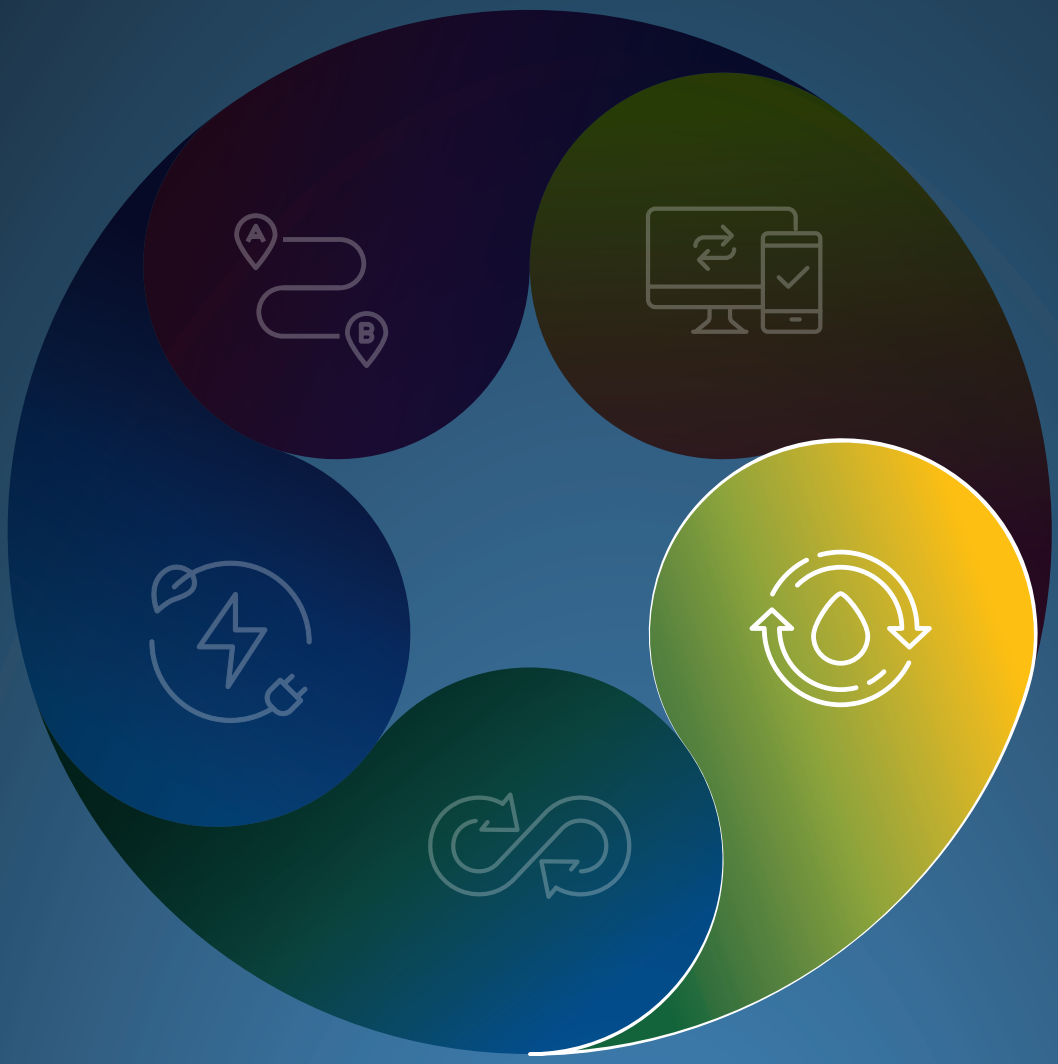
Comisiwn Seilwaith Cenedlaethol Cymru
National Infrastructure Commission Wales

in partnership with ARCADIS



WATER SECTOR INFRASTRUCTURE INSIGHTS

State of Play and Future Challenges

Ref: 30277500-AUK-XX-XX-RP-TC-0001-01

Table of Abbreviations

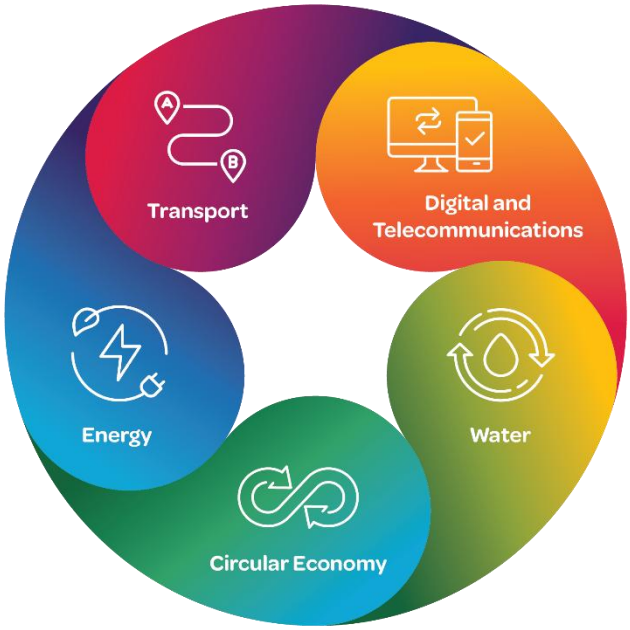
Abbreviation	Meaning
DCWW	Dŵr Cymru Welsh Water
DWI	Drinking Water Inspectorate
HD	Hafren Dyfrdwy
LLFA	Lead Local Flood Authority
NAVs	New Appointments and Variations (independent water companies)
NbS	Nature-Based Solutions
NICW	National Infrastructure Commission for Wales
NMB	Nutrient Management Board
PFAS	Per-and poly fluoroalkyl substances
WRMP	Water Resource Management Plans

Contents

1 Introduction

1.1 Context

1.1.1 This report is one of five Infrastructure Insights reports commissioned by the National Infrastructure Commission for Wales (NICW) to consider key infrastructure needs for Wales over the next 80 years across the following sectors:



1.2 Water sector overview

1.2.1 The challenges facing the water sector are typically associated with:

- The impacts of too little rainfall and/or stored water, resulting in drought, water supply and water scarcity issues
- The impacts of too much rainfall at once leading to flood devastation
- Water quality issues.

1.2.2 All of these issues have public health implications and impacts on nature. These issues are all also at risk of being exacerbated by climate change, changing weather patterns and associated deterioration of natural landscapes, and these challenges will only become more acute as average temperatures continue to increase and weather patterns change with increased storm events.

1.2.3 For the purposes of this commission, the water sector has been defined as including three main areas (with this study focussing solely on the first two):

- Water resources – this report considers the potential risk of there being too little Water in Wales in the coming years and identifies future issues and challenges around ensuring a resilient water supply.
- Water quality – this report considers the quality of water and water bodies in Wales and looks at the issues and challenges associated with this.
- Flood and coastal erosion management – dealing with instances of 'too much' water, leading to flooding. This is clearly a key topic for Wales but given NICW's recent publication on 'Building Resilience to Flooding in Wales by 2050'[1], it has been agreed that this study would not focus on flood and coastal erosion management.

1.3 Focus of this report

1.3.1 Focussing on the water sector in Wales and specifically on water quality and water resources issues, the purpose of this report is to:

- Assess and explain the current key issues impacting water quality and water resources in Wales
- Identify future needs, issues, challenges and risks and consider the potential impact or consequences of these risks to Wales (doing so through the lens of the Well-being of Future Generations Act)
- Identify priority issues of most critical significance for Wales
- Guide future Commissioners on the key issues and challenges they might consider as a priority for action and development within the next Senedd term.
- Present existing data to evidence the state of water quality and water resources across Wales now and into the future, to enable future monitoring of performance across this sector.

1.3.2 It is important to note that this report is intended to provide a high-level overview of the issues across the sector and to highlight those which will be important for Welsh Government to consider further. The scope of the study was to provide a narrative and overview of the issues based on sector experience, readily available headline information and with targeted input from key stakeholders. The scope did not allow for primary research or detailed analysis of existing data. Research was completed during 2025, and the document presents the state of play as of then. It should be noted that much of this study was undertaken prior to the publication of the Independent Water Commission (IWC) report (known as the Cunliffe review).

1.3.3 In line with NICW's overarching ambitions and remit, this report takes a long-term view of water quality and water resources. Broadly, it considers the following timescales[2]:

- **Short term** - 5-15 years ahead, therefore looking beyond the next Senedd term but within the timeline of most existing plans and policies, including Future Wales: The National Plan 2040
- **Medium term** - 15 – 50 years ahead, to enable forward planning and help shape understanding beyond current policy horizons to consider the next likely significant issues and challenges.

[1] Building Resilience to Flooding in Wales 2050
[2] These timescales reflect those used across all infrastructure insights reports and it is acknowledged that they do not mirror the timescales which water companies plan to.

- **Long term -** 50 – 80 years ahead but in recognition of the difficulties and uncertainties around very long-term thinking, this is subject to a lighter focus. However, the importance of a long-term perspective in helping to ensure the actions we take across the sector in the short term are suitably informed, resilient and future proof is recognised.

1.4 Stakeholder input

1.4.1 For this overview of state of play and future challenges to be informed by the real experience of stakeholders working across the sector, two online workshops were held, as follows:

- 15 July 2025 – Water quality workshop
- 16 July 2025 – Water resources workshop.

1.4.2 Information gained from these sessions has informed the narrative throughout this report.

1.5 Assumptions

1.5.1 This review has been based on a series of broad assumptions about what a future Wales might look like, to assist with understanding of the longer-term timeframe, and to ensure that the five Infrastructure Insight reports are consistent. The assumptions are based on established, published sources and are intended to provide a high-level guide and to help frame thinking around scale of change across Wales:

- **Climate change** will have cross cutting impacts in Wales. For example, current worst-case projections anticipate increases in temperature of 3.8°c to 6.8°c in the summer by 2070; significant changes in the seasonality of weather extremes, with significant increases in heavy hourly rain anticipated[3]; and sea level rises of between 22cm and 28cm in Cardiff[4].
- Wales has made progress towards emissions reductions. However, these changes are considered to have come about due to 'easy wins' in the energy and industry sector. Significant further reductions will have been achieved through the closure of the Port Talbot Steelworks in 2024. However, significant change is needed to further accelerate emissions reductions in line with Wales' Carbon Budgets, with concern identified that these changes are not taking place at a fast enough rate[5][6].
- **Energy use** – Welsh electricity demand is projected to at least double and potentially triple by 2050[7].
- **Population** is anticipated to increase in Wales over the short – medium term, with a 5.9% increase projected by mid-2032 and a 10.3% increase projected by 2047[8]. This increase will be driven by migration, with natural change being negative over the same time period.

[3] ukcp18_headline_findings_v4_aug22.pdf
[4] Adapting to climate change - Progress in Wales
[5] Wales Fourth Carbon Budget
[6] Progress Report: Reducing emissions in Wales
[7] Energy use in Wales, third edition 2022
[8] National population projections: 2022-based [HTML] | GOV.WALES

- **Age profile** - The number of people in Wales aged over 65 is set to increase by 19.6% by 2032 in the short term and will be over 1 million by 2060 [9].
- In terms of **economic development**, longer term forecasts identify the challenges faced by relatively weak productivity when compared to other parts of the UK. Challenges with productivity are to be exacerbated by an ageing population. Changing working patterns and emerging industries resulting from technical innovation are considered to both provide opportunities and challenges[10].
- **Nature and biodiversity** in Wales are under threat. Changes in how we manage land in Wales combined with the effects of climate change will continue to impact nature in the future and will require transformative action to address[11].

