Chapter 4
Objective:

Ensure a Safe and Reliable Water Supply

Our Strategic Aims

- Manage the sustainability and quality of drinking water from source to tap to protect human health.
- Manage the availability, sustainability and reliability of water supply now and into the future.
- Manage water supplies in an efficient and economic manner.

Introduction

Safe and reliable water supplies are essential to public health and to social and economic progress. The water we need must be abstracted from surface or groundwater sources and treated to a high standard before it is distributed through an extensive network of water mains to households and businesses.

This chapter details the current situation in regard to water supply, the challenges that Irish Water faces and our strategies for tackling these challenges. These strategies are arranged around three key requirements of:

- **Quality;**
- **Sustainability and Reliability;** *and*
- **Managing Water Supplies in an Economic and Efficient Manner.**

Performance targets against these key requirements are also presented.

The Current Situation

Delivering a safe and reliable drinking water supply to over 80% of the population requires the abstraction, treatment and delivery of over 1,600 million litres of water each day. Water is delivered to each tap from a water supply zone. This is a defined supply area served by a single source or group of connected sources. Treated water is processed and transported from the water source through to each tap. The system serving the water supply zone includes one or more abstractions (where water is taken from - lake, river or groundwater), treatment plants to purify and disinfect the water, storage in a tank or reservoir and distribution through pipes. A graphical representation of a water supply zone is presented in Figure 5. There are currently around 900 separate water treatment plants and approximately 60,000 km of pipelines delivering water in Ireland.

Water supply zones were historically developed within local authority boundaries rather than on a river basin or regional level. This fragmentation has resulted in a large number of small water treatment plants and water supply zones and a highly variable performance ranging from good operation in newer treatment and distribution infrastructure (e.g. pumps, plant and pipes) to periods of unacceptable performance in older systems. Smaller water sources are also susceptible to sporadic and seasonal variations in water quality and availability.

Our Main Legal Obligations

Legislation in relation to water services and public health dates back to the last century. The water quality standards which our treated water supplies must now meet are set by the European Drinking Water Directive and transposed into law in Ireland through the European Union (Drinking Water) Regulations, 2014. Enforcement of these regulations is the responsibility of the EPA. Amongst other requirements, the regulations set the limits of concentrations for a range of chemical and microbiological parameters in water intended for human consumption. Under the drinking water regulations, Irish Water must notify the EPA of non-compliances with these parameters. Parameters which do not impact on the wholesomeness or cleanliness of water intended for human consumption, such as colour or hardness, are not included as a required standard within the Drinking Water Directive.

The abstraction of water from any lake, river, stream, well, or spring by a sanitary authority (Irish Water has the status of a sanitary authority) for a public water supply is governed by the Water Supplies Act, 1942. This Act requires a sanitary authority wishing to abstract water for public supply to apply to the Minister (now ABP) for a water abstraction order. When determining (i) whether or not the sanitary authority can take a supply: and (ii) the volume: and (iii) abstraction rate for that supply, ABP must consider the potential impact of the abstraction on riparian owners, on the water body itself and on the navigability of navigable rivers or canals. ABP may refuse the granting of an abstraction order or alter the terms of the abstraction. The Water Supplies Act, 1942 also allows the sanitary authority to protect the source of their abstraction from pollution or interference with the flow.

Our commitments in relation to the Birds, Habitats and Water Framework Directives are detailed in the Chapter 6 – Protect and Enhance the Environment and generally relate to the preservation of sustainable ecological flows in water bodies from which we abstract and ensuring that the construction and operation of our water supply infrastructure does not impact negatively on protected areas and species.

Key Challenges

The challenges which face Irish Water to ensure a safe and reliable water supply to all its present and future customers are summarised in the paragraphs below.

There are currently many water supply zones which fail to meet the European and Irish Drinking Water standards for microbiological and chemical parameters or have significant operational, maintenance or capacity problems at individual treatment plants, giving rise to water quality risks. This includes customers who have a Boil Water Notice due to microbiological contamination in their water supplies (approximately 23,000 customers in January, 2014). This situation is unacceptable to us and addressing it is our top priority.

