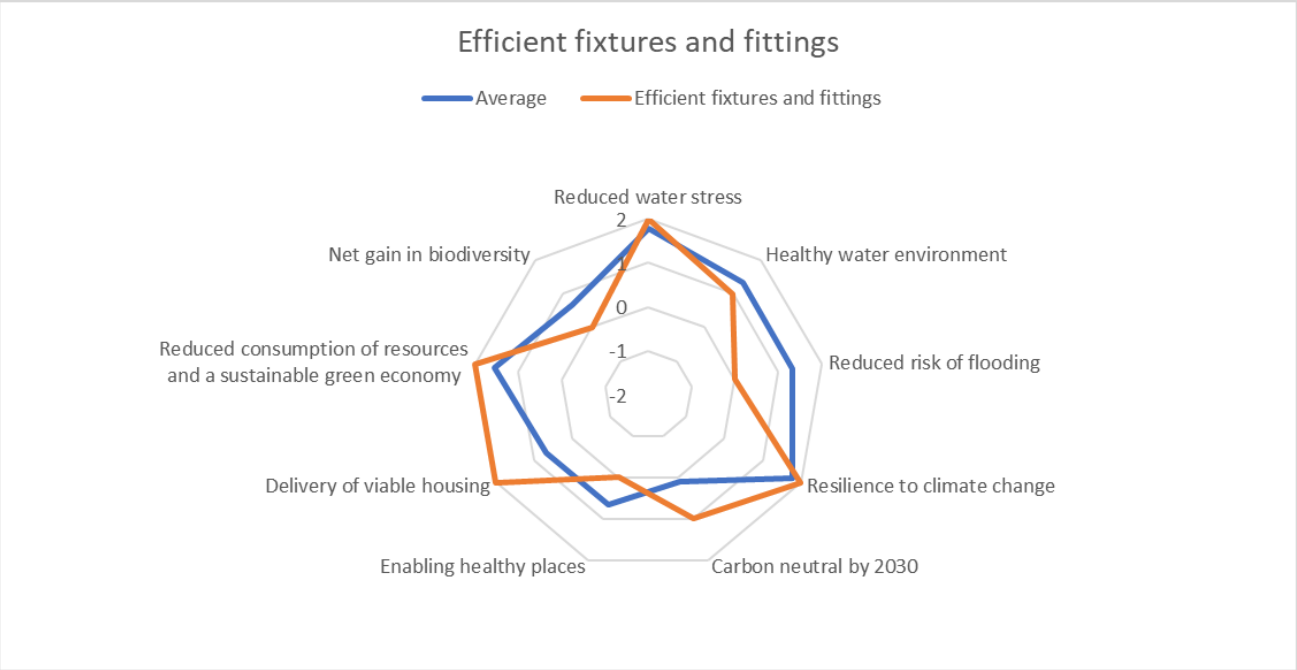


Figure 7.2 Radar plot showing the MODA for efficient fixtures and fittings

7.3.2 Application

The use of efficient fixtures and fittings can be encouraged in the MKCP by applying a tight water efficiency target for residential sites (a suitable target is discussed in 4.3) coupled with the requirement for it to be met using a fittings-based approach. For non-household development meeting an Excellent Standard under BREEAM would require the use of efficient fixtures and fittings.

Efficient fixtures can also be applied to existing properties, although this may be harder to achieve through the Local Plan process. On non-household properties, where there is a change of use, or retrofit of an existing building, tighter standards could be required at that point, for example, through a requirement to meet BREEAM.

For existing residential properties on the private market, there is no opportunity to enforce more efficient fittings, however, residents could be encouraged via an education campaign. This could be more effective when coupled with a household water efficiency visit in partnership with Anglian Water.

Household water efficiency visits have been shown to deliver savings of 36 litres per property on average in the Southern Water area (Greater Brighton). These savings come through a combination of behaviour modification, identification of minor leaks and fitting devices such as tap aerators. Non-household visits also have significant opportunities to reduce water demand, with the size of the demand saving being variable based on the nature of the business.

For residential properties owned by the Council there may be opportunities to upgrade fixtures and fittings and set rules around their removal.

Flow restrictors are devices that can be retrofitted to existing properties to reduce the volume of water used in the property. These have been used in a trial by Crawley Homes in 2022, and in trials by Affinity Water elsewhere in the country. Affinity Water installed over 11,000 of these devices in the properties of high consumption users in the period 2023-24 and recorded an average saving of 100 litres per property (Affinity Water, 2024). Their delivery partner for the project state an average saving of 64 litres per property and a saving of up to £360 per year in energy costs and 0.6 tonnes of CO_2e per year (Cenergist, 2025). This demonstrates the potential to save not just water, but carbon as well.

7.4 Green and blue infrastructure

7.4.1 Overview

In Phase 1 Green and Blue infrastructure and SuDS were considered separately. It was recognised that there is considerable overlap between the three themes and so these have been combined into one section for Phase 2. The original separate scoring has been retained to show the differences and similarities between the three themes.

Green Infrastructure (GI) can include street trees, parks, gardens, SuDS, and nature reserves. GI are often accessible by the public and benefit the environment at the same time. This can include carbon sequestration from trees, buffer systems for road runoff from planted roadside verges, and reduction of urban heat islands. Incorporating GI into Healthy Places can help approach socio-economic and environmental issues.

Blue Infrastructure (BI) is more water focussed, with Natural Flood Management (NFM), de-culverting watercourses and stormwater management. BI also encompasses WRCs and how they are managed - although this will not be considered within this report. Like GI, BI, can be incorporated into healthy public places.

SuDS can incorporate most of the measures in GI and BI, but have the primary purpose of managing runoff which may or not be the case with GI and BI. There is also some overlap with RwH.

The radar plots in Figure 7.3 and Figure 7.4 demonstrate similar benefits with both offering opportunities to increase biodiversity, reduce water stress, reduce flooding and enable healthy places. The only difference in the scoring reflected alignment of BI to the objective of creating a healthy water environment.