1.6 Structure of this report

1.6.1 Following this introduction, this Infrastructure Insight document takes the following structure:

- **Chapter 2** sets out background and context
- **Chapters 3 and 4** investigates the current state of play in the sector, seeking to establish a baseline.
- **Chapter 5** considers what the vision for water quality and water resources could look like
- **Chapter 6** looks at future challenges across these sectors in the short term
- **Chapter 7** considers medium to longer term challenges
- **Chapter 8** summarises the key challenges and identifies important next steps
- **Chapter 9** considers how progress can be monitored over time.

[9] Ibid.
[10] Welsh Budget 2023: Chief Economist's report
[11] State of Natural Resources Report 2025

2 Background and Context

2.1 Why does this sector matter to Wales?

2.1.1 The Water Strategy for Wales [12] published in 2015 by Welsh Government, recognises that "*Water is one of our greatest natural assets and an integral part of Wales' culture, heritage and national identity. It shapes our natural environment and landscapes, providing us with a sense of place in mountains, valleys and coastline and supporting Wales' diverse wildlife. It provides a basis for economic development, including energy supply and tourism. Access to clean, safe, and resilient water supplies also plays a vital part in supporting the health and well-being of everyone who lives, works and visits here."* The Strategy sets out a long-term policy direction which aims to ensure Wales has a more integrated and sustainable approach to managing water and associated services.

2.1.2 The importance of water as a resource which is well managed is underlined also by the recent Independent Water Commission report (the Cunliffe review[13]) which recognises the critical need for a water system which is resilient to future pressures and challenges and supports economic growth.

2.1.3 Water quality is hugely important to Wales. The Senedd Research Paper, Water Quality in Wales[14] (August 2023) recognised that "*Water quality is …crucial to health, the economy, environment, and our ability to enjoy the natural world*". Fundamentally, this recognises that without a secure supply of safe drinking water a society cannot properly function, and the risk of outbreak of disease grows.

2.1.4 A healthy water environment is essential because it ensures reliable access to clean water for drinking, sanitation, agriculture, and industry, which protects public health, supports economic activities, and sustains healthy ecosystems. Without a healthy water environment, communities face increased risks of disease, food insecurity, and environmental degradation, making it a critical foundation for sustainable development and resilience against climate change and disasters.

2.1.5 Tables 2.1 and 2.2 provide an overview of how the water sector as a whole, and in particular water resources and water quality, is critical to the overall wellbeing and success of Wales, with reference to the seven goals (Table 2.1) and five ways of working (Table 2.2) set out in The Well-being of Future Generations (Wales) Act.

[12] https://www.gov.wales/sites/default/files/publications/2019-06/water-strategy.pdf
[13] Independent Water Commission: review of the water sector - GOV.UK
[14] https://senedd.wales/media/v3fl5zes/23-12-water-quality-in-wales.pdf

Table 2.1 – Contribution of water sector to wellbeing goals

Well-being goal	Contribution of this sector
A prosperous Wales	Water supports the economy by providing reliable supply for homes, businesses, agriculture, and industries, enabling sustainable economic growth and job creation. Affordable, clean and reliable water supplies are important.
A resilient Wales	Healthy water systems and nature based solutions support the restoration of natural ecosystems and help Wales adapt to challenges like climate change, flooding, and drought. Resilient supplies designed with the long term in mind underpins the function of society.
A healthier Wales	Clean, safe water is fundamental for public health, hygiene, and wellbeing; effective wastewater management prevents disease and protects communities
A more equal Wales	Equitable access to water ensures all communities, including vulnerable groups, have affordable and reliable water and sanitation services
A Wales of cohesive communities	Water infrastructure (like flood defences and reservoirs) strengthens communities, supports recreation, and fosters social connections. Without these features, communities will suffer from the impacts of flooding and coastal erosion.
A Wales of vibrant culture and thriving Welsh language	Healthy and attractive rivers, lakes, and coasts are central to Welsh heritage, recreation, and identity.
A globally responsible Wales	Sustainable water management reduces Wales' environmental impact, supports global climate action, and promotes responsible use of shared natural resources

Table 2.2 Contribution of water to the five ways of working

Way of Working	Contribution of this sector
Long-term	Investments in water infrastructure and catchment management are designed to ensure sustainable, reliable water supplies and healthy ecosystems for future generations, supporting climate adaptation and biodiversity goals.
Prevention	Measures such as pollution control, demand management, and natural flood management reduce the risk of environmental degradation and water scarcity, while restoring wetlands and riparian habitats will help prevent future issues.
Integration	Water sector initiatives are aligned to deliver multiple benefits, ensuring that water management, nature restoration, community resilience, and climate adaptation support and reinforce each other. This integrated approach enhances ecosystem recovery, strengthens community well-being, and contributes to the long-term resilience of both people and nature in Wales.
Collaboration	Partnership between stakeholders engaged in the water sector ensures that joined up approaches come forward and meaningful interventions can emerge.
Involvement	Stakeholder and community engagement ensures that water management solutions reflect local priorities and knowledge and support public participation in river restoration and conservation efforts.

2.2 Relationship with nature

2.2.1 NICW is committed to giving nature a formal voice in infrastructure decisions, as recommended in their 2024 Building Resilience to Flooding in Wales by 2050 (recommendation 3). The purpose of this is to treat ecosystems as key stakeholders in infrastructure decision making. These steps aim to enhance long-term resilience, honour the Well-being of Future Generations Act, and align infrastructure with biodiversity recovery and climate adaptation.

2.2.2 Water and the natural environment are fundamentally entwined. Water is essential for the natural environment, and the environment is a core part of the water cycle. Many important ecosystems are aquatic or rely on water, the availability of good quality water is essential for the health of these ecosystems. Similarly, good quality fresh water relies on a healthy and functioning natural environment. The environment supplies rainfall, filters water and provides storage, along with other ecosystems services that are key to human life and civilisation. Human activities disturb the water cycle and compromise the effectiveness of ecosystems services benefits for water, examples of impacts on the water environment include:

- Hardstanding and compacting surfaces reduces infiltration, increasing runoff and soil erosion, and reducing natural storage and filtration of water.
- Abstracting water reduces flows and water levels in waterbodies, which can lead to habitat loss, increased pollution concentration, and weakening natural resilience against drought.
- Diffuse pollution from rural runoff, discharges of wastewater and urban runoff increases pollution and reduces water quality in waterbodies.
- Straightening rivers increases velocities causing flooding and erosion and physical barriers in watercourse prevent fish passage and divide ecosystems.

2.2.3 Water management has some positive benefits for the environment. Water is stored to provide water resources for public use, this storage is often used to augment flows in watercourses, increasing flows in the summer, which supports the water environment. Similarly, discharges from wastewater treatment works provides baseflows for watercourses.

2.2.4 Impacts on water should be managed to minimise and mitigate adverse effects on the natural environment. Specific water management activities, such as water supply abstractions and wastewater management, are regulated and there are strict processes to follow to understand and mitigate any adverse effects. However, many activities have an impact on water, meaning that compromises have to be made or there may be no regulatory process through which impacts can be assessed and mitigations implemented. For instance, surface water runoff is usually not regulated, despite often containing high levels of pollutants, including nutrients from agricultural land and toxic substances from highways. Recent changes have brought about some improvements, for instance agricultural nutrients are now better regulated through the Control of Agricultural Pollution Regulations 2021.

2.3 What shapes the sector today?

2.3.1 The water sector is driven by a range of legislation and policy at various levels as summarised in Table 2.3.

Table 2.3 Context – legislation, policy and plans

Category	Policy/legislation	Relevance to this sector review
International	Water Framework Directive 2017	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 ('WFD 2017'), are the primary mechanism for assessing and managing the water environment in Wales. They transpose and implement water quality standards from the EU's 2000 Water Framework Directive ('EU WFD') and place a statutory duty on the Welsh Ministers to prevent deterioration and improve all water bodies to 'good status' by 2027.
	Urban Wastewater Treatment Directive 1991 (revised 2025)	The EU's Urban Wastewater Treatment Directive, adopted in 1991 (revised in 2025) sets rules for the collection, treatment, and discharge of urban wastewater to protect water quality and human health.
	Habitats Directive in UK	The EU's Habitats Directive (Council Directive 92/43/EEC) was first adopted in the UK in 1994, and now under the *Conservation of Habitats and Species Regulations 2017* (for England and Wales). It designates and protects Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). Nutrient Neutrality is a means to ensure the Habitats Directive is met where new developments may harm designated sites.
England and Wales	Water Industry Act 1991	Sets out the main powers and duties of the water and sewerage companies and their regulators in England and Wales.
	Water Resources Act 1991	Sets out how water resources in England and Wales are managed and protected.
	Flood and Water Management Act 2010	Improves flood and coastal erosion risk management in England and Wales by creating a national strategy (for each of England and Wales) and assigning Lead Local Flood Authorities (LLFAs) to manage local flood risk. It includes Schedule 3 that provides powers for LLFAs to approve and adopt Sustainable Drainage in new developments
	Water Resources West Regional Water Resources Plan	This plan is for water resources in the West of England region, HD and DCWW are both

Category	Policy/legislation	Relevance to this sector review
		members of this group, as they supply customers in this area.
Wales	River Basin Management Plans (RBMPs)	Required under the WFD Regulations 2017, RBMPs set out locally specific environmental objectives and actions to protect and improve the water environment. These are updated every six years. There are three RBMPs which cover Wales – The Dee, Western Wales and the Severn.
	Improving Effluent Quality and River Quality: Action Plan	Sets out the measures Dwr Cymru (DCWW), Hafren Dyfrdwy (HD) and Natural Resource Wales (NRW) will take to reduce storm overflows, improve water quality, and communicate better with the public about water quality.
	Control of Agricultural Pollution Regulations 2021	Requires Welsh farms to implement nutrient management planning, sustainable fertiliser and manure application practices, and manure and silage storage standards to prevent water pollution.
	Water Resources Management Plans (WRMPs)	Prepared by the Welsh water companies, DCWW and HD, and NAVs. These plans forecast water supply and demand over a minimum 25-year period, guiding future investments and ensuring long-term water security.
	Drought Plans	Detail the strategies and operational procedures water companies will use to manage supplies during drought conditions.
	Drainage and Wastewater Management Plan	Prepared by the Welsh water companies, DCWW and HD. These plans forecast wastewater requirements over a 25-year period, guiding future investments.

2.4 Who is responsible?

2.4.1 Responsibilities for management of water quality and water supply/ resources in Wales are spread across government, the water companies and regulators as highlighted in Table 2.3. It is noted that the recent Cunliffe Review will bring about some changes to responsibilities. Table 2.3 highlights the current situation as of end 2025.

2.4.2 The Government of Wales Act 2006, and subsequent Wales Act 2017, devolved water-related powers to the Senedd, including water supply, water resources management, water quality, flood risk, and sewerage.

2.4.3 The water companies are responsible for providing drinking water to customers and treating wastewater collected in public sewers, as well as managing the infrastructure required for this.

Water companies are regulated by Ofwat, NRW and the Drinking Water Inspectorate. Natural Resources Wales also has a general role to oversee the health of the water environment, including monitoring water quality and overseeing water resources.

2.4.4 Local authorities and highways authorities manage surface water drainage. As the lead local flood authority, local authorities in Wales adopt drainage in new developments. This is primarily to manage flood risk; however, these features also have water quality benefits. Local authorities are the local highway authority with responsibility for local roads, including the drainage. These roles are not regulated by the environmental regulator.