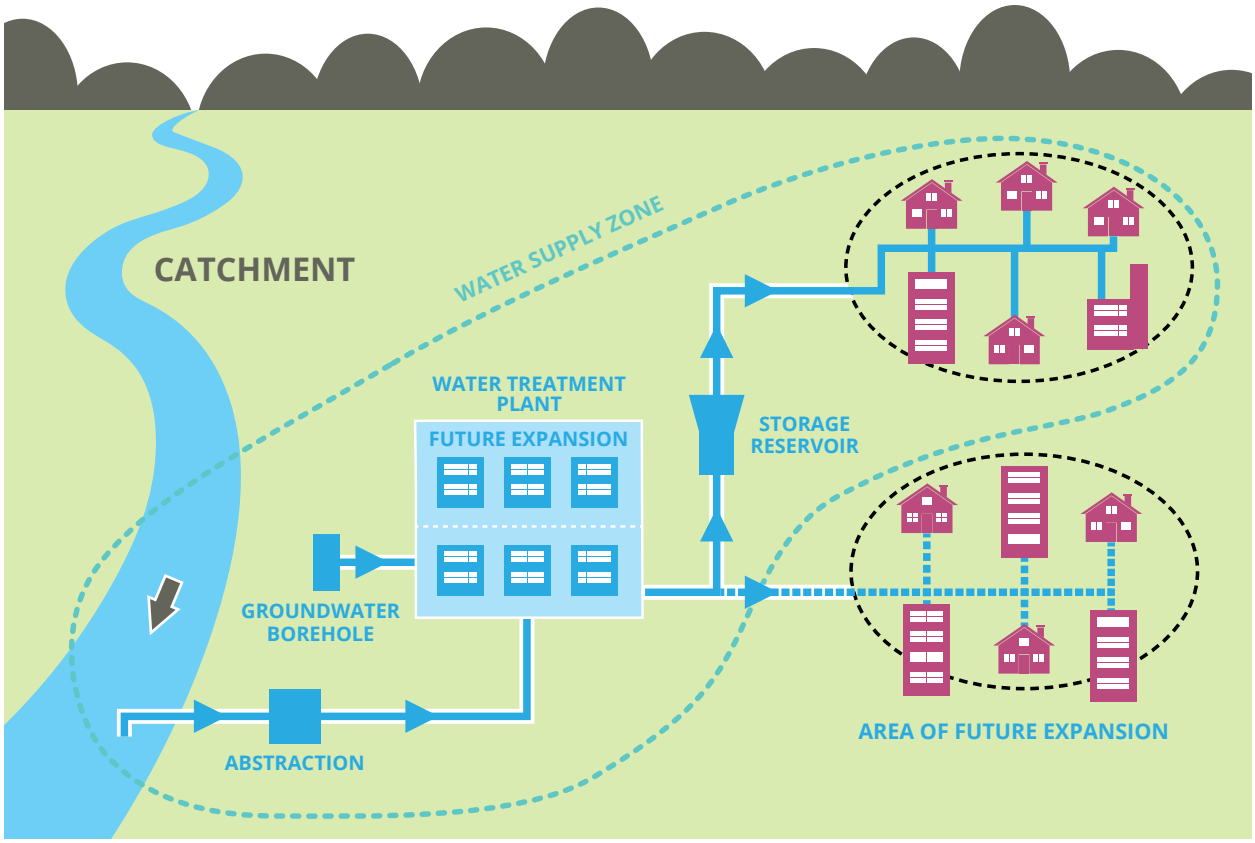
Protection of water sources from contamination ensures safe water supply and reduces treatment costs. However, the protection of individual water supply sources has to date been variable and risk based assessments to determine and prioritise protective measures have not been completed for all water supply sources.

Water resources for supply have not, previously, been managed on a catchment, regional or national basis. Therefore, we have urban regions such as Dublin where there is a potential shortage of future water resources whilst in the west of Ireland there are catchments with a surplus of potential available resources but a deficit in treatment provision.

No national rules are in place to ensure correct, safe and efficient operation of our treatment plants, storage and distribution network. In some areas there is limited knowledge of the condition, lifespan and location of our above and below ground assets (e.g. treatment plants, pipes, valves and other infrastructure).

Water Treatment Plant Pipework. Photo: Maurice O'Connell

Figure 5 Graphical Representation of a Water Supply Zone



Water flows through pipes at pressure from the treatment works to each household tap. We currently estimate that nationally we are losing approximately 49% of our treated water to leakage from the distribution network and in customer properties. This is unacceptable and reducing this level of leakage is a priority. However, with an underground network of ageing pipes and with a pressurised system including thousands of joints vulnerable to ground conditions and traffic vibrations it will never be possible to reduce water leakage to zero. Instead, our intention is to apply a best practice asset management approach in an economic and efficient manner in order to achieve the optimum water savings to achieve a sustainable and economic level of leakage. The metering of domestic and commercial properties will aid the detection of leaks within the customer's property and alert customers to the wastage of water on their property with the potential to reduce their water bills.

Water supplies also face a range of challenges from external factors outside of Irish Water's control such as climate change and the need to maintain sustainable resources by balancing abstraction against environmental needs.

Ballymore Eustace Water Treatment Plant. Photo: Irish Water

Case Study

Vartry Water Supply, a City Perspective

Prior to the 1860's in Dublin, most drinking water was sourced from the Royal and Grand Canals. The canals were poor water sources, offering limited supplies of low pressure, filthy water. ***"Drink the canal water as it is and you swallow filth and animal nature; boil it and you drink a decoction of poison"*** wrote one Dubliner of the day, Walter Thomas Meyler. The poor quality of drinking water in the city, resulted in large scale outbreaks of cholera and in the 1860's over a thousand deaths were traced directly to a single public water tap in Dublin which was contaminated with sewage. In 1852, an eminent doctor John Gray, was elected to Dublin City Council where he gained a reputation for his interest in improving the lot of the impoverished. In 1853 he was elected to the Waterworks Committee, and began work on improving the water supply for Dublin. He identified the River Vartry rising below the Sugar Loaf Mountain in County Wicklow, as the best potential source for the city. He sought to have a Parliamentary Bill passed to empower Dublin Corporation to advance the works, however, he faced wide scale objections from the private owners of the canals and there was outcry in the media at the high cost of the works and the volumes of water proposed. The Bill was debated for nearly five weeks and the first stones were turned on site in 1862. The Vartry Supply involved building two major reservoirs to the south of Roundwood in Co. Wicklow, a water treatment plant, a 2.45 mile long tunnel under Callowhill, and forty miles of trunk water mains to deliver water to the city. The project was an amazing feat of engineering, with the works completed by men using picks and shovels, horses and carts.