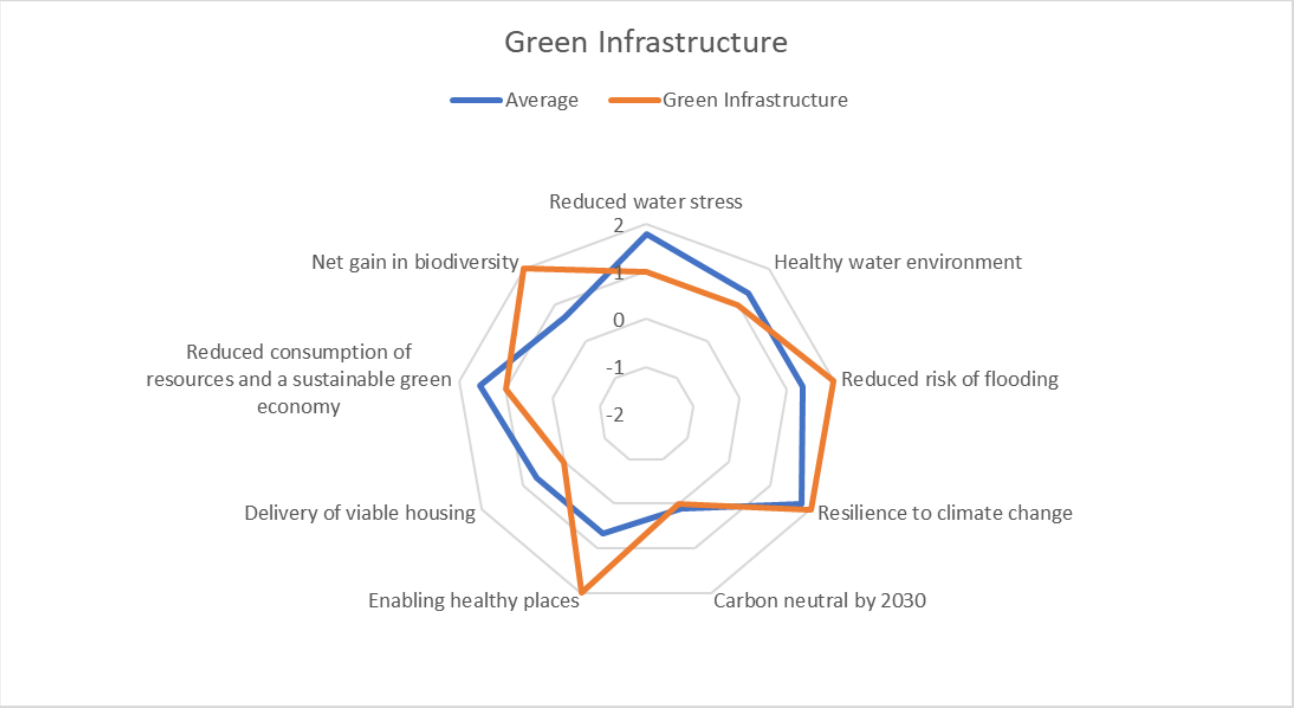


Figure 7.3 Radar plot showing the MODA for Green Infrastructure

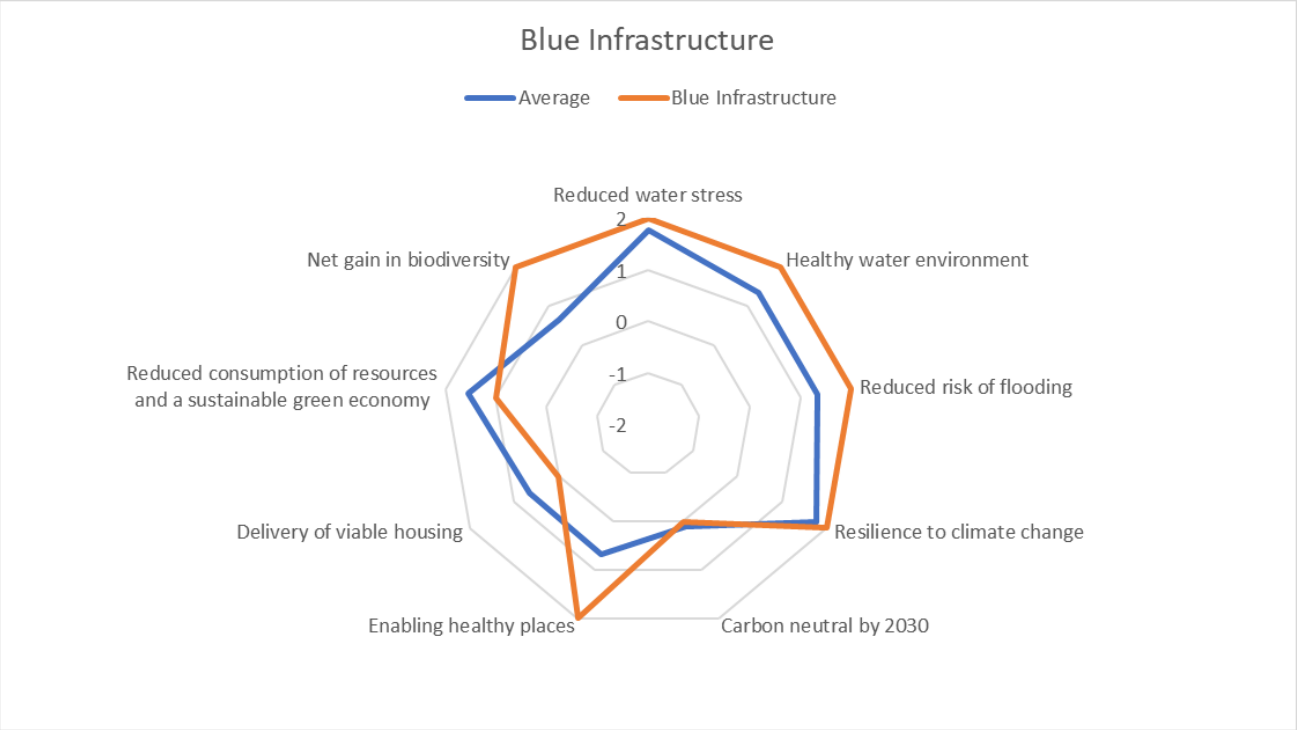


Figure 7.4 Radar plot showing MODA for Blue Infrastructure

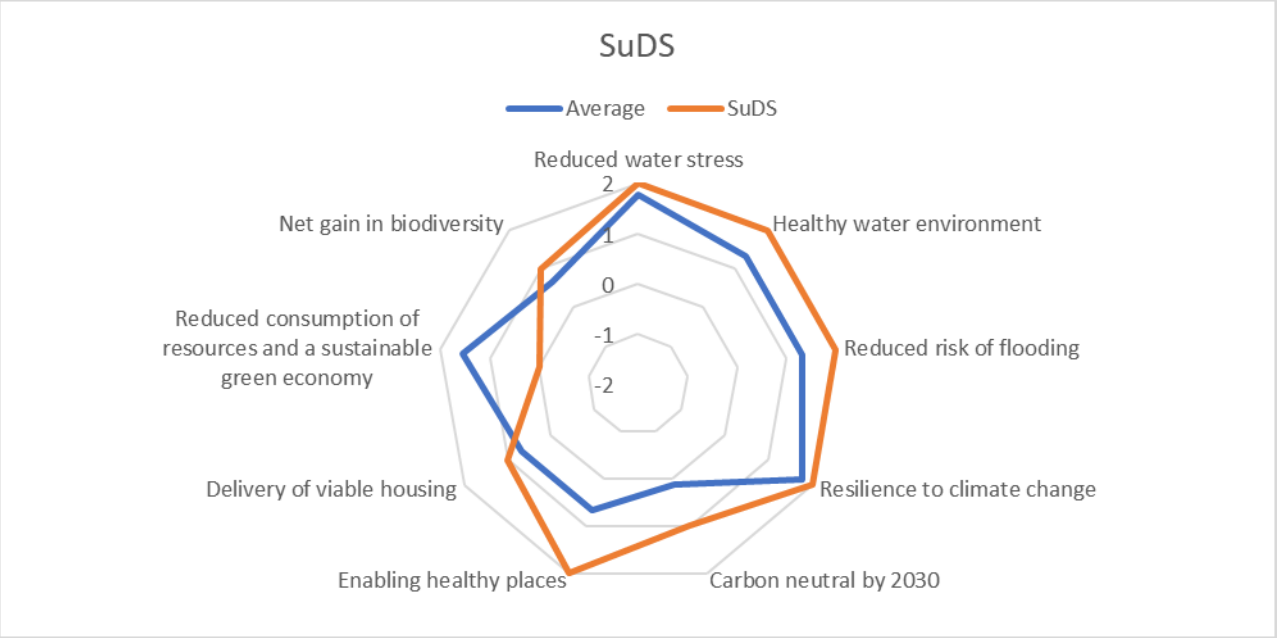


Figure 7.5 Radar plot showing the MODA for SuDS

7.4.2 Application

Buckinghamshire and Milton Keynes have a joint Local Nature Recovery Strategy (LNRS) one of 48 covering the whole of England. These strategies are a requirement of the Environment Act 2021, and agree the priorities and measures for nature's recovery and wider environment. They are intended to create an understanding of the locations important for conserving and enhancing biodiversity, encourage stakeholders to work together to deliver the wider visions for nature's recovery, and guide mandatory biodiversity net gain investments. They are updated every five years, and at the time of writing the first LNRS for the MK area has been submitted to Defra for approval.

The biodiversity benefits of GI and BI can be maximised by aligning with the LNRS, the LNRS should be referred to. The LNRS can be found on the Buckinghamshire and Milton Keynes Natural Environment Partnership website.

Milton Keynes also has a Nature, Green and Blue Infrastructure Strategy that discusses how to implement GI and BI and presents policy recommendations to support the strategy.

Milton Keynes as LLFA provide Flood risk guidance for developers. MKCC seeks all new development and redevelopment to use SuDS in order to reduce flood risk, improve water quality and present options for biodiversity and public amenity.

For GI, consideration should also be given to selecting species that require little or no additional water demand for irrigation / watering to meet the objective of using resources widely. The long-term benefits of GI, BI and SuDS are more certain where the feature is adopted by AW, the Parks Trust or LPA.

7.5 Rainwater harvesting and greywater recycling

7.5.1 Overview

In Phase 1 Rainwater Harvesting (RwH) and Greywater Recycling (GwR) were considered separately. Like with Gi and BI, there is considerable overlap between the two themes and so these have been combined into one section in Phase 2. The original separate scoring has been retained to show the differences between the two themes.

RwH is the capture of water falling on buildings, roads or pathways that would normally be drained via a surface water sewer, infiltrate into the ground or evaporate. In the UK, this water cannot currently be used as a drinking water supply as there are strict guidelines on potable water, but it can be used in other systems within domestic or commercial premises, principally for toilet flushing, garden watering and for clothes washing machines.

Systems for collection of rainwater can be simple water butts attached to a drainpipe on a house, or it could be a complex underground storage system, with pumps to supply water for use in toilet flushing and washing machines. By utilising rainwater in this way there is a reduced dependence on mains water supply for a large proportion of the water use in a domestic property.

Greywater refers to water that has been “used” in the home in appliances such as washing machines, showers, and hand basins. Greywater recycling (GwR) is the treatment and re-use of this water in other systems such as for toilet flushing. By their nature, GwR systems require more treatment and are more complex than RwH systems, and there are limited examples of their use in the UK.

Greywater re-use refers to systems where wastewater is taken from source and used without further treatment. An example of this would be water from a bath or shower being used on plants in the garden. This sort of system is easy to install and maintain, however, as mentioned above the lack of treatment to remove organic matter means the water cannot be stored for extended periods.

Greywater recycling refers to systems where wastewater undergoes some treatment before it is used again. These systems are complex and require a much higher level of maintenance than RwH or greywater re-use systems.

Domestic water demand can be significantly reduced by using GwR, and unlike with a RwH system where the availability of water is dependent on the weather, the source of water is usually constant when the building is occupied (for instance if it is from bathing and showering). However, the payback period for a GwR system is usually long, as the initial outlay is large, and the cost of mains water relatively low. Viability of greywater systems for domestic applications is therefore currently limited. Communal systems may offer more opportunities where the cost can be shared between multiple households.

Figure 7.6 and Figure 7.7 show the radar plots for RwH and GwR. Both options score highly for reducing water stress and reduced consumption of resources. The differences between the two techniques are evident on reducing flood risk where RwH has a higher contribution due to the storage potential of surface runoff, but GwR scores more highly for climate resilience as it is not impacted by drought (RwH may not be available during dry periods when demand for water is highest).

