

Chapter 5

Objective:

Provide Effective Management of Wastewater



Our Strategic Aims

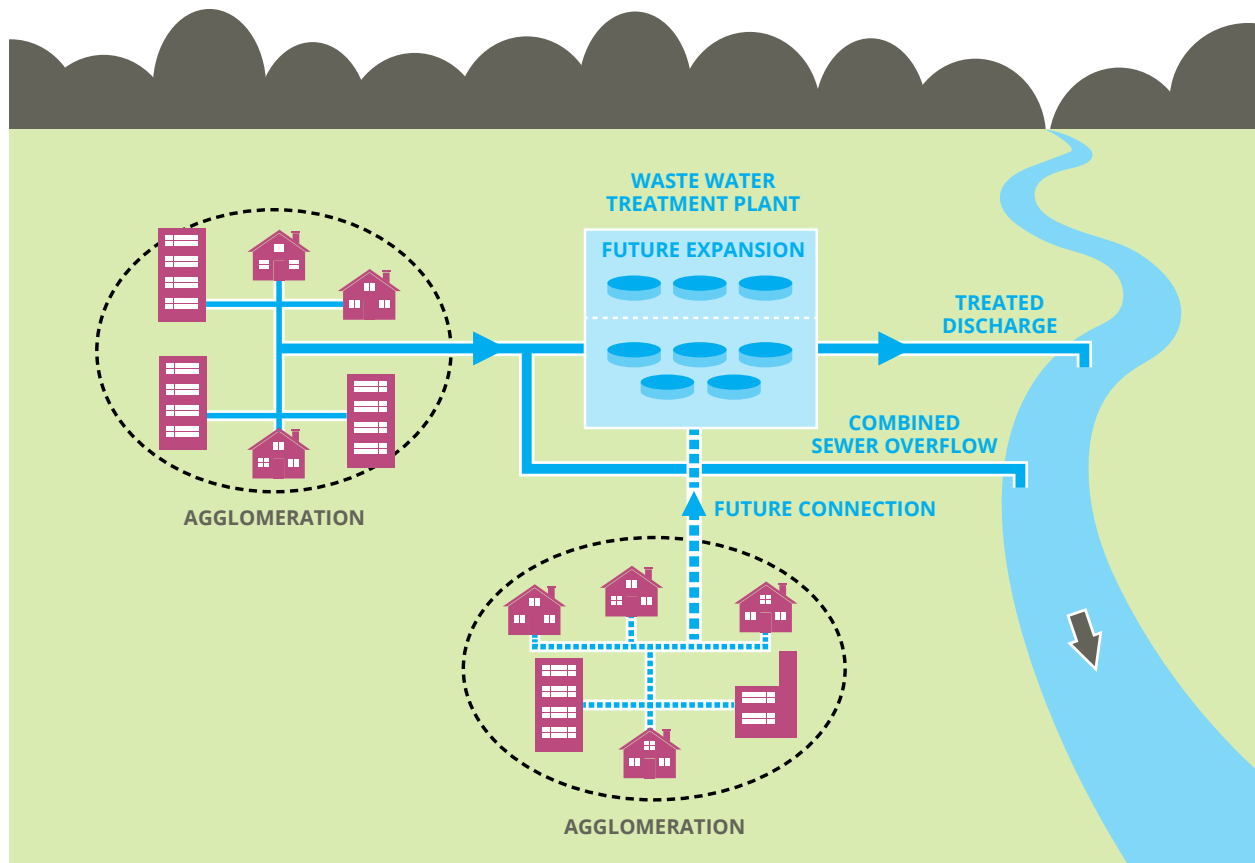
- Manage the operation of wastewater facilities in a manner that protects environmental quality.
- Manage the availability and resilience of wastewater services now and into the future.
- Manage the affordability and reliability of wastewater services.

Introduction

Providing an effective wastewater management system for the collection and treatment of effluent is essential to protect the environment and public health. The treatment of wastewater to appropriate standards prior to its discharge to watercourses safeguards water used for drinking water abstraction, bathing, fishing and other recreational activities. A graphic illustrating the elements of a wastewater treatment system is presented below.

