

Irish Water

**Interim Revenue Control 2017 - 2018**

**Investment Plan 2017 - 2021**



## Version Control

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## Executive Summary

**A long term investment perspective is required in order to strategically address the many deficiencies in Irish Water's (IW's) asset base.**

The repair and upgrading of our water treatment plants, wastewater treatment plants and water and sewerage networks will require a multi-billion euro investment programme over several investment cycles. IW's long term investment planning strategy has been set out in our 25 year Water Services Strategic Plan (WSSP) which was subject to public consultation and approved by the Minister for the Environment, Community and Local Government in 2015.

In preparing this Investment Plan, IW has identified a minimum total capital requirement of c. €13bn to address the known deficits. It is clear that there will not be sufficient funding available to deliver everything that is needed in the near term. IW must optimise investment decisions to ensure that we utilise scarce capital by making investments that deliver the best possible service improvements, while maximising value-for-money. The WSSP provides the overall framework to allow for investment planning.

The Commission for Energy Regulation's (CER's) Interim Revenue Control 2 (IRC2) covers a two year period, 2017 and 2018. As this is too short a time horizon for optimal investment planning, IW has developed an Investment Plan<sup>1</sup> based on a five year investment planning horizon, 2017 to 2021, which aligns to our WSSP and our seven year Business Plan, 2014-2021. The first two years of this Investment Plan constitutes our capital infrastructure submission for IRC2.

A significant part of the Investment Plan for IRC1<sup>2</sup> was the completion of projects which the Local Authorities (LAs) had committed to under the Water Services Investment Programme (WSIP) governed by the Department of the Environment, Community and Local Government<sup>3</sup> (DECLG). In IRC2, IW as a single national utility is taking a strategic, nationwide approach to asset planning and investment, and meeting customer requirements.

IW's primary function is to provide clean drinking water to customers and to treat and return wastewater safely to the environment. In providing these services we play a central role in enabling economic growth, protecting both the environment and the health and safety of our customers and the public. Consequently we must take a number of policy considerations into account when weighing up the relative merits of investment needs.

**To develop this Investment Plan we have applied a best practice approach, listened to the views of our customers and stakeholders and accounted for external constraints.**

With a deficient asset base, IW has had to select its investment portfolio in consideration of a wide range of competing priorities. To ensure both rigour and transparency, IW has developed a robust, evidence based asset investment planning process, based on leading

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<sup>1</sup> Under Section 34 of the Water Services (No. 2) Act 2013 (the 2013 Act), IW is required to prepare an Investment Plan for a period determined by the CER.

<sup>2</sup> Previously referred to as the Interim Price Control period (IPC1).

<sup>3</sup> Renamed as Department of Housing, Planning, Community and Local Government on 23 July, 2016

industry practice, i.e. the UK Water Industry Research (UKWIR) Common Framework for Expenditure Decision-Making.

This approach uses an Investment Planning Framework to assess each investment option based on its cost, benefits, and contribution to specific targets and needs. This allows the best combination of solutions to be identified based on legislative, business and financial constraints.

A key element of the approach has been meaningful consultation and engagement with our stakeholders and customers, both domestic and non-domestic. We published the Emerging Investment Plan (EIP) for consultation with stakeholders in January 2016. We also undertook a focused research study by speaking directly with 1,100 customers to examine satisfaction with the current levels of service and preferences for different service improvements. Through this research, we have been able to identify our customers' priorities for investment and to incorporate these into our portfolio assessment. We recognise in particular the importance which our customers place on drinking water quality, and on the resolution of leakage and lead issues.

Finally, the overall portfolio was considered from a funding, operability and deliverability perspective. We need to ensure that we can fund the investment, maintain existing service during implementation, and that IW has the capacity to deliver such a portfolio.

The Investment Portfolio outlined in this paper for the CER approval reflects a combination of these inputs; the Investment Planning Framework, engagement with our stakeholders and customers and wider constraints, such as funding limitations.

### **IW has set very challenging targets for the Investment Plan to 2021.**

IW recognises that many decades of under-investment had led to a legacy of deficiencies in our drinking water and waste water treatment plants and networks. This has been exacerbated by a lack of planned asset management and maintenance programmes. We have developed service level targets to 2021 which will begin to address these deficiencies. These 2021 targets draw on our WSSP, Business Plan, and the outcomes of our customer and stakeholder engagement process.

They include<sup>4</sup>:

- The number of Boil Water Notices in place for greater than 200 days being reduced from c. 4,057 to zero.
- The number of schemes on EPA's Remedial Action List being reduced from 71 to zero.
- Compliance with the parameters for Lead in Drinking Water being increased from 85% (estimated) to 98%.
- Network leakage volume reduced by 180 Megalitres per day.
- Rationalisation of 105 Water Treatment Works.

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<sup>4</sup> The full suite of our 2017-2021 targets are detailed in Appendix G.

- The Population Equivalent (PE) served by Wastewater Treatment Works compliant with the Urban Wastewater Treatment Directive increasing from 2.4m to 4.8m.
- Reducing the number of public wastewater agglomerations with no-treatment from 37 to zero.

In seeking to deliver these targets we are constrained by a number of factors, including financeability.

**The expenditure required to meet all our objectives is significant.**

By the end of the first IW investment period (IP1 2014-2016) we expect to have invested approximately €1.85bn in the water services network. The next Investment Period 2017-2021 (IP2) requires increased levels of expenditure to improve service delivery to our customers and meet our targets.

The IP2 Investment Planning Framework represents a major shift from the legacy model where expenditure was exclusively on new LA projects, focused within county boundaries, with very limited capital maintenance provision. IW has estimated that €4.8bn investment over the period 2017-2021 is required to deliver all of the Investment Plan targets. Table E.1 outlines the categories of spend within this €4.8bn investment. We refer to this portfolio as the Draft Investment Portfolio.

<b>Category</b>	<b>Target Spend €m<sup>5</sup> 2017-2021</b>
<b>National Programmes<sup>6</sup></b>	<b>1,377</b>
Drinking Water National Programmes	909
Wastewater National Programmes	402
Other Infrastructure National Programmes – National Labs, Inventory Management, Depots etc.	66
<b>Capital Maintenance - Water Services Above Ground (WSAG), Water Services Below Ground (WSBG), Wastewater Above Ground (WWAG), Wastewater Below Ground (WWBG)</b>	<b>813</b>
<b>Projects<sup>7</sup></b>	<b>2,614</b>
Drinking Water Projects	1,103
Wastewater Projects	1,511
<b>Total</b>	<b>4,804</b>

**Table E.1 – Draft Investment Portfolio 2017 – 2021 (2015 monies rounded)**

<sup>5</sup> All monetary figures in this paper are rounded to the nearest million 2015 monies unless otherwise stated.

<sup>6</sup> National Programmes refer to drinking water, wastewater and other programmes to bring asset performance to acceptable levels of compliance and capacity nationally e.g. Metering Programme, Resilience Programme etc.

<sup>7</sup> Projects relate to investment in specific assets e.g. Cork Lower Harbour WWTP and networks and Ringsend Wastewater Treatment Plant.

## **Our Investment Plan is constrained by a number of factors.**

The €4.8bn draft portfolio is unconstrained, i.e. it does not take into account any limitations in relation to funding or supply chain capacity. We have reviewed the €4.8bn draft portfolio to determine if it is (a) financeable, (b) deliverable, (c) operable and (d) meets the needs of our stakeholders and customers.

Our constrained funding has been assessed as c. €3.6 billion over the period 2017-2021. Our IP2 investment portfolio, detailed in Table E.2, reflects this funding limit and other constraints considered in our review.

We refer to this portfolio as the **Final IP2 Investment Portfolio**.

<b>Category</b>	<b>2017 €m</b>	<b>2018 €m</b>	<b>2019 €m</b>	<b>2020 €m</b>	<b>2021 €m</b>	<b>Total €m</b>
Wastewater Projects	186	264	300	277	206	1,233
Water Projects	156	186	201	178	119	841
National Water Programmes	78	82	111	133	187	591
National Wastewater Programmes	34	34	69	85	97	320
National Water and Wastewater Programmes	6	25	5	8	7	51
Capital Maintenance - Water Services Above Ground (WSAG)	10	11	10	28	42	100
Capital Maintenance Water Services Below Ground (WSBG)	39	41	65	75	87	306
Capital Maintenance - Wastewater Above Ground (WWAG)	4	8	10	20	30	72
Capital Maintenance - Wastewater Below Ground (WWBG)	4	8	12	19	30	73
<b>Total</b>	<b>516</b>	<b>660</b>	<b>783</b>	<b>824</b>	<b>805</b>	<b>3,588</b>

**Table E.2 – Final IP2 Investment Portfolio 2017 – 2021 (2015 monies rounded)**

The Final Investment Portfolio includes strengthened provisions in response to government Housing Policy Initiatives which will support social and economic growth. These programmes (c. €122m) will support network extensions and reinforcements to facilitate growth and economic development needs.

## **This Final IP2 Investment Portfolio is subject to approval by the CER.**

The IRC2 period runs from January 2017 to end December 2018 – the first two years of the IP2 five year investment plan. Within this two year period we are seeking infrastructure capital investment of €1.176bn (rounded), as per Table E.2.

IW has prepared this Investment Plan in accordance with section 34 of the Water Services (No.2) 2013 Act (“the 2013 Act”). It is being submitted to the CER as part of its wider IRC2 review. This document, including the Final IP2 Investment Portfolio and associated proposed expenditure, is subject to the CER’s approval.

IW will update this IP2 Final Investment Portfolio to reflect the CER determination on IRC2.

# 1. Introduction

## 1.1 Updated Investment Plan Submission

IW submitted a draft Investment Plan to the CER (CER) in March 2016. Since that submission, we have reviewed key elements of the Investment Plan to take account of emerging priorities and improved information on key investments. The outcome of this review is the inclusion of some additional programmes of investment and re-profiling of some existing programmes and projects whilst staying within the overall Irish Water Business Plan funding envelope. The key changes comprise:

- Inclusion of additional interventions in response to Government policies and in particular actions to promote housing and growth;
- Re-profiling of expenditure on projects to accommodate additional interventions and take account of improved information on schedules for some key projects; and
- Further development of the investment output targets for IRC2 and IP2 period.

The updated spend profiles are included within the summary tables in Section 4 and contained in the updated Business Plan Questionnaire being submitted to the CER in conjunction with this Investment Plan.

## 1.2 Background

Irish Water (IW) was established in 2013 to deliver water and wastewater services based on a national water services utility model under Government policy. We have taken responsibility for a large network of fragmented and disjointed water and wastewater assets, some of which date from the 19<sup>th</sup> century, providing services to a relatively dispersed population and with service provision based on existing LA boundaries.

The known portfolio of assets within the water and wastewater sector includes, approximately:

- 63,000kms of mapped water pipelines;
- 25,000kms of wastewater pipelines (estimated);
- Approx. 900 water treatment plants;
- Approx. 1,100 wastewater treatment plants;
- 1,610 water storage reservoirs and towers;
- 1,060 water pumping stations; and
- 1,163 wastewater pumping stations.

On a daily basis, these assets are used in the abstraction, treatment and delivery of c.1,700 million litres of drinking water, delivered through some 1,000 separate water supply areas (public water supply zones) to our customers. IW also collects wastewater from over 1,000 separate communities connected to the wastewater network (wastewater zones known as “agglomerations”) and treats c. 1,600 million litres of wastewater daily, before it discharges it back into our rivers, estuaries and coastal areas.

The transformation of our drinking water and wastewater services across 31 LA service providers into a single way of working to modern utility practice, while reducing costs and improving services, is a significant undertaking and will take time. It must be approached on

a structured and phased basis over a number of years and will require on-going commitment from all key stakeholders.

The repair and upgrading of our water treatment plants, wastewater treatment plants and water and sewerage networks will require a multi-billion euro investment programme over several investment cycles out beyond 2021. The investment required, to address all known deficits, is estimated to be c. €13bn.

Sufficient funding will not be available in the shorter term to deliver everything that is needed. IW will have to optimise investment decisions to ensure that it utilises scarce capital by making investments that deliver best possible service improvements, while maximising value-for-money.

### **1.3 The first IW Investment Plan**

The first Interim Revenue Control (IRC1)<sup>8</sup> set by the CER covered the period 1 October 2014 to 31 December 2016. The first IW Investment Plan covered the three year period 1 January 2014 to 31 December 2016 and was approved by the CER as part of the IRC1 review.

While staying within the overall allowances, IW has made significant progress since 2014. Our customers are starting to see the benefits of the targeted investment approach adopted. This is evidenced by:

- 28 Water Treatment Works (WTWs) being removed from the Environmental Protection Agency's (EPA) Remedial Action List (RAL). This is a first step in meeting our objective of achieving a zero RAL number;
- A reduction in the number of people on Boil Water Notices (BWN) from over 23,000 to c. 6,000<sup>9</sup> following the provision of new infrastructure at Castlerea, South Roscommon and Boyle. In addition, we have commenced a new scheme for North East Roscommon, which is currently on a BWN and we are about to commence the Central Regional Scheme in Kerry, which is currently regarded as high risk;
- It is estimated that c. 34 megalitres per day (Ml/day) of drinking water has been saved to end 2015 in the operation of the First Fix Leak Repair Scheme.
- In tackling leakage, we have reviewed the district metering infrastructure nationally and assessed it as only 50% operable. We are undertaking significant works to improve this to 90% operability through the delivery of the water conservation projects and we have achieved initial savings in network losses in early pilot schemes;
- Upgrade works have been completed in Clonakilty and Clifden and we have made significant progress in upgrading wastewater treatment, with major upgrades in progress in Swords, Naas (Osberstown), Leixlip, Galway, Dunmore East, Ardmore,

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<sup>8</sup> Previously referred to as the Interim Price Control period (IPC1).