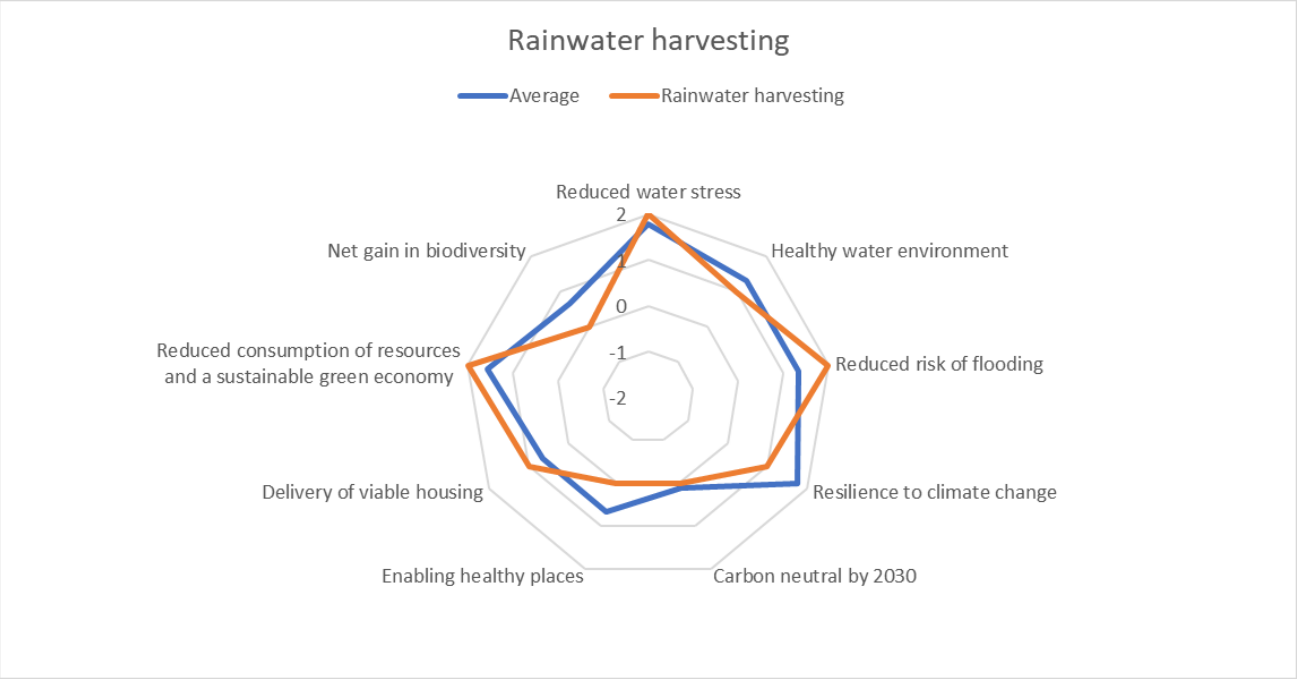


Figure 7.6 Radar plot showing the MODA for Rainwater Harvesting

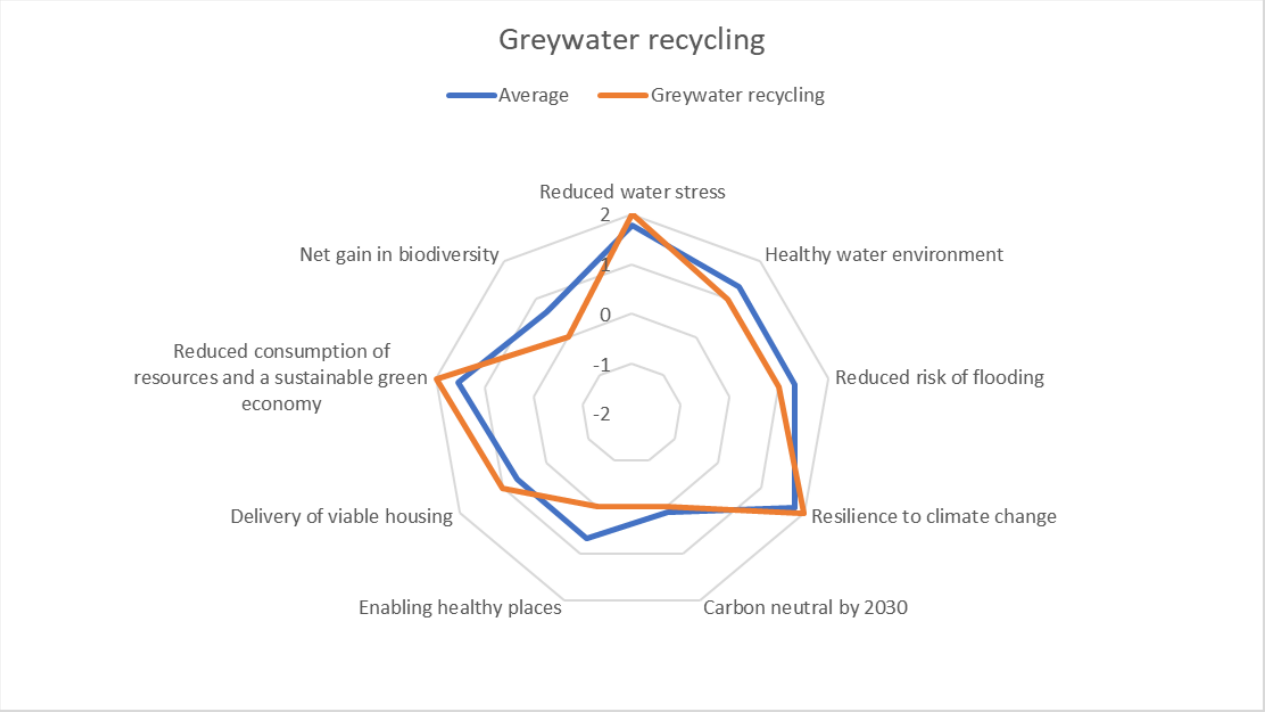


Figure 7.7 Radar plot showing the MODA for Greywater Recycling

7.5.2 Application

The new National SuDS guidance makes it a requirement for development sites (including both residential and non-household sites) to consider RwH where there is a demand for non-potable water and an available contributing catchment area that will deliver safe and efficient water savings, or there is a need for landscape irrigation, or the development is in an area identified as seriously water stressed (which includes the Anglian Water area).

Opportunities to incorporate RwH into development sites in MK should therefore be encouraged.

Both RwH and GwR require separate pipework to distribute non-potable water around the building and avoiding the risk of contaminating the potable supply. This can be difficult to retrofit to existing buildings, so is much better applied as part of a new build design. The Future Homes Hub proposed a road map to greater water efficiency. This includes recommendations for a new British Standard for dual supply pipework and for new build housing to contain the necessary pipework in order to facilitate future application of RwH.

The is also an opportunity to upskill local plumbers to support the green economy.

In general, communal systems are preferred over RwH or GwR at an individual plot scale. This is because they are more cost effective to maintain and long-term maintenance is more likely to be carried out.

7.6 Application

Some IWM measures are better suited than others to different types of development. For example, diversification of water resources may have the large impact on the water demand at a data centre, but may be difficult to apply to a council property. Table 7-4 provides an indication of how suitable each technique may be to different types of development. This is a generalisation, and measures may be more or less suitable in specific cases.

Table 7-4 Suitability of each measure to different types of development

Type	Diversification of water resources	Efficient fittings and fixtures	Green and blue infrastructure and SuDS	RwH and GwR
Strategic residential developments	++	+++	+++	+++
Major residential developments	++	+++	+++	+++
Non-major residential developments	+	+++	++	++
Flats	+	+++	++	++
Council properties	+	+++	++	++
Large non-household	+++	+++	+++	+++

Type	Diversification of water resources	Efficient fittings and fixtures	Green and blue infrastructure and SuDS	RwH and GwR
Small non-household	+	+++	++	++
Data centres	+++	+	+++	++

+++ Highly suitable

++ May be suitable

+ Unsuitable or minimal benefit

Efficient fixtures and fittings are applicable to all development types, however, they have been scored down for data centres based on the potential volume of water saved by the measure (likely to be a low number of employees) compared with the overall water use on the site, predominantly for cooling.

7.6.1 Strategic development

Strategic developments are sites larger than 500 dwellings. The size of the site opens many opportunities to maximise the benefits of each IWM measure. For example, there may be sufficient space for large areas of greenspace to be created, and for high quality habitat to be provided. If there are watercourses present within the site, there may be sufficient space to re-naturalise them. SuDS can be incorporated into the design of the site at the master planning stage, allowing the design to be optimised reduce flood risk, provide water quality treatment and a biodiversity benefit. On a large site, a communal RwH system may be possible which is managed and maintained centrally. Diversification of water resources may be possible on this size of site: however, water demand may be too high for it to be served by an individual borehole. The efficient fixtures and fittings approach will be an important contributor.

7.6.2 Major development

A major development is one with between 10 and 499 dwellings. The suitability of IWM measures is similar to strategic sites. Space may be more limited making it harder to optimise GI, BI and SuDS features. The efficient fixtures and fittings approach will be an important contributor.

7.6.3 Non-major developments

Non-major developments are those with less than 10 dwellings. There may be limited opportunities to implement GI and BI, but a suitably designed SuDS can still provide some benefit to reducing flood risk, treating runoff and supporting biodiversity. The efficient fixtures and fittings approach will be an important contributor.