This chapter details the current situation in terms of wastewater management, the challenges that Irish Water faces and our strategies for tackling these challenges. Performance targets against which our future progress can be assessed are also presented.

Figure 7 Wastewater Treatment System



The Current Situation

Over 1,000 separate wastewater treatment plants and collection networks currently process our wastewater in Ireland. While some of our wastewater treatment plants have enough capacity to cope with their effluent loads, others do not. We have many smaller communities and a number of large coastal urban centres without any effective wastewater treatment. In addition, many communities are served by individual septic tanks or private plants that are outside the scope of Irish Water's remit.

The legislative context for provision and licencing of appropriate wastewater treatment infrastructure in Ireland is governed by the Urban Wastewater Treatment Regulations (SI 245 of 2001) and the Wastewater Discharge (Authorisation) Regulations (SI 684 of 2007). All discharges from wastewater collection systems and treatment plants throughout the country which serve an agglomeration of greater than 500 PE (population equivalent) are required to be issued with a Wastewater Discharge Licence from the Environmental Protection Agency (EPA). Discharge licences set out the monitoring and compliance requirements in respect of treated effluent discharges to the receiving watercourse. All discharges from wastewater collection systems and treatment plants which serve an agglomeration of less than 500 PE (population equivalent) are required to be issued with a Wastewater Discharge Certificate from the Environmental Protection Agency (EPA).

Under the previous funding model, investment in wastewater collection and treatment was the responsibility of the local authorities. This approach did not encourage strategic investment planning at a regional or national level. One consequence was that investment was concentrated in larger urban centres to address legislative requirements, at the expense of smaller development centres where a rapid expansion of housing had led to increased pressures and demands on outdated treatment systems. This has resulted in a large number of small schemes with either no treatment or unacceptable treatment which does not meet the requirements of the legislation.

At the same time, collection systems have developed in an ad-hoc manner. Older urban areas are served by combined systems which accept stormwater run-off and foul flows. Such systems present a risk of flooding and to offset this risk, many are provided with overflows which discharge excess flows to rivers and streams in times of heavy rainfall. These are referred to as Combined Sewer Overflows (CSO's) and where the overflows spill too frequently, or where the receiving stream is too small, they can be a source of pollution.

Key Challenges

As a minimum, discharges from wastewater treatment plants are required to comply with the standards of treated effluent quality stated in the Urban Waste Water Treatment Directive (UWWTD) and any further standards as licenced by the EPA. Many of the discharges from our wastewater treatment plants do not comply with standards specified (either in the Directive or in the Wastewater Discharge Licences) due to overloading, lack of investment and in some cases poor operational procedures. As a consequence, an Infringement Case has been initiated by the European Commission on 71 agglomerations which did not meet the requirements of the Directive in 2011. A key challenge is to ensure that compliance is achieved in a timely and cost effective manner through operational improvements and upgrading and replacement of assets. Investment must be prioritised to where the environmental benefit is greatest and growth is occurring.