2.4.5 In addition to these parties with formal roles in managing the water environment, landowners, farmers, power generators, private water suppliers and businesses may abstract water from the water environment and discharge to the environment.

2.4.6 Overall, the wide range of parties involved is complex and responsibilities are, in places, overlapping. This can make overall management of the sector difficult to co-ordinate. NICW found similar complexities in flood risk management in the Building resilience to flooding in Wales by 2050 report.

Table 2.4 – Water sector governance (as of 2025)

Organisation	Remit	Role
UK Government	Government	The UK government has a responsibility to ensure fair, sustainable, and legally compliant management of water resources between England and Wales, respecting devolution agreements and safeguarding the interests of Welsh communities and environments.
Welsh Government	Government	The Welsh Government is responsible for managing and regulating water resources within Wales, with significant legislative powers to develop policies, set environmental standards, oversee water and wastewater services, and ensure sustainable, safe water provision for Welsh communities under laws such as the Environment (Wales) Act 2016.
	Highway Authority (via the North and Mid Wales Trunk/South Wales Trunk Road Agent	The Welsh Government also has legislative powers and responsibilities to manage how the strategic highways network (covering A roads) interacts with water resources, including ensuring proper drainage, preventing pollution, managing flood risks, and complying with environmental regulations to protect water quality and surrounding ecosystems.
Natural Resources Wales	Regulator	Natural Resources Wales (NRW) regulates, manages, and protects water resources in Wales, ensuring sustainable use, water quality, and environmental compliance. They are the environmental regulator for water and sewage companies and are also responsible for oversight of the environment in Wales. NRW also produce River Basin Management Plans.
Ofwat	Regulator	Ofwat is the economic regulator for the water and wastewater companies in England and Wales, ensuring that companies provide reliable services, protect consumers, and invest sustainably.

Organisation	Remit	Role
		Welsh Government has announced that a new Financial Regulator will be set up and in place by 2030. Ofwat is working with the UK and Welsh governments on the implementation of water reforms. Until these new arrangements are in place, Ofwat will continue to drive water companies to improve performance and deliver maximum value for customers, communities, and the environment,
Water Companies -	Water supply Wastewater	Dwy Cymru Welsh Water (DCWW) and Hafren Dyfrdwy are the two main water and sewerage companies operating in Wales. They maintain and monitor the quality of the drinking water they supply and treat wastewater before returning it to the environment. New appointments and Variations (NAVs) are independent water companies that usually serve small areas or individual developments; NAVs are regulated as water companies.
Mining Remediation Authority	Wastewater from disused mines	Manages the effects of past coal mining, including mine water pollution and other mining legacy issues to prevent contamination of rivers and ground water.
Drinking Water Inspectorate	Regulator	Regulates drinking water testing standards in England and Wales, enforces drinking water regulations, and publishes reports on drinking water quality. Also provides advice to local authorities regarding the Private Water Supplies Regulations. .
Local authorities	Drainage and Highway authority	Local authorities adopt drainage features on new developments as part of their role as SuDS Approval Body and are also the highway authority responsible for manging local roads and their drainage. The also have a duty under the Private Water Supplies Regulations.
Consumer Council for Water	Customer representative body	Represents the interests of water and sewerage consumers in England and Wales
Glandŵr Cymru	Canal and River Trust for Wales	Manages canals and navigable waterways in Wales.
Note: The recent Cunliffe Review will bring about changes to the above responsibilities.		

3 Current State of Play – Water Quality

3.1.1 Traditionally, poor water quality (referring to water quality in the environment) has not generally been a concern to the public, in contrast to water resources, where the public may be affected by water outages, hose pipe bans or other water restrictions. In recent years there has been a growing awareness of water quality and the public are now recognising the impact of poor waterbody health on the local and national environment.

3.1.2 Water quality is managed through River Basin Management Plans (prepared by NRW) that provide a legal framework for protecting and improving the water environment, through clear objectives for water quality management in each river basin. However, the need for nutrient neutrality and the Improving Effluent Quality and River Quality: Action Plan as separate initiatives for improving water quality highlight that these do not improve water quality sufficiently. River Basin Management Plans tend to lack clear, specific environmental objectives for each catchment and consequently are not sufficiently robust. Their legal status does not support any enforcement or consequence for failure to comply with or meet the objectives.

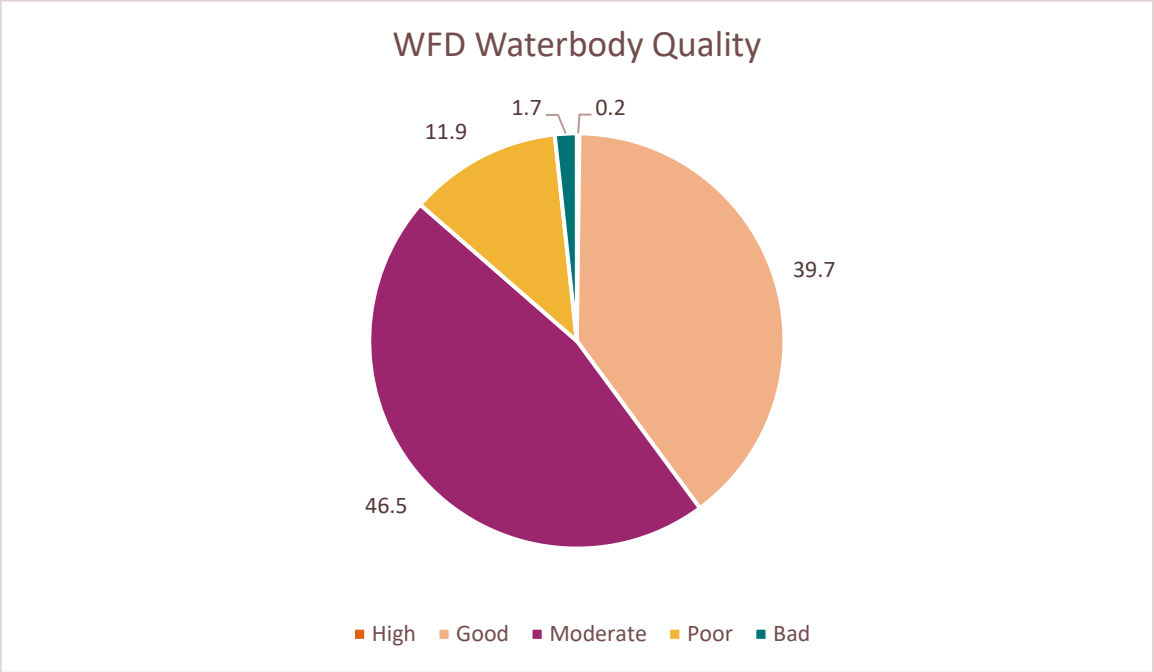
3.1.3 There are also funding gaps associated with the delivery of River Basin Management Plans. Water companies are responsible for many actions in them and there may be funding in their investment plans to deliver measures that meet these and some objectives. However, for other measures there is no funding and delivery is reliant on voluntary activities by landowners or other funding opportunities.

3.2 Water quality status of waterbodies

3.2.1 Wales performs better than average on the water quality of its waterbodies, with 40% achieving good ecological status in 2024[15] compared to 38% in the EU[16] and only 16% in England in 2019[17], (the most recent data releases). A breakdown of the water quality of waterbodies in Wales is displayed in Figure 3.1.

[15] Natural Resources Wales / Assessment of water quality in Wales 2024
[16] Water Framework Directive | WISE Freshwater
[17] Surface water status - GOV.UK

Figure 3.1 – Status of WFD waterbodies in Wales



Source: Natural Resources Wales / Assessment of water quality in Wales 2024[18]

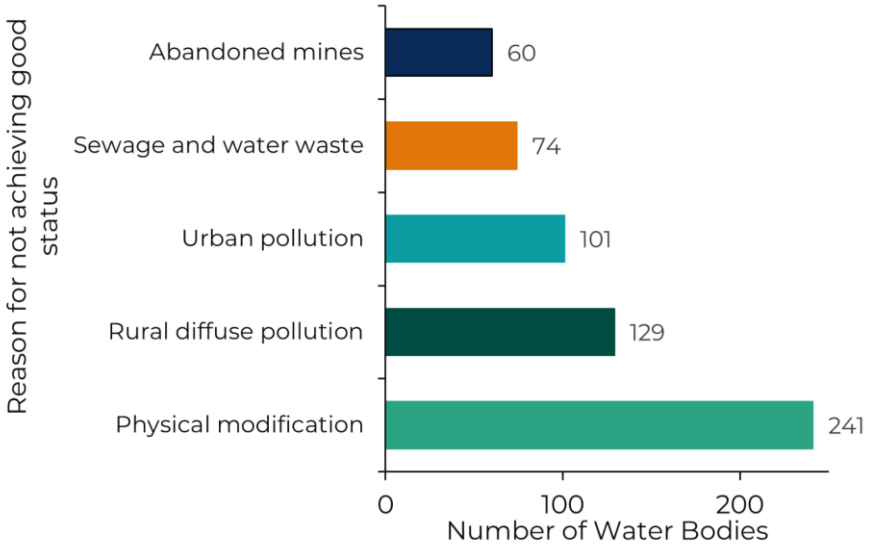
3.2.2 At the introduction of the Water Framework Directive, the target introduced was for all waterbodies to achieve good ecological status by 2027. Whilst the current waterbody status of 40% in Wales compares well to other areas, this remains the same as the previous classification in 2021 (albeit an improvement of 3% from 2015 and 5% since 2019). **Achieving the target of all waterbodies having good ecological status by 2027 is highly unlikely**.

3.2.3 The WFD Regulations specify quality elements that are used to assess the status of a waterbody, these include biological (for example, fish, invertebrates and plants), chemical (for example, heavy metals, pesticides and nutrients) and physical indicators (for example, presence of barriers to fish migration and modelled lake level data). Under WFD Regulations, the one-out-all-out approach means that if one quality element fails good status, the overall waterbody classification will be less than good. This does mean that progress on improvements may be masked, as the status does not change as the improvement is not enough to change the waterbody status or other elements have not improved enough.

3.2.4 Across Wales there are pressures from a range of sources that lead to poor ecological status, these are shown in Figure 3.2.

[18] NRW, Assessment of Water Quality in Wales, 2024

Figure 3.2 Reasons for not achieving good status in Welsh rivers (2021)



Source: Minister for Climate Change's response to the Chair of CCEI Committee (2021)[19]

3.2.5 In England, all waterbodies are failing due to poor chemical status. This is due to the introduction of new monitoring for ubiquitous, persistent, bioaccumulative, and toxic (uPBT) chemicals (including PFAS - per-and poly fluoroalkyl substances - and mercury). **These chemicals are not monitored as part of WFD monitoring in Wales**, and there is concern from environmental NGOs[20] that this is giving a false impression of water quality in Wales. These chemicals are persistent and take many years, or even longer, to breakdown in the environment, and there may not be any simple solutions to removing them. However, it is imperative that there is no further accumulation of these chemicals, that the sources of them are understood and that they are managed at source.

3.2.6 There are a range of bodies, asset owners and regulators responsible for performance in this area. Of the sources of pollutants shown in Figure 3.2, only discharges from wastewater and mines are regulated, these discharges must be consented and monitored. Discharges from other sources are not regulated, however they are significant reasons for poor water quality in Wales.