<sup>9</sup> As of end 2015.

Carrigtwohill, Youghal, Shannon and Cork Lower Harbour. Work is now commencing in Bundoran, Killybegs and other towns; and

- A major programme of asset maintenance has commenced to repair known defects across the asset base and targeted programmes of work have been initiated to reduce risks and optimise water treatment (disinfection, pH correction). In addition, we have rehabilitated over 500kms of the worst performing watermains from the point of view of burst history.

We intend to build upon the work undertaken in the first Investment Plan and deliver further service improvements for our customers into 2017 and beyond.

## 1.4 Planning for the Future

The Investment Plan (IP2), 2017-2021, presents a portfolio of capital investment in the water services infrastructure which we believe delivers, to the greatest possible extent, the objectives of our WSSP and seven year Business Plan<sup>10</sup>, within the constraints of available funding.

IW faces many challenges over the coming years. These include a deficient asset base, non-compliant water supplies on the EPA Remedial Action List (RAL), high leakage levels resulting in reduced water resources, and non-compliant water supplies and wastewater treatment works. Both the WSSP and Business Plan outline how we intend to address these challenges and set out IW's vision for water services in Ireland.

### 25 year WSSP

Section 33 of the 2013 Act requires IW to prepare a WSSP. Our first WSSP was approved by the Minister for the Environment, Community and Local Government<sup>11</sup> (“the Minister”) in October 2015. The WSSP identifies the key objectives, aims, strategies and targets of IW over the next 25 years to deliver high quality drinking water and wastewater services to our customers in an economic and efficient manner.<sup>12</sup> The WSSP is a long-term vision for water and wastewater services in Ireland. IP2, as a five year plan, is the next step in delivering this vision. The six broad objectives of the WSSP are as follows:

- 1. Meeting customer needs in an economic and efficient manner:** meeting compliance standards and providing capacity for new development within efficiency targets set by our economic regulator, the CER;
- 2. Ensuring safe and reliable water supplies:** meeting EU and Irish drinking water quality standards, reduce the risk of non-compliance with the Drinking Water Regulations (SI 122 of 2014) and eliminate Boil Water Notices and Do Not Consume Notices;

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<sup>10</sup> Please refer to the following link [here](#)

<sup>11</sup> Renamed as Department of Housing, Planning, Community and Local Government on 23 July, 2016

<sup>12</sup> Please refer the following link [here](#).

3. **Providing effective management of wastewater:** meeting the minimum standards of the Urban Wastewater Treatment Directive (UWWTD) and licences issued under the Wastewater Discharge Authorisation regulations;
4. **Protecting and enhancing the environment:** meeting EU and national environmental obligations (Birds and Habitats Directives – Natura 2000) that give special protection to identified areas which are important for drinking water supply, nature conservation, bathing and fisheries;
5. **Providing drinking water and wastewater services for future population and economic growth:** meeting future requirements by making appropriate, timely and cost effective investments; and
6. **Invest in our future by understanding the Asset Base:** Studies are required to improve data confidence (data quality and quantity) and support further asset management and investment analysis.

Before finalisation, the draft WSSP was subjected to Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) under the Habitats Directive. It was then subject to public consultation prior to its adoption by the Ervia Board and submission to the Minister. A review of the implementation and operation of the WSSP will be conducted every five years.

In developing the WSSP, IW took account of:

- River Basin Management Plans;
- Local Area Plans;
- Development plans;
- Regional planning guidelines; and
- Infrastructure associated with Strategic Development Zones.

### *IW Business Plan*

The objectives of IW's Investment Plan are also informed by our seven year Business Plan, 2014-2021.<sup>13</sup> The Business Plan includes objectives to deliver a €5.5bn capital investment programme and €500m in capital efficiencies and cost savings. Other objectives include the implementation of best utility practice in operations, maintenance and capital investment.

## **1.5 Submission of Investment Plan 2 to the CER**

IP2 forms part of IW's submission to the CER for the Investment Period (2017 – 2021). IW is required to prepare an Investment Plan under section 34 of the 2013 Act. It is the second such Investment Plan submitted to the CER under the 2013 Act. Section 34(4) of the 2013 Act states that;

*An investment plan shall set out and particularise the investment in water services infrastructure that Irish Water considers necessary for the effective performance by it of its functions*

Furthermore section 34(8) states that;

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<sup>13</sup> Please refer the following link [here](#).

*Irish Water shall, when submitting a water charges plan to the Commission (CER) under section 22 (of the Act), provide the Commission with the most recent investment plan*

Therefore in advance of submitting an updated water charges plan to the CER, IW must first submit IP2 to the CER for review and comment, as part of its wider IRC2 process.

## **1.6 Interim Revenue Control 2**

Effective investment planning requires utilities to take a long-term view as to how the network will develop to accommodate customer, economic and environmental needs. The development of water services infrastructure can take a number of years from conceptual design through to planning permission and construction, therefore longer term plans are prudent.

The CER has decided that a second interim revenue control, known as Interim Revenue Control 2 (IRC2), will be put in place for the period 1 January 2017 to 31 December 2018.<sup>14</sup> However, to ensure that an effective long-term investment plan is developed for the network, IP2 is a 5 year investment plan<sup>15</sup>.

Therefore the application for funding only relates to the first two years of this investment plan, i.e. 2017 and 2018. This document, including the Investment Portfolio and associated proposed expenditure, is subject to the CER's approval. IW will update this plan to reflect the CER determination on IRC2. The final years of IP2 will be examined under the CER revenue control review that follows IRC2.

## **1.7 Impact of policy changes on IP2**

The targets set for the IP2 period are based on our WSSP and Business Plan objectives and stakeholder needs.

IW expects that new, or updated, customer, economic and/or environmental requirements will emerge during the IP2 period. There are a variety of policy matters where exact funding requirements have not yet been determined and which may impact on targets currently envisioned for end 2021 (and indeed end 2018). These include:

- The next cycle of River Basin Management Plans (RBMPs). The Water Framework Directive is implemented through RBMPs which contain “programmes of measures” needed to deliver the water quality targets. It is expected that the next cycle will complete in 2017.
- The 2013 Act allows for take-over of Group Water Schemes (GWS) by IW. A general requirement for a take-over is the agreement of at least two-thirds of the GWS members (S.95 Water Service Act 2007) or exceptional circumstances (S91 Water Services Act 2007),<sup>16</sup> such as a risk to public health. If a request is made by a GWS to be taken over, there may be instances where remedial works are needed to maintain health standards and/or improve quality of service. Multiple requests may

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<sup>14</sup> Please refer to section 2.4 of CER/15/106 [here](#).

<sup>15</sup> Under S34 of the 2013 Act, the CER determines the period of the Investment Plan.

<sup>16</sup> Please refer to the following link [here](#).

lead to significant capex requirements, which would need to be reviewed and approved by the CER.

- IW may be required to take over third party drinking water and wastewater assets located in residential estates connected to IW networks. Taking in Charge may also be required for stand alone Developer Provided Infrastructure where these are adjacent to IW networks. Under section 12 of the Act, the Minister may transfer the operation and ownership of such infrastructure. Any expenditure in this area would need CER approval; and
- Other policy matters, such as the need for the capitalisation of assets if a Storm Water Separation policy is approved by the CER.

IW may need to update this Investment Plan to accommodate matters, such as those listed above, within available funding. The next revenue control provides an opportunity to undertake a formal review of this Investment Plan.

## 2. Investment Planning Process

The first Investment Plan, covering the period 2014-2016, represented the transition from the capital programmes previously overseen and largely funded by the DECLG<sup>17</sup>.

This Investment Plan (IP2) is the next stage in IW developing a national picture of investment needs, beyond legacy contract commitments. However, there is still a significant element of LA project commitments included within IP2. We refer to these projects as “carryover projects”. IP2 represents a portfolio of investments, strategically determined by IW, taking into account the funding required to complete these carryover projects.

IW has taken a methodical approach to developing the investment portfolio outlined in this document. We have used an Investment Planning Framework to assess each investment option based on its cost, benefits, and contribution to specific targets and needs.

This framework allows an appropriate combination of solutions to be identified based on legislative, business and financial constraints. The solution may be through capital maintenance, a specific project investment, a national programme of expenditure or a combination of these investment categories. The Investment Planning Framework allows IW to (a) deliver on the targets identified in the most efficient way and (b) monitor and report to stakeholders on the progress made against achieving these targets and objectives.

Table 2.1 briefly outlines each step in the process for developing our investment portfolio. Further detail of our investment planning process and the steps involved are provided in Appendix B.

<b>Investment Planning Process</b>	
<b>Step 1: Define Objectives</b>	<i>We define the overall objectives of the Investment Plan. The Investment Plan is aligned to the 6 broad objectives in our 25 year WSSP and our Business Plan commitments to deliver efficiencies and cost savings in our investment activities.</i>
<b>Step 2: Understand the IW Asset Base</b>	<i>Understanding the asset base at a national level is central. We worked with the LAs to determine missing/ inaccurate data, started collecting GIS data and undertaking studies. Data gathering is an ongoing process and will, over time, steadily increase our knowledge of the asset base.</i>
<b>Step 3: Risk Assessment</b>	<i>A dataset of asset condition and performance was established (given data limitations). We began a process of risk assessment to identify assets which are at significant risk of failure (or have already failed). Compliance and other operational performance risks were then identified. A deterioration modelling approach was used to assess capital maintenance risks.</i>
<b>Step 4: Needs Identification</b>	<i>Asset failure reasons were identified. Reasons for failure include current limitations of the assets or failure to meet future regulatory compliance,</i>

<sup>17</sup> DHPCLG from 23 July, 2016

<b>Investment Planning Process</b>	
	<i>service standards or growth scenarios. A Statement of Needs was prepared for each asset in the investment portfolio, e.g. a WTW or WWTW identified in the risk assessment.</i>
<b>Step 5: Intervention Generation</b>	<i>This step involves the identification of asset upgrades, replacements or renewals, needed to meet the required service performance that will mitigate or eliminate the risk arising from the asset deficiency identified in Step 4. Collectively these are known as 'interventions'.</i>
<b>Step 6: Service Measure Framework (SMF)</b>	<i>All interventions and associated risks are placed on the SMF platform. Service Measures are a consistent approach to articulate service risk and assess the value of interventions against each other, by calculating pre and post intervention levels of risk. Each intervention is examined (in terms of service impact) against one or more of the Service Measures.</i>
<b>Step 7: Consultation with stakeholders</b>	<i>The values of Service measures, referred to in Step 6, are also informed by consultation with stakeholders. Valuation was investigated using customer research and stakeholder engagement.</i>
<b>Step 8: Plan Balancing</b>	<i>This involves the optimisation of intervention options by examining their contribution to specific targets. Optimisation allows budgetary constraints, asset performance, risk targets and performance levels to be set, which give the best combination of solutions to meet the targets identified.</i>
<b>Step 9: Business Decision Making</b>	<i>The final step was a review of the entire optimised list of interventions against IW business constraints, such as whether the list is financeable, deliverable, operable and meets stakeholder needs.</i>

**Table 2.1 – Steps in the Investment Planning Process**

Steps 1 to 6 involve technical analysis of the assets to assess risks, identify investment needs and potential investment options. These first six steps are discussed in detail in Appendix B.

The next section discusses Step 7, Consultation with Stakeholders, while section 4 discusses the final two steps, Plan Balancing and Business Decision Making.

### **3. Consultation with stakeholders**

Water and wastewater services are of critical importance to our society and economy. Following decades of under-investment, there are now many competing investment needs. Stakeholders, including our customers, have differing views on how these investment requirements should be prioritised. In a constrained funding environment, IW needs to understand and consider these views in order to ensure that we are appropriately balancing our available investment across competing areas. This investment balancing process is a key element of the value that we bring as a single national utility.

The importance of stakeholder consultation has also been recognised in national legislation and by the CER. Under the 2013 Act, IW is required to consult with the following parties when preparing an Investment Plan: EPA; Regional bodies (three Regional Assemblies); and Planning authorities (31 Local Authorities). Similarly, the CER has recommended<sup>18</sup> that IW should consult with customers and various stakeholders to understand their needs. Over and above these mandatory requirements, IW has also made a commitment in the WSSP that we will work closely and collaboratively with our regulators, customers and other stakeholders in all our planning, development and operational activities.

The engagement and consultation process that we have followed for this Investment Plan is set out below. Firstly, we describe the approach followed in relation to the wider sectoral stakeholders, including those identified in legislation and by the CER. Secondly, we provide details on how we have researched the views of our customers, both domestic and non-domestic.

#### **3.1 Stakeholder Consultation and Engagement**

IW used both new and existing channels to engage with stakeholder groupings on the Investment Plan. In particular, we:

- Examined relevant output from the WSSP engagement process undertaken in Q1 2015;
- Delivered presentations to the IW National Stakeholder Forum, which has been meeting on a quarterly basis since 2013;
- Used the new regional planning structure as a basis for meetings with the regional bodies and planning authorities;
- Undertook a formal consultation on the draft plan<sup>19</sup> with a wide range of stakeholders, including all statutory consultees, the Public Water Forum, and those recommended by the CER; and
- Provided briefings to stakeholders, individually or in groups, during Q1 2016.

Input received from the stakeholders during this process touched on a variety of investment and policy matters. In general, stakeholders' views can be summarised under the following themes, which are described in turn below:

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<sup>18</sup> As per CER/14/076 Advice to the Minister on the Economic Regulatory Framework for the public water services sector in Ireland

<sup>19</sup> Referred to as the Emerging Investment Plan

- Growth and the provision of water services to support economic development;
- Prioritisation of investment;
- Drinking Water Quality; and
- Specific investment proposals.

### ***Growth and the provision of water services to support economic development***

The basis of growth projections and the provision of water and wastewater services to meet economic development needs was highlighted as a key issue by stakeholders. Alternative approaches to projecting demand arising from growth were put forward (this is addressed in further detail in Appendix E).