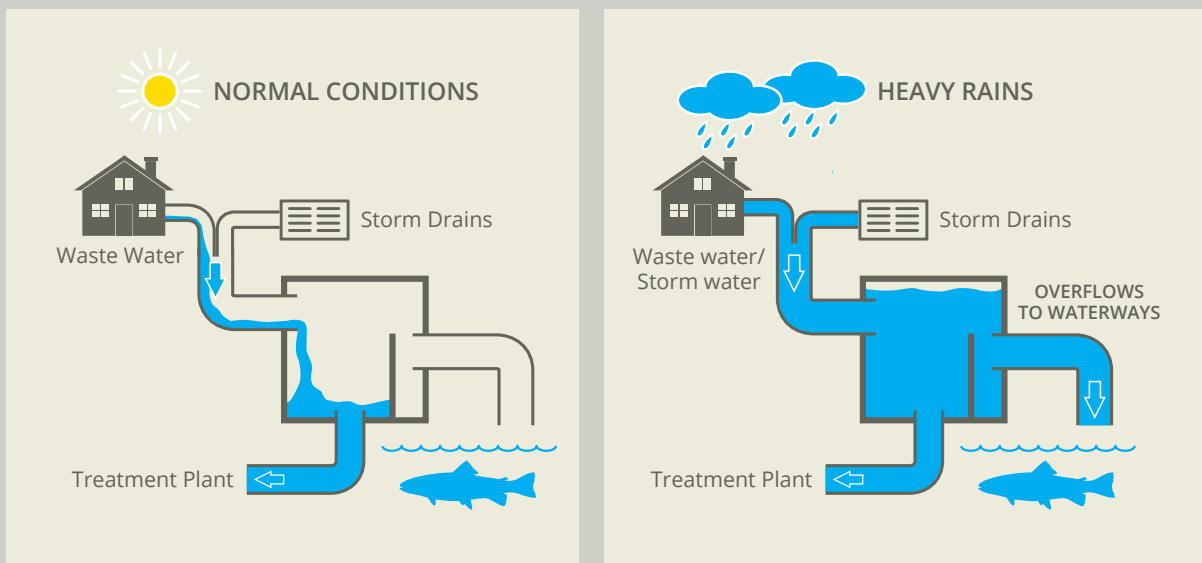
A large proportion of our urban sewer networks function as combined systems carrying both wastewater and surface water runoff from impermeable hard-standings (e.g. roads, pavements, roofs of buildings, car parks). During periods of heavy rain, excess surface water run-off mixes with effluent and this can result in discharges through combined sewer overflows (CSOs) directly into watercourses. Such discharges can cause serious pollution from intermittent wastewater spills. Our challenge is to understand how these systems are operating and to design and implement appropriate interventions to mitigate the impact of discharges on the environment.

Currently, we have high volumes of infiltration of groundwater entering the wastewater collection networks due to leaky sewer pipes. This infiltration, together with peak flows in high rainfall and the variability of loads, represents a significant challenge to the efficient operation and performance of collection and treatment systems. In coastal areas, salt water intrusion has further adverse impacts in terms of plant corrosion and inhibition of the biological treatment process. The challenge of infiltration to sewers mirrors the leakage issue in water mains in that it is extremely difficult to quantify and resolve.

Combined Sewer Overflows (CSOs)

CSOs are an inherent and necessary part of our sewer network as constructed. They act as relief valves to the network during periods of heavy rainfall without which foul effluent would back-up the pipelines causing blockages and flooding of properties. While these discharges should only occur during heavy rainfall which results in dilution of the foul effluent prior to overflow many of the existing CSOs are inadequately designed to retain solid waste resulting in a threat to environmental standards.

A graphic of the operation of a CSO is presented below.



No national Standard Operating Procedures (SOPs) are in place for the collection and treatment of wastewater and their development and implementation is a high priority.

In many areas, there is limited knowledge of the location and condition of below ground assets. This requires significant surveys and upgrading of the GIS records, development of the system models and a process for keeping them up to date. Knowledge of networks is a pre-requisite for the efficient prioritisation of network improvements to deliver environmental improvement and to enable new development in a cost effective way.

What Our Customers Can Expect from Us

In the future our customers can expect us to provide an effective wastewater collection, treatment and disposal system, which protects human health and the environment whilst providing capacity for social and economic growth. Our objective is to ensure compliance with our discharge licences, with the Urban Wastewater Treatment Regulations and other relevant legislation for all of our wastewater discharges. Recognising that the scale of the challenge will require a number of investment cycles and will involve major investment, we must ensure that the solutions are appropriate and cost effective.

Case Study

Lower Cork Harbour Main Drainage Scheme

The Cork Lower Harbour Main Drainage Scheme (Cork LHMDs) includes the population/industrial centres of Cobh, Carrigaline, Crosshaven, Passage West, Monkstown, Glenbrook, Ringaskiddy Shanbally and Coolmore. The existing sewer network serving the Lower Cork Harbour area comprises mainly combined sewer systems. Wastewater from Cobh, Carrigaline, Passage West/Monkstown and Ringaskiddy is currently discharged following preliminary screening or untreated into the Harbour. This is in breach of the Urban Wastewater Treatment Directive

Wastewater from the Cork Lower Harbour area will now be transferred to a new wastewater treatment plant at Shanbally (north west of Carrigaline) and treated effluent discharged utilising the existing IDA outfall discharging to the Harbour at Dognose Bank. The scheme includes the construction of associated pumping stations and new/upgraded sewers, rehabilitation of existing sewers and surface water separation where economically viable. The scheme has been approved by An Bord Pleanála and construction is due to commence in 2015.