Abandoned mines

3.2.7 Disused mines accumulate water that may discharge from them into water courses. This water typically contains heavy metals and may cause pollution to the receiving waterbody. This is a particular issue in parts of Wales, where there is a strong mining heritage. The mine operator is responsible for the quality of any water that is discharged. For disused mines, the Mine Remediation Authority is responsible for managing water quality.

19 business.senedd.wales/documents/s120470/Response%20from%20the%20Minister%20for%20Climate%20Change%20to%20the%20Chairs%20letter%20of%2018%20November%202021%20regarding%20se.pdf

20 OEP Report Confirms Concerns Over Chemicals - Afonydd Cymru

Sewage and water waste

3.2.8 Wastewater is collected in sewers and passed to wastewater treatment works where it is treated to remove solids, toxic chemicals and microbes before being discharged into the environment, either a watercourse or the sea. The wastewater treatment works significantly improve the quality of the water that is discharged, compared to raw sewage, however, the effluent contains some nutrients that accumulate in the environment and may lead to poor water quality, especially nitrogen and phosphorus. The effluent also contains other substances, for instance pharmaceuticals, microplastics, heavy metals and PFAs.

3.2.9 Investment in wastewater infrastructure is managed through Drainage and Wastewater Management Plans, which sewerage undertakers prepare every five years. These plans assess the needs for wastewater infrastructure at three scales, catchment, regional and company level, for a minimum of 25 years. They assess population growth and climate change and the environmental impacts of wastewater to set out investment plans.

3.2.10 Wastewater treatment works have been and continue to be upgraded to improve the removal of nutrients and improve water quality in the receiving waterbody. Substances that are not specifically regulated, including microplastics and PFAS, are not required to be removed by water companies from wastewater. Current technologies are unlikely to be effective at removing many of these substances, and they will be more effectively managed at source.

3.2.11 More recently, there has been more on the contribution from **storm overflows**, where untreated sewage is discharged into watercourses to prevent the sewer flooding elsewhere. There are over 2,500 storm overflows in Wales[21]and stakeholder feedback highlights that many serve relatively small catchments and small populations in rural areas. Spills from storm overflows are often caused by excess surface water, where the sewer also collects runoff from roofs and streets, in heavy rainfall this can cause the sewer to overflow. Options to reduce storm overflows include storing the wastewater to treat it later, or to remove or attenuate the surface water, however this requires an alternative way to manage the surface water, which can be complex in existing urban settings.

Urban pollution

3.2.12 As can be seen in Figure 3.2, urban runoff is one of the largest causes of waterbodies not achieving good ecological status. Urban pollution is generally complex, and the pollution arises from a mixture of **misconnections** (where foul drainage is connected to surface water sewers) that include foul water, **private sewer discharges** (for example from septic tanks) that include nutrients, and **surface water** discharges, including highway drainage, that include dust/grit, oils, detergents, metals, road salt, bacteria from animal faeces and other particulates. There are currently no requirements to treat, manage or monitor runoff from roads and surface water sewers.

3.2.13 The data on private treatment works (for example septic tanks) in Wales is likely to be an underestimate of the real number. Registration is now required for private treatment works in Wales[22], this requirement

[21] Report on storm overflows in Wales, Senedd, 2022
[22] https://naturalresources.wales/permits-and-permissions/water-discharges-and-septic-tanks/septic-tanks-and-private-sewage-systems/register-your-septic-tank-or-small-sewage-treatment-plant/?lang=en

was introduced in 2020, and it is likely that **many private treatment works are not registered**. This means that there is no way to oversee them or ensure they are working properly and well maintained. Many private treatments works owners do not always know that they require maintenance. This is likely to be a significant source of pollution in Wales, but the exact scale is unknown.

3.2.14 **Road runoff** contains pollution from tyre particles, fuel spills and other vehicle fluids, road surface fragments, sediment and herbicides. These contain heavy metals and toxic chemicals such as polyaromatic hydrocarbons (PAHs) which have shown to be carcinogenic and hormone disrupting to aquatic life. Highways outfalls do not require a permit as they are considered low risk. If there is a risk of contamination, they have to follow pollution prevention guidelines[23] (please note this is Environment Agency guidance that is used by NRW and is currently archived by the EA). However, these only consider certain forms of contamination, primarily oil, and focus on prevention of pollution from significant events, such as spills, and not general the accumulation of pollution.

3.2.15 Guidance for the design of new/improved highway or active travel infrastructure includes a risk assessment for the potential harm runoff may cause[24]. Treatment process for road drainage is based on the type of road, not an assessment of the runoff or specific pollutants, as with the design of wastewater treatment works. There is no requirement to monitor the performance of these systems or to undertake maintenance to ensure that water quality outcomes are maintained. There is also no requirement to retrofit treatment to older roads that were constructed before this guidance was introduced.

3.2.16 Schedule 3 of the Flood and Water Management Act has been commenced in Wales (in England, this schedule has not been commenced, though there have been several initiatives to do so). This requires that all new developments include Sustainable Drainage Systems[25] (SuDS) and that these systems are adopted by the local authority to maintain in perpetuity. The primary driver behind this is to ensure that SuDS are utilised to reduce peak flows from new developments to sustainably manage flood risk and to ensure that these systems have long-term maintenance, as water companies will not adopt most SuDS due to rules around what constitutes a sewer.

3.2.17 The guidance for SuDS in Wales[26] also requires that they also perform a water quality function, utilising natural processes helps to remove pollutants. Similar to road drainage requirements, treatment processes in SuDS guidance are based on the development type and there is no monitoring of their performance or maintenance to maintain water quality performance. Funding for maintenance of SuDS is provided by a commuted sum from the developer to the adopting body to cover 30 years of maintenance. This funding is not ring-fenced.

3.2.18 Generally, there is a **lack of data on urban runoff**. Very few outfalls are regularly monitored, and the impacts are not well understood. This is likely to be a significant source of many pollutants, including micro-plastics and hydrocarbons, as well as nutrients from private wastewater treatment. Without data it is difficult to assess the scale of the problems, what might be needed to manage it, where the priorities lie and whether measures that are being implemented are having a beneficial effect.

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[23] [Withdrawn] Pollution prevention guidance (PPG) - GOV.UK
[24] Design Manual for Roads and Bridges: CG 501 Design of highway drainage systems, National Highways, 2022
[25] Sustainable drainage
[26] statutory-national-standards-for-sustainable-drainage-systems.pdf

Rural diffuse pollution

3.2.19 Pollution from agricultural and forestry land is recognised as a significant source of pollution in Wales. There has been a general trend of reduced nutrient application to farmland in the UK over the last 20 years[27], which has reduced the impact of agriculture on water quality. However, some catchments have seen increased intensification of farming, for instance high densities of poultry farming, that have reversed this trend.

3.2.20 Agricultural pollution is considered to be the main factor in the poor quality of the rivers Wye, Lugg and Usk, which have attracted media attention[28] recently due to their poor condition. The cause of poor water quality in the section of the upper Wye located in Wales, is estimated to be predominantly from agricultural runoff, accounting for 72% of the phosphorus in the river, wastewater is responsible for 23% of the phosphorus[29]. This highlights the critical need to better manage agriculture as a source of pollution. (It should be noted that there are concerns that the approach used to estimate this apportionment has not been rigorously tested for agricultural purposes.)

3.2.21 The Welsh Government introduced the Control of Agricultural Pollution Regulations (2021) to reduce the impact of runoff from agricultural land by controlling how nutrients and slurry is stored and applied on farms. This requires farms to have nutrient management plans, limits the application of nutrients to agricultural land and increases slurry storage requirements that will likely reduce pollution incidents from farms if it is effectively implemented. However, many farms face significant costs for implementing the requirements for the regulations, particularly for improved slurry storage. Nature based measures to manage the impacts from agricultural practices, for instance buffer strips to control runoff and filter nutrients, are hampered by regulations in Wales.

3.2.22 This approach does not assess the **cumulative impact of agricultural practices on a waterbody** and does not set specific targets or outcomes for agricultural land from a water quality perspective. For some waterbodies these regulations may be sufficient to reduce the impact of agricultural runoff, if they are effectively implemented. However, there may still be a cumulative effect on some waterbodies where there is a high density of farming in the catchment, that this approach will not prevent.

Physical modifications

3.2.23 Physical modifications are changes made to a waterbody's shape or course that significantly alter characteristics and prevent the waterbody from reaching its full ecological potential. They include channel diversions, dredging, and channelisation (straightening a watercourse) that alter a river's shape and flow dynamics, and the construction of dams, weirs, culverts, and bridges that present barriers to species migration and sunlight. These features change the physical status of the river, for instance they may shade it and cut out natural light, they may create steep banks instead of a range of water depths, they may increase the velocity of water, that may not suit some species, and they may create a barrier to migration up and down the river for species.

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[27] https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2023/chapter-11-agri-environment

[28] River Wye: Welsh Water sewage dumps added to pollution lawsuit - BBC News

[29] Phosphorus Source Apportionment Summary: Updating the SAGIS Upper Wye Model, DCWW, 2023

3.2.24 Physical modifications are generally a legacy issue of previous activities to manage waterbodies to suit development around them and control water. The weirs, dams, culverts etc that cause poor ecological status were generally constructed in previous generations. Some of these features may still be utilised in new developments, however, the impacts on the waterbody are considered when proposing new structures.

3.3 Nutrient neutrality

3.3.1 Nutrient neutrality is an example of water quality issues having a broader impact. Nutrient neutrality affects catchments where there is a designated natural habitat of international importance that relies on water, typically a river, wetland or estuary that supports internationally important species, and the site is failing due to the poor water quality, especially high levels of the nutrients' nitrogen and phosphorus. Sites that have international designations are covered by the Conservation of Species and Habitats Regulations 2017, which requires that no plan or project can be approved that might prevent the site from recovering. This includes the approval of housing developments where the additional wastewater that would be discharged into the catchment would increase nutrients that may harm the site.

3.3.2 NRW has provided advice on nutrient neutrality, as a way to continue to deliver housing in these catchments, where an alternative source of nutrients in the catchment can be offset against the additional nutrients the housing would introduce. This **requires the developer to fund** the additional activities, which increases the costs of the development and the price of the houses. The sources of nutrients to offset are usually from agricultural activities, this typically involves paying farmers to change or even stop certain agricultural activities, for example to cease farming livestock in an area, or to find ways to reduce the nutrient better on agricultural land, for example managing slurry better and installing buffer strips to filter nutrients from runoff.

3.3.3 Traditionally, the wastewater impacts from developments are managed by the sewage undertaker through sewage and wastewater treatment systems. The wastewater treatment works is designed to meet permit requirements that are set so that the discharge does not have a negative effect on the receiving waterbody. In the case of nutrient neutrality, this is not happening and **the wastewater treatment works cannot be relied on to manage the full environmental impact** of wastewater from the new development. Developers are now required to provide some of this.

3.3.4 There are eight nutrient neutrality catchments in Wales[30]. Nutrient neutrality will be required for new housing in these catchments until the designated site is in favourable condition, which will mean that the nutrient levels are sustainable.

3.3.5 The catchments in Wales have formed Nutrient Management Boards (NMBs) and these are developing Nutrient Management Plans (NMPs) that identify measures to manage nutrients within the catchment to facilitate development and help the sites recover. Developers will be able to fund measures that offset the nutrients from their developments (though this will not lead to an overall reduction in nutrients, as the development will replace these nutrients through wastewater

[30] Housing targets in Powys falling short as phosphates issue delays development | brecon-radnor.co.ukl

discharges). However, there is no funding for measures that help the site recover and there are currently no timeframes for this.