Respondents commented on the important role of drinking water and wastewater services in supporting long term economic growth, attracting foreign direct investment, and job creation. The importance of meeting enterprise needs in Dublin and in key regional locations was highlighted. A number of respondents were of the view that the Investment Plan should provide for services in small towns and rural villages to facilitate social and economic growth and maintain sustainable rural communities.

### ***Prioritisation of investment***

Stakeholders commented on the need for prioritisation of investment and provided their views on suggested priority areas which included, but were not limited to:

- Providing sufficient water services capacity in Dublin;
- Providing services to support economic growth, including at strategic sites and business parks;
- Reducing leakage;
- Remediating overloaded wastewater treatment plants which are having a harmful effect on receiving waters; and
- Tackling plants and agglomerations where the EPA has identified a requirement for corrective action.

Stakeholders noted the importance of investment on a phased basis, based on evidence of demand, and only where a critical need has been identified.

### ***Drinking Water Quality***

A number of respondents raised issues on drinking water quality, including:

- Microbiological contamination, including cryptosporidium;
- Trihalomethanes (THMs);
- Lead;
- Pesticides; and
- Oil spillages.

In this regard stakeholders offered suggestions to improve the approach at catchment management level, including support for source protection.

### ***Specific investment proposals***

Stakeholders also gave their views on specific proposals for investment which were included in the Emerging Investment Plan. Comments addressed many areas, including:

- Stormwater separation;
- The taking in charge of Developer Provided Infrastructure (DPI);
- Scada/Telemetry;
- Research and Innovation; and
- The rationalisation of water supplies.

Further details on stakeholder views, together with the IW response in each case, are provided in Appendix E. In selecting the final portfolio of investments, IW has carefully considered these views in the context of available funding. In particular, we have recognised the requirement to strike an appropriate balance between addressing the performance deficiencies in our asset base and allocating sufficient funds towards planning and investing for the future.

### **3.2 Customer Research**

In order to ensure that a representative mix of customer views was obtained, we undertook a Customer Priorities study which was based on best practice from the UK water industry. This involved a face-to-face survey of c. 1000 domestic and 100 non-domestic customers.

In the survey, respondents were asked to rank different aspects of service in priority order. Service was defined in terms of 16 measures covering the following three areas:

- The quality of tap water;
- The availability of the water supply; and
- Wastewater and environmental compliance.

The results of the survey indicate that domestic and non-domestic customers share very similar views to each other.

Based upon the service improvements presented to customers, **drinking water quality** has the highest priority for customers, both domestic and non-domestic, followed by **leakage**. The importance of these two service improvements reflects that customers consider these to be 'fix all' solutions, i.e. fixing these will improve other aspects of service.

**Lead** in water is the next highest priority, for both domestic and non-domestic. There were high levels of awareness and understanding of this issue from media coverage and debate at the time that the survey was undertaken. The fourth highest priority was dealing with **internal sewer flooding**. Customers expressed the view that while the current level of service around internal sewer flooding is good, the impacts on customers when such incidents occur are so severe that it should remain a priority. This is a key area where the data available on customers at risk is incomplete and needs to be developed from models and empirical data.

There was considerable sympathy across customers for those affected by **water aesthetics** (discolouration, taste and smell), or affected by **drinking water restrictions** (e.g. BWN).

The overall ranking for proposed improvements for all customers combined is shown in Table 3.1:

Service Area Priority	Priority Weighting	Priority Ranking
Drinking water quality	1.000	1
Leakage	0.737	2
Lead in water	0.728	3
Internal sewer flooding	0.588	4
Water discoloration, taste & smell	0.575	5
Drinking water restrictions	0.565	6
External sewer flooding	0.542	7
Persistent low pressure	0.448	8
Supply interruptions	0.436	9
Water use restrictions	0.432	10
Connecting new properties	0.411	11
Sewage odour	0.383	12
Minor pollution incidents	0.311	13
Major pollution incidents	0.298	14
River water quality	0.239	15
Bathing Water Quality at Beaches	0.183	16

**Table 3.1 – Customer rankings of service area priority**

In addition to providing valuable insights on which service areas are most important to customers, the results were also used to infer or estimate the relative *value* of changes to each service measure. This ‘value’ estimation enabled IW to apply the principle of cost benefit in our assessment of investment options detailed in the previous section.

Further detail on IW’s customer research is provided in Appendix E.

## 4. Approach to Defining the Investment Portfolio

The outputs of stakeholder consultation and customer research were a key input to the final two steps in our Investment Planning process, *Plan Balancing* and *Business Decision Making*. Plan Balancing determines the draft Investment Portfolio, and Business Decision Making determines the final Investment Portfolio. These are described in turn below.

### 4.1 Investment Planning Process - Step 8 - Plan Balancing

This is a process whereby all investment options which have been identified in the preceding steps are assessed in a software tool against multiple criteria including budget, asset performance levels, service improvement targets and risk. The tool calculates the best combination of investments to meet the criteria which have been set. This combination of investments is the Draft Investment Portfolio, as summarised in Table 4.1 and broken out by the following investment categories:

- **Capital Maintenance:** This investment category is focused on ‘like for like’ replacement or refurbishment of worn out assets;
- **National Programmes:** This refers to water, wastewater and other programmes to bring asset performance to acceptable levels of compliance and capacity at a national level e.g. Disinfection Programme, Impounding Reservoirs Programme etc; and
- **Projects:** These are Water and Wastewater projects, including Major Projects, targeted at specific assets to achieve a quality, enhanced level of service or supply/demand balance objective.

Category	Target Spend 2017-2021 €m
<b>National Programmes</b>	<b>1,377</b>
Water National Programmes	909
Wastewater National Programmes	402
Other Infrastructure National Programmes – National Labs, Inventory Management, Depots etc.	66
<b>Capital Maintenance</b>	<b>813</b>
<b>Projects</b>	<b>2,614</b>
Water Projects	1,103
Wastewater Projects	1,511
<b>Total</b>	<b>4,804</b>

Table 4.1 – Draft Investment Portfolio 2017 – 2021 (2015 monies rounded)

Table 4.1 indicates that investment of €4.8bn is needed to deliver all of the Investment Plan targets to 2021, with 55% of the spend allocated to Projects and the remaining 45% to National Programmes and Capital Maintenance. This Draft Investment Portfolio is

unconstrained, i.e. it does not take into account any limitations in relation to funding or supply chain capacity. The impact of these limitations was assessed in Step 9, Business Decision Making.

## **4.2 Investment Planning Process - Step 9 - Business Decision Making**

This step involved assessing the Draft Investment Portfolio against IW's specific business constraints to examine whether it is practicable to implement. The draft Investment Portfolio was reviewed to determine if it is (a) financeable, (b) deliverable, (c) operable and (d) meets the needs of our stakeholders and customers. These limitations/constraints are discussed in turn below, before setting out the resulting impact and the final IP2 Investment Portfolio.

### *a. Financeability*

Investment of €4.8 billion would equate to c. €1 billion of capital investment per year out to the end of 2021. However, IW operates within a constrained funding model driven by external factors. Therefore the first limitation placed on the draft Investment Portfolio is financeability. We have assessed available funding to be c. €3.6bn over the IP2 period 2017-2021. Our final Investment Portfolio has been adjusted to reflect this limitation.

We expect that we will need to continue to reprofile forecast expenditure over the period to align to any changes in available funding. These may arise due to external policy-related factors, which in turn will affect our ability to meet our Investment Plan targets. The next Revenue Control period, beginning in 2019, provides an opportunity to undertake a formal review of the financeability of the remaining Investment Portfolio.

### *b. Deliverability*

Even if funding constraints could be addressed, IW would not be able to deliver all of the needed investments across the asset base in the 2017-2021 period. It is appropriate to ramp up the investment in some areas, for example National Programmes, in parallel with increasing capacity in the supply chain. Planning requirements, and the time required to successfully complete the associated application processes, would also act as a constraint.

The full draft Investment Portfolio was therefore reviewed, taking the deliverability of each project and programme into account. IW is confident that the final Investment Portfolio selected can be delivered. We are currently setting out our proposals in this regard in a supporting Delivery Plan, which is under development at present for implementation in 2017.

### *c. Operability*

'Operability' refers to whether IW can maintain existing service during implementation of the various capital projects and programmes. While some planned/unplanned outages are inevitable, the roll-out of each investment must be carefully managed so that it does not lead to a temporary degradation of service to our customers. This was a key consideration in reviewing the draft Investment Portfolio. All necessary amendments have been reflected in the final Investment Portfolio, which is being submitted for CER approval.

#### d. Acceptability

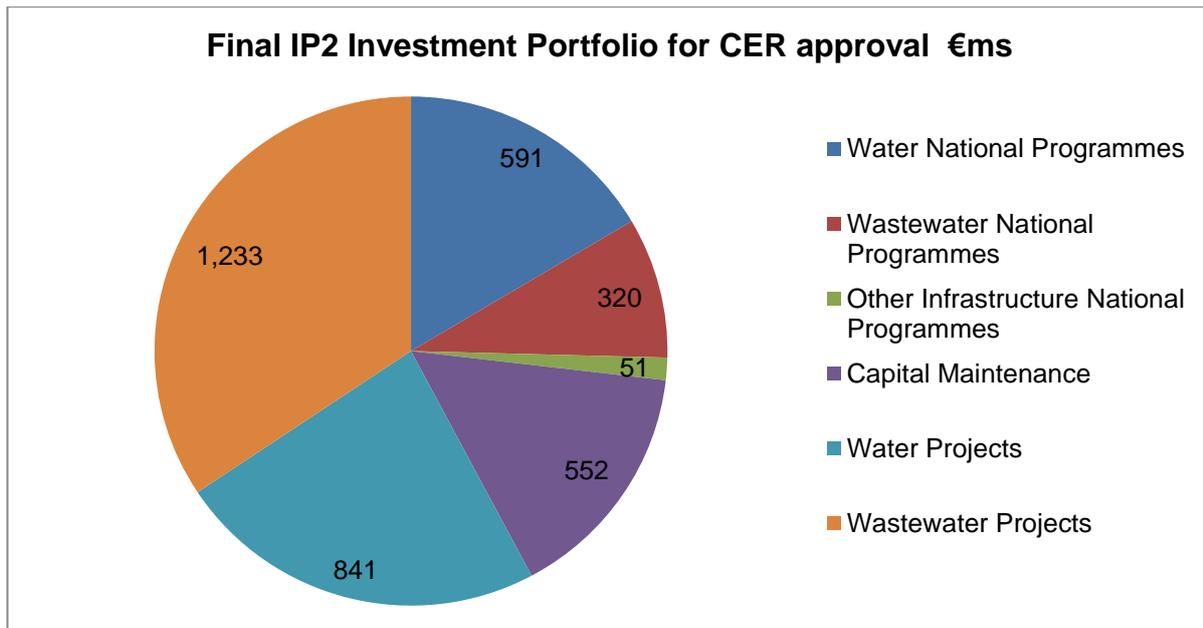
As discussed in section 3, a key element of IW's overall investment planning process has been meaningful consultation and engagement with our stakeholders and customers, both domestic and non-domestic. This provided a valuable perspective on the relative importance of different service improvements. The draft Investment Portfolio was reviewed to assess how the identified needs of our customers and stakeholders can be appropriately balanced within the available funding constraints. The review also ensured that the high priority attached by stakeholders and customers to the areas of Drinking Water Quality, Leakage, and Lead has been adequately reflected in the final Investment Portfolio.

### 4.3 Final IP2 Investment Portfolio

The outcome of the above Business Decision Making is a Final Investment Portfolio which is deliverable, operable and which reflects the investment priorities of our stakeholders and customers to the greatest extent possible, within a €3.6bn available funding constraint. This Final Investment Portfolio, which is being submitted to the CER for review and approval, is set out in Table 4.2 and the pie chart in Fig. 4.1, broken out by investment category.

<b>Category</b>	<b>Total €m 2017-2021</b>
<b>National Programmes</b>	<b>963</b>
Water National Programmes	591
Wastewater National Programmes	320
Other Infrastructure National Programmes – National Labs, Inventory Management, Depots etc.	51
<b>Capital Maintenance</b>	<b>552</b>
<b>Projects</b>	<b>2,074</b>
Water Projects	841
Wastewater Projects	1,233
<b>Total</b>	<b>3,588</b>

Table 4.2 – Final IP2 Investment Portfolio (2015 monies rounded)



**Figure 4.1 – Investment Portfolio for approval by CER (2015 monies rounded) Pie Chart**

Prior to the establishment of IW, capital expenditure was predominantly focused on individual projects, building new assets on a county by county basis. In general, very limited funding was allocated to the maintenance of existing asset performance.

Under the final Investment Portfolio submitted for CER approval, 42% of expenditure is allocated to National Programmes and Capital Maintenance. This is a more efficient approach than the legacy model and reflects the focus on improving service levels at a national level.

The annual spend profile for the final Investment Portfolio is provided in Table 4.3, showing a gradual ramping up of expenditure over the period in line with the profile of available funding. Capital Maintenance and National Programmes will absorb a greater share of expenditure in the latter years of IP2. In the early years, IW will still be completing a substantial number of projects which are carrying over from the 2014-2016 Investment Plan period. As these “carryover projects” complete, funding will become available for increased investment in the other expenditure categories.

Category	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m	Total €m
Wastewater Projects	186	264	300	277	206	<b>1,233</b>
Water Projects	156	186	201	178	119	<b>841</b>
National Water Programmes	78	82	111	133	187	<b>591</b>
National Wastewater Programmes	34	34	69	85	97	<b>320</b>
Other Infrastructure National Programmes	6	25	5	8	7	<b>51</b>
Capital Maintenance	56	67	97	142	189	<b>552</b>
<b>Total</b>	<b>516</b>	<b>660</b>	<b>783</b>	<b>824</b>	<b>805</b>	<b>3,588</b>

**Table 4.3 – Final IP2 Investment Portfolio Total Spend by category (2015 monies rounded)**

As can be seen from Table 4.3, within the IRC2 period (2017 and 2018), we are seeking CER approval of infrastructure capital investment of €1.176bn to deliver the first two years of this five year investment plan.