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 WW1 - Manage the operation of wastewater facilities in a manner that protects environmental quality	
WW1a	Prepare and implement a Wastewater Compliance Strategy.
WW1b	Produce appropriate guidance documentation and Standard Operating Procedures.
WW1c	Develop and implement Capital Investment Plans on a prioritised basis to progressively achieve compliance.
WW1d	Manage the wider potential environmental impacts associated with the construction and operation of wastewater systems.
Aim WW2 - Manage the availability and resilience of wastewater services now and into the future	
WW2a	Implement risk assessments for all agglomerations in terms of short, medium and long term risks to customer service.
WW2b	Manage existing wastewater assets and plan for new assets based on short, medium and long term sustainability.
WW2c	Identify properties at risk of flooding from combined sewers, and implement measures to reduce risk on a phased basis.
WW2d	Identify and manage critical wastewater assets.

Strategy	Purpose	
Aim WW3 - Manage the Affordability and Reliability of Wastewater Services		
WW3a	Adopt an asset management based approach to capital maintenance and capital investment.	To optimise the lifecycle of assets, extend asset life and reduce operating costs.
WW3b	Develop and implement strategies and standards to minimise the unit costs of wastewater treatment including standardising treatment processes.	To optimise costs and meet the various appropriate discharge requirements by availing of the best technologies and extending the usage of standardisation, automation and control systems.
WW3c	Optimise energy consumption in wastewater treatment plants and collection systems.	To reduce energy consumption across all installations thereby reducing operating costs through efficient plant and process selection and maximising energy recovery opportunities.
WW3d	Ensure adequate governance and control of discharges to the sewer network, having regard for best practice and value.	To ensure that discharges from the trade sector are controlled and managed to minimise loads at source, thereby reducing loads to treatment.
WW3e	Engage with regulators and stakeholders.	To give certainty with regard to customer charges and to develop strategies for future growth and investment in infrastructure.
WW3f	Optimise capital and operational investments in wastewater services.	To minimise costs while maintaining a compliant and sustainable level of service.

WW1: MANAGE THE OPERATION OF WASTEWATER FACILITIES IN A MANNER THAT PROTECTS ENVIRONMENTAL QUALITY.

[WW1a] Prepare and implement a Wastewater Compliance Strategy.

We will develop a Wastewater Compliance Strategy setting out a pathway to ensure that the discharges from the wastewater treatment systems that we manage comply with the water quality standards required by the Urban Waste Water Treatment Directive (UWWTD) and to support the objectives of the Water Framework Directive. We will continue to investigate all wastewater treatment plants that are failing or at risk of failing to meet the UWWTD and prioritise these for remedial work or upgrades.

Combined sewer overflows (CSOs) will be addressed as a component of the Wastewater Compliance Strategy. We will look to international best practice to guide us in the development of design standards and will use network modelling simulation where appropriate to determine the performance and operation of CSO structures. We will then develop plans for remedial measures where required. Waste Water Discharge Licences control all discharge points from the agglomeration including CSOs. We recognise the challenge of achieving compliance at an affordable cost and the need to prioritise in the early investment periods to secure the maximum environmental benefit from the available funds.

In our priority programme for short term investment, we are developing solutions to address the requirements highlighted in the Infringement Case taken by the European Commission on the 71 agglomerations, together with the full list of urban centres currently without treatment and a number of high priority sites identified by EPA where serious pollution is noted and where designated bathing areas are affected by wastewater discharges.

[WW1b] Produce appropriate guidance documentation and Standard Operating Procedures.

There are currently no national Standard Operational Procedures (SOPs) to carry out maintenance, inspection and operational duties on wastewater treatment plants. This has led to inconsistencies in treatment plant performance and variations in operational costs due to the different approaches used previously by local authorities. We will develop national rules for effective wastewater system management in accordance with international best practice and will prepare SOPs including staff training and maintenance regimes across the range and scale of our wastewater treatment plants and collection networks. In developing these, we are drawing on proven processes developed in other high performing water utilities which we will adapt for Irish conditions during 2015.