7.6.4 Flats

GI, BI or SuDS for a block of flats will look significantly different to a development of houses. Space may be limited around the block, but there may be opportunities for blue roofs, green roofs or green walls. These could provide biodiversity benefits while also helping the building maintain a stable temperature, helping climate resilience. The efficient fixtures and fittings approach will be an important contributor.

7.6.5 Council properties

Efficiency fixtures and fittings are particularly suitable for council properties. The Council have some element of control of the fixtures and fittings applied, reducing the risk of them being removed by the tenant. They can also provide a large benefit to tenants in the form of reduced water and energy bills. A RwH system could also be maintained by the Council.

7.6.6 Large non-household

Large non-household developments may have a large roof area providing a catchment to support a RwH system. They may also have sufficient space for a large storage tank to store rainwater. As with larger residential sites, a large site area provides greater opportunities for planning GI, BI and SuDS in a way that can maximise their impact. An assessment should be made where water is required for non-domestic uses as to whether this can be from non-potable sources.

7.6.7 Small non-household

Smaller non-household sites may not have the space to provide a storage space for collected rainwater. The focus may have to be on efficient fixtures and fittings to reduce water demand. Smaller sites can still have a contribution to reducing flood risk through a suitably designed SuDS.

7.6.8 Data centres

As with other large sites, there are opportunities to plan the site in a way to accommodate well designed GI, BI and SuDS. The biggest impact IWM measure could be reducing the large water demand on the site through diversification of water resources. RwH or a small borehole is unlikely to meet the typical water demand of a large data centre, a larger source may be required, such as effluent reuse or in the case of Milton Keynes, utilising the balancing lakes as a water resource.

7.7 Recommendations for Integrated Water Management

- Water efficient fixtures and fittings could benefit most types of development site. A water efficiency policy requiring 93l/p/d and the equivalent BREEAM standard for non-household development would drive adoption of this measure. The proposed 93l/p/d target reflects the viability challenge of targeting 85l/p/d, whilst

also improving on the existing Plan:MK policy and the optional building regulations target of 110l/p/d.

- Rainwater Harvesting should be encouraged on all sites where it is practical.
- On all sites, SuDS, GI and BI should be considered as early in the design of the site as possible so a suitable layout that maximises their benefits can be established.
- The national standards for sustainable drainage systems, the Local Nature Recovery Strategy and the Green Infrastructure Strategy should guide the design and implementation of SuDS, GI and BI in Milton Keynes.
- When designing GI and SuDS, consideration should be given to native plant species that require little or no water.
- For all major non-household development consideration should be given to the use of non-potable water where the type of water-use allows this to be viable.
- For data centres, water for cooling should come from a non-potable source. Applications for data centres using potable water should be resisted where alternative cooling methods are feasible.
- The lakes in Milton Keynes provide an opportunity that many neighbouring authorities do not have. Assets that can be used to manage flood risk, while providing the potential for use as a water resource, and other benefits such as biodiversity, and amenity. MKCC are planning an Asset Performance and Capacity Assessment – Balancing Lakes Study (APCA – BLS) which will include an assessment of the potential to use the balancing lakes beyond their original design function. This issues is not, therefore, assessed in this IWMS.

8 Conclusions and recommendations

8.1 Conclusions

8.1.1 Water resources

Water resources in England are under considerable pressure. The Environment Agency has stated that "the scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand."

The new National Water Resources Framework identified the Ruthamford Central WRZ which serves Milton Keynes as having the highest percentage growth of any WRZ in England. A comparison of the growth accounted for the in Anglian Water's WRMP24 and the MKCP projections show the combined growth forecast of Buckinghamshire and Milton Keynes is within water company projections, however the trajectory of growth from Milton Keynes brings it close to the WRMP projections suggesting the combined growth could be ahead of AW's forecast between 2030 and 2037. Milton Keynes City Council and Buckinghamshire Council should engage early with AW to ensure all three plans are aligned.

Part G of Building regulations currently states that new build housing should achieve a minimum of 125 l/p/d. A tighter target of 110l/p/d is allowed if the local authority can establish a clear need based on available evidence. This target was included in the current Local Plan for Milton Keynes - Plan:MK (2019). Many LPAs are now going further than this. The Written Ministerial Statement (WMS) by the former Secretary of State for Levelling Up, Housing and Communities (DLUHC) states that:

"…in areas of serious water stress, where water scarcity is inhibiting the adoption of Local Plans or the granting of planning permission for homes, I encourage local planning authorities to work with the Environment Agency and delivery partners to agree standards tighter than the 110 litres per day that is set out in current guidance."

A Shared Standard for Water Efficiency has been published as part of a collaborative and collective approach by Anglian Water, Cambridge Water, Essex and Suffolk Water, Affinity Water, the Environment Agency and Natural England. It is designed to help support LPAs to deliver sustainable growth by specifying a more stringent water efficiency policy than the contained in Building Regulations (110l/p/d). It recommends that new homes are built to a standard of 93l/p/d, supported by a non-household standard where development will aim to achieve full credits in the BREEAM water calculator with a minimum of 3 credits in WAT01

8.1.2 Infrastructure assessment

A capacity assessment was undertaken by JBA comparing the future flow from each WRC (the current actual flow and the forecast additional flow from growth), with the permit limit. Two of the WRCs (Sherington and Turvey Cottages) are currently exceeding their permit

limits, although no further growth is planned in these catchments during the plan period. Cotton Valley WRC is the largest WRC in the study area and serves the majority of the planned development in Milton Keynes as well as an area in Central Bedfordshire and Buckinghamshire. This WRC has capacity to serve all of the growth planned in this catchment from MKCC, however once neighbouring authority growth is also included, the WRC may be close to or exceeding its permit limit by 2050 if no action is taken. There is sufficient time for AW to respond to this.

There are 1,047 houses planned in the catchment of Newport Pagnell WRC. This WRC currently has a descriptive permit and may not have capacity for this level of growth. However, Anglian Water have advised that the majority of growth from the Newport Pagnell catchment will be processed at Cotton Valley WRC, which has capacity to accommodate the planned growth.

Where new infrastructure or upgrades to existing infrastructure may be required, engagement between MKCC and AW is required to ensure that delivery of this infrastructure is aligned with delivery of development sites. Grampian conditions may be sought by the water company should development be in advance of the necessary infrastructure.

There are a number of poorly performing storm overflows on both the sewer network and on storm tanks at WRCs in Milton Keynes. Furthermore, this performance has got significantly worse in the last two years. Published plans to improve storm overflow performance are based on data from 2022 or earlier, so it is unclear what plans AW currently has to address this. Growth within these catchments could result in an increase in the operations of these overflows contributing to a worsening of water quality in the area. Action should be taken by the water companies to address these overflows prior to an increase in wastewater demand being generated by new development.

8.1.3 Water quality and environmental impact

The modelling indicates that growth during the MKCP plan period could result in a significant deterioration in ammonia at Cotton Valley, Lavendon, Newport-Pagnell, North Crawley, and Olney WRCs. The deterioration downstream of Cotton Valley, North Crawley, and Olney is predicted to occur for several kilometres downstream towards Bedford. Treatment to TAL is shown to reduce deterioration to 0%.

Growth alone will not prevent good ecological status from being achieved in the future, should improvements in upstream water quality be made.

An assessment was also made of the impact downstream on protected sites (such as SSSIs, SAC and Ramsar sites). A significant deterioration in water courses adjacent to protected sites was predicted (Felmersham Gravel Pits SSSI and Stevington Marsh SSSI) but this can be prevented by improvements in treatment upstream , including but not exclusively at the WRCs serving Milton Keynes.

Where a WRC is shared with a neighbouring authority, coordination of growth plans in collaboration with Anglian Water is essential to ensure that infrastructure is in place prior to development to prevent a breach of the environmental permit.

8.2 Recommendations

Chapter	Recommendation	Responsibility	Timescale
Water resources	Annually review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	Anglian Water	Ongoing
Water resources	Provide yearly updates of projected housing growth to water companies to inform WRMP updates.	MKCC	Ongoing
Water resources	Use planning policy to require a water efficiency standard of 93l/p/d to be achieved using the fittings-based approach. The policy should allow for a future reduction in the water efficiency target if required.	MKCC	In MKCP
Water resources	This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.	MKCC	In MKCP
Water resources	Larger residential developments and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage in order to reduce water demand.	MKCC	Ongoing
Infrastructure assessment	Annually update LPA growth trajectories and undertake network modelling where appropriate to ensure adequate provision of water supply to new sites without detriment to existing customers and feedback to MKCC on implications for phasing of sites.	Anglian Water	Early in MKCP plan period

Chapter	Recommendation	Responsibility	Timescale
Infrastructure assessment	Early engagement is required with AW to ensure infrastructure is in place prior to occupation.	Developers and MKCC	Early in MKCP plan period
Infrastructure assessment	MKCC and developers should obtain infrastructure maps from AW to ensure existing water supply infrastructure is taken into account in site layout.	MKCC and Developers	At master planning stage
Infrastructure assessment	Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	MKCC, AW and developers	During MKCP plan process
Infrastructure assessment	Developers will be expected to work with the sewerage undertaker closely and early in the planning promotion process to develop an Outline Drainage Strategy for sites. The Outline Drainage strategy should demonstrate the wastewater assets required, their locations including points of connection to the public foul sewerage, whether the site drainage will be adopted by the water company and if any sewer requisitions will be required.	MKCC, AW and developers	Ongoing
Infrastructure assessment	Developers will be expected to demonstrate to the Lead Local Flood Authority (LLFA) that surface water from a site will be disposed using a sustainable drainage system (SuDS) with connection to surface water sewers seen as the last option. New connections for surface water to foul sewers will be resisted by the LLFA, Anglian Water and Thames Water	MKCC and developers	Ongoing
Infrastructure assessment	Early engagement between MKCC and AW is required to ensure that where strategic infrastructure is required, it can be planned in by AW and will not lead to any increase in discharges from sewer overflows.	MKCC, Developers, AW	During MKCP plan process