The new supply project resulted in significant improvements in the quality of life for the inhabitants of Dublin. In terms of public health, the last major outbreak of dysentery was recorded in the late 1860's and the Vartry scheme dramatically reduced the scourge of waterborne disease in the city.

As a testimony to the success of the project, the original Vartry supply still provides drinking water for 200,000 people or 15% of the population of the Greater Dublin Area. However, the treatment plant and infrastructure has had no major upgrade since it was first built over 150 years ago, and the supply is now in decline. The water treatment plant does not conform to modern drinking water regulations, the tunnel is in danger of collapse, and the reservoir draw-off facilities need a to be re-built to ensure the safety of the structure. The upgrading of the Vartry Water Supply is likely to be addressed in Irish Water's National Water Resources Plan and future Capital Investment Plans.

Vartry Water Treatment Plant. Photo: Nicholas O'Dwyer.

Statue of Dr John Gray in O'Connell Street, Dublin. Photo: Irish Water

What our customers can expect from us

We will develop and implement strategies underpinned by 'on the ground' measures to meet water quality standards, ensure water availability and provide an acceptable level of service to our customers. We will monitor and report our compliance with these strategies.

Objectives and Strategies

The proposed strategies and performance targets to achieve this objective are summarised in the table below and are detailed in the remaining sections of this chapter.

	Strategy	Purpose
	Aim **WS1** - Manage the sustainability and quality of drinking water from source to tap to protect human health	
WS1a	Prepare a National Water Resources Plan and implement on a phased basis.	To ensure a sustainable water supply for all customers whilst maintaining sustainable ecological water flows, complying with water quality standards, identifying key strategic sources to support balanced regional development.
WS1b	Prepare and implement Drinking Water Safety Plans for all Water Supply Zones.	All water supplies are protected in accordance with international best practice.
WS1c	Implement Standard Operational Procedures for all water treatment plants, water storage facilities and distribution networks.	To ensure correct treatment of water and optimal operation of water treatment plants.
WS1d	Develop and implement Capital Investment Plans to improve drinking water quality	To target investment to ensure that water supplies comply with Drinking Water Standards and meet capacity needs.
WS1e	Prepare and implement a "Lead in Drinking Water Mitigation Plan".	To effectively address the risk of failure to comply with the drinking water quality standard for lead due to lead pipework.
WS1f	Prepare and implement strategies to manage other quality issues in water supplies.	To address other (non-regulatory) water quality issues such as hardness where economically feasible.

	Strategy	Purpose
	Aim **WS 2** – Manage the availability, sustainability and reliability of water supply now and into the future	
WS2a	Implement risk assessments for all water supply areas in terms of short, medium and long term risks to customer supply.	To ensure that water supply areas have quantified risk assessments and appropriate mitigation measures are in place.
WS2b	Manage existing water resources and plan for new resources taking a regional view of needs and having regard to the objectives of the Water Framework Directive (WFD).	To ensure long term sustainability of yields is considered in the management of existing and new water sources to meet predicted needs while being aligned with the requirements of the WFD with respect to maintaining sustainable ecological flows.
WS2c	Develop long-term sustainable water sources with resilience to climate change.	To ensure all new sources are able to cope with the potential impacts and risks from climate change.
WS2d	Develop methodologies to build strategic resilience and network connectivity into resource planning.	To ensure that all water supply zones have built in security and reliability, by developing larger scale regional solutions which offer better governance, economies of scale in operation and can be monitored effectively
WS2e	Manage future regulatory requirements for abstraction licencing, headroom in treatment facilities and population growth.	To ensure security in Levels of Service for all customers which take account of impacts from future regulation and population growth.
WS2f	Match water abstraction to availability and quality using surface water and groundwater sources. This is known as Conjunctive Use.	To ensure Levels of Service for all customers accounting for seasonal and climate change variations, maximising source resilience.
WS2g	Prepare Regional Water Conservation Strategies and implement on a phased basis.	To reduce water leakage to a sustainable economic level in stages through a systematic work programme over a reasonable period.

	Strategy	Purpose
	Aim **WS3** – Manage water supplies in an efficient and economic manner	
WS3a	Adopt an asset management based approach to capital maintenance and capital investment.	To maximise the lifespan of assets and their performance for consistent levels of service at least cost.
WS3b	Optimise the unit cost of water supply through proper water resource and treatment planning.	To minimise the unit costs of water treatment for all our customers taking advantage of scale and efficient processes.
WS3c	Prepare and implement water demand management and customer education strategies.	To reduce the volume of water abstracted, treated and used and therefore to reduce the cost to the customer.
WS3d	Optimise capital and operational investments in water supply.	To ensure the maximum return and customer benefit from investments through delivery of services in the least cost manner.