We will initiate public education and information campaigns in order to inform customers of the impacts of fats, oils and greases and inappropriate material such as pharmaceuticals, baby wipes, nappies and sanitary towels being discharged into the wastewater system.

Unexpected wastewater incidents (for example blockages, pollution, public complaints) require planned management to correct and minimise the impact of an event. We will develop, update and maintain Wastewater Incident Response Plans for all our wastewater systems which will be managed locally through the service level agreements with local authority staff. These plans will document the procedures, processes and information to support the management of an incident. We will develop and maintain an Emergency Response Plan with regard to provision of wastewater services, in accordance with 'A Framework for Major Emergency Management' published by the Inter-Departmental Committee on Major Emergencies, so that we can respond when called upon to support the principal response agencies in reacting to and managing major emergencies.

[WW1c] Develop and implement Capital Investment Plans on a prioritised basis to progressively achieve compliance.

Where non-compliance arises from inadequate treatment processes or capacity constraints we will need to plan the necessary capital works to increase capacity and efficiency of treatment plants. Where feasible, minor capital investments focusing on process upgrades and bolt on solutions will be deployed as permanent or interim measures. Where larger capital works are required, we must have regard to the priority of compliance with the UWWTD standards, growth, available funding and the need to achieve optimum environmental benefit.

We recognise that we cannot address all of the compliance issues in the short term due to funding constraints and the need for a much greater understanding of the wastewater asset base and receiving environments on which they impact. This will require major surveys of our assets and the development of models of both the networks and the receiving water bodies. By adopting this approach future investments will be targeted and efficient and will deliver optimum benefit.

We will also rehabilitate, upgrade and replace wastewater collection pipelines that have significant structural and service defects which can be identified through surveys and investigations. This will be a long term programme having regard to the scale of the works, the lack of data on sewer condition and the need to prioritise critical infrastructure.

[WW1d] Manage the wider potential environmental impacts associated with the construction and operation of wastewater systems.

The construction and operation of our wastewater treatment plants and networks can result in environmental impacts due to noise, dust, odour and other factors. These can be mitigated by utilising appropriate design, construction and operational standards. Irish Water will follow a best practise standardised approach to the planning and execution of our works, including a high level of public engagement at key stages in the process.

The planning and construction of all new wastewater infrastructure will undergo appropriate environmental assessment as part of the relevant statutory processes. These studies will optimise site selection, identify site specific constraints associated with sensitive receptors (for example plants, animals, built heritage and humans) and develop mitigation measure to be adopted during the construction and operation of the new plant. Robust and well-engineered solutions which are sensitive to the environmental context will enable Irish Water to develop wastewater systems that can be built and operated without excessive adverse impact on communities and the wider environment.

WW2: MANAGE THE AVAILABILITY AND RESILIENCE OF WASTEWATER SERVICES NOW AND INTO THE FUTURE.

[WW2a] Implement risk assessments for all agglomerations in terms of short, medium and long term risks to customer service.

We will prepare risk assessments for all agglomerations served by our wastewater treatment systems to determine short, medium and long term risks to the effective provision of wastewater services. Risks include the flooding of properties, equipment failure, non-compliance of discharges, environmental pollution and capacity constraints. These risk assessments will be used to plan investment and mitigation measures.

As we obtain data regarding our below ground assets, we will develop hydraulic models of all our networks so that we can simulate high flow conditions and identify bottlenecks within the system which need to be addressed. We will supplement these with internal CCTV surveys and other investigations to identify critical defects.

The most persistent risks to disruption of wastewater services, particularly in urban areas, are blockages due to the accumulation of grease or non-biodegradable material. We are developing a national fats, oils and greases (FOG) strategy to effectively manage these discharges and seek to eradicate them at source.

[WW2b] Manage existing wastewater assets and plan for new assets based on short, medium and long term sustainability.

We will work with the EPA and other stakeholders in a catchment based approach to ensure sustainable wastewater management. This approach will consider all effluent discharges into each catchment's water bodies (both from our wastewater discharges and from others) and the ability of the water body to receive treated effluent whilst achieving the water body objectives under the WFD.