Chapter	Recommendation	Responsibility	Timescale
Infrastructure assessment	Early engagement with Anglian Water is required to ensure that provision of WRC capacity at Cotton Valley is aligned with delivery of development.	MKCC	Ongoing
Infrastructure assessment	Provide Annual Monitoring Reports to Anglian Water detailing projected housing growth.	MKCC	Ongoing
Infrastructure assessment	AW should ensure that the growth forecasts used for planning upgrades at WRCs take into account a sufficient level of growth.	AW	Ongoing
Infrastructure assessment	Anglian Water to assess growth demands as part of their wastewater asset planning activities and feedback to the Council of concerns arise.	AW	Ongoing
Water quality and environmental impact	Provide annual monitoring reports to AW detailing projected housing growth in the Local Authority.	MKCC	Ongoing
Water quality and environmental impact	Take into account the full volume of growth (from MK and neighbouring authorities) within the catchment.	AW	Ongoing
Water quality and environmental impact	Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	MKCC	MKCP plan development
Water quality and environmental impact	The Local Plan should include policies that require all development proposals with the potential to impact on areas with environmental designations to be considered in line with the relevant legislation and where stated, in consultation with Natural England (for national and international designations and priority habitats).	MKCC	MKCP plan development

Chapter	Recommendation	Responsibility	Timescale
Water quality and environmental impact	The Local Plan should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	MKCC	MKCP plan development
Water quality and environmental impact	In partnership, identify opportunities for incorporating SuDS into open spaces and green infrastructure, to deliver strategic flood risk management and meet WFD water quality targets.	MKCC, Developers, Anglian Water, Environment Agency.	Ongoing
Water quality and environmental impact	Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme.	Developers	Ongoing
Water quality and environmental impact	Opportunities for Natural Flood Management that include schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution within Milton Keynes.	MKCC, Environment Agency, Natural England.	Ongoing
Integrated Water Management	Water efficient fixtures and fittings could benefit most types of development site. A water efficiency policy requiring 93l/p/d and the equivalent BREEAM standard for non-household development would drive adoption of this measure.	MKCC	In MKCP
Integrated Water Management	Rainwater Harvesting should be encouraged on all sites where it is practical.	MKCC	In MKCP
Integrated Water Management	On all sites, SuDS, GI and BI should be considered as early in the design of the site as possible so a suitable layout that maximises their benefits can be established.	MKCC, Developers	At master planning stage
Integrated Water Management	The national standards for sustainable drainage systems , the Local Nature Recovery Strategy and the Green Infrastructure Strategy should guide the design and implementation of SuDS, GI and BI in Milton Keynes.	MKCC, Developers	Ongoing

Chapter	Recommendation	Responsibility	Timescale
Integrated Water Management	When designing GI and SuDS, consideration should be given to native plant species that require little or no water.	MKCC, Developers	Ongoing
Integrated Water Management	For all major non-household development consideration should be given to the use of non-potable water where the type of water-use allows this to be viable.	MKCC, Developers	Ongoing
Integrated Water Management	For data centres, water for cooling should come from a non-potable source. Applications for data centres using potable water should be resisted where alternative cooling methods are feasible.	MKCC, Developers	Ongoing
Integrated Water Management	The lakes in Milton Keynes provide an opportunity that many neighbouring authorities do not have. Assets that can be used to manage flood risk, while providing the potential for use as a water resource, and other benefits such as biodiversity, and amenity. MKCC are planning an Asset Performance and Capacity Assessment – Balancing Lakes Study (APCA – BLS) which will include an assessment of the potential to use the balancing lakes beyond their original design function. This issues is not, therefore, assessed in this IWMS.	MKCC, AW, EA	Within the proposed Balancing Lakes Study