WS1: MANAGE THE SUSTAINABILITY AND QUALITY OF DRINKING WATER FROM SOURCE TO TAP TO PROTECT HUMAN HEALTH

[WS1a] Prepare a National Water Resources Plan and implement on a phased basis.

A National Water Resources Plan is a country wide assessment of water resource availability and water demand. The plan will assess the likely future demands of our customers and balance these needs against availability and sustainability of water for supply on a catchment and river basin scale. The plan will then make strategic level recommendations for the development of water supply infrastructure to meet the demands of population and economic growth in a sustainable manner. The plan will take a regional perspective supporting balanced regional development and will include for inter-region or inter-catchment water transfers where required to ensure adequate water provision into the future. Any such transfers must be environmentally sustainable and therefore cannot compromise the needs of the local catchment or region.

Our National Water Resources Plan will focus on efficient, environmentally sustainable use of water and providing for reliability and security of supply (system resilience). We will improve or decommission water sources which are at risk from contamination or low flows or are causing avoidable environmental impacts.

The plan will also include strategies for addressing water quality issues related to pesticides, trihalomethanes (chemical compounds formed when chlorine used to disinfect drinking water reacts with organic matter) and sludges resulting from water treatment processes (See EN3c).

The plan will also include cost-effective measures to transfer water from areas that have plentiful water resources to those which have insufficient supplies to meet current demand and to support growth, ensuring that this approach meets sustainability criteria and supports balanced regional development in line with national and regional planning policy.

We are targeting a rationalised approach towards fewer larger water supply zones based on sustainable water sources to provide effective, consistent service, quality and value for money to our customers.

[WS1b] Prepare and implement Drinking Water Safety Plans for all of our Water Supply Zones.

Drinking Water Safety Plans (DWSP) seek to protect human health by managing risks to water quality taking a whole catchment approach to manage risks from source through to the tap. Protection of the water source is a priority component of this risk management as ensuring a high quality source of raw water can be the most effective way of reducing the cost of water treatment. The plans assess the risks of contamination of water sources and propose mitigation measures to minimise these risks. They then propose appropriate treatment processes and preventative measures for contamination risks in the water distribution system. Both the World Health Organisation (WHO) and the EPA strongly endorse the Drinking Water Safety Plan approach to managing drinking water supplies effectively in the interests of public health.

Irish Water will prepare DWSPs for all water supply zones (WSZs). All DWSPs will use an approach which is in accordance with the WHO guidelines and will ensure that protection and controls are put in place to meet health based standards. DWSPs will also consider the longer term impacts of climate change on the water sources.

We will categorise each WSZ on the basis of risk, focusing on those with the greatest risk of water quality failure. We have created data capture and management systems to assess risk and support DWSP development. We expect that these pro-active plans will take over from the reactive 'Remedial Action Lists' used successfully by the EPA up to now as the key drivers of investment in and operational management of our water supplies.

We will engage with all stakeholders, including landowners and the local authorities, in the development and implementation of measures aimed at delivering effective improvements in the quality of raw water within each catchment supporting good quality raw water sources. This approach will contribute towards sustainability and environmental gains, and potentially have a positive impact on both the cost of treating water and sustainability of yields from the catchment.

The categorisation of the water supply sources nationally using DWSP's will support the phased implementation of the National Water Resources Plan and inform where water sources should be abandoned or combined and also where treatment must be upgraded and centralised to meet water quality standards.

The implementation plan for DWSPs will be published in the first quarter of 2016 covering 135 WSZs and a subsequent programme will be published in 2021 covering the remaining WSZs.

[WS1c] Implement Standard Operating Procedures for water treatment facilities, water storage facilities and distribution networks.

Standard Operational Procedures (SOPs) are written rules and processes for the correct operation of water treatment plants to ensure safe water supply and efficient operation. The procedures will be prepared by reference to best international practice, tailored for Irish conditions and will include staff training and maintenance regimes for all of our treatment plants, water storage facilities and distribution networks.

Irish Water will develop 'Asset Needs' briefs for each plant which will detail the improvements required to meet the SOPs. These documents will then inform the Capital Investment Plans. We will immediately address those failures which can be removed by implementing changes to plant operations or through our minor capital programmes.

We will update and maintain Drinking Water Incident Response Plans. These plans document the procedures, processes and information to support the management of a drinking water incident (unexpected event). The plans assess the risks and assign responsibilities in the event of an incident. They identify the correct communication channels and enable site and event specific arrangements to be made efficiently and effectively.

We will also work with relevant statutory bodies in support of 'A Framework for Major Emergency Management' as published by the Inter-Departmental Committee on Major Emergencies. We will develop and maintain an Emergency Response Plan, in accordance with the framework, so that Irish Water can respond when called upon in the support of the principal response agencies in reacting to and managing major emergencies.

[WS1d] Develop and implement Capital Investment Plans to improve drinking water quality.

As we improve our knowledge of our assets, collect and interrogate data we will build up a greater understanding of our abstractions, treatment plants and distribution systems and how inadequacies in their operation, maintenance and condition contribute to water supply quality problems. We will then be able to prioritise our investment plans on the basis of risk.