This approach recognises that water quality in catchment is impacted by multiple pressures, from various sources. Our objective will be for a balanced approach between the sectors, with impacts from wastewater services being addressed as part of a coordinated approach in each catchment, towards the achievement of agreed water body objectives.

[WW2c] Identify properties at risk of flooding from combined sewers, and implement measures to reduce risk on a phased basis.

Rain falling on roads, roofs and other impermeable surfaces, runs down gutters and drain pipes and into the storm drainage system. In older urban areas, developed pre 1970s, it was common to combine all drainage (foul and rainfall runoff) into a single combined sewerage system. Even where separate storm drainage is provided, it is common that a proportion of runoff is connected to the foul sewer, so that all sewerage systems have increased flows in times of rainfall.

Increasing urbanisation combined with more frequent and intense rain storms (due to climate change) can result in the capacity of some combined sewers being exceeded. This can cause flooding of properties causing distress to some customers.

Irish Water is committed to implementing mitigation measures to either reduce the probability that a combined sewer will flood or reduce the severity of the flooding where long term protection solutions aren't economically feasible.

We are putting in place a register to record and gather information on flooding events from combined sewers caused by inadequate capacity and due to other causes (blockages, collapses and equipment failures). The register will catalogue the extent, frequency and cause of flooding. It will inform our investment to enable us to prioritise areas that flood more frequently and to reduce the number of incidents of flooding caused by blockages, collapses and equipment failures.

Irish Water is committed to working with the key stakeholders (planners, land managers and developers) in developing long term sustainable solutions.

In the longer term, Irish Water will focus on research and development, improve sewer network models and investigate (in collaboration with local authorities) the use of sustainable urban drainage systems in combined sewer areas. These measures will enable Irish Water to promote an integrated urban drainage approach and to provide a more cost effective and more sustainable wastewater collection system.

This work will be carried out in close collaboration with local authorities and the OPW with whom Memoranda of Understanding are being developed. This will recognise that the operational response to flood events must be coordinated, to be led generally by the local authority, with Irish Water support. We will work with the CER to agree investment in flood risk abatement measures with a view to systematically reducing the numbers of properties at risk of flooding from our systems through each investment cycle. We will cooperate with other authorities when flood relief schemes are being developed to ensure that solutions are coordinated for effective relief for urban communities.

[WW2d] Identify and manage critical wastewater assets.

Sustained environmental performance depends on the reliability and robustness of each treatment plant and its associated network. Critical elements of both plants and networks have the potential to cause major impacts on services and the environment if they fail. We will identify these critical assets and prioritise their maintenance and management.

WW3: MANAGE THE AFFORDABILITY AND RELIABILITY OF WASTEWATER SERVICES

[WW3a] Adopt an asset management based approach to capital maintenance and capital investment.

We recognise that robust and reliable information on wastewater infrastructure is vital to inform future investment plans and target improvements where they are most needed. Having inherited the wastewater services infrastructure from the local authorities, we have commenced the integration of wastewater asset records to our GIS system and we are in the process of collating existing hydraulic models and other records (CCTV files) where they exist. These are being assessed for reliability and we are scoping the on-going studies which will gradually improve the extent and accuracy of these vital data and analysis systems.

As we develop our data systems, we will collect workflow data from the field, in conjunction with our operational and maintenance activities, which will inform the system data to enable a whole life asset management approach to strategic planning and investment decisions.

[WW3b] Develop and implement strategies and standards to minimise the unit costs of wastewater treatment including standardising treatment processes.

We will develop a number of cost reduction strategies as part of our focus on minimising the unit cost of delivering wastewater services whilst meeting environmental standards.

We will strive to standardise treatment processes countrywide using best-in-class, value-for-money technology and control systems. Standardisation will support our strategy of modular development of treatment plants in sync with growth of demand.

This will also enable more cost effective planned maintenance, use of spare parts and skills requirements in their operation. We will combine this approach with remote monitoring of all plants, recording critical parameters, flows, energy consumption and process indicators, enabling us to target where interventions are required and minimise plant downtime.