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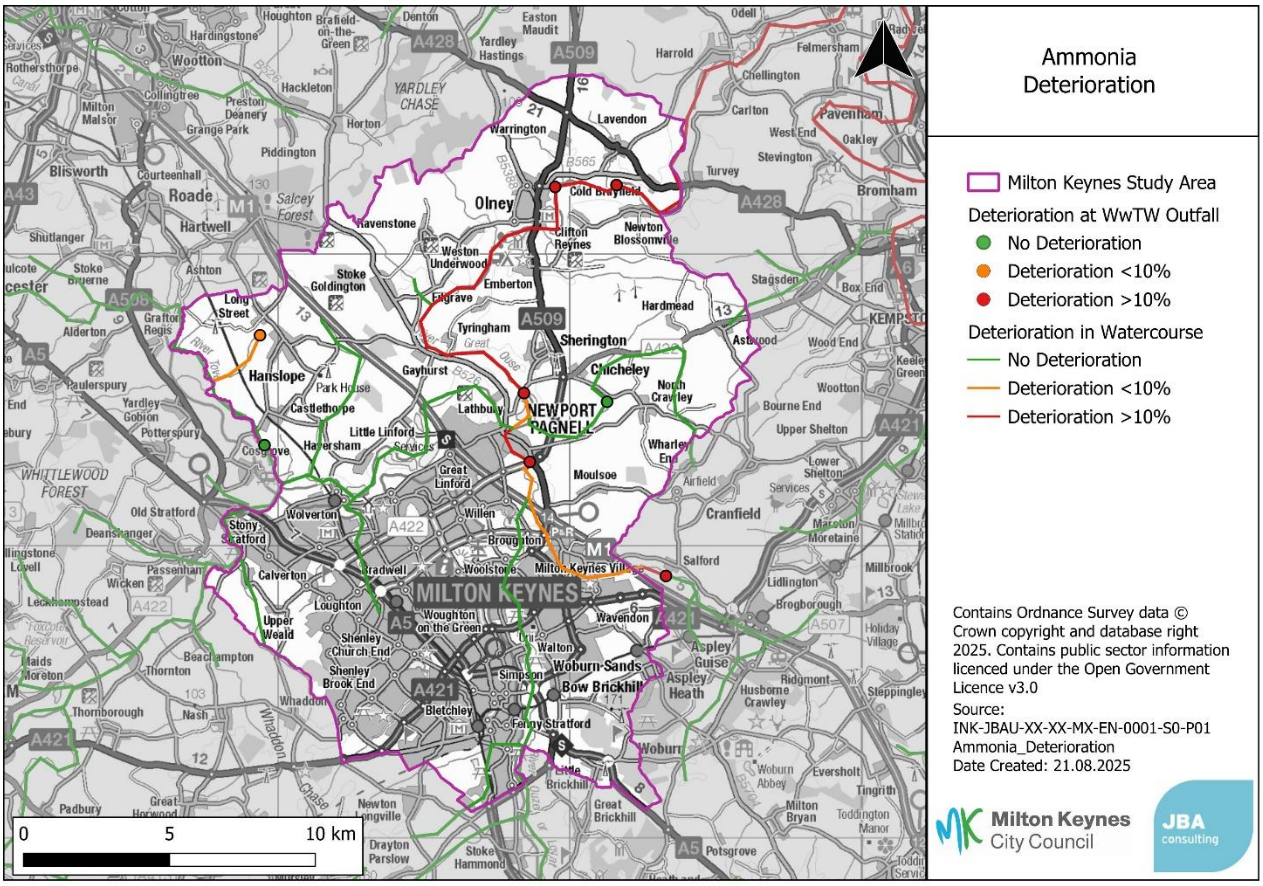
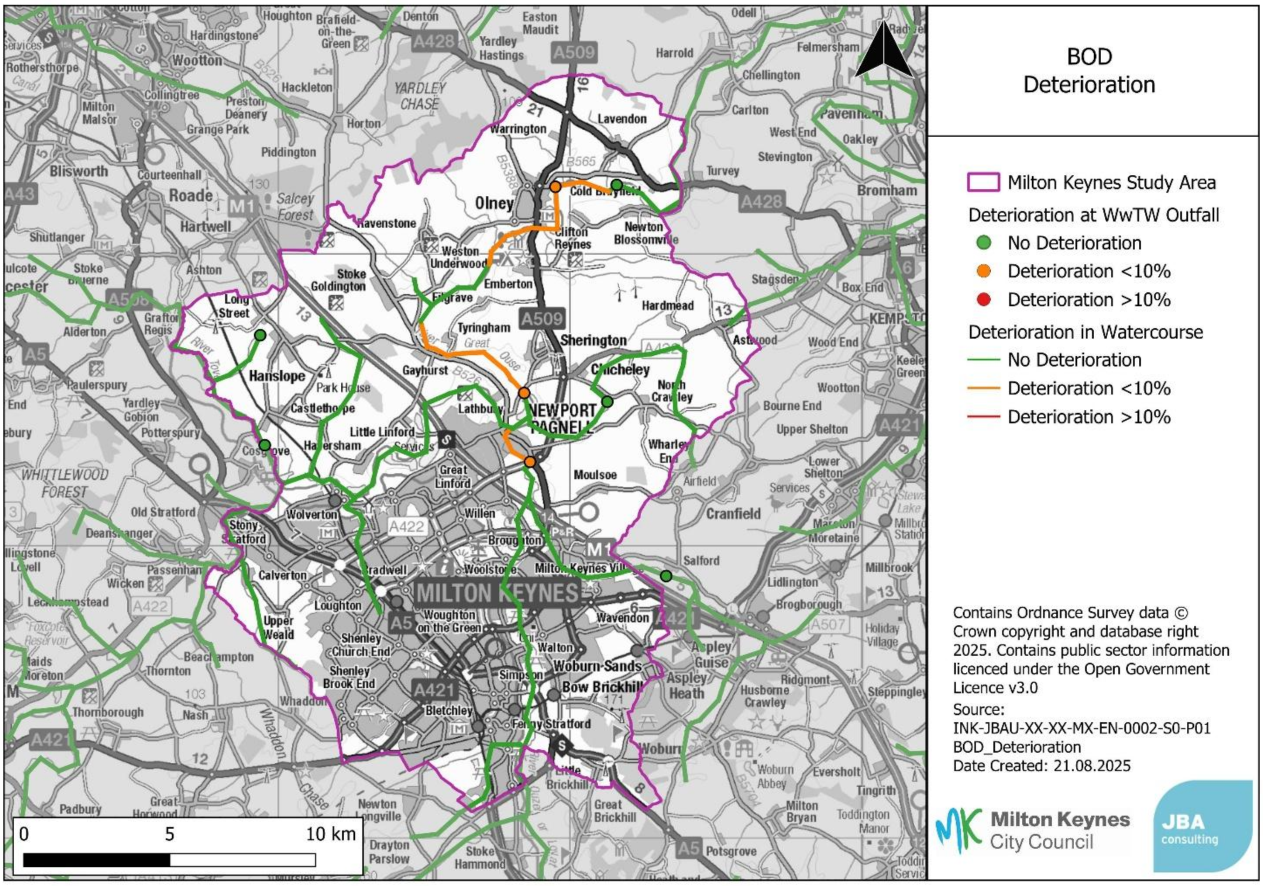
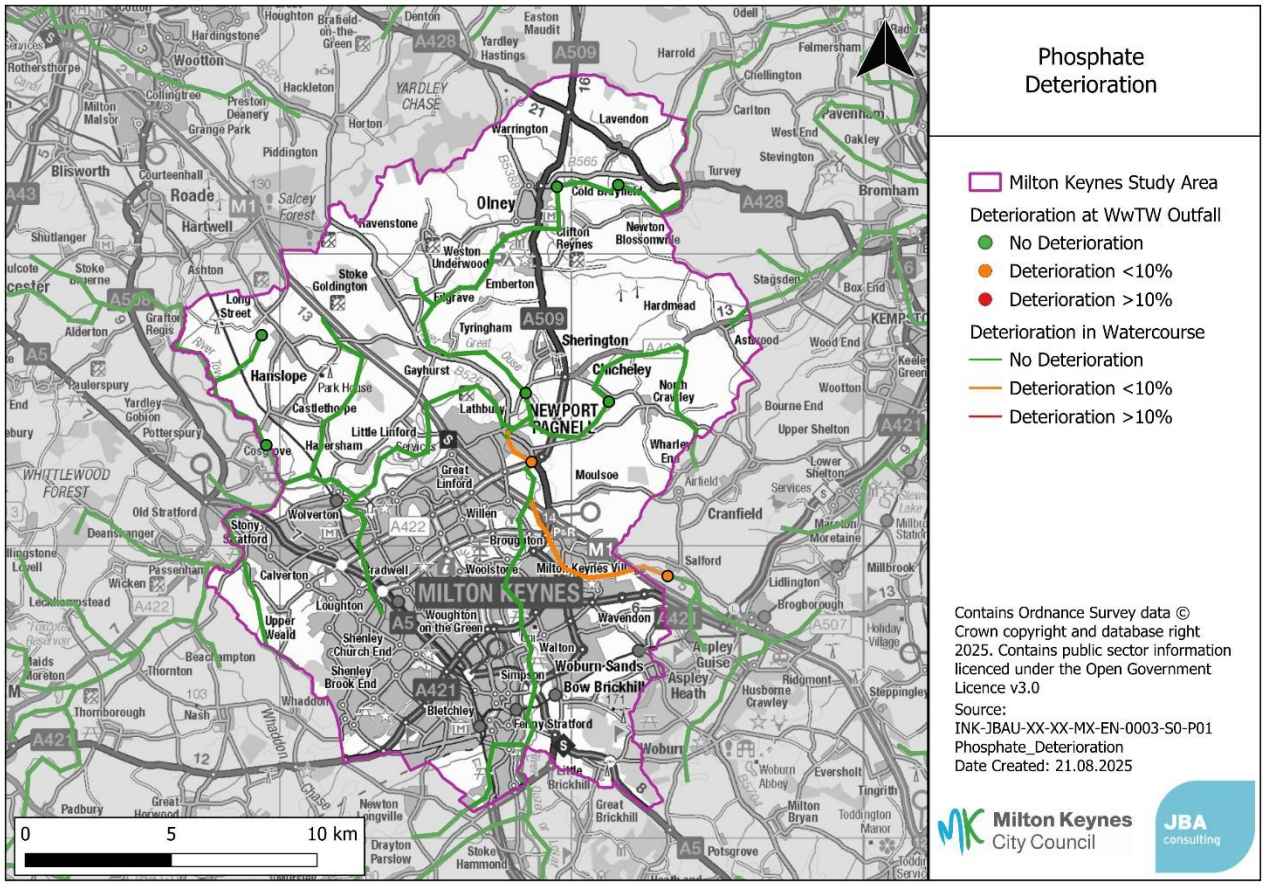
A Appendix A - Water quality mapping

A.1 Future scenario

The set of maps below show the modelled results if wastewater discharges increased by the volume predicted during the MKCP plan period. They show a result at the point of mixing (i.e., where the WwTW discharges) and the results downstream in the river. These are colour coded based on whether deterioration is greater (red) or less than (amber) 10%. Areas where no deterioration is predicted are coloured green.

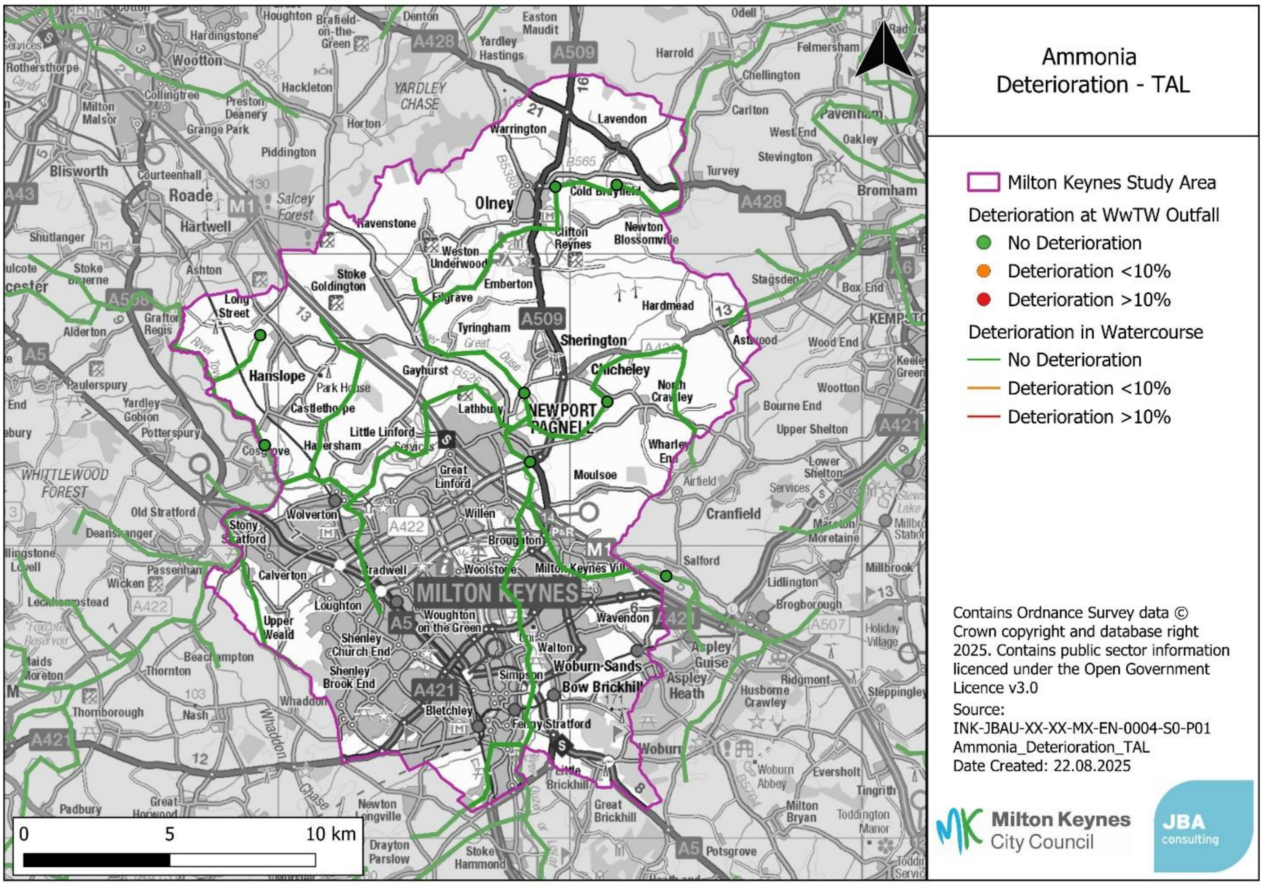

Ammonia Deterioration
Milton Keynes Study Area
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2025. Contains public sector information licenced under the Open Government Licence v3.0
Source: INK-JBAU-XX-XX-MX-EN-0001-S0-P01 Ammonia_Deterioration
Date Created: 21.08.2025
Milton Keynes City Council
JBA consulting
0 5 10 km


BOD Deterioration
Milton Keynes Study Area
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2025. Contains public sector information licenced under the Open Government Licence v3.0
Source: INK-JBAU-XX-XX-MX-EN-0002-S0-P01 BOD_Deterioration
Date Created: 21.08.2025
Milton Keynes City Council
JBA consulting
0 5 10 km



A.2 TAL scenario

This second set of maps show the modelled results in the TAL scenario, where each WwTW has been upgraded to the technically achievable limit (TAL). This shows areas where deterioration could not be prevented. In each case this is less than 10%.