We are presently implementing solutions to urgently address immediate inadequacies in water supply provision and Irish Water has developed a work plan for all schemes which are currently failing to comply with microbiological or chemical quality standards.

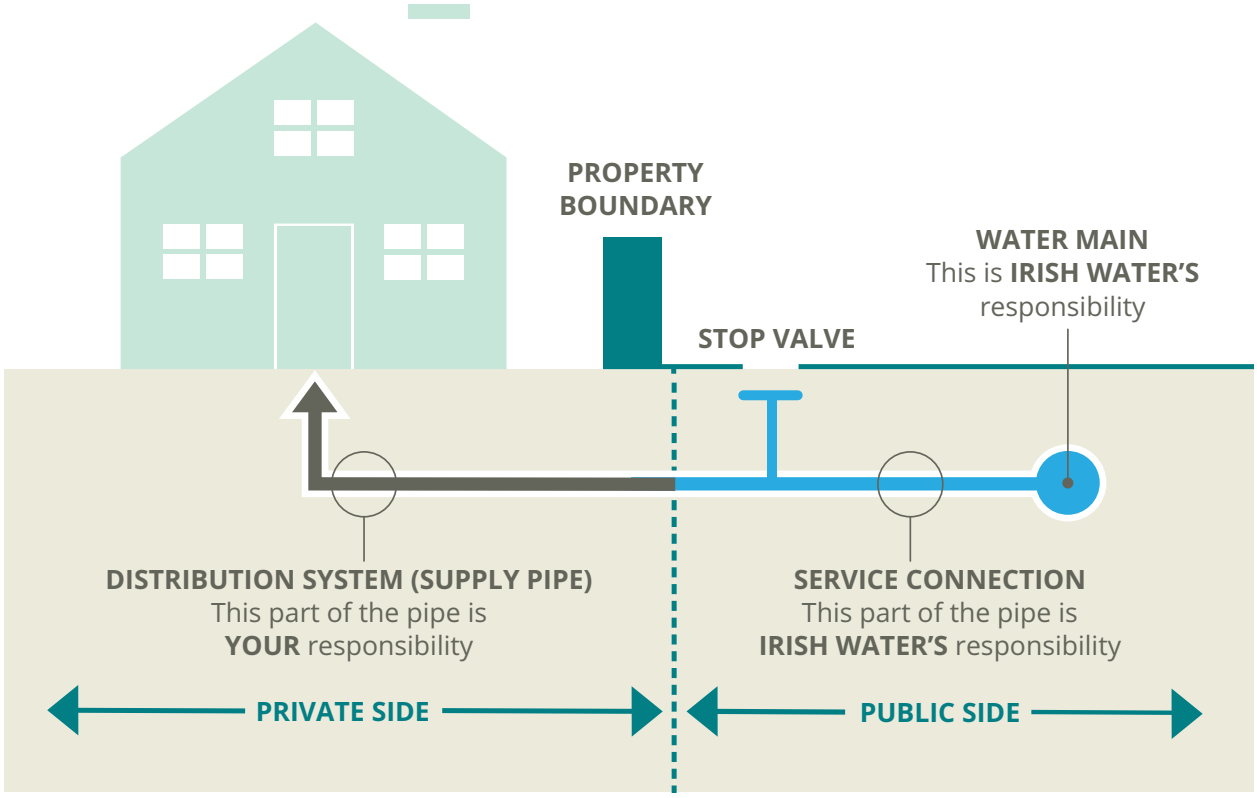
[WS1e] Prepare and implement a Lead in Drinking Water Mitigation Plan.

The use of lead pipes and conduits in water supplies has been documented from Roman times. In Ireland water service connection pipes, storage tanks made of lead, lead supply pipes and internal plumbing were used in construction up until the early 1970s. Therefore, it must be assumed that the majority of older houses and public buildings may have lead supply pipes and internal plumbing, except where it has been replaced.

Lead can be absorbed into solution in water from lead pipes and the solubility (plumbosolvency) is a function of the water chemistry. Drinking water treatment usually includes pH adjustment (typically using lime) in order to reduce lead solubility, but this is only partially successful. Internationally, other chemical treatments are used which deposit a coating on the pipe wall inhibiting the solution of lead into the water.

The acceptable concentration of lead in drinking water is 10 µg/litre, based on standards set by the EU Drinking Water Directive, with effect from December, 2013. Prior to that date, the standard was 25 µg/l, down from 50µg/l in 2003. The general health advice, echoed by both the EPA and HSE, is that the preferred option for meeting this standard is full removal of lead from the distribution network (both public service connection pipes and private supply pipes and plumbing), but achieving this will inevitably take a considerable period of time.

Figure 6 Extent of Responsibility for Household Connection Pipe



The Irish Water website provides advice to customers on lead, including the HSE and EPA Joint Position Paper – Lead (Pb) in Drinking Water, December 2013 which is available from the following link (**https://www.water.ie/support/questions-and-answers/lead-pipes-information-for-customers/**).

Irish Water is responsible for public service connection pipes up to the site boundary as shown in Figure 6. Householders are responsible for the supply pipe from outside the site boundary and internally in the property.