[WW3c] Optimise energy consumption in wastewater treatment plants and collection systems.

We will prepare and implement a Sustainable Energy Strategy, as outlined in under Aim EN1b of this document. Due to the energy intensive nature of pumping and wastewater treatment, we intend to implement measures to reduce power costs and carbon emissions including the delivery of “greener” technologies where possible. We will target replacement of older inefficient plant (pumps, air blowers), include variable speed controls and look to optimise energy recovery from wastewater sludge digestion.

[WW3d] Ensure adequate governance and control of discharges to the sewer network, having regard for best practice and value.

We will develop a Wastewater Source Control and Licencing Strategy to regulate and licence the volume and quality of wastewater that commercial customers discharge into our collection network. We will work with local authorities and the EPA in relation to granting and approval of industrial discharge licence applications to ensure that the discharged load is within the capacity of the network and treatment plant and that, where necessary, additional capacity can be planned and implemented.

We will survey the wastewater treatment loads and operational practices of our industrial customers and will provide advice on initial treatment of effluent and the means of meeting their operational wastewater requirements. We recognise the need for greater control of waste loads to our sewers and plants to prevent corrosion of our assets, failure of our treatment processes and issues with extreme odour generation.

We will also develop and implement a management system for the regulation of discharges of Fats, Oils and Greases (FOGs) to our networks.

[WW3e] Engage with regulators and stakeholders.

Through our project planning and development processes we will engage with all stakeholders including our regulators, planning authorities, landowners, our customers and other interested parties.

We must balance the requirements set by both of our regulators: meeting our requirements under the UWWTD and WFD for the EPA and ensuring that our customers are receiving a quality of service at an affordable cost as prescribed by the CER. To achieve these we will work together in a collaborative manner. We will agree a balanced approach to the delivery of services to both protect the customer and meet environmental objectives. This will be set out in our Wastewater Compliance Strategy.





























[WW3f] Optimise capital and operational investments in wastewater services.

We will develop detailed cost benefit analysis and prioritisation models for all works and strategies agreed with our regulators. We will promote the use of the most cost effective measures, and timing, in planning to achieve required wastewater discharge quality, with investments benefiting from best combination of capital and operational responses.

In the first instance, we will seek to maximise the capacity of existing assets through operational improvements supported by targeted capital investment.

Indicators and Targets

Indicators and targets for the effective management of wastewater are presented in the table below.

Strategic Objective	PROVIDE EFFECTIVE MANAGEMENT OF WASTE WATER			
	Definition	Current Baseline (Based on Current Knowledge)	End of 2021 Target	2040 Target
AIM WW1	Manage the operation of wastewater facilities in a manner that protects environmental quality			
Waste Water Treatment - Compliance with the Urban Wastewater Treatment Directive requirements	% of total population equivalent served by WWTP compliant with the UWWTD	 60%	 90%	 100%
Waste Water Treatment - Compliance with discharge Emission Limit Values (ELVs) to achieve WFD objectives	% of WWTP serving > 500 PE compliant with the EPA Discharge Licence ELVs	 35%	 60%	 100%
Pollution Incidents caused by Irish Water Waste Water Treatment Systems	Number of Category 2 (localised pollution) incidents reported to the EPA	      149	      75	    20
AIM WW2	Manage the availability and resilience of waste water services now and into the future			
Sewer Flooding; flooding which occurs when capacity of below ground assets is exceeded due to heavy rainfall, resulting in flooding inside and outside of buildings	Number of incidents of sewer flooding of properties	 Not available. Develop register to record number, cause, extent of flooding	 Accurate register of number of properties at risk of flooding from sewers. Historic high priority flood sites addressed	 80% reduction in number of properties which flood frequently (more than once in 10 years)
AIM WW3	Manage the affordability and reliability of waste water services			
Licensed Discharges to Sewers	% of national licensable trade effluent load discharged to sewers under conditions determined by Irish Water in accordance with polluter pays principle	 Not available. Commence establishment of register to trade effluents producers and apply a risk weighting to each	 50% of trade effluent load licensed covering priority classes of discharges	 > 95% of trade effluent load licensed (allowing for turnover of small businesses)