Ammonia
Deterioration - TAL
Milton Keynes Study Area
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2025. Contains public sector information licenced under the Open Government Licence v3.0
Source:
INK-JBAU-XX-XX-MX-EN-0004-S0-P01
Ammonia_Deterioration_TAL
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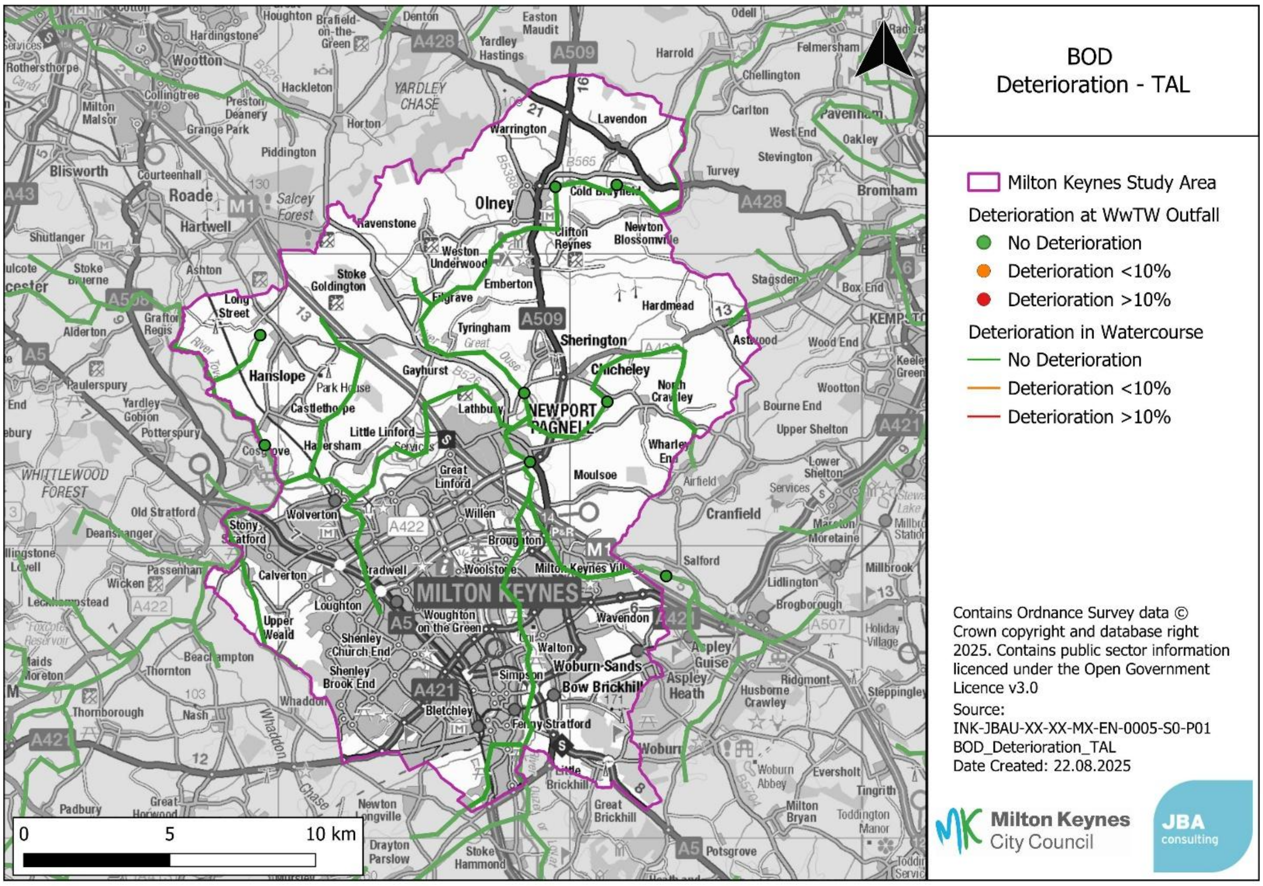
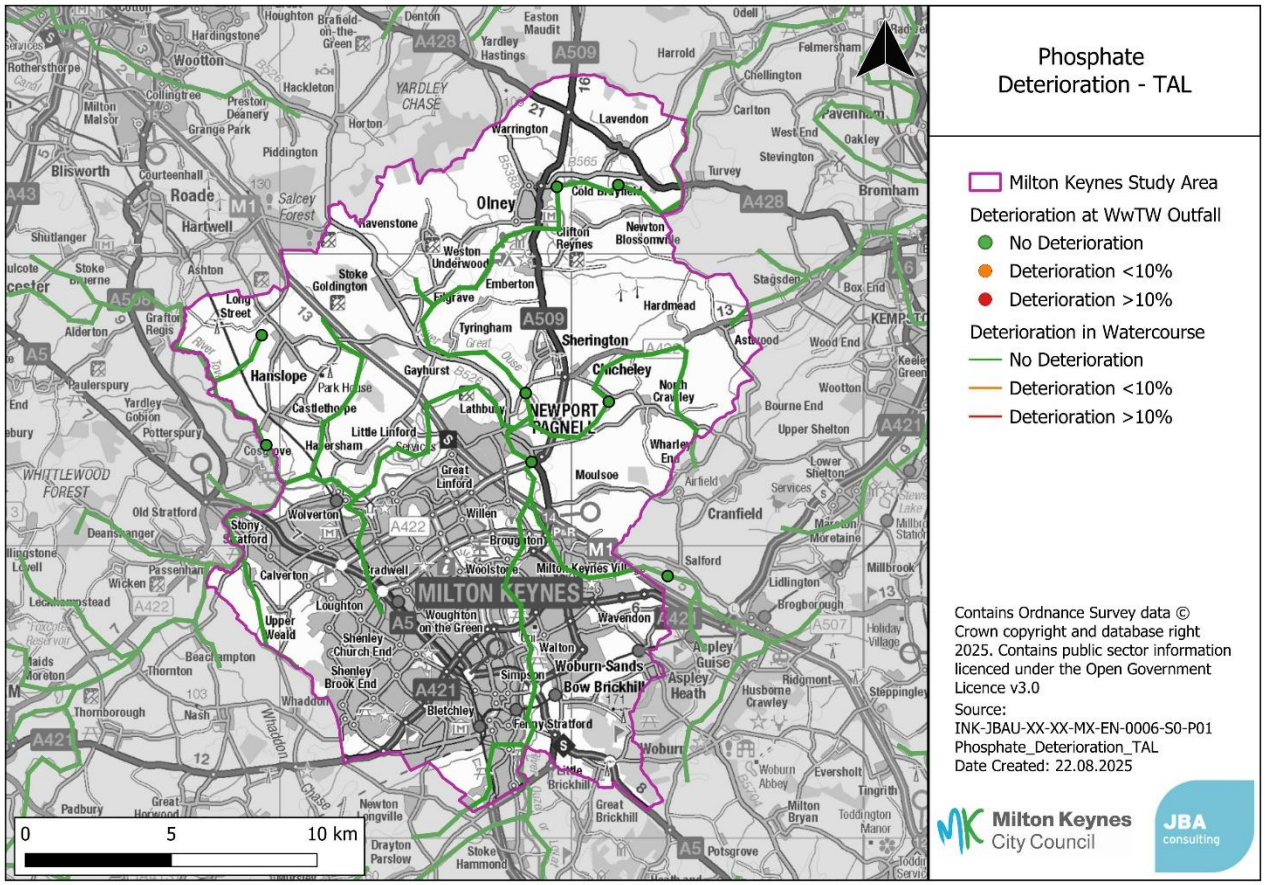
0
5
10 km
MILTON KEYNES


BOD
Deterioration - TAL
Milton Keynes Study Area
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2025. Contains public sector information licenced under the Open Government Licence v3.0
Source:
INK-JBAU-XX-XX-MX-EN-0005-S0-P01
BOD_Deterioration_TAL
Date Created: 22.08.2025
0
5
10 km
MILTON KEYNES