A full listing of the Capital Maintenance programmes, the National Programmes and Water and Wastewater Projects in the final Investment Portfolio is provided in Appendix C and summarised in the following sections.

#### **4.4 Final IP2 Investment Portfolio – Expenditure Categories**

Below, we set out a description of the three main capital expenditure categories – Capital Maintenance; National Programmes; and Projects.

##### **4.4.1 Capital Maintenance €552m**

Capital Maintenance is ‘like for like’ replacement or refurbishment of worn out assets. The objective of capital maintenance is to find the most cost-effective way of maintaining services, making best use of existing assets. Historically, capital maintenance in Ireland’s water services sector has been well below normal long-term maintenance levels. This was acknowledged by the CER in its IRC1 review.<sup>20</sup>

A failure to invest in capital maintenance results in an increasing number of asset failures which has a knock on impact on both costs and service to our customers. This simply defers necessary investment which results in further asset degradation and greater ultimate costs of remediation.

The capital maintenance deficit that has built up over decades in Ireland is difficult to quantify. If IW did not carry out any capital maintenance then the spend on reacting to asset failures would increase further over time and result in decreasing levels of service and performance for our customers.

IW has profiled Capital Maintenance expenditure of €552 million over the IP2 period, 2017-2021, which covers capital maintenance across the drinking water and wastewater network (above and below ground). The capital maintenance programmes for both drinking water and wastewater are outlined in Appendix C.

Capital Maintenance expenditure has been influenced by the Business Decision Making process, and particularly our customers’ needs. Customers identified Drinking Water Quality and Leakage as priority areas for investment in water services. On the wastewater side, internal sewer flooding is a key concern. Capital maintenance programmes over the period directly address these issues.

Proposed investment in Watermain Rehabilitation (€110m), Pressure Management (€12m) and Find and Fix (€138m) will target leakage reduction, whilst Water Above Ground Capital Maintenance (€100m) will target water quality improvements. On the wastewater side, Wastewater Below Ground Capital Maintenance (€71m) and other asset refurbishment programmes will target internal and external flooding issues.

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<sup>20</sup> Please refer to pg 11 at the following link [here](#).

Table 4.4 summarises the Capital Maintenance spend per year on water and wastewater, categorised by Water Services (WS) and Wastewater Services (WW), Above Ground (AG) and Below Ground (BG).

Description	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m	Total €m
WSAG	10	11	10	28	42	100
WSBG	39	41	65	75	87	306
WWAG	4	8	10	20	30	72
WWBG	4	8	12	19	30	73
<b>Total</b>	<b>56</b>	<b>67</b>	<b>97</b>	<b>142</b>	<b>189</b>	<b>552</b>

Table 4.4 – Final IP2 Investment Portfolio – Capital Maintenance (2015 monies rounded)

The graph in Fig. 4.2 shows the gradual increase in Capital Maintenance spend from €56m in 2017 to €189m in 2021. This level of spend is deemed necessary, deliverable and operable.

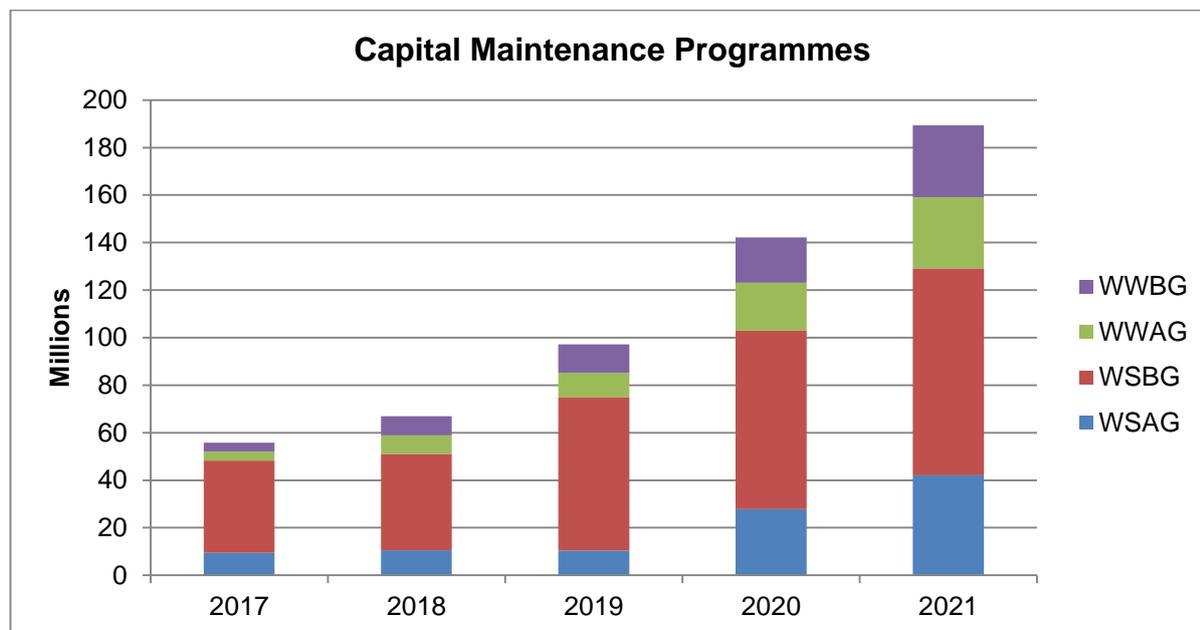


Figure 4.2 – IP2 Investment Portfolio – Capital Maintenance Spend Profile

#### 4.4.2 National Programmes €963m

A key focus of the Investment Portfolio is National Programmes, whereby IW will improve our asset information, performance and service levels at a national level, ensuring a geographic spread of investment.

The proposed National Programmes will deliver a wide range of improvements in both drinking water and wastewater schemes and will result in hundreds of plants being upgraded.

Key programmes to address customer and stakeholder concerns over the period have been identified within the available funding envelope. These include programmes to tackle risks

to drinking water quality (Water Treatment Programme €183m), lead in water (National Lead Programmes: Lead Service Pipe Replacement and Orthophosphate Dosing €174m) and leakage (First Fix €54m). In wastewater, the progression of Drainage Area Plans (€54m) which will identify network performance and flooding issues have also been included.

These programmes are detailed in Appendix C, split between Drinking Water, Wastewater and Other Infrastructure. The spend profile over the IP2 period, 2017 to 2021, is provided in Table 4.5. IW will ramp up expenditure on National Programmes towards the end of the period as funding becomes available.

Description	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m	Total €m
National Water Programmes	78	82	111	133	187	591
National Wastewater Programmes	34	34	69	85	97	320
Other Infrastructure National Programmes	6	25	5	8	7	51
<b>Total</b>	<b>118</b>	<b>142</b>	<b>186</b>	<b>226</b>	<b>290</b>	<b>963</b>

Table 4.5 – Final IP2 Investment Portfolio – National Programmes (2015 monies rounded)

#### 4.4.3 Projects €2,074m

In addition to the Capital Maintenance and National Programmes, IW proposes to invest in a large number of specific asset projects across the country, which will enable substantial progress towards our 2021 targets. Expenditure on Projects accounts for 58% of the available funding in the Investment Plan period. The projected outcomes for these projects are included in Table 4.8.

The spend profile for Water and Wastewater Projects over the IP2 period, 2017 to 2021, is provided in Table 4.6. The carry over of project expenditure from the 2014 to 2016 investment period is included in the initial years. Expenditure on projects eases from 2019 as Capital Maintenance and National Programmes ramp up.

Description	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m	Total €m
WSAG Projects	101	128	164	162	106	660
WSBG Projects	55	58	37	17	14	181
WWAG Projects	147	192	232	179	134	884
WWBG Projects	39	72	67	98	72	349
<b>Total</b>	<b>342</b>	<b>451</b>	<b>501</b>	<b>455</b>	<b>325</b>	<b>2,074</b>

Table 4.6 – Final IP2 Investment Portfolio – Capital Projects (2015 monies rounded)

#### 4.4.4 Programmes to Support Social and Economic Growth €122m

Since the submission of the draft Investment Plan to CER in March 2016, IW has strengthened provisions for growth in response to Government Housing Policy initiatives. IW has included Network Extension Programmes for Water (€13m) and Wastewater (€38m) and additional wastewater treatment capacity projects (€10m) in the Investment Plan. These programmes, coupled with previously identified Local Network Reinforcement projects to address known (€31m) and unknown network constraints (€31m) will help to support the Social and Economic Growth objectives of the Water Service Strategic Plan. Table 4.7 summarises these programmes.

Description	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m	Total €m
Network Extensions Water	3	3	5	2	-	13
Network Extensions Wastewater	9	9	15	5	-	38
Local Network Reinforcement (WW - Named)	-	2	4	15	10	31
Network Reinforcement (WS&WW Un-named)	2	4	4	11	9	31
Wastewater Treatment Reserve List	-	-	-	5	5	10
<b>Total</b>	<b>14</b>	<b>18</b>	<b>28</b>	<b>37</b>	<b>25</b>	<b>122</b>

Table 4.7 – Programmes to support Social and Economic Growth (2015 monies rounded)

#### 4.5 Final IP2 Investment Portfolio Outcomes

By investing €3.588 billion in the IP2 period, IW will greatly improve Ireland's drinking water and wastewater services. This will allow us to meet our customer needs in an economic and efficient manner, ensure safe and reliable water supplies, provide effective management of wastewater, protect the environment, provide for population and economic growth and increase our understanding of the asset base.

Between Capital Maintenance, National Programmes and Projects expenditure, IW expects to deliver outputs across a series of categories in the 2017-2021 period. Since the initial submission of the Investment Plan to the CER in March 2016, IW has reviewed the lines of investment within the BPQ which are contributing towards the Investment Portfolio Outcomes set out in the WSSP and IW Business Plan. Where possible, the specific investments that are contributing towards these targets were identified, quantified and assigned units. This will enable future measurement of progress to be monitored from this baseline. The results of this exercise are included in a separate document entitled Investment Portfolio Outcomes Explanatory Note which will be issued in tandem with this document and summarized in Table 4.8 and Appendix G.

Table 4.8 provides IW's Indicators and expected outcomes for the IRC2 period (2017-2018) and the IP2 period (2017-2021). The definitions of the columns are:

- Indicator: This column refers to the investment output category.
- WSSP Starting Point: This column refers to the baseline starting position identified in the Water Services Strategic Plan<sup>21</sup>
- Expected Outcomes by end 2016: This column refers to IW anticipated outcomes by the end of the IRC1 period, 2014 - 2016, and identifies the starting position for the IRC2 period
- Expected Outcomes by end 2018: This column refers to IW anticipated outcomes by the end of the IRC2 period, end 2018, based on the constrained expenditure of €3.588 billion.
- Expected Outcomes by end 2021: This column refers to IW anticipated outcomes by the end of the IP2 period, end 2021, based on the constrained expenditure of €3.588 billion.

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<sup>21</sup> WSSP Starting Point on the best available asset knowledge at the time of the WSSP preparation. Subsequent improvements in data and performance have resulted in changes to this baseline as identified separately to the CER.

Indicator	WSSP Starting Point	Expected Outcomes by end of 2016	Expected Outcomes by end of 2018	Expected Outcomes by end 2021
Number of people on Boil Water Notices (BWN)	23,079	4,057	1,041	0
Number of WTP's on the RAL	121	71	41	0
Compliance with the parameters for Lead in Drinking Water	Estimated as 85 – 95%	Establish baseline	-	98% compliant <sup>22</sup>
Environmental Assessments and Plumbo-solvency Control Plans	-	-	200 WTWs <sup>23</sup>	-
Replace Backyard Lead Shared Service	40,000 (circa)	38,701	<36,000	<22,000
Replace Individual Lead Service Connection Pipes	140,000 (circa)	139,716	<136,000	<117,000
Leakage	0	60 megalitres per day of savings	117 megalitres per day of savings	226 megalitres per day of savings
Rationalisation of WTP's	918	0	12	105
WWTW's - Compliance with UWWTD	>1,722,000 p.e.	>2,359,000 p.e.	>2,361,000 p.e.	>4,839,000 p.e.
Overloaded WWTW's >2000	45	27	24	6
Overloaded WWTW's <2000	113	97	82	74
No. of agglomerations with no treatment or preliminary treatment only	44	38	19	0
WWTWs – compliance with Emission Limit Values	-	14	36	64
Sewer Flooding	-	-	1 project in progress	12 projects in progress
Energy Efficiency Improvement	Energy consumption 527GWh/yr	12%	20%	33% <sup>24</sup>
Headroom – Water	-	54% <sup>25</sup> 10% <sup>26</sup> 44% <sup>27</sup>	54% >9% 38%	60% >7% 30%
Headroom – Wastewater	-	54% <sup>28</sup>	56%	59%
Network Capacity – Nr of supply zones with updated hydraulic models	-	Establish register	0	12
Network Capacity – Nr of agglomerations covered by DAP	-	Establish register	14	36

**Table 4.8 – Investment output targets for IRC2 and IP2 period.**

<sup>22</sup> Subject to technological alternative to lead replacement being available (orthophosphate dosing)

<sup>23</sup> The assessments will further inform the works required at the individual sites.