3.3.6 Nutrient Management Plans are generally reliant on the use of nature-based solutions to remove nutrient from runoff before they reach the waterbody. However, there are **barriers to the implementation of nature-based solutions** in Wales for the purposes of improving water quality. NRW's position on this is that they cannot be used to remove nutrients, they can only be used to manage flow rates. This contrasts with the situation in England, where farmers can receive payments for land management schemes for these purposes. Additionally, there is currently no funding for measures that help the sites to recover – whilst measures that offset nutrients from new developments may be funded by developers, these will maintain the existing balance of nutrients, and they will not reduce the nutrients and support the sites to recover.

3.3.7 Enabling development in nutrient neutrality areas requires a return to the wastewater system managing all of the water quality impacts of the sewage from new development. Alongside Nutrient Management Plans, DCWW is planning to invest approximately £1.4bn in a phosphorus investment plan by 2032, that will remove 90% of the phosphorus load from their wastewater treatment works discharging to failing SAC rivers.[31]

3.3.8 In addition to this, a **catchment-based approach is needed** to ensure that nutrients are managed across the catchment, and all needs can be accounted for. This should include understanding the sources of nutrients so that the requirements for nutrient management are fairly apportioned to the sectors and sources that contribute them to the catchment. The need for a catchment approach was also recognised in NICW's recent report on building resilience to flooding in Wales[32]

3.3.9 Catchments that do not have designated sites of international importance do not benefit from Nutrient Management Plans and there is less incentive to reduce nutrients entering the waterbodies. The ecology of these waterbodies would also benefit from better nutrient management, despite not having an international designation.

[31] Our Manifesto for Rivers in Wales, Dwr Cymru Welsh Water, 2023
[32] Building Resilience to Flooding in Wales by 2050, NICW, 2024.

4 Current State of Play – Water Resources

4.1.1 The supply of drinking water (and the security of that supply) relies on the availability of water in the environment and the infrastructure to abstract, treat, store and deliver it to customers. Wales has plenty of water and is generally regarded as a wet country. However, the natural environment of Wales has developed to rely on plentiful water. There is inevitably a limit to the water that can be abstracted before there is a detrimental impact on the natural environment.

4.1.2 Dŵr Cymru Welsh Water (DCWW) and Hafren Dyfrdwy (HD) supplied 927 million litres per day (Ml/d) in 2023, 877 Ml/d and 50 Ml/d respectively[33]. In addition to this, a significant volume of water from Wales is transferred to England. DCWW operates a series of reservoirs in the Elan Valley that can export more than 320 Ml/d[34] via the Elan Aqueduct[35] for Severn Trent Water to supply its customers in Birmingham. United Utilities can take up to 205Ml/d from Lake Vyrnwy and the River Dee to supply customers in Liverpool, Cheshire, and Manchester[36].There are also other water users. The power industry, agriculture and industrial users also abstract water, and there are 14,904 registered private water supplies in Wales[37].

4.1.3 The water companies in Wales have Water Resource Management Plans that set out how they will provide drinking water for a minimum of 25 years. These plans are currently updated every 5 years. The Water Resource Management Plans estimate future water needs based on changes in water availability, projecting the population growth, additional needs for water, and future changes in water consumption, for instance from water metering. Water companies consider a range of options to manage increasing water needs, including encouraging users to use less to finding alternative sources of water. The water companies in Wales plans' show that they anticipate being able to balance future demands from a growing population and decreasing rainfall in summers in future through a combination of:

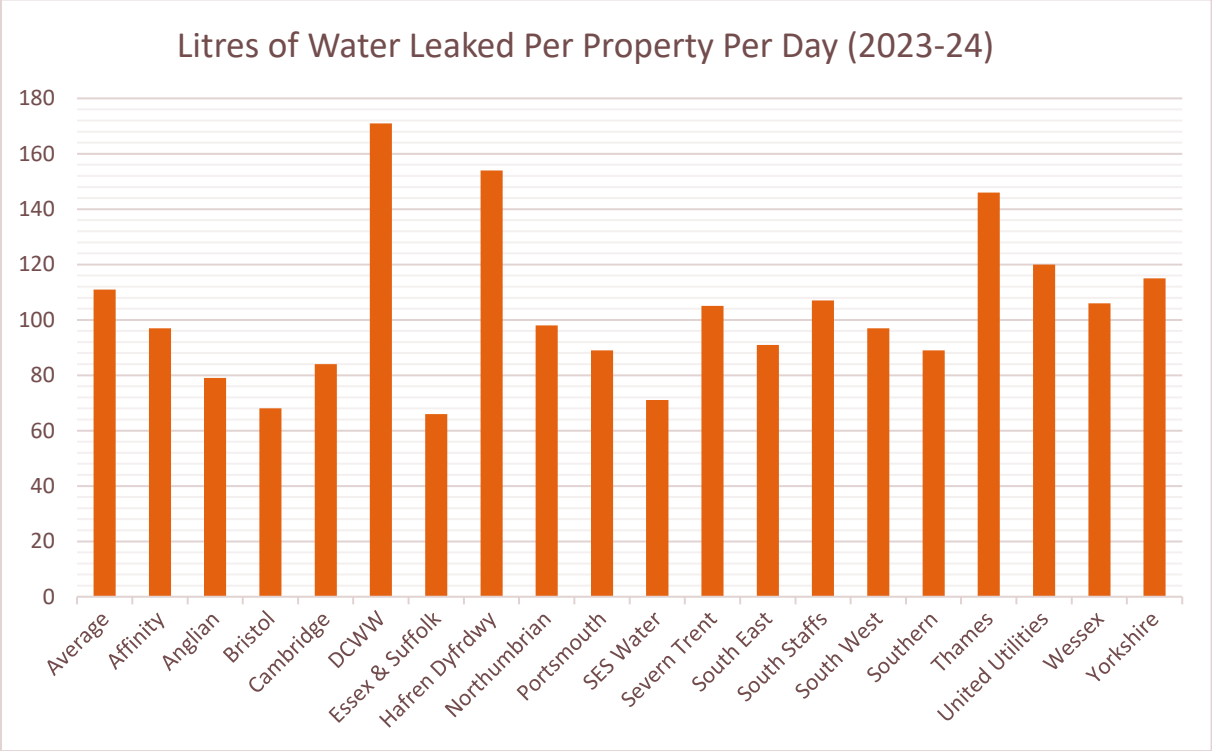
- Reducing leakage – both DCWW and HD aim for a 50% reduction in leakage by 2050
- Increased water metering to reduce customer water consumption and increase customer leakage detections and remediation; and
- Improving non-household water efficiency – both DCWW and HD aim for 110 litres per person per day by 2050.

4.1.4 There is plenty of scope to reduce the water needed for supply through these plans, as Wales has the highest leakage per customer in the UK and the lowest levels of water meter coverage. Leakage rates are illustrated in Figure 4.1 below. DCWW report that the high rates of leakage they experience reflect the rural nature of their supply zones and the relatively high pipe length per customer

[33] Summary of the chief inspectors report for drinking water in Wales, DWI, 2024
[34] Elan Valley Trust Strategic Plan 2019-2030, Elan Valley Trust, 2019
[35] https://www.ice.org.uk/what-is-civil-engineering/what-do-civil-engineers-do/elan-valley-water-supply
[36] Strategic Regional Water Resource Solutions North West Transfer: Detailed Feasibility and Concept Design, Untied Utilities, 2022
[37] https://www.dwi.gov.uk/what-we-do/annual-report/drinking-water-2024/drinking-water-2024-private-water-supplies-in-wales/

compared to the rest of the UK For example, in Wales there are approximately 9.25 m of water main for every customer, compared to approximately 5.47 m of water main per customer in England[38],.

Figure 4.1 - Water leakage rates per Property by Water Company (this graph shows the average leakage per property per day for the latest three years compared to the number of properties in the latest year). Source: Discover Water[39]



4.1.5 Water Resource Management Plans are only required to be undertaken by Water Companies and consider the water the water company is responsible for supplying. Other water users do not have to plan for water use and there is currently no strategic process to consider water demand from water users not supplied by water companies, including private water supplies and the agriculture, energy and industrial sectors. This has not caused significant issues in Wales, as there is generally sufficient water, however, we are now facing a period of potentially unprecedented change for the water environment with new and increasing pressures on water resources that need to be given consideration in future planning to ensure that all users can access water and to understand where there may be competing needs. Pressures on water resources include:

- Increased demand from agriculture to address the impacts of long, dry summers
- Increased demand for water from new technologies, in particular data centres and hydrogen power have significant needs for clean water and
- Longer- term, increased demand for water elsewhere in the UK to be shared via water transfers.

[38] Drinking Water 2024, DWI, 2025
[39] https://www.discoverwater.co.uk/leaking-pipes

4.1.6 The water provided by water companies must be of drinking water quality. In most homes this water is used for all purposes, including car washing, toilet flushing, and garden watering (although some homes may use water butts in the garden). These uses do not require water of drinking water standards.

4.1.7 Rainwater harvesting and greywater recycling offer opportunities to reduce the water extracted from the environment by collecting it or reusing it locally. For greywater recycling this requires a bespoke wastewater treatment works to treat the wastewater to a higher standard than normal wastewater effluent (though not to full drinking water standards), which is usually best achieved in new developments. Rainwater recycling can be done at the property level. However it is more efficient at the development scale. Both require a second supply system to deliver this water where it is needed and for purposes that are safe for use in the home, as it is not fit for consumption. As a consequence, these systems are easier to install in new developments, when the utilities and plumbing are being installed, however the additional costs mean that they will only be utilised where there is a driver for developers to implement them, for instance building regulation requirements. These systems are not easily retrofitted, and the costs are unlikely to be offset by any savings, so they are unlikely to be customer led, but they do offer water resource management benefits.

4.1.8 Drinking water standards[40] set limits for a range of substances in drinking water, including micro-organisms, chemicals such as nitrate and pesticides, and metals such as lead and copper. Water companies test the water they supply throughout the water treatment process and manage exceedance of these standards through various means, which include blending with other water with lower concentrations and filtration. There are currently no statutory standards for PFAS in drinking water in the UK[41]. The DWI has issued guidance to water companies to monitor PFAS and report on the concentrations found and they are expected to manage water supplies if PFAS levels reach 0.1 micro gram per litre or more. As well as strong regulation, going forward it will be important to develop new technologies and solutions to removing these substances efficiently and effectively.

4.1.9 Wales benefits from a legacy of reservoirs to support water supply and balance the availability of water in the winter through the summer. This infrastructure provides significant benefits for water security. There are currently no plans to increase the number of reservoirs in Wales, as there is no forecast need for any, in contrast to England, where reservoirs are needed to manage increasing demand and support restoring sustainable abstractions.

4.1.10 There are treatment works, reservoirs and pipe networks that require regular maintenance and capital replacement The infrastructure that Wales relies on to provide drinking water is aging many of the reservoirs in Wales are over 100 years old. The rural nature of Wales means that there are many small treatment works and supply networks that serve small remote areas, which increases the cost of maintenance. The costs of maintenance and infrastructure investment are included in Water Company planning and price setting.

[40] https://www.dwi.gov.uk/drinking-water-standards-and-regulations/
[41] https://www.dwi.gov.uk/pfas-and-forever-chemicals/

5 Future Ambition

5.1.1 Aspirations for the future of water in Wales are captured across a range of documents and publications, including the Welsh Government's strategy and water company plans.

5.1.2 Based on the findings of this study and the issues raised by stakeholders as part of this research the following are suggested key ambitions for water quality and water resources in Wales.