Irish Water is currently surveying the extent of lead pipework in our system and mapping it into our Geographic Information System (GIS) using data from the metering project and local authority surveys of backyard supply pipes.

Based on currently available data, we estimate that there are some 160,000 domestic properties with lead service connection pipes. There are also a further 30,000 to 40,000 domestic properties which have shared supply pipes and a proportion of these are lead pipes.

IW is currently developing a Lead in Drinking Water Mitigation Plan which will include the replacement of lead service connection pipes over a 10 year period and consideration of other feasible technological alternatives to reduce lead in drinking water as quickly as possible in the short term. We aim to have this strategy in place by early 2016.

We will notify households of lead exceedances in their water supply and advise households with lead supply pipes on flushing protocols and replacement options. We will also advise our customers on the appropriate Domestic Plumbing Standards Policy based on international best practice. Where a customer decides to replace their (private side) lead supply pipe, we will commit to replace the (public side) service connection pipe at the same time, if this has not already been done.

[WS1f] Prepare and implement strategies to manage other quality issues in water supplies.

Drinking water must comply with standards set by the Drinking Water Regulations (2014) and the strategies for meeting these standards are presented above. We will also identify water supplies that suffer from water quality issues which do not have required standards under the Drinking Water Regulations such as water hardness and discolouration due to natural sources. These problems can cause concern to customers and excessive hardness in particular can cause damage to hot water appliances. However, neither hard water nor the substances associated with hard water, such as lime, calcium and magnesium, require the restriction of a supply nor do they make water unfit for human consumption.

We will continue to review our treatment processes to ensure optimum removal of colour, iron and manganese compounds and dissolved solids leading to colour. We also recognise that colour and turbidity often arise from changes in flow in old mains (notably iron pipes) and we will work to minimise this, recognising that relining or replacement of these is a long term objective. While treatment to reduce hardness in water supply is not currently a priority, it may be considered in severe cases by the CER when priority compliance issues have been addressed.

WS2: MANAGE THE AVAILABILITY, SUSTAINABILITY AND RELIABILITY OF WATER SUPPLIES NOW AND INTO THE FUTURE

[WS2a] Implement risk assessments for all water supply zones in terms of short, medium and long term risks to customer supply.

Water sources can be susceptible to changes in river flows or lake and groundwater levels. We will prepare risk assessments for all water supply sources to determine short, medium and long term risks to water supply capacity. Based on these risk assessments, we will identify and develop our plans for sustainable water sources nationally. Measures to achieve this will include rationalisation of water supply zones to utilise larger sources and interconnection of networks to ensure security of supply.

Risk assessments of all water supply zones will be completed by the end of 2017.

[WS2b] Manage existing water resources and plan for new resources taking a regional view of needs and having regard to the objectives of the Water Framework Directive (WFD).

The WFD promotes a holistic approach to the management of the water environment where all stakeholders work together. Working with the EPA, we will seek to balance the volume of our abstractions and the locations where we abstract water with the needs of the ecology supported by the water environment. We will identify opportunities for co-operation on the development of catchment management initiatives that will increase protection of drinking water sources.

This will form a key part of the National Water Resources Plan and Drinking Water Safety Plans with the initial identification of appropriate measures aligned with the requirements of the WFD being completed by the end of 2017.

[WS2c] Develop long-term sustainable sources with resilience to climate change.

It is important that our water treatment and distribution systems are able to cope with impacts from both short term extreme weather events and longer term changes to water resources.

Climate change studies indicate that extreme weather events such as droughts and flooding resulting from intense or prolonged rainfall could become more common in the future.

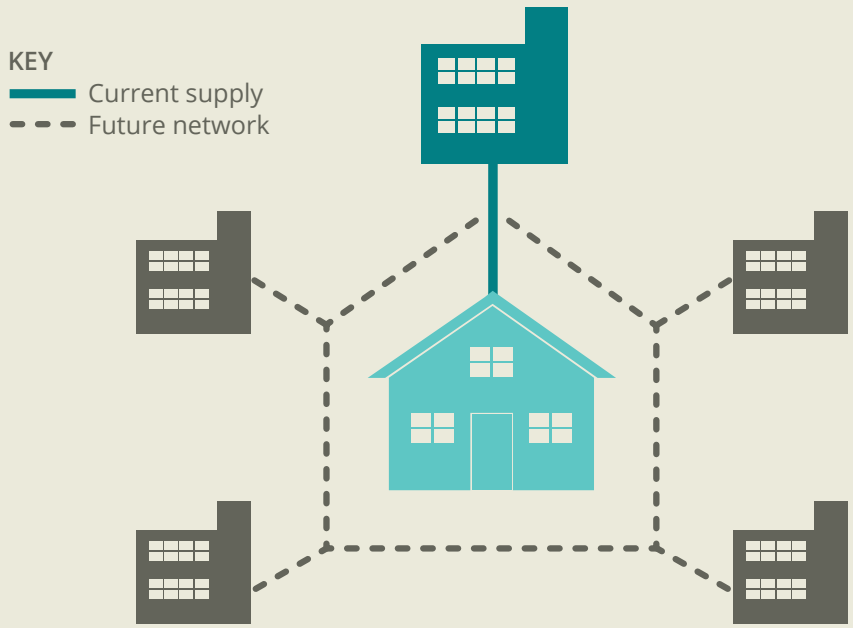
Irish Water will seek to develop new water sources and mobilise additional sources to support those at risk, in order to make our supplies resilient to potential climate change impacts.