<sup>24</sup> 33% is the NEEAP 2020 target

<sup>25</sup> a) 60% of plants meeting headroom targets of: 20% in large urban areas, 15% in Regional Gateway Towns, 10% at all other plants

<sup>26</sup> b) Capacity headroom in GDA and mid-Eastern Region to be greater than >15%

<sup>27</sup> c) Reduce % of plants with headroom of <15% from 44% to 30%,

<sup>28</sup> 60% of plants meeting headroom targets of: 20% in large urban areas, 15% in Regional Gateway Towns, 10% at all other plants

## 4.6 Change Control

With the establishment of IW, the water industry in Ireland has undergone a significant amount of change in the last number of years. Given the long-term investment needs set out in this document and the previous Investment Plan 2014-2016, it is inevitable that investment priorities will not remain static for the entire period of this Investment Plan.

Changing priorities can arise from unforeseen events, for example the storms and associated flooding in the winter of 2015-2016 have highlighted weaknesses in infrastructure which demand mitigation measures to avoid future similar impacts. Therefore, it is important that IW must have a level of flexibility in the Investment Portfolio to ensure that it can accommodate changing priorities driven by:

- External events that are outside the control of IW;
- Additional risks which are not currently known to IW; and
- Projects which are postponed as a result of the IW Gate process; and
- Changes in national policy impacting the water and wastewater services sector.

The beginning of the next revenue control in 2019 will provide an opportunity to undertake a formal review of this Investment Plan and examine whether it still meets customer, economic and environmental needs. It will also provide an opportunity to take account of events during the period such as the following:

- Publication of the next cycle of River Basin Management Plans, expected in 2017;
- National Planning Framework process, including publication of regional and economic spatial strategies; and
- Any update of the Water Services Strategic Plan.

## 5. Delivery and Capital Efficiencies

### 5.1 Supporting Investment with Effective Operations and Maintenance

A key consideration in investment planning is the link between capital and operational expenditure. To reflect the fact that we are facing a huge compliance challenge, IW has developed a range of National Programmes to address key performance issues and improve knowledge of the asset base. Furthermore, we intend to increase capital maintenance spend over the course of the next two investment periods to a level which reduces operational expenditure and reactive maintenance spend in the longer term.

Effective asset management will be enabled by the collaborative approach between the IW Asset Management and Operations functions.

Capital intensive interventions are not appropriate in all cases. Operation interventions, in certain instances, will be required. Examples include the following:

- Role of operational water conservation measures in creating capacity in existing assets to support new development; and
- Operations process optimisation teams will continue to identify low cost interventions to stretch the operational capacity of the existing assets, while achieving compliance.

IW's Investment Plan will have a knock on impact on our Operations & Maintenance (O&M) costs. This element of O&M growth is referred to as Delta Opex and is outlined in our IRC2 Operational Expenditure submission to the CER.

### 5.2 Capital Efficiencies

IW is fully committed to reducing costs and improving service levels to our customers over several investment cycles, which will allow us to align to peer company efficiency levels.

In our Business Plan, IW committed to delivering capital efficiencies of €500m in the period 2014-2021.

The CER, as part of its IRC1 revenue review process, published an assessment of our first Investment Plan 2014-2016.<sup>29</sup> This CER document examined experience in other jurisdictions with regard to capital efficiencies and recommended areas where IW could look to pursue such efficiencies.

IW will look to deliver the €500m target over the 2014-2021 period through a number of channels, including:

#### **Using asset management techniques to optimise existing assets**

Under the IP2 Investment Planning process we have adopted an asset management strategy which optimises asset life; balancing capital investment with maintenance and operation of the assets. This type of approach contributes to improving the serviceability and

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<sup>29</sup> Please refer to the following link [here](#) on the CER website.

safety of our assets and reducing performance risk in a sustainable way. Whole life costing, extension of assets lives and deferring the need for major new plant, where appropriate, is all of benefit to the customer.

To do this we will need to increase our understanding of the asset base and effectively use capital maintenance to extend asset lives so that customer service levels can be maintained and improved.

### **Standardisation of asset technical standards**

Asset standards are the technical standards used in the design and operation of drinking water and wastewater infrastructure, which aim to ensure that the best solutions are adopted for new assets.

Standards will result in consistency across the country which will lead to reduced costs and improved service delivery to the customer. They will also provide greater clarity and support to designers and contractors, in the design, construction, operation, maintenance and decommissioning of assets.

IW is developing a single set of national asset standards that will be periodically updated to reflect new innovative technology and changes in legislation. The benefits of having IW asset standards will include improved customer service across the entire system (as opposed to operating within LA boundaries), the selection of optimum solutions for new investment, reduced design costs and lower maintenance costs.

### **Re-scoping of projects and rationalisation of assets**

There is still a significant element of LA project commitments included within IP2. We refer to these projects as “carryover projects” and they are highlighted in Appendix C. However, since early 2014 we have been engaged in re-scoping these carryover projects and examining their continuing need.

For example, the proposed new WWTW at Shannon Town has been re-scoped to upgrade the existing plant to maximise its asset life and achieve cost savings, with source control of trade waste discharge also factored in to achieve the most sustainable outcome.

We have approximately 900 Water Treatment Works serving our customer base. We believe this to be inefficient, especially considering the size of peer company asset bases. Respondents to our Emerging Investment Plan also believe this type of asset base to be inefficient. Rationalisation of water supplies, promoting regional solutions and utilising sources across county boundaries is a key part of our strategy for achieving safe and secure water supplies and delivering efficiencies for the customer.

### **Centralised Procurement**

Applying a uniform and consistent approach to procurement activities will deliver efficiencies and cost savings to the customer. For example, the implementation of standard utility systems (such as Primavera and Oracle) will allow for visibility of budget, spend and performance.

IW has established central procurement for all goods and services required in asset operation and investment. We will use our national buying power to procure goods and services; standardising what we buy and ensuring that our supply chain is aligned to our requirements, particularly our adopted standards for quality, reliability and energy efficiency. IW will procure goods and services in the competitive market place based on international best practice and in compliance with procurement legislation.

The use of frameworks (longer term relationships), call off contracts (purchasing one item at a time) or discrete one-off contracts, where it is commercially beneficial to do so, is key to IW efficiently purchasing goods and services.

### **Innovative solutions to capital build/maintenance**

Innovation in the provision of drinking water and wastewater services will be integral to delivering benefits in efficiency, customer service and water and environmental quality. This will enable the application of the most appropriate and sustainable solutions, drawing on best international practice and the required automation and instrumentation for central monitoring and control of asset condition and performance.

In addition to a constant review of international practice, we will support local research and development to achieve the best outcomes for our customers and the environment. We will pursue innovation in three ways:

- Collaboration with stakeholders such as academic institutions;
- Research and pilot innovative technologies, processes and systems for local application; and
- Collaboration with other water utilities to become a “fast follower” (i.e. learn best practices).

We are already implementing innovative practices in our investment planning. The recent upgrade to the Clonakilty Wastewater Treatment Works, which involves the use of new Nereda wastewater technology, is a good example of the use of innovative technology. This technology facilitates treatment of wastewater within a third of the spatial footprint compared with conventional wastewater treatment processes. It also reduces the volume of sludge produced and chemicals consumed during the operational phase of the plant. It is the first plant constructed in Ireland and the UK using Nereda technology, and the first in the world that is built mostly underground to minimise the visual impact.

We will continue to investigate alternative and innovative solutions in relation to both new projects and for the upgrading of existing plants and networks. Investment decisions will be based on solutions that provide the lowest whole-life cost whilst also meeting our energy and carbon commitments.

### **5.3 Tracking Efficiencies**

IW needs to effectively identify, record, monitor and report efficiencies across its capital investment activities. This will promote customer and stakeholder confidence in our ability to deliver service improvements, while reducing costs.

IW is developing a Standard Operating Procedure (SOP) to track Capex efficiencies. The SOP will provide a process for the management of savings, and include a collection of tools that will be used in the implementation of this process. It will also provide a set of rules that govern how opportunities are identified and efficiencies realised through initiatives. This is how we intend to track delivery of the €500m of capital efficiencies identified in the 2014-2021 Business Plan.

## 5.4 Monitoring and Evaluation of Investment Plan Delivery

It is crucial that the delivery of our Investment Plan is tracked internally and externally to show our customers, the CER and other stakeholders that (a) we are making the best possible investment decisions in the drinking water and wastewater services assets, (b) we are steadily improving service delivery and (c) we are working towards meeting our IP2 target outcomes.

### Internal Monitoring and Evaluation

IW has an established internal governance process to ensure projects and programmes of expenditure within the Investment Plan are being tracked and are delivering the required outputs. To achieve this, IW has established the Water Investment Approval Committee (WIAC), to implement the governance process. The WIAC is comprised of the IW Heads of Departments and their authorisation is required before a project or programme can proceed. WIAC has the ability to challenge any element of a project or programme put forward for review. Supporting the WIAC is the IW ‘Gate’ process, which consists of five mandatory review / approval points. The five Gates (Gates 1-5) cover the progressive approval of projects from design to post implementation, as illustrated in the figure below.

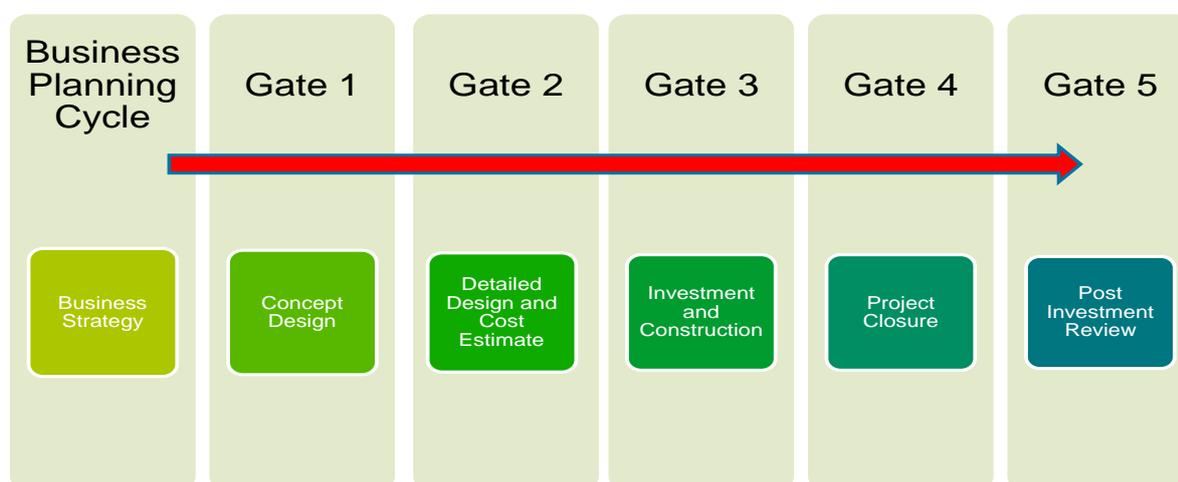


Figure 5.1 - Stages and Gates in the WIAC/GIAC Process

### External Monitoring and Evaluation

IW will also be subject to external monitoring and evaluation of Investment Plan delivery. In its IRC1 decision paper (CER/14/746) the CER outlined its intention to implement a comprehensive programme of monitoring of IW’s outputs. This also includes the establishment of an Outputs Monitoring Group (OMG) which will monitor capital expenditure

and output delivery. IW expects this to be the forum where changes to the CER approved 2017-2021 Investment Plan are agreed.

We recognise that an effective monitoring regime is important for the CER to carry out its duties. IW will work with the CER over the IP2 period to develop this monitoring programme and establish the Outputs Monitoring Group.

## 6. Conclusion

IW was established in 2014 to take on the challenge of reforming how Ireland's water and wastewater services are delivered. Over the course of IRC1, much progress has been made. We are already delivering investment of over €1.8bn to begin the process of bringing our infrastructure up to an acceptable standard. We are making real savings in our cost base, bringing a national utility approach to effectively and efficiently delivering water and wastewater services. We are also placing our customers' needs at the centre of everything we do; including actively seeking their views on our investment priorities.

To fully address all of the deficiencies in our asset base will take a multi-billion euro investment programme continued through several investment cycles. The Investment Portfolio presented in this plan is deliverable, operable and reflects the priorities of our stakeholders and customers to the greatest extent possible, within funding constraints.

By investing €3.6bn in the IP2 period, IW will greatly improve Ireland's drinking water and wastewater services. This will allow us to meet our customer needs in an economic and efficient manner, ensure safe and reliable water supplies, provide effective management of wastewater, protect the environment, and provide for population and economic growth.