5.1.3 Overall, it is suggested that the focus should be on ensuring a water environment that provides water for users sustainably whilst supporting a thriving natural environment. The following will be key to this:

- Water needs to be seen as a national asset/ resource, with everyone taking more responsibility for its use and quality. This should be reflected in reduced leakage and consumption, reduced pollution, and improved water quality, with all parties managing this resource responsibly.
- Taking a catchment-based approach to water management. Considering the cumulative impacts of water-based decisions at the catchment level.
- Understanding the full value of water in Wales, in a world where freshwater will become more precious.
- Assessing the nation's entire water resources needs, taking account of all sectors and the impacts of climate change to plan for future water resources holistically and a framework for determining how to manage competing needs.
- A more holistic approach to water management. Currently improvements are primarily focussed on the water companies. Whilst these are necessary and must be delivered, agricultural runoff and urban runoff also represent significant sources of poor water quality and should be further addressed. Similarly, customers and water users have a role to play in reducing water consumption.
- A sustainable means to fund water quality improvements for non-water company sources needs to be found and a clear vision for what they should be achieving in respect of water quality.
- A clear understanding is required of what investment is needed to maintain the assets the water supply system relies on and how to build on this to meet future needs.
- Nature-based solutions should be seen as standard features of the landscape.

6 Future Challenges – Short Term

6.1.1 This section considers the possible short-term challenges for the sector. It considers the likely developments across the industry in the next 10-15 years and comments on the possible increasing risks. In line with the brief for this study this is not intended to be exhaustive but instead to provide future Commissioners with an indication of likely possible trends or issues.

6.2 Catchment Based Decision Making

6.2.1 Challenges that will be faced in water quality and water resources are discussed in following section, however, it is clear that for both of these areas **joined-up catchment based decision making** is required that considers the needs of a catchment as a whole and covers all activities that affect the health of the catchment, including discharges, abstractions, runoff, developments, management of sensitive sites/species and any other activities that affect the health of waterbodies.

6.2.2 Water companies are undertaking activities to improve the environment in the current investment period, including on reducing the number of storm overflows, reviewing the long-term sustainability of water abstractions, and improving the sustainability. A catchment-based approach would ensure that these activities consider all impacts across the catchment.

6.2.3 Assessing impacts and priorities at a catchment level would help to ensure that investment is directed that the most beneficial issues for the catchment, for instance there is currently significant funding allocated to resolving storm overflows, however, in some catchments there may be more pressing issues to address. A **catchment-based approach** would help to target funding at the measures that will improve the environment the most, ensuring funding is spent most effectively.

6.2.4 Developing a **framework that assesses all the issues, pressures and needs cumulatively across catchments**, including those on flood risk, water quality, water resources and biodiversity, and considers how to manage these collectively would have many benefits. Collaboration between all the stakeholders in the catchment would allow collective decision making and the identification of funding and delivery. For example, a catchment-based approach would help to incentivise nature-based solutions that can help to manage many catchment issues. Nature-based solutions can slow water, helping to filter pollutants, prevent flooding downstream and improve water availability throughout the year. A catchment-based approach would need to be undertaken in the context of regional and strategic planning, especially where water resources are concerned, as catchments may supply water to other areas, and to ensure the costs are fair and proportionate.

6.2.5 Food production in Wales also affects both water quality and water resources. Runoff from farmland and livestock production introduces pollutants to waterbodies. In some catchments it has been seen that farming is the most significant source of some nutrients (see section 3.2). Demand for water for agriculture is likely to increase as climate change alters the environment and the marketplace for food. Other sectors will likely impact water, for instance, energy and communications (especially in the form of data centres). **More planning for the growth of non-household water needs** is needed, especially the agricultural sector, to allow for informed decision making.

6.3 Water Quality

6.3.1 Over the short term, the water companies will invest in the reduction of storm overflows and upgrading wastewater treatment works that will likely lead to the reduction of nutrients and pollutants entering some watercourses. As this period progresses, the reduction of storm overflows is likely to involve the use of SuDS to manage surface water instead of it entering the sewer, making the sewer more resilient to heavy rainstorms. Schedule 3 of the Flood and Water Management Act includes provision for SuDS that are retrofitted to be adopted by the local authority, and this is likely to be employed to ensure these features are owned in perpetuity.

6.3.2 Nutrient management plans in nutrient neutrality areas will also likely lead to some improvements in the catchments they are applied in. Implementation of the Control of Agricultural Pollution Regulations will also reduce the nutrient loads for agricultural land.

6.3.3 However, there may be an increasing need for food production to support a growing UK population and pressure for agricultural production. There may be an increase in global competition for food and the trend for import tariffs may continue, which may drive more domestic production of food Balancing an increased drive for food production and keeping the price of food affordable with maintaining and improving environmental stewardship in warmer and dryer summers may prove a challenge.

6.3.4 Whilst regulations may reduce agricultural runoff in the short term, in the medium and longer term there is a risk that **nutrient levels from agricultural runoff could increase**. If more land is brought into production in catchments or existing agricultural activities are changed to ones that discharge higher levels of nutrients, albeit within regulatory limits, total nutrient loads will increase. Sustainably managing nutrients at the catchment level will be necessary, not only managing the input of nutrients. To ensure this, farmers need properly resourced, long-term and practical incentives that support action at the farm and catchment scale and a framework that sets out what the catchment priorities are.

6.3.5 **Urban runoff is likely to increase** proportionately as the cause of poor water quality (particularly with climate change leading to more and worse flooding), there are currently very few measures proposed to manage it, and there is no clear ownership with roles split between several parties. Without regulation, ownership of the issues and funding for their management will need to be identified.

6.3.6 SuDS will be implemented in this period, on new developments and retrofitted to the existing environment to reduce surface water entering combined sewers. These will likely be adopted by the local authority under provisions within Schedule 3 of the Flood and Water Management Act. At a small scale this may be sustainable, however **the scale of SuDS delivery that is likely to be required to improve storm overflows, may represent an increasing burden on local authorities**. The maintenance for SuDS adopted under Schedule 3 is funded by commuted sums, a single payment that covers the maintenance costs for a fixed period, typically 30 years, once this runs out the burden of maintenance falls on general taxation. Prior to utilising SuDS, the surface water would have been managed (albeit not necessarily as sustainably as using SuDS) through public sewers that are maintained through regular funding from water customer bills. The Welsh

Government should consider if this transfer of the burden for surface water management in urban areas to the taxpayer is appropriate or if an alternative funding/ownership model needs to be developed.

6.3.7 The end of this period and the early part of the following period is likely to be key for the improvement of water quality. The water companies' current 25-year plans (they will have been updated each five-years), which set out a step change in investment in water quality improvements compared to previous plans will be nearing their full delivery, and we should start to see more improvements in waterbody health. If these plans are not delivered, or subsequent versions of the plans do not continue with the proposed investments in water quality improvements, waterbodies may deteriorate significantly with the potential loss of significant habitats. This would threaten Wales' reputation for global responsibility and significantly harm the natural environment of Wales.

6.4 Water Resources

6.4.1 In the short term, water companies' investment in the water supply network to lower leakage and install water meters in customers' homes, should start to lower domestic water consumption.

6.4.2 New water users are likely to start to increase in Wales in this period, particularly data centres and hydrogen power. This is likely to lead to increased demands for clean water beyond that in current water resource management plans.

6.4.3 Private water supplies may become unreliable in future and private water supply users may wish to have a mains water connection. There are approximately 14,900 private water supplies in Wales, and there may be more unregistered private supplies. Understanding the full scale of private supplies on water resources planning and developing scenarios for transfer to mains supply will be necessary.

6.4.4 Improving our understanding of the future requirements for water across all sectors and how competing needs will be prioritised during periods of water stress will become increasingly important. New and expanding non-household water users may put unforeseen pressure on water resources, especially if the cost of water is a small portion of the running costs. Understanding the growth of non-household water requirements, both from industry and agriculture/food production due to investment and the impacts of climate change, is an essential step. These new demands raise a number of challenges and questions including how water companies will be notified or engaged such that they can plan for these changes, how water of sufficient quality and quality can be provided, how to ensure water is used efficiently and who pays for any infrastructure required. Water requirements of other sectors, such as agriculture, is outside the normal scope of water resource management plans. Regional water resource planning in England considers non-household uses and their future demand, however there is currently no equivalent in Wales. Whilst regional water resource planning in England is in its infancy and there is only limited progress on assessing these non-water company pressures, the regional groups are beginning to assess these issues, and they provide a forum to do this on a regional scale.

6.4.5 **Additional water saving may need to be adopted**. Rainwater harvesting and greywater recycling offer opportunities to reduce the demand on public water supply. These are particularly suited to

non-household developments, where toilet flushing is a significant portion of the water use. Incentivizing farmers, developers and private building operators to utilise these approaches may be necessary. Implementing water efficiency labelling, similar to energy consumption labels, on goods that use water, such as washing machines and dishwashers, will also help to reduce water consumption in the home. This was planned for 2024 but was paused for the general election and has not yet been implemented.

6.4.6 Investment in this period is vital to **maintain aging assets and to improve infrastructure**. This will come at a cost. Maintaining and investing in secure water supplies will be essential for the sustainability of Wales. Balancing the burden of these costs will be key. Securing funding in a way that is regarded as fair and does not have negative consequences on Welsh prosperity may be a challenge. Similarly, it will become increasingly important that Wales can **establish principles about how water is shared**, especially when it is scarce, so that access to water for priority users are safeguarded. This may need to include water that is exported.

7 Future Challenges – Medium to Long Term

7.1.1 This section considers the likely medium (15-50 years) and longer term (50-80 years) challenges and issues for water quality and water resources in Wales which the Welsh Government should seek to plan for in order to address. These timelines reflect NICWs long term remit and the brief for this study, and it is noted that they don't necessarily align with water company planning horizons.

7.2 Water Quality

7.2.1 In the medium to longer term some improvements are expected as a result of water company investment, Nutrient Management Plans and implementation of the Control of Agricultural Pollution Regulations. However, urban runoff and private wastewater treatment systems will continue to negatively affect water quality and impact nature. Chemical pollution and the accumulation of ubiquitous substances will increase and may become a significant source of pollution. There is likely to be more focus on these issues as environmental non-government organisations, and the public will expect to see improvement.

7.2.2 Without regulation **chemical pollution is likely to become an increasingly significant cause of poor water quality**. At present there is only limited monitoring of chemical pollution in Wales and limited understanding of the sources and causes of chemicals. Ideally, chemicals should be managed at source, particularly from industrial chemicals, for instance PFAS. However, many chemicals that cause pollution come from a wide range of uses are pollution occurs at the point of use, for instance tyre particles and hydrocarbons. Monitoring is required to understand the primary sources of chemicals and how best to prevent them. For many chemicals, intercepting and filtering runoff from urban areas will prevent them entering waterbodies. However, this will require investment in new drainage systems and sustainable drainage, as traditional surface water sewers do not collect these chemicals.

7.2.3 Some impacts of urban runoff and chemical may be mitigated by the use of SuDS to manage surface water to reduce combined storm overflows. These gains are likely to be small, as the implementation of SuDS is likely to be limited and where it is used to manage existing surface water flows (most will be deployed on new developments). These will not mitigate the impacts from private wastewater treatment systems discharges and will only intercept some chemicals discharged into the environment.