[WS2d] Develop methodologies to build strategic resilience and network connectivity into resource planning.

Water supply zones that are reliant on a single source, water treatment plant or storage, are more vulnerable to short or longer term service interruptions due to contamination of a source or failure in a treatment process.

We will seek to interconnect water supply zones, where possible, or to develop back-up sources and treatment and storage facilities to ensure reliability and resilience in water supply. This will take account of the risk and impacts of supply failure and its mitigation will be a function of criticality and cost, taking account of funding available.

Figure 7 Graphical Representation of a Strategic Water Supply Network



Irish Water is developing better links between our water treatment works to enhance the resilience of water supply to our customers' properties.

[WS2e] Manage future regulatory requirements for abstraction licencing, headroom in treatment facilities and population growth.

We will work with the EPA and the Department of the Environment, Community and Local Government to manage the regulation of our water abstractions, on the assumption that new national regulations for abstractions are likely to be introduced in the near term. In respect of any new regulations, our paramount consideration will be to ensure that Irish Water can maintain supplies to its present and future customers.

The headroom capacity in some water treatment facilities, particularly in the Dublin area, is at critical levels. Irish Water has a target to maintain headroom capacity in the 10-20% range to ensure resilience of supply to meet peak demands, population growth and other demand increases. Where the scale and economic impact of supply failure is high, or the consequences to vulnerable customers would be significant, we believe that the available headroom should be at the upper end of this range, 20% over current daily need in large urban areas, 15% in regional gateway towns and 10% elsewhere.

[WS2f] Match water abstraction to availability and quality using surface water and groundwater sources.

Irish Water will take a full part in the process of developing river basin management plans and related programmes of measures to protect water sources from catchment impacts. These can include runoff from agriculture, forestry, tourism or other activities. Drinking water supplies are particularly vulnerable to organic pollution (leading to algal blooms) but also to other compounds such as metals, chemical or pharmaceutical residues.

Within our water safety plans, we will include consideration of these risks and their mitigation. Depending on the level of risk, this may require consideration of mitigation measures such as temporary shut-down or interconnection of multiple sources, where practicable.

[WS2g] Prepare Regional Water Conservation Strategies and implement on a phased basis.

Leakage is an immediate priority for Irish Water. Irish Water currently estimates that, nationally, 49% of water produced is lost to leakage, with the leakage lowest in the Greater Dublin Area and greatest in rural schemes with relatively long pipeline lengths per customer served.

We are currently carrying out detailed audits across the country and validation of the local area metering and valve controls forming District Meter Areas (DMAs) which have been installed since 2000 in most local authorities at a cost of over €100M. In many cases, the integrity of DMA boundaries has been compromised for local operational reasons so that accurate leakage calculations and leak targeting are not currently possible. We are working to re-establish the DMA infrastructure as a pre-requisite to a large scale programme of water conservation measures, which we plan to deliver on a regional basis.

We will prepare Regional Water Conservation Strategies that will deliver a targeted programme of leakage detection, leakage control, pressure management and leakage repair. This work will be implemented in a continuous programme over a number of investment cycles to bring leakage down and maintain it at sustainable economic levels. We will introduce pressure management measures and replace or rehabilitate water pipelines as required.

We estimate that 10% of our domestic customers have significant leaks, divided between internal leaks on fittings or plumbing and leaks on their external supply pipes. Our metering programme and our 'First fix' programme will assist in repairing the external leaks and will also encourage the repair of internal leaks by customers. We will analyse domestic metering data returns to build up a better picture of water usage and review demand calculations in all water supply zones during 2015 and 2016.

We plan on reducing leakage across all schemes to less than 38% by the end of 2021, 30% by the end of 2027 and will work to achieve a sustainable economic level of leakage, by 2040. Experience from the UK indicates that an economic level of leakage is in the region of 18-22% of water treated.

WS3: MANAGE WATER SUPPLIES IN AN EFFICIENT AND ECONOMIC MANNER

[WS3a] Adopt an asset management based approach to capital maintenance and capital investment.

Irish Water assets comprise our rights to abstract water from specific water bodies our reservoirs, extensive pipe networks, pumping and storage systems, treatment plants, buildings and other equipment. We recognise that robust and reliable information on the condition of our water assets, capacity and their future lifespan is vital to inform future investment plans and to ensure that assets are replaced or upgraded when necessary.

We have developed a national Geographic Information System (GIS) into which all of the available water network information from the local authorities has been mapped. This is reasonably comprehensive for the public water mains following major surveys as part of water conservation studies over the past 10 years. Where data is available, it is not always complete with regard to the size, material, condition or age of assets, all of which is useful information. The presence and location of fittings (valves, hydrants, manholes) and connections is also very important. Ongoing surveys will be needed to upgrade and increase the reliability and value of these asset datasets.

[WS3b] Optimise the unit cost of water supply through proper water resource and treatment planning.