## Appendix A Glossary of Terms and Abbreviations

Abbreviation	Description
AA	Appropriate Assessment
AER	Annual Environmental Report
BOD	Biochemical Oxygen Demand
CAPEX	Capital Expenditure
CBA	Cost Benefit Analysis
CER	Commission for Energy Regulation
CFC	Coagulation/Filtration/ Clarification
CSO	Combined Sewer Overflow
DAP	Drainage Area Plan
DBO	Design Build Operate
DECLG	Department of Environment, Community and Local Government, renamed as Department of Housing, Planning, Community and Local Government on 23 July, 2016
DHPCLG	Department of Housing, Planning, Community and Local Government
DMA	District Metering Area
DPI	Developer Provided Infrastructure
DW	Drinking Water
EIP	Emerging Investment Plan
EPA	Environmental Protection Agency
ESRI	Economic and Social Research Institute
GDA	Greater Dublin Area
GWS	Group Water Scheme
H&S	Health and Safety
HSQE	Health, Safety, Quality & Environment
IRC 2	Interim Revenue Control 2
LA	Local Authority
NCAP	National Certificate Authorisation Programme
Opex	Operational Expenditure

Abbreviation	Description
PCT	Project Costing Template
PE	Population Equivalent
RAL	EPA Remedial Action List
RBMPs	River Basin Management Plans
WRZ	Water Resource Zone
SCADA	Supervisory Control and Data Acquisition
SDZ	Strategic Development Zone
SEA	Strategic Environmental Assessment
SMF	Service Measure Framework
SOP	Standard Operating Procedure
THM	Trihalomethane
UCDB	Unit Cost Data Base
UFW	Unaccounted For Water
UWWTD	Urban Wastewater Treatment Directive
WFD	Water Framework Directive
WS	Water Supply
WSSP	Water Services Strategic Plan
WTWs	Water Treatment Works
WSZ	Water Supply Zone
WW	Wastewater
WWDA	Wastewater Discharge Authorisation
WWTWs	Wastewater Treatment Works

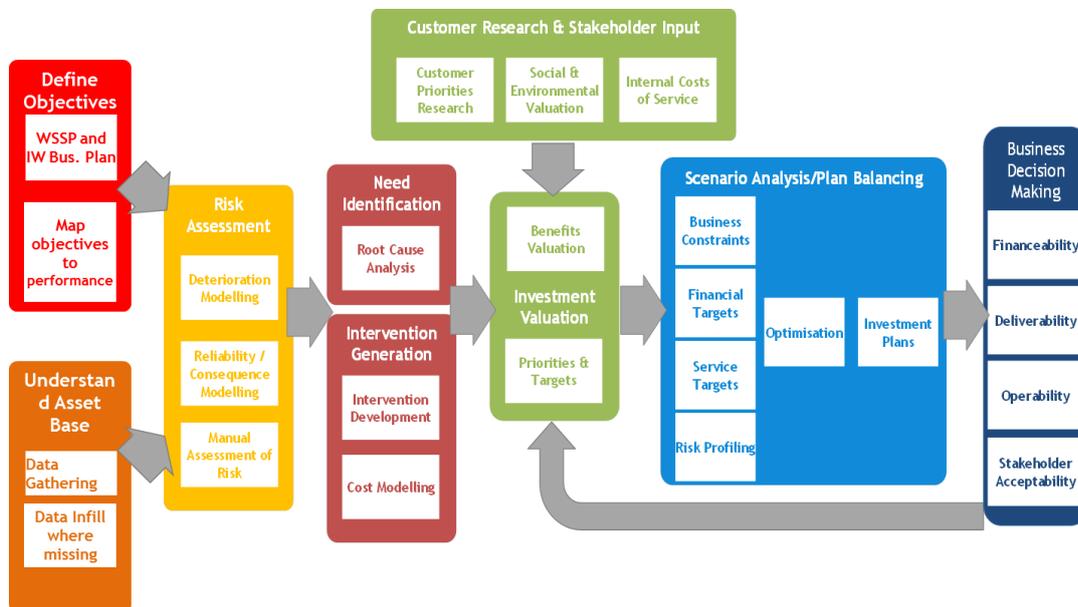
Term	Description
Abstraction	The removal of water from a river, lake or groundwater usually with the use of a pump.
Agglomeration	An urban settlement (village, town or city area) which is connected through a pipe network to a wastewater treatment plant. Agglomeration areas are defined on maps and used to plan wastewater services infrastructure.
Asset	Infrastructure (e.g. buildings, treatment plants) and equipment (e.g. pumps, screens, treatment units, disinfection systems and control panels) controlled and

Term	Description
	operated by IW to deliver drinking water and wastewater services. We divide these into Below Ground Assets such as pipework and valves and Above Ground Assets such as treatment plants.
Borehole	A vertically drilled hole into the subsoil and/or bedrock which is used to monitor or abstract groundwater. A borehole is usually lined with a casing and/ or screen to prevent it from collapse.
Catchment	The area of land where surface water from rainfall converges to a single point at a lower elevation, usually a point in a river, lake or an estuary. The catchment includes all drainage channels, tributaries (smaller streams) and floodplains.
Discharge	Treated effluent from a wastewater treatment plant which is returned to the water environment. This is usually from a pipe and outflow structure into a river or the sea.
Draft Investment Plan	Plan developed by IW to meet all of the 2021 output targets.
Drinking Water Regulations	European Union (Drinking Water) Regulations 2014 - S.I. No. 122 of 2014.
European Directive	A legal act of the European Union which requires member states to achieve a particular result. Examples are the Drinking Water Directive, Urban Wastewater Treatment Directive and the Water Framework Directive.
Groundwater	Water located beneath the ground surface in soil and rock pore spaces and fractures within rock formations.
Headroom	Spare capacity in water and wastewater infrastructure (treatment plants and networks) to cope with adverse weather conditions or unplanned incidents such as a break in a trunk main or equipment failures at a treatment plant.
Interim Revenue Control 2 (IRC2)	The next interim review of IW allowed revenues by CER. This will cover the two-year period from 2017 to 2018.
Investment Plan	An investment plan shall set out and particularise the investment in drinking water and wastewater services infrastructure that IW considers necessary for the effective performance by it of its functions
National Programmes	National Programmes refer to water, wastewater and other programmes to bring asset performance to acceptable levels of compliance and capacity nationally e.g. Metering Programme, Resilience Programme etc
Network	The interconnection of pipes and pumping stations used for the distribution of treated water and the collection of wastewater.
Planning Authority	'Planning authority' means a local authority
Population Equivalent (PE)	Wastewater treatment plants are described in terms of their designed treatment capacity, which is generally expressed as population equivalents (PE). This is a measurement of total organic biodegradable load, including industrial, institutional, commercial and domestic organic load, on a wastewater treatment plant, converted to the equivalent number of population equivalents (PE). One person is considered to generate 60g of BOD per day (BOD is the 5 day biochemical oxygen demand) and 1 PE is defined as being equivalent to 60g of BOD per day.
Raw Water	Water abstracted for drinking water purposes before treatment.

Term	Description
Regional Assembly	'Regional assembly' means a body established in accordance with section 43 (as amended by the Local Government Reform Act 2014) of the Local Government Act 1991;"
Regional Planning Guidelines	Regional Planning Guidelines (RPGs) are policy documents which aim to direct the future growth of a region over the medium to long term. They appraise the critical elements involved in ensuring sustainable and good planning in the right places, and though the protection of sensitive or environmentally important locations. The Guidelines inform and direct the City and County Development Plans of each of the Councils. The Planning and Development Act, 2000 (as amended) requires that all Regional Authorities shall at the direction of the Minister make Regional Planning Guidelines. Eight Regional Authorities were set up in 1994 under the Local Government Act 1991 (Regional Authorities) Establishment Order 1993. However, the 8 Regional Authorities have been reconfigured to 3 Regional Assemblies under the Local Government Reform Act, 2014 and the RPGs will be replaced by Regional Spatial and Economic Strategies to be published in 2016.
Resilience	The ability of a system (e.g. water supply zone or wastewater network) to cope with change or stress. In a drinking water and wastewater services context stress to the system or network could result from increased demand, partial failure of operating plant, climate change or local contamination of water sources.
River Basin Management Plans	A plan for a group of catchments which contains a range of measures (proposals) aims at protecting and improving the use of the water environment.
Standard Operating Procedures	Detailed, written instructions and rules for managing and operating assets.
Unaccounted for Water	Water that is lost through leakage or unaccounted use from our water supply network.
Water Body	A defined section of river, lake or groundwater identified in the water body characterisation of the River Basin Management Plans developed under the Water Framework Directive.
Water Supply Zone	The area supplied by an individual water supply scheme. This typically includes one or more abstractions (from a river, lake or groundwater), a treatment plant, storage in reservoirs and the distribution pipe network to deliver the water to each household or business.

## Appendix B Investment Planning Process

This appendix provides further details of our Investment Planning process illustrated in Figure B.1 below.



Source: Based on UKWIR Common Framework for Expenditure Decision Making

Figure B.1 – Investment Planning Process

### Step 1 – Define Objectives

The first step involves the identification of objectives that the Investment Plan aims to achieve. In the case of this Investment Plan we have defined our targets as those set out in the 25 year WSSP and the 7 year IW Business Plan.

### Step 2 – Understanding the Asset Base

A key advantage that IW is bringing to the water services industry is the ability to understand the asset base at a national level. Our current knowledge of the asset base is poor. A number of steps have been taken by IW to improve our understanding of the asset base, including workshops with the LAs to determine missing/ inaccurate data, collecting data in GIS, and undertaking further studies/asset surveys.

IW anticipate that collection of this data will take a number of years, but it will result in better planning, capital maintenance allocation and customer service levels.

Standard approaches developed across the water industry were used by IW in the data gathering and elicitation process to supplement available data with information based on estimating techniques. In many cases standard templates were used for generic site types, for use in estimating missing data such as configuration and construction type.

### *Above-Ground Assets*

Relevant asset information required includes construction type, material, commissioning date, refurbishment history, capacity, configuration (parallel or series units and/or process streams, duty/standby/assist arrangement), etc. Where this data has been missing or were incomplete we used standard templates for generic site types.

For example, a wastewater pumping station of a particular size and approximate commissioning date would have a default set of assets of a given type and configuration to be used where no other data exist. Statistical data infilling has also been used to generate random data within specified ranges, for example to allocate commissioning dates in a given decade. Historical data have been generated based on typical refurbishment intervals or asset life expectancies.

Also data gathering/validation was a component of Operator workshops where 'typical' site data and information are obtained, prior to the elicitation of judgements regarding typical likelihoods of asset failure, costs of failure, repair and replacement and the associated service consequences.

### *Below-Ground Assets*

For below ground assets, data was/can be more complete particularly for water networks. However, a variety of approaches were used for infilling missing or invalid data. Where data is sparse, 'standard models' were applied for modelling commonly occurring failure modes and service consequences. These models are based on experience in model development covering different geographical areas and can be adjusted to reflect local circumstances.

Where GIS data is not available, water supply areas/zones/DMA's and sewerage catchments were characterised using quantitative and/or qualitative data and information obtained from operational staff for use in hierarchical risk and consequence trees. For example, in water supply the attribution of each area/zone/DMA has included estimates of the:

- proportion of materials and ages
- interconnectivity with adjacent zones
- distance from treatment works
- pressure
- connection density
- general soil type
- topography

### **Step 3 – Risk Assessment**

Once the dataset of asset condition and performance was established (to the extent possible given current limitations in asset information), IW asset management teams began a process of risk assessment to identify assets which are at significant risk of failure (or have already failed). These were put forward for needs identification, Step 4 of the process.

## Drinking Water Supply

- The World Health Organisation and the EPA in Ireland strongly advocate a holistic approach to drinking water safety based on Water Safety Plans for all drinking water catchments managing risks from 'source to tap' and IW has adopted this approach. This requires a risk based approach to meeting the required standards by source control of pollutants at source, ensuring effective treatment and the integrity of storage and distribution systems.
- IW assessed drinking water quality performance against the requirements of the IW water treatment strategy, across over 900 WSZs based on the available information and supplemented by data gathered at LA workshops. The water supply treatment issues and risks identified are summarised in Table B.1.

Category	Description
Asset Nos.	<ul style="list-style-type: none"> <li>• Around 900 Water Treatment Plants;</li> <li>• Over 600 plants for 20% of production; and</li> <li>• Unsustainable number of separate supplies.</li> </ul>
Known Issues	<ul style="list-style-type: none"> <li>• 31 Local Authorities: <ul style="list-style-type: none"> <li>○ No common approach/specifications/ standards;</li> <li>○ No standard approach to operations; and</li> <li>○ Reactive not proactive (risk based approach).</li> </ul> </li> <li>• &gt;2,000 abstraction points:</li> <li>• Limited raw water quality data implies that treatment process design was weak; investments have failed to improve compliance in some cases.</li> </ul>
Risks Identified	<ul style="list-style-type: none"> <li>• Risk Based: WHO Drinking Water Safety Plan assesses risk for: <ul style="list-style-type: none"> <li>○ Catchment (WFD, abstraction, pesticides);</li> <li>○ Raw Water;</li> <li>○ Treatment (THM, Cryptosporidium);</li> <li>○ Distribution (Leakage, Lead, THM);</li> <li>○ Customer (lead);and</li> <li>○ Management (Telemetry, training, SOP, PM).</li> </ul> </li> <li>• Integrated with WFD Planning - Art 17</li> <li>• Key risks to be mitigated through design, investment and management: <ul style="list-style-type: none"> <li>○ WTP with Inadequate Protozoa barrier;</li> <li>○ WTP to be assessed or at THM risk;</li> <li>○ Abstraction/ production capacity deficit;</li> <li>○ Properties with lead risk; and</li> <li>○ Leakage.</li> </ul> </li> </ul>
Output	<ul style="list-style-type: none"> <li>• Large scale investment programme for scheme rationalisation, plant upgrading and process augmentation</li> </ul> <p>Investment priority for:</p> <ul style="list-style-type: none"> <li>- Development and management of sustainable sources;</li> </ul>

	<ul style="list-style-type: none"> <li>- Appropriate treatment at strategic sites – reflects DWRP Risk;</li> <li>- Rationalisation of high risk, low volume sites; and</li> <li>- Leakage reduction.</li> </ul>
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Table B.1 – Water Supply Treatment Issues and Risks

### Wastewater

IW has gathered available data on over 1,000 wastewater treatment plants from a number of sources including EDEN (EPA Database), EPA annual reports, IW systems and through workshops with IW regional and LA operational staff. It was recognised that monitoring and sampling data was often limited and further data was obtained from workshops and IW site audits.

The known issues and risks are identified in Figure B.2 below.