7.2.4 During this period, the initial commuted sum that covers the maintenance of SuDS adopted by local authorities will run out. **SuDS are likely to deteriorate as maintenance becomes a burden on core local authority funding**. Many SuDS will be in the public realm and there may be questions about the appearance of these features and whether they are performing a useful function. Where they are managing highway runoff or runoff from other areas with a relatively high concentration of pollutants, there are also questions about whether they are providing a water quality benefit compared to the previous arrangement, where the runoff was collected by a combined sewer and conveyed to a treatment works. There is a risk that the accumulation of pollutants in SuDS features may pose a risk to groundwater sources or that these may be flushed out during heavy rainfall into receiving water bodies.

7.2.5 If SuDS are to be used to manage water quality, they will need to be designed for this purpose and their performance may need to be monitored, especially where the catchment is sensitive and the pollution load may be significant. The maintenance regime will need to account for water quality, to ensure the SuDS maintain their performance. This will need to include how waste from SuDS maintenance is managed to prevent the pollutants they collect from ending up in the waterbodies through poor management. Budgets for maintenance will need to include any additional costs.

7.2.6 In this period, it is likely that population growth in the UK and increasing international competition for food will promote more domestic food production. This may also likely to drive increase intensification of food production which risks increasing the nutrient loads further from additional land being brought into production or changes to more intensive farming that increase nutrients whilst remaining within regulatory limits. There are calls for farmers to implement **nature-based solutions to manage runoff**, however without incentives and removal of regulatory barriers, farmers will find it difficult to deliver them.

7.3 Water Resources

7.3.1 Climate change impacts are likely to increase during this period, leading to more dry summers and there is likely to be **more pressure on the provision of fresh water**. This will be particularly acute in the southern areas of Wales where the water resource zones are more stressed. Increasingly over time it will be increasingly more important to view water as a precious commodity.

7.3.2 Water company investment in leakage reduction and customer meters will likely have reduced the water that is needed to supply customers. However, there is a risk that the forecast reductions for these investments are not fully realised, as they rely on customer behaviour change and customers fixing more household leaks (for instance dripping taps, leaking toilets and broken pipes). Smart meters will help customers to recognise that they have leaks, however, some leaks are often hard to identify, and homeowners do not always know that they are responsible for all leaks[42]. In addition, whilst climate change is included in demand forecasting, it **may drive additional domestic water consumption** over this long-term beyond current planning estimates. Hot weather may lead to longer and more frequent showers, more garden watering and other outdoor uses (for instance filling swimming/paddling pools), longer and hotter summers may increase this beyond current forecasts. Water labelling, if introduced should have helped to embed behaviour change.

7.3.3 Similarly, **climate change may increase the rate of leakage for water company assets**. Drier weather will lead to more soil shrinkage that causes pipes and reservoirs to leak. The planned investment in leakage reduction may not be sufficient to keep up with this and deliver the forecast water company leakage reductions. Water companies will need to continue to invest in and develop innovative leakage detection and repair methods, to manage these additional costs.

7.3.4 Growth of commercial water uses will increase. **Agricultural users will need more water for livestock and crops,** and water demands from industry will grow. This will put pressure on the environment and the water available for abstraction.

[42] www.ofwat.gov.uk/wp-content/uploads/2018/05/The-long-term-potential-for-deep-reductions-in-household-water-demand-report-by-Artesia-Consulting.pdf

7.3.5 An option raised by stakeholders to manage the potential future shortage of water in some water resources zones is to develop a water ring main in Wales that distributes water around the country, allowing areas where there is available water to supply areas that are experiencing shortages. This approach would help to balance water across the country. However, it will be at a considerable upfront cost, and the running costs will also be significant, as the mountainous nature of the Wales will mean that the energy required for pumping will be significant and have a significant carbon footprint. Any decision to invest in this approach would need to balance the costs against other ways to manage water, including reducing losses from pipe leakage and reducing demand further.

7.3.6 Accurate forecasting of future water demand and resources will help to inform investment decisions in assets and maintenance. Droughts are still likely and may become more likely in future. Developing a protocol to **manage competing needs for water and prioritising supply** accordingly may help to manage future resources when they are scarce. This may be particularly important to manage the competing needs of households and non-household water users and potentially competing needs between non-household users, for instance agriculture and industry.

7.3.7 Poor water quality may affect the future **provision of drinking water**. If concentrations of controlled substances exceed drinking water standards they must be removed. Removing nitrates from water, for instance, is expensive[43], high concentrations of nitrate in drinking water sources potentially presents a significant future cost to the provision of safe drinking water. Similarly, increased concentrations of other substances present a risk to drinking water. The control of agricultural pollution regulations will hopefully keep nitrate levels below the drinking water limit (though there is a risk with this approach that concentrations in some catchments or sub-catchments could increase, as activities in the catchment change to ones that discharge more nutrients than they currently do, and whilst all land might be compliant with the regulations the cumulative impact leads to higher concentrations). There is also a future risk that other substances, for instance heavy metals, increase from urban runoff or that new substances are added to the list of controlled substances, for instance PFAS, which would lead to increased costs of drinking water treatment. Monitoring and understanding the concentration and affected areas for chemicals like PFAS is essential for understanding the future risks to drinking water supply.

7.3.8 Embracing **nature-based solutions** and a general restoration of nature across all areas, rural and urban, offers the opportunity to resolve many of the issues faced in the water sector, particularly water quality issues in Wales. Natural systems provide environmental services at a lower cost than engineered solutions to manage man-made impacts on the environment, including filtering pollution, storing water and improving air quality, as well as providing many other benefits, including habitat and amenity space. Embracing the potential for nature-based solutions and natural systems, from regenerative farming to greening streets, has the potential to make significant improvements to water and the wider environment and should be embraced in this period.

7.3.9 The space required to implement nature-based solutions is a barrier to their uptake. Land take to manage agricultural runoff may impact productivity and in urban areas space is at a premium and there are many constraints. Additionally, if nature-based solutions are expected to deliver specific

43 https://assets.publishing.service.gov.uk/media/679a6bbea4f9eb2b483f7f79/Nitrates_challenges_for_the_water_environment.odt

outcomes or expectations, their ownership and ongoing maintenance will be key, for which there may be need for regulation and oversight to ensure these outcomes are being met consistently. Developing a fair funding mechanism and a way to ensure long-term outcomes for nature-based solutions will be essential.

7.3.10 Nature-based solutions will also need to be planned, to ensure there are utilised to manage the most pressing challenges and maximise limited resources, in land and funding, available to deliver them. **Catchment planning** provides away to manage the array of challenges in the water sector. Catchment plans will need to account for all water users, current and future demand, water quality, climate change and its impacts on the whole water environment, and how growth and development, and the holistic impacts of any interventions to manage these.

7.3.11 Water resources are likely to become more scarce in England during this period. England is already importing water from Wales and is currently assessing the development of further strategic water resources schemes to improve water availability, including internal water transfers and new reservoirs44. There are currently no plans to increase the water that England imports from Wales, however, this may be explored in future. Should there be a need to **export more water to England**, any scheme should not put water resources in Wales under any additional pressure, and the needs of Welsh water users should be considered, particularly in water scarce periods.

7.3.12 Globally, freshwater is in decline[45], this is, in part, driven by **over abstraction of groundwater**, which many regions rely on. If this trend continues the water in Wales, which is reliant on rainfall, may become a rare and valuable commodity. This natural advantage coupled with the infrastructure that is already in place to manage water may provide Wales with an opportunity in future. Making the most of this potential global advantage may provide an opportunity to invest in water infrastructure and the water environment, however, this will need to be balanced with traditional and domestic water needs.

[44] https://www.ofwat.gov.uk/rapid-action-on-major-water-infrastructure-is-securing-supply-for-future-generations/

[45] Unprecedented continental drying, shrinking freshwater availability, and increasing land contributions to sea level rise; Chandanpurkar et al; Science Advances; 2025

8 Key Challenges and Next Steps

8.1.1 Water is a significant part of Wales' culture and identity. It is **imperative that water supply is protected** and secured into the future so that it continues to support the environment of Wales and serve the needs of the population and economy.

8.1.2 Key to this is for **water quality to be a higher priority**. There are significant water quality and water challenges in Wales.

8.1.3 Table 8.1 highlights the key challenges highlighted by this research study and the priority issues that Welsh Government should look to address moving forward. The issues shown in Table 8.1 were assessed using a prioritisation framework which considered:

- Cross sector benefits – this considered the extent to which tackling the issue would benefit the Energy, Digital, Transport, or Circular Economy infrastructure sectors also considered by this review.
- Relevance to NICW remit – in particular looking at whether the issue identified fits within NICWs remit to consider long-term issues, and whether NICW could be able to add value/influence.
- Contribution to/alignment with the 7 Well Being goals.
- Stakeholder acceptability, and whether the issue correlates well with feedback from stakeholders
- Deliverability, considering whether the issue is realistically deliverable
- Cost and benefit.

8.1.4 The issues which ranked the highest in this prioritisation exercise are shown as first part of. Table 8.1. Whilst all the issues identified in this review are important it is recommended that Welsh Government consider acting on these top priority issues.

8.1.5 An assessment of the priorities highlighted in Table 8.1 and the wider issues covered in this report against the NICW framework is presented in Appendix A. This shows strong alignment between the findings of this report and the remit and focus of NICW.

Table 8.1 – Priority issues and potential actions for improving water quality and water resources in Wales

Priority Issue	Pathway	Timeline	Current baseline
Top priorities			
Increasing the delivery of nature-based solutions. There is consensus that increasing the use of nature-based solutions would improve many of the issues facing the water sector, however their use remains limited. There are funding barriers and costs associated with the delivery. There are also questions about monitoring and regulating there performance.	Improving the uptake of nature-based solutions needs to address many barriers. Incentivising landowners and beneficiaries to implement and contribute to NbS will be essential to offset the impacts on costs and productivity. Incentives may be through direct grants, support payments or other incentives. On-going maintenance must be included in any support framework. Regulation also needs to be considered. If NbS are utilised to deliver specific outcomes, should it be regulated and by whom? Will regulation limit its uptake? Will regulation only apply when NbS is used for certain outcomes, but not others, for instance water quality benefits, but not flood risk management benefits? If so, how will the primary function be determined? These issues, and many others will need to be addressed.	Short – Medium Term	NbS for water quality benefits needs regulation currently, this limits its uptake.
Non-domestic water demands, including those from commercial, industrial, and agricultural users, are not fully understood from a water resource management perspective. This lack of insight means forecasts for future water demand and planning may be missing critical elements. Not planning for all areas of water demand growth may lead to unsustainable abstraction, increased competition for water resources, and missed opportunities for efficiency.	The projected growth of water needs across all non-domestic sectors should be assessed. This should consider the impacts of new developments such as data centres and expanding agricultural activities. This includes evaluating how future demands can be incorporated into catchment planning to ensure sustainable resource allocation. Further investigation could examine mechanisms for valuing water as a commodity, ensuring that commercial/non-domestic users are charged fairly and incentivised to use water efficiently. In agriculture, research should explore ways to promote sustainable water use, such as encouraging small-scale reservoirs, drip irrigation, water trading, and other efficiency measures, to support both productivity and long-term water security.	Short – Medium Term	No systematic forecasting of non-domestic water demand

Priority Issue	Pathway	Timeline	Current baseline
The **impacts of climate change on water consumption** should be better understood for all water users, especially those that are not included in the remit of WRMPs. Changes in weather patterns, increased frequency of droughts, and shifting demands from households, agriculture, and industry could all significantly affect how water is used and managed in the future.	Assess and forecast how the impacts of climate change on the use and consumption of water, including household use and non-household uses and identify responses and responsibilities. To also include consideration of how climate change may affect users who reply on private water supplies,	Short – Medium Term	No modelling of climate-driven demand changes on non-domestic water demand
The absence of **catchment level planning** results in uncoordinated management efforts, increasing the risk of cumulative impacts on waterbodies. This potentially undermines long-term sustainability and regulatory compliance and leads to missed opportunities to collaborate.	The creation of catchment level frameworks should be investigated. These should assess cumulative pressures, set clear catchment goals, and outline specific objectives. They should be supported by legal mechanisms that ensure compliance.	Short Term	No formal catchment-level frameworks exist Catchment management is fragmented across multiple organisations with overlapping responsibilities.
In many catchments, **Water Quality considerations can currently restrict development** due to the requirement to provide nutrient mitigation. .	The deliverability of nutrient management plans requires review to ensure they are in place and that nutrients are not holding back development. There needs to be a systematic process for restoring protected sites and ensuring nutrients in these catchments are managed effectively in future to prevent regression. There should be consideration of who pays and whether funding should be associated with targets for site restoration.	Short – Medium Term	Eight nutrient neutrality catchments in Wales
Agricultural runoff is a key source of pollution to watercourses, contributing excess nutrients and other contaminants that degrade water quality, harm aquatic ecosystems, and pose risks to human health and biodiversity.	Work is required to identify priority areas where targeted agricultural runoff management is needed to further manage nutrient loads on waterbodies and understand the scale of work that is required. Consideration of how regulation may be expanded to consider all pollutant sources is also needed.	Short – Medium Term	Agricultural pollution is the main factor in poor water quality in rivers like Wye, Lugg, and Usk; contributes up to 72% of phosphorus in some catchments.