Minimising the unit cost of delivering water to the customer whilst meeting environmental compliance will result in the rationalisation of water supply areas over time and, subject to funding ability, will focus on a smaller number of high quality, sustainable sources with standardised treatment processes. This rationalisation approach will be developed within the National Water Resources Plan by the end of 2017.

[WS3c] Prepare and implement demand management and customer education strategies.

Demand management encompasses activities to manage the use of water as a sustainable resource whilst protecting the environment.

As the Regional Water Conservation Strategies referred to in [WS2g] are implemented, the focus on customer demand management in combination with reduced leakage will ensure costs for water abstraction, treatment and distribution are reduced. Demand management will be facilitated through the domestic metering programme, with water use figures provided on quarterly bills and the potential for customer savings for low water use.

We will support education on water usage to encourage reduced water demand across both domestic and commercial water users. This will focus on the 'value of water' and how our actions and activities impact on our water demand and the implications for the environment, levels of service and costs to customers. The introduction of meters to measure domestic water usage at individual properties will facilitate this.

We will promote the reuse of grey water and water efficient domestic appliances, plumbing and fittings. We will also prepare and enforce standards on plumbing and fittings in relation to connection agreements. We will provide specific advice to our commercial and industrial customers on how to reduce water usage, thereby assisting our drive towards minimising abstraction.

[WS3d] Optimise capital and operational investments in water supply.

We will develop detailed cost benefit analysis and prioritisation models for all strategies and projects that deliver best value for our customers and satisfy our regulators (CER and EPA). The assessment of capital investment projects will follow a process with key decision points and detailed options assessment to ensure that the most cost effective alternatives are selected.

Within the project planning and development process, we will engage with all stakeholders including regulators, planning authorities, landowners, fisheries, our customers and other interested parties and work with all concerned in a collaborative basis. This will assist towards delivering our projects and programmes in a timely and efficient manner, minimising add-on costs.

Indicators and Targets

Indicators and targets for ensuring a safe and reliable water supply are presented in the table below.

ENSURE A SAFE AND RELIABLE WATER SUPPLY					
Indicators	**Definition**	**Current Baseline**	**End of 2021 Target**	**End of 2027 Target**	**2040 Target**
AIM WS1	Manage the Sustainability and Quality of Drinking Water from Source to Tap to Protect Human Health				
Drinking Water Microbiological Standards	% of national samples meeting microbiological compliance standards	99.82% (based on currently available data)	99.99%	99.99%	99.99%
Boil Water Notices	Notices in place >200 days	23,000 people on notices (2014)	0 people on notices	0 people on notices	0 people on notices
Treatment Plants on the EPA 2013 RAL	Carry out Remedial Action at all WTPs on the EPA's 2013 RAL	126 WTPs on the 2013 RAL (list Appendix 1)	100% of required remedial action undertaken		
Drinking Water Lead standards	% of national samples meeting Lead Compliance Standards sampled in the public network.	Estimated 85–95% meeting standard of 10µg/l*	98% meeting standard of 10µg/l**	99%**	99.5% meeting standard of 10µg/l
Drinking Water Chemical Standards	% of national samples meeting chemical compliance standards	99.51% (based on currently available data)	99.75%	99.90%	99.90%
Drinking Water Trihalomethane Standards	% of national samples meeting THM compliance standards	90.3% (based on currently available data)	93%	99%	99.50%

* To be established through a comprehensive national monitoring programme
** Based on technological alternative to lead replacement being available

ENSURE A SAFE AND RELIABLE WATER SUPPLY					
Indicators	**Definition**	**Current Baseline**	**End of 2021 Target**	**End of 2027 Target**	**2040 Target**
AIM WS2	Manage the Availability, Sustainability and Reliability of Water Supplies Now and into the Future				
Water Supply Interruptions	Average hours of supply interruption per property served (per year) - hours lost due to water supply interruption for 3 hours or longer (planned or unplanned)	Not currently available. To be defined by end of 2016	Transition from unplanned to planned supply interruptions with targeted reduction in number of interruptions	On track to achieving long term target	0.13 hours lost per annum - planned and unplanned interruptions
Water Pressure	% of properties at or above reference level (minimum of 15 metre pressure head at property meter)	Not currently available. To be defined by end of 2016.	From 2019, 2% per annum decrease in properties below pressure reference level	On track to achieving long term target	99.9% receiving appropriate pressure
AIM WS3	Manage Water Supplies in an Efficient and Economic Manner				
Leakage	Leakage expressed as a % of treated water put into the distribution system	Approx. 49% of treated water	Less than 38% of treated water	Less than 30% of treated water	Achieve Sustainable Economic Level of leakage (*currently considered 18 to 22% in the UK)
National Water Resources Planning (NWRP)	Implement National Water Resources Plan	Large number of small unsustainable Water Treatment Plants (WTPs) (Circa 900 in total). (Define the appropriate number of WTPs based on NWRP to be developed and implemented by 2018)	Rationalisation of WTPs & Water Supply Zones. Target reduction to 780 WTPs.	Continue programme of rationalisation base on cost benefit and available funding	Fully implement NWRP target for optimum number and scale of water treatment plants