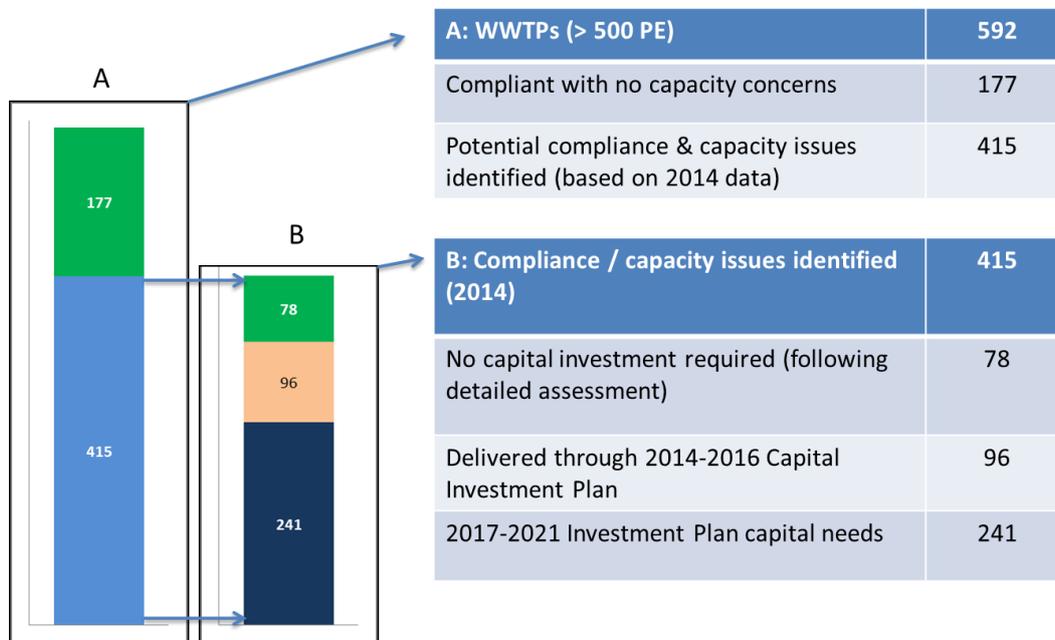


Figure B.2 – Wastewater Treatment: Known Issues/ Risks

### Step 4 – Needs Identification

The needs identification process involved root cause analysis whereby the reason for the asset failure was identified. The needs identification approach for each of the four asset high level categories and capital maintenance are summarised below.

#### Water Supply Above Ground – Water Treatment Needs

A Statement of Needs was developed for each WSZ which identified the following requirements:

1. Treatment process and storage deficiency/ gap based on:
  - a. Input water quality characteristics:
    - i. Groundwater G1 (low risk) to G5 (high risk) and
    - ii. Surface water S1 (medium risk) to S3 (high risk)
  - b. Demand scenarios:
    - i. Current (2015);
    - ii. Medium term (2025); and
    - iii. Long term (2035).
  
2. Number and size of treatment process units/ streams to mitigate current and future risks including:
  - a. Plant capacity based on current leakage levels (resulting in larger plants);
  - b. Plant capacity based on target leakage levels (resulting in smaller plants); and
  - c. Plant capacity based on target leakage levels with rationalisation options for smaller WTPs (resulting in lower number of plants).
  
3. National programmes including SCADA, H&S, Dam Safety, etc.

#### *Wastewater Above Ground – Wastewater Treatment Needs*

A similar Statement of Needs approach was adopted for Wastewater Above Ground assets. A Statement of Needs was developed for each agglomeration which identified the following requirements:

1. Treatment process deficiency/ gap based on:
  - a. Current performance against required standard (UWWTD or WWDA) based on 2014 annual environmental reports;
  - b. Existing load and capacity;
  - c. Receiving water status; and
  - d. Future load projections.
  
2. Number and size of treatment process units/ streams to mitigate current and future risks including:
  - a. Upgrade works to achieve UWWTD standards only where required; and
  - b. Upgrade works to achieve WWDA emission limits where required.
  
3. National programmes including SCADA, H&S, etc.

#### *Water Supply Below Ground – Water Networks*

The needs identification process for water networks is a combination of outputs from the capital maintenance modelling workstream and assessment of needs. A Statement of Needs was developed considering the following requirements:

1. Leakage reduction interventions by WSZ:
  - a. Intervention types:
    - i. Mains rehabilitation;
    - ii. Leak repairs (find and fix); and

- iii. Pressure management.
  - b. Intervention goals:
    - i. Option 1 – Maintain current leakage level within each WSZ and
    - ii. Option 2 – Achieve target leakage level within each WSZ
  - c. Below ground interventions are linked to Water Supply Above Ground options
- 2. National programmes for asset maintenance:
  - a. Valve and fitting maintenance programmes;
  - b. Leakage management/ District Metering Area (DMA) programme;
  - c. Domestic and non-domestic metering; and
  - d. First Fix;
- 3. Programmes to improve resilience:
  - a. Dublin region;
  - b. Regional centres; and
  - c. Network telemetry/ SCADA coverage of WSA & DMA infrastructure.
- 4. Investigations required to inform future decisions; and
- 5. National Lead Programme.

#### *Wastewater Below Ground – Networks*

The needs identification process for wastewater networks followed a slightly different path as a result of the lack of available data on network condition and performance. The approach taken was more of a data gathering and validation process which then enabled a series of programmes to be scoped out by building up asset data and knowledge, investigating key performance issues and identifying capital maintenance needs associated with sewer network assets. A Statement of Needs was developed considering the following requirements:

- 1. Project specific major capital programmes which include:
  - a. Network upgrades to:
    - i. Eliminate known and predicted property flooding and Combined Sewer Overflows (CSO), odour and noise issues;
    - ii. Eliminate pumping station performance and capacity issues; and
    - iii. Provide future capacity for growth and economic development.
  - b. Based on existing studies carried out over previous decade (reviewed and adjusted for current population and load estimates); and
  - c. Where no studies exist, proposed upgrades have been developed based on works identified in catchments with similar characteristics.
- 2. National Investment Programmes:
  - a. Standardised solutions/ studies for frequently arising needs:
    - i. Asset refurbishment to improve performance;
    - ii. Investigations (drainage area plans, asset surveys, hydraulic and water quality modelling);
    - iii. Asset condition inspections and surveys; and
    - iv. Interventions to facilitate development needs.
  - b. National programmes including SCADA, H&S, etc.

## *Capital Maintenance – All Asset Classes*

The objective of capital maintenance is to find the most cost-effective way of maintaining services, making best use of existing assets. In order to do this, it is necessary to consider operational costs as well as capital costs, including options that avoid the need for capital investment altogether. In the Investment Period, 2017 – 2021, we intend to further increase the funding for this work above historic levels, as the data demonstrates the needs and benefits, expanding spend towards the levels indicated by international benchmarks. In order to deliver expenditure as efficiently as possible, we are putting in place a series of contract frameworks backed by standard specifications for application from 2017.

A deterioration modelling approach has been developed to consider the entire asset stock, which uses UK data to determine the predicted number and impact of asset failures as a result of a lack of investment. Further scenarios were modelled to determine the impact of undertaking investment to maintain current levels of service/ performance and to address a perceived backlog in capital maintenance that may have caused deterioration in service. In time, these deterioration models will become more reliable as they build on field data collected via IW systems. In this exercise, the approach described below was used to derive the appropriate level of capital maintenance required. It is anticipated that it will take a number of years to build up the work programmes to this optimum level of intervention.

The needs identification process for capital maintenance is based on the following scenarios:

1. Scenario 1 – Reactive only:
  - Investment at asset level to repair or replace assets that are predicted to fail; and
  - Results in decreasing levels of service performance and increasing maintenance spend over asset life as assets deteriorate.
2. Scenario 2 – Maintain current levels of service:
  - Investment to maintain current levels of service (regardless of whether this is meeting requirements); and
  - Results in increased spend but stable levels of service and performance.
3. Scenario 3 – Improved service levels:
  - Investment levels to improve levels of service from current baseline; and
  - Results in increased spend and increasing levels of service and performance

### **Step 5 – Intervention Generation**

Intervention generation includes the identification of asset upgrades, replacements or renewals needed to meet the required service performance which will mitigate or eliminate the risk arising from the asset deficiency identified in the previous steps. During this step IW identified a range of interventions to meet the investment needs of each asset class. The range of interventions were targeted to achieve the outcomes at each asset level identified in Table B.3.

Water	Wastewater
Option 1 – WTW based on current leakage levels	Option 1 – WWTW based to meet UWWTD Standards
Option 2 – WTW based on target leakage levels	Option 2 – WWTW based on WWDA standards
Option 3 – Rationalisation option	

*Table B.3 – Range of interventions examined*

The Capital Maintenance interventions were identified through deterioration modelling. The deterioration modelling considered asset upgrades that were proposed via a capital intervention or project. Multiple capital maintenance scenarios were generated and the capital maintenance scenario selected for each site, WSZ or agglomeration is optimised based on whether or not a capital intervention or project is going to be progressed at the particular site, WSZ or agglomeration. This approach ensures that there is no overlap of capital maintenance for sites and zones/ agglomerations where an upgrade is proposed.

Capital interventions were costed using a centralised cost database developed by leveraging the use of existing industry models and cost data gathered by IW, which is a mix of project costs, framework rates, quotations and contractor estimates. A series of cost curves derived from the combined data were collated to form the Unit Cost Data Base (UCDB). These cost curves cover the vast majority of water and wastewater treatment assets and also water and sewer pipe laying and renovation activities.

The Unit Cost Database (UCDB) cost curves developed for the IRC2 process were based on:

- Below Ground - IW frameworks; and
- Above Ground – TR61<sup>30</sup> and industry data adjusted to IW conditions supplemented by IW data where available.

A Project Costing Template (PCT) was developed based on the UCDB. This provided a consistent and uniform method for:

- Costing interventions (Capex and Opex);
- Identifying pre and post investment service performance;
- Allocating costs to QBEG (see below) cost categories; and
- Applying consistent overheads and risk factors.

Both a Solutions Challenge Forum and Technical Review Forum were set up internally to assess the investment planning process adopted. The Solutions Challenge Forum considered Intervention Generation at a macro level and challenged the solutions adopted, for example standardised applications for water and wastewater treatment plants. The Technical Review Forum considered Intervention Generation at a local level and reviewed

<sup>30</sup> To aid the estimation of future capital and operational expenditure, and to continue to benchmark Capex and Opex against analogous capital projects in the UK, Irish Water used TR61. TR61 Capex and Opex models have been developed from final account cost data provided by various UK water companies since 1977. The suite of TR61 models covers the vast majority of water and wastewater treatment assets and also water and sewer pipe laying and renovation activities. The latest version of cost models were issued at the end of 2012 after an external audit.

the options generated for individual asset types. Using these two processes, all information was validated before being inputted into the plan balancing tool.

## **Step 6 - Investment valuation**

Our Service Measure Framework (SMF) is an agreed suite of asset and service risk measures that were used in our investment decision-making. These Service Measures inform the business about the underlying level of risk that the asset base carries in regard to achieving those targets, and this forms a key input in forecasting performance.

Service Measure Frameworks are used by the majority of UK water and sewerage companies. They sit at the centre of all investment planning and provide the consistent basis upon which all risk is articulated within the business.<sup>31</sup> The framework is a platform upon which all of the individual service measures of a company are placed.

- SMs are used as a consistent approach to articulate service risk and assess the value of individual investments in the asset base in comparison with other investments
- Each SM may be defined in terms of risk (frequency of failure, quantity by severity level) or in terms of absolute performance
- Pre intervention position provides an assessment of the risk to service prior to the expenditure. This position needs to be defined in line with the principles of Cost Benefit Analysis (CBA)
- Post intervention position provides an assessment of the residual risk to service once the expenditure has been undertaken
  - The 'value' of the solution is the difference between these two
  - Each Solution is assessed (in terms of service impact) against one or more of the Service Measures

These measures are typically valued using a mixture of:

- Mandatory obligations or policy directions and essential enablers to the utility transformation and business efficiencies;
- Customers' Stated Preference values for changes in service;
- Social/environmental values; and/or
- 'Private costs' which the business incurs in responding to failures of service.

The valuation of the service measures was investigated using customer research identified in the main section of the paper.

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<sup>31</sup> This is very much in line with the UK Water Industry Research (UKWIR) Common Framework for Expenditure Decision-Making (the 2014 update of the original 2002 Common Framework), an approach which supports our investment planning methodology for IRC2.

Some objectives and targets within the WSSP and Business Plan can be directly translated into an appropriate Service Measure, e.g. reduction of leakage to a defined level. The figure below details this.

WSSP Objective	Target	Service Measure	Measure
Leakage	ML/d	Leakage	ML/d
Other objectives within the WSSP and Business Plan are translated using a composite measure e.g. Drinking Water (DW) Quality			
WSSP Objective	Target	Service Measure	Measure
Boil Water notices	>200 days	DW Quality (micro/chem) <ul style="list-style-type: none"> <li>• Sample fails</li> <li>• Boil Water Notice</li> <li>• Do Not Consume Notice</li> </ul>	No. Sample Failures
DW Standards (micro)	%samples meeting stds		Property Days
DW Standards (Chem.)	%samples meeting stds		
DW Standards (Lead)	%samples meeting stds		

Figure B.4 – Linking WSSP & Business Plan objectives to Service Measures.

### Step 7 - Customer Research & Stakeholder Input

We undertook a customer priorities study to understand the relative value of changes in drinking water, customer and environmental service levels for domestic and non-domestic customers.

Stakeholder engagement on the Investment Plan included the EPA, regional bodies and planning authorities, as per our statutory requirement, and also state bodies, representative groups for domestic and non-domestic customers and other representative bodies such as environmental groups. This is described further in Appendix E.

### Step 8 - Plan Balancing

At the heart of plan balancing is an investment optimisation approach. Unlike a prioritisation approach where interventions are ranked and selected based upon their benefit to cost ratio, the optimisation approach provides an additional dimension where intervention options are chosen to form part of the investment plan based not only on a combination of their cost and their benefits but also their contribution to specific targets (also known as constraints).

The optimisation approach allows projects budgetary constraints, asset performance and/ or risk targets, and performance levels to be set, and the best combination of solutions to meet the constraints to be identified.