Priority Issue	Pathway	Timeline	Current baseline
Other priorities			
Many **private wastewater treatment works are not currently registered**, leading to gaps in understanding of pollution sources, lack of oversight and potential risks to water quality and public health. Unregistered facilities may not be subject to regular monitoring or compliance checks, increasing the likelihood of untreated or poorly treated effluent being discharged into the environment. Similarly, **private water supplies** may be underestimated and pose a future burden on water resource planning.	A systematic method is required for proactively identifying and registering private wastewater treatment works and private water supplies. Consider scenarios for private supplies to transfer to mains supply in future water resource planning.	Short Term	No public record of private treatment works numbers, or the likely scale of unregistered private treatment works. Private water supplies are registered, but there may be unregistered supplies.
Nature Based Solutions are an option for reducing pollutant loads while supporting biodiversity and climate resilience but their use for this purpose is hindered by regulatory barriers.	A review of whether existing regulations facilitate the best Nature Based Solution outcomes is required.	Short – Medium Term	Regulatory barriers prevent Nature Based Solutions from being used for nutrient removal.

Priority Issue	Pathway	Timeline	Current baseline
Urban pollution remains a significant and largely unaddressed challenge, as there is currently no comprehensive regulation or lead organisation responsible for managing the complex and varied sources of urban runoff. This results in ongoing risks to water quality.	A strategy for identifying and monitoring main sources of urban pollution and chemical pollution, including PFAS, is required. Priorities should be identified for managing these sources of pollution and a strategy to manage them. This would benefit from a lead organisation with responsibility for coordinating efforts to rectify sewer misconnections and oversee broader urban pollution management initiatives. Delivering more SuDS in urban environments offers the potential to deliver multiple benefits, including reducing urban pollution, mitigating storm overflows, and supporting flood risk management. Future Research should assess how the delivery of retrofit SuDS in urban areas can be streamlined.	Short – Medium Term	No monitoring of ubiquitous persistent bioaccumulative and toxic substances No lead organisation for urban runoff/pollution
There is uncertainty over whether Schedule 3 of the Flood and Water Management Act 2010 enables the long-term delivery of water quality benefits through **Sustainable Drainage Systems (SuDS),** particularly regarding the sustainability of funding and the ongoing maintenance responsibilities placed on Local Authorities.	An assessment of the funding and long-term water quality benefits of SuDS adopted under Schedule 3 would help in forming views on whether: • water quality outcomes can be guaranteed in perpetuity through Schedule 3. • the burden of SuDS on Local Authority budgets once commuted sums for maintenance have expired is sustainable • How best to fund the maintenance of retrofit SuDS to manage surface water and prevent storm overflows	Short – Medium Term	No assessment of long-term benefits or risks of Schedule 3.
There is currently limited information available to help consumers make informed choices about the water efficiency of household goods. Without clear labelling, **opportunities to promote water**-saving behaviours and reduce consumption are missed.	Encourage the government to implement legislation to mandate water efficiency labelling.	Short Term	Currently no mandatory water efficiency labelling for household goods

Priority Issue	Pathway	Timeline	Current baseline
Water is not currently valued as a national commodity, which can result in inefficient use, lack of investment incentives, and challenges in negotiating water transfers or managing demand from commercial users.	Research could focus on developing robust methods for valuing water as a national resource, particularly for use in discussions with non-household users and during water transfer negotiations. This could include evaluating alternative pricing mechanisms that reflect the commercial benefits of water use, ensuring that the value of water is recognised and that pricing structures support sustainable management and equitable access.	Medium – Long Term	No formal system in place.

8.2 Cross cutting themes

8.2.1 A number of the issues identified in this water sector review are relevant to the other infrastructure sectors being considered as part of this wider study. Including:

- **Energy Sector** – New energy sources, such as hydrogen, are likely to require water in future, and this changing demand need to be considered.
- **Digital Sector** – The increasing demand for data centres is already starting to have an impact on water consumption and will require significant volumes of fresh, clean water in the future. As above, this changing demand needs to be considered and planned for.
- **Transport Sector** – Run off from roads has been highlighted as a significant unknown issue due to the poor water quality. Water quality in highway runoff needs to be considered as part of road infrastructure investment and maintenance.
- **Circular Economy Sector** – there may be opportunities to recycle nutrients in waterbodies for agricultural fertilisation.

9 Monitoring Progress

9.1.1 Going forward it will be important to monitor the status of water quality and water resources/supply. It is recommended that Welsh Government monitor a range of existing data sources over time, with a focus on those listed in Table 9.1 below.

Table 9.1 – Existing data

Issue/indicator	Why important?	Who collects this data?	How often is this published / updated?	Is this data publicly available?
WFD status (number of watercourses reaching 'good status')	Key indicator of water quality status	NRW	6 yearly	Yes
Leakage data	Key indicator of efficiency/supply	DCWW/HD	Annually	Yes
Percentage of customers with a water meter	Key indicator of efficiency	DCWW/HD	Annually	Yes
Per-capita consumption	Key indicator of efficiency/supply	DCWW/HD	Annually	Yes
Water consumption by non-domestic users	Increasing demand and need to monitor	DCWW/HD	Annually	Yes
Storm Overflow spills	Indicates progress on reducing storm overflows	DCWW/HD	Annually	Yes
Number of nutrient neutrality catchments	Shows how progress on protecting key sites	NRW	When changed	Yes

9.1.2 In addition to the above, a number of key data gaps are noted (Table 9.2), and it is recommended that Welsh Government consider, as a priority, how improved data in these areas could be collated and monitored going forward. It is noted that some organisations may not have the funding and resources needed to collect data at this level.

Table 9.2 – Data gaps

Indicator/data needed to demonstrate status/track progress	Why important?	Who should collect this data in future?	How often?
Key chemicals/substances in waterbodies that aren't monitored, including ubiquitous substances such as PFAS, mercury	Key determinants of water quality	NRW	Annually
WQ of runoff from high priority highways/urban surface water outfalls	Key contributor to water quality, aid assessment of impact from surface water sources	Highways authorities / Water companies	Annually
Number and location of private water supplies	To improve regulation and monitoring	NRW	Annually
Number and location of private treatment works	To improve regulation and identify where WQ improvements could be made with upgrades	NRW	Annually
Nutrient mitigation delivered in nutrient neutrality catchments, including the funding source and purpose of the mitigation	To assess the success of nutrient management plans	NMBs	Annually
Housing delivered in nutrient neutrality catchments	To assess the success of the Nutrient Management Plans	Welsh Government	Annually
Number of SuDS schemes adopted under Schedule 3, including number of retrofitted SuDS schemes and the reason for the retrofit	To measure the success of Schedule 3 and the amount of SuDS used to manage existing issues and the drivers for retrofitting to understand the sources of extra tax-payer burden.	LLFAs	Annually
Total abstracted volume of water	Indicates progress on reducing abstraction to sustainable levels	NRW	Annually
If adopted in future – Number of catchment plans.	To enable full catchment consideration of water issues.	NRW	Annually

Appendix A – Alignment of identified issues against the NICW framework

The issues and challenges identified in this report and highlighted for further consideration in Table 8.1 have been assessed, in qualitative high-level terms, against the NICW framework and remit, which includes:

- The Well-being of Future Generations Goals
- The Nature Emergency
- The Climate Emergency
- The Socio-Economic Duty
- Long-term considerations.

NICW Framework element	Assessment
Goal – Prosperous Wales	By promoting efficient water use, safeguarding water quality, and investing in innovative solutions, Wales can create the conditions for thriving businesses, secure livelihoods, and equitable access to resources for current and future generations.
Goal – Resilient Wales	Tackling the issues identified in this report strengthens Wales' resilience by protecting natural resources, adapting to climate change, and reducing vulnerability to pollution and scarcity. Implementing sustainable water management, catchment planning, and nature-based solutions helps safeguard communities, ecosystems, and infrastructure against future shocks, ensuring Wales can thrive in the face of environmental and economic uncertainties.
Goal – More equal Wales	The report's recommendations help tackle inequalities by ensuring fair and efficient access to clean water, reducing pollution, and supporting the health and wellbeing of all communities across Wales. Improving water management, reducing pollution, and promoting efficiency help tackle inequalities.
Goal – Healthier Wales	Implementing the priority actions outlined in this report will improve water quality and reliability, reduce pollution risks, and create healthier environments, directly benefiting public health and quality of life throughout Wales.
Goal – Wales of Cohesive Communities	By advancing the priority issues set out in this report, Wales can foster more cohesive communities through collaborative catchment planning, fair access to clean water, and shared stewardship of local resources, encouraging partnership and collective action for the benefit of all.
Goal – Wales of vibrant culture and thriving Welsh language	Protecting water resources and the natural environment creates spaces where Welsh language and cultural traditions can continue to be celebrated and sustained.
Goal – Globally responsible Wales	This report enables Wales to manage its resources sustainably, reduce pollution, and demonstrate environmental leadership, contributing positively to global efforts for climate action, ecosystem protection, and responsible stewardship.

NICW Framework element	Assessment
Nature Emergency	Taking forward these priority actions will directly contribute to tackling the nature emergency in Wales by enhancing water management, reducing pollution, and supporting habitat restoration, helping to halt biodiversity loss and rebuild healthy ecosystems.
Climate Emergency	In the face of the climate emergency, advancing these priority actions will help Wales reduce emissions, strengthen resilience to extreme weather, and ensure sustainable water management in a changing climate.
Socio-Economic Duty	The socio-economic duty requires public bodies to ensure equality of outcome, rather than just equality of opportunity. Focusing on these priority issues helps fulfil Wales' socio-economic duty by promoting fair access to water, reducing inequalities in environmental health, and supporting inclusive opportunities for communities, particularly those most vulnerable to resource insecurity.
Long-term considerations	Taking a long-term view, addressing these priority issues will secure sustainable water resources, support future economic growth, and protect environmental quality for generations to come, ensuring that decisions made today continue to benefit Wales well into the future.

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