Phosphate
Deterioration - TAL
Milton Keynes Study Area
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2025. Contains public sector information licenced under the Open Government Licence v3.0
Source:
INK-JBAU-XX-XX-MX-EN-0006-S0-P01
Phosphate_Deterioration_TAL
Date Created: 22.08.2025
Milton Keynes City Council
JBA consulting
0
5
10 km
MILTON KEYNES
NEWPORT PAGNELL
Olney
Sherington
Hanslope
Wolverton
Woburn Sands
Bow Brickhill
Fenny Stratford
Bletchley
Cranfield
Lavendon
Hartwell
Roade
Blisworth
Wootton

B Appendix B - Water quality results

B.1 Ammonia

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	TAL Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
CASTLETHORPE STW	0.1016	0.1016	0%	0.0336	-67%	HIGH	HIGH	HIGH
COTTON VALLEY STW	0.6027	0.7330	22%	0.2054	-66%	MODERATE	MODERATE	HIGH
HANSLOPE STW	2.0931	2.1036	1%	0.4148	-80%	POOR	POOR	GOOD
LAVENDON STW	0.2278	0.2710	19%	0.0824	-64%	HIGH	HIGH	HIGH
Newport Pagnell	0.1411	0.1702	21%	0.0980	-31%	HIGH	HIGH	HIGH
NORTH CRAWLEY STW	0.3620	0.3620	0%	0.3460	-4%	GOOD	GOOD	GOOD
OLNEY STW	0.2506	0.2971	19%	0.0914	-64%	HIGH	HIGH	HIGH
WAVENDON STW	0.1657	0.1864	12%	0.1392	-16%	HIGH	HIGH	HIGH

B.2 BOD

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	TAL Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
CASTLETHORPE STW	1.9033	1.9034	0%	1.7384	-9%	HIGH	HIGH	HIGH
COTTON VALLEY STW	2.2203	2.2612	2%	2.2100	0%	HIGH	HIGH	HIGH
HANSLOPE STW	7.5818	7.6004	0%	4.4352	-42%	POOR	POOR	GOOD
LAVENDON STW	2.1921	2.1901	0%	2.0785	-5%	HIGH	HIGH	HIGH
Newport Pagnell	2.4157	2.4408	1%	2.1885	-9%	HIGH	HIGH	HIGH
NORTH CRAWLEY STW	3.1620	3.1621	0%	2.7834	-12%	HIGH	HIGH	HIGH
OLNEY STW	2.1619	2.1765	1%	2.0703	-4%	HIGH	HIGH	HIGH
WAVENDON STW	4.6695	4.6732	0%	4.6385	-1%	GOOD	GOOD	GOOD

B.3 Phosphate

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	TAL Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
CASTLETHORPE STW	0.2893	0.2894	0%	0.1340	-54%	POOR	POOR	MODERATE
COTTON VALLEY STW	0.2478	0.2476	0%	0.1722	-31%	MODERATE	MODERATE	MODERATE
HANSLOPE STW	0.4320	0.4336	0%	0.1722	-60%	POOR	POOR	MODERATE
LAVENDON STW	0.2600	0.2588	0%	0.1816	-30%	POOR	POOR	MODERATE
Newport Pagnell	0.2386	0.2398	1%	0.1420	-40%	MODERATE	MODERATE	MODERATE
NORTH CRAWLEY STW	1.2971	1.2971	0%	0.8222	-37%	BAD	BAD	POOR
OLNEY STW	0.2567	0.2557	0%	0.1803	-30%	POOR	POOR	MODERATE
WAVENDON STW	0.1546	0.1606	4%	0.1381	-11%	MODERATE	MODERATE	MODERATE

C Appendix C - Environmental sites water quality impact

C.1 SSSIs

The tables within this appendix detail the predicted deterioration in water quality in the river adjacent to each SSSI, SAC, SPA and Ramsar downstream of WwTWs serving growth in the MKCP plan period. It includes the protected site name, reference and the point in the SIMCAT model used to obtain the result. The first three results show the predicted deterioration at the end of the plan period if all planned growth were delivered. The final three columns show the result of the TAL scenario where all WwTWs are upgraded to their technically achievable limit. A negative number indicates an improvement in water quality compared to the future scenario, i.e. deterioration can be prevented.

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Berry Fen SSSI	1002793	CSO487	1	-1	0	-57	-9	-39
Felmersham Gravel Pits SSSI	1003101	STORM_ODELLSTW	18	-1	-1	-62	-5	-30
Godmanchester Eastside Common SSSI	1003156	HUNTINGDONSTW	2	-1	-1	-66	-12	-40
Houghton Meadows (SSSI)	1003079	ExtraPlotPoint-Reach177No2	2	-1	-1	-66	-12	-40
Islington	1001918	ExtraPlotPoi	0	0	0	-15	-2	-71

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Heronry SSSI		nt-Reach408No9						
Little Paxton Pits SSSI	1002740	GB105033043270Boundary	0	0	0	-29	-1	-26
Ouse Washes SSSI	1002701	WQ26M31	1	-1	0	-56	-9	-39
Portholme SSSI	1002838	WQ22M60	-1	-1	-1	-73	-10	-40
River Nar SSSI	1001656	StartOfReach414	0	0	0	-24	-7	-52
Setchey SSSI	1001984	ExtraPlotPoint-Reach408No9	0	0	0	-15	-2	-71
St. Neot's Common SSSI	1002840	CSO481	4	0	0	-46	-8	-41
Stevington Marsh (SSSI)	1003113	ExtraPlotPoint-Reach79No11	13	-1	-1	-58	-4	-32
The Wash SSSI	1002998	ExtraPlotPoint-Reach421N	1	0	0	-23	-7	-52

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
		o3						
Wiggenhall St. Germans SSSI	1001653	ExtraPlotPoint-Reach408No9	0	0	0	-15	-2	-71

C.2 SAC

SAC name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Portholme	UK0030054	WQ22M60	-1	-1	-1	-73	-10	-40
Ouse Washes	UK0013011	StartOfReach194	1	-1	0	-57	-9	-39
The Wash & North Norfolk Coast	UK0017075	ExtraPlotPoint-Reach421No3	1	0	0	-23	-7	-52

C.3 SPA

SPA name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Ouse Washes	UK9008041	WQ26M31	1	-1	0	-56	-9	-39
The Wash	UK9008021	ExtraPlotPoint-Reach421No3	1	0	0	-23	-7	-52

C.4 Ramsar

Ramsar name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Ouse Washes	UK11051	WQ26M31	1	-1	0	-56	-9	-39
The Wash	UK11072	ExtraPlotPoint-Reach421No3	1	0	0	-23	-7	-52

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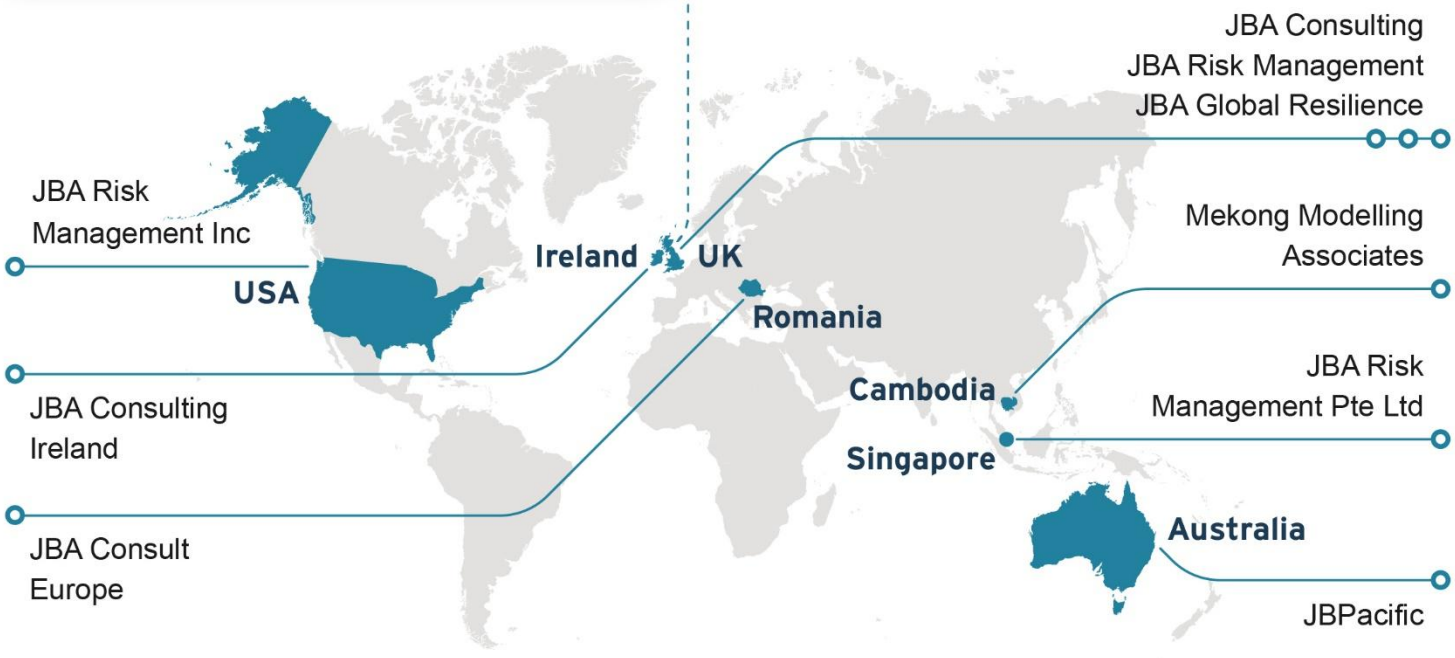

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