## **Step 9 - Business Decision Making**

The optimised list of interventions and associated capital maintenance was used to support business decision making by IW and thus support the finalisation of the Investment Portfolio. Decision making by the business considered the plan balancing output through a series of internal workshops aimed at validating that the proposed investments will meet the objectives and targets set out in the WSSP and IW Business Plan. A further process of refinement was undertaken over the early part of 2016 to ensure that the profile of projected spend on projects and programmes fits within the expected funding constraints set out in the IW Business Plan.

In Q2 2016, additional programmes of investment were identified in response to Government policies and actions to promote housing and growth. Further re-profiling of spend was necessary to take account of these additional programmes and also improved information on schedules for some key projects to stay within the funding constraints set out in the IW Business Plan.

The outputs of this re-profiling exercise is reflected in the current document (Interim Revenue Control 2017 – 2018 Investment Plan 2017 - 2021 v.1.1 dated August 2016).

## Appendix C Investment Portfolio - Capital Maintenance, National Programmes and Projects

The utility based approach adopted for Investment Planning results in an investment portfolio, where 42% is allocated to national programmes and capital maintenance, which will be deployed across the asset base on a risk based approach and the remaining 58% of the expenditure is allocated to specific projects.

### Capital Maintenance Programmes

The Capital Maintenance Programmes that have been identified for inclusion in the Investment Portfolio are summarised below.

<b><u>Water Capital Maintenance Programmes</u></b>	<b>Total €m 2017-2021</b>
<b><u>Find and Fix</u></b> – Programme to locate and fix leaks on water networks, targeting areas where bursts and water shortages are most likely to affect customers or impact on the potential for housing and economic developments. These additional resources will support the work of existing resources to target the biggest leaks first, saving the most water in the most effective way to ensure a better service for our customers.	<b>138</b>
<b><u>Watermain Rehabilitation</u></b> - High burst rates on certain sections of the water network result in constant interruption of supply to customers and deterioration of water quality. Investing in water conservation interventions to reduce bursts and leakage levels will deliver many benefits and efficiencies for Irish Water and its customers. Reducing the water we abstract from the environment will protect our limited natural resources.	<b>110</b>
<b><u>Water Above Ground Capital Maintenance</u></b> - Planned Maintenance programmes for water treatment and above ground assets.	<b>100</b>
<b><u>Metering</u></b> – Domestic and Non Domestic Meter Capital Maintenance will replace failed meters in existing boundary boxes and replace damaged boundary boxes. Capital Maintenance of Non-Domestic Meters and install new meters annually in existing boxes to replace failed or damaged or end-of-life DN15 meters.	<b>33</b>
<b><u>Pressure Management Programme</u></b> is reducing leaks and bursts by managing excessive pressure in the networks. This involves monitoring the networks through pressure sensors, identifying areas of excessive pressure and installing pressure reducing valves.	<b>12</b>
<b><u>Capital Maintenance - Valves, Hydrants, PRVs, Kiosks</u></b> - Planned maintenance programmes for water main fittings and valves and fixtures to reduce leakage and unplanned interruptions.	<b>8</b>

<b>Trunkmains</b> - To improve the assessment and estimate of leakage on trunk mains through; a) revised leakage survey approach b) improved flow measurement / metering, in order to develop a profile of the risks, condition and performance and short and long term investment requirements for these critical assets..	<b>3</b>
<b>DMA Maintenance</b> - Flow meters and batteries to be replaced for the period 2017-2021. Valves, Hydrants, Kiosks and PRVs programme for hydrants and chambers to be replaced, allowing for those covered in Mains Replacement. Urban/Rural Kiosks to be replaced. PRVs (100 mm - 900 mm), and PRVs (900 mm - 1800 mm) to be replaced. Logger + transmitter and battery to be replaced. Sluice valves, air valves, scour valves, butterfly valves and chambers to be replaced for the period 2017-2021	<b>2</b>
<b>Capital Maintenance Telemetry</b> – replacement of logger + transmitter and battery in field telemetry units.	<b>1</b>
<b>Water Capital Maintenance Programme Total</b>	<b>407</b>

<b>Wastewater Capital Maintenance Programmes (Above and Below Ground)</b>	<b>Total €m 2017-2021</b>
<b>Wastewater Above Ground Capital Maintenance</b> – Programmed replacement and repairs of WWTP plant and equipment.	<b>71.8</b>
<b>Wastewater Below Ground Capital Maintenance</b> – Programmed sewer and rising main rehabilitation to reduce blockages, collapses, flooding and pollution.	<b>70.8</b>
<b>Manhole Refurbishment</b> - Replacing Manhole Covers which are broken/rocking and pose a risk to public/traffic.	<b>1.0</b>
<b>Pump Station Refurbishment</b> – Programme of refurbishment of WW network pumping stations to reduce operational, performance and H&S risks.	<b>0.7</b>
<b>Odour and Noise</b> Resolving odour and noise complaints associated with WW Pumping Stations and WW Networks.	<b>0.5</b>
<b>Permanent Flow Monitoring Programme</b> - IW are required to embark on a major Drainage Area Planning programme. To support this programme a parallel programme of in sewer flow monitoring surveys will be required to acquire the rainfall and sewer flow data required to calibrate the models built under the DAP Programme. The DAP model build programme is detailed and costed under a separate national programme. This programme only provides the costs for the sewer flow monitoring surveys.	<b>0.3</b>
<b>Site Security Refurbishment</b> - Health and safety external site security for the WWBG sites.	<b>0.1</b>
<b>Wastewater Capital Maintenance Programme Total</b>	<b>145</b>

## National Programmes

The National Programmes that have been identified for inclusion in the Investment Portfolio are summarised below. The break out of all the National Programmes is provided in the accompanying Business Planning Questionnaire submission to the CER.

Water National Programmes	Total €m 2017-2021
<b>Lead Services Pipe Replacement Programme</b> - Programme to replace lead backyard shared services and lead communication pipes to the property boundary.	96
<b>Orthophosphate Dosing</b> – IW is preparing a Lead in Drinking Water Mitigation Plan to address lead compliance, which will be subject to SEA and AA. Subject to environmental acceptability, it is proposed to implement a national programme of ortho-phosphate dosing, as a key element of the Plan.	78
<b>First Fix Leak Repair</b> targets the repair of leaks on domestic properties. IW assists customers by notifying them where suspected leakage is occurring within the boundary of the property. It is intended that leaks which are identified on the external supply pipe serving a property will be offered a free leak repair.	54
<b>Water Treatment Programmes</b>	
Coagulation/ Filtration/ Clarification (CFC) - Upgrading and installation of new CFC processes to remove undesirable contaminants (e.g. THM precursors, turbidity, colour, iron, manganese, etc.) from raw water prior to disinfection.	45
WTWs Sludge Treatment Programme - Provision of sludge treatment to manage and dispose of wastewater produced during drinking water production.	44
Disinfection Programme - Upgrading of disinfection processes to inactivate pathogens as part of a multiple barrier approach for the production of safe drinking water.	40
Filtration Programme - Upgrading of filtration processes at multiple WTP sites.	33
Treated Water Storage Programme - provision of a minimum of 24-hours treated water storage on all schemes to minimise water supply interruptions arising from normal water treatment plant operation and maintenance.	20
<b>New Connections</b> - including standard and significant new connections	18
<b>Minor Programmes Carryover</b> (Disinfection, Mains Rehab, Reservoir Refurbishment, HSQE, PRV, Critical Assets Water, RAL Filter & coagulation, Plant Refurbishment, Process Optimisation and Control, Energy Efficiency, Source Protection).	15

<b>Growth Programme</b> - objective is to identify capacity bottlenecks in the water networks across the country and to remove them over the investment period.	<b>15</b>
<b>Continuation of Phase 1 Domestic Metering Programme</b> – Programme to complete meter installations not completed within the IRC1 period.	<b>14</b>
<b>Large Non-Domestic Revenue Meter Assurance</b>	<b>14</b>
<b>Reservoir Inspections</b> to assess asset condition and inform future investment.	<b>14</b>
<b>Network Extensions Water</b> - Provision of strategic water infrastructure to enable priority development lands to be serviced where housing provision can most effectively contribute to resolving the current housing deficit.	<b>13</b>
<b>Energy Efficiency Water</b> - As a public body Irish Water has committed to 33% increase in energy efficiency savings by 2020 using 2009 as a base year. Upgrade and replacement of inefficient systems and the embedding of an energy efficient culture in plant design and operation. 10-40% of spend in facilities with equipment >20 years old. The scope of the Water Energy Efficiency Programme is to focus on the accelerated replacement and improvement of existing energy inefficient assets that are not included elsewhere within the Investment Plan.	<b>12</b>
<b>HSQE_A and HSQE_B</b> - Programmes to address known H&S issues at IW facilities.	<b>8</b>
<b>New District Metering Area Programme</b> – Programme to install new DMA meters within WSZs (as opposed to capital maintenance programmes of existing DMA meters)	<b>6</b>
<b>Mains Renewal - Water Quality</b> The Water Quality Mains Programme will specifically address the rehabilitation or provision of new mains where the condition of existing infrastructure impacts on drinking water quality. The primary focus will be on disinfection issues, discoloration and other non-compliance with drinking water requirements. Prioritisation will be risk based, and include the number of consumers affected and cost of remediation. Key outputs include enhanced customer service, drinking water regulation compliance and new or renewed assets.	<b>5</b>
<b>National Impounding Reservoir Safety (Dams)</b> – Remediation works deemed necessary to ensure the stability of existing impoundments, continuity of supply and reduce risk of failure.	<b>5</b>
<b>Water Taking In Charge - Initial Works</b> Priority service critical remediation works to water infrastructure in residential estates transferred to IW following Taking in Charge by the LA.	<b>4</b>

<b>National Telemetry WTP</b> - Provision of Telemetry and SCADA at IW assets not covered under specific project upgrades.	4
<b>Source Protection Programme</b> Source Protection involves the upgrading of source water protection works to ensure that raw water abstracted for drinking water production is of the highest quality possible (i.e. minimising water treatment costs).	4
<b>Drinking Water Safety Plans</b> - Programme of works arising from implementation of DWSPs.	4
<b>Water Network Modelling</b> - Modelling of water network for Large Towns / Gateways to support future investment decisions.	4
<b>Remaining Water National Programmes (value &lt; 5m).</b>  Site Security Upgrades - Water Sites, Pesticides Programme, Regularise Licencing for Existing Surface Water, and Groundwater Sources, National Telemetry Programme Reservoirs, Source Protection Key Study, Catchment Management Strategy, National Telemetry Programme Pressure Booster Stations, National Water Resources Plan, Water Services Infrastructure Refurbishment in Residential Estates for Taking in Charge, National Telemetry Programme Chlorine Booster Stations, Predictive Failure Modelling - Water Below Ground Networks, Trunk Mains - Analysis, Remediation, Models & Tools, Advanced Pressure Management - Urban Centres, Drinking Water Quality Risks in Water Networks, Poly Aromatic Hydrocarbons Study	20
<b>Water National Programmes Total</b>	<b>591</b>

<b>Wastewater National Programmes</b>	<b>Total €m 2017-2021</b>
<b>Sludge Programme (Sludge Hubs/ Satellites)</b> – The Wastewater Sludge Strategy will be the driver for this programme where investment will be provided to upgrade identified hubs and satellites to receive and treat wastewater sludges from their respective areas.	58
<b>Drainage Area Plans (DAP)</b> - to survey, map and assess the condition of existing networks (e.g. Dublin Centre City & Rathmines/ Pembroke, Cork City and Midleton) as a basis for cost effective compliance with overflow standards, address infiltration (including saline) and misconnections. The DAP process will identify the current performance level of the collection systems including level of infiltration/ exfiltration, structural deficiencies, hydraulic performance, indicate level of environmental impact and significance of individual Storm Water Overflows. DAPs (incl. hydraulic models) are to be kept live and represent existing asset condition and performance.	54

<b>Network Extensions Wastewater</b> - Provision of strategic wastewater infrastructure to enable priority development lands to be serviced where housing provision can most effectively contribute to resolving the current housing deficit.	<b>38</b>
<b>New Connections</b> , including standard and significant new domestic and non-domestic connections.	<b>30</b>
<b>Reinforcements for Growth</b> - Implementation of infrastructural reinforcements to accommodate defined growth needs, where such growth cannot be accommodated by existing infrastructure without high risk of service failure, compliance failure, or property damage.	<b>16</b>
<b>Energy Efficiency Wastewater</b> - As a public body Irish Water have committed to 33% increase in energy efficiency savings by 2020 using 2009 as a base year. Upgrade and replacement of inefficient systems and the embedding of an energy efficient culture in plant design and operation. The breakdown for the energy efficiency is assumed as follows ; Energy Conservation - Business Process Changes: 3-5% , Energy Conservation - Operations & Maintenance Mgt: 5-10%, Energy Conservation - Facility & Equipment Upgrades: 10-40% of spend in facilities with equipment >20 years old. The scope of the Wastewater Energy Efficiency Programme is to focus on the accelerated replacement and improvement of existing energy inefficient assets that are not included elsewhere within the Investment Plan.	<b>16</b>
<b>Telemetry installations</b> - SCADA /Telemetry upgrades at plants not included in individual upgrade projects (above and below ground).	<b>13</b>
<b>National Certificate of Authorisation Programme (NCAP)</b> – a programme has been defined for smaller wastewater treatment plants (< 500 PE). These sites will be prioritised based on the impact discharges are having on the environment.	<b>12</b>
<b>Storm Tanks</b> – the provision of appropriate storm water management at existing WWTPs is provided for in this programme where doing so will improve compliance, increase capacity and prolong the operational life of the existing plant. All sites above a threshold and not listed as individual projects elsewhere in the investment plan will be assessed.	<b>10</b>
<b>Wastewater TIC Initial Works</b> Priority service critical remediation works to wastewater infrastructure in residential estates transferred to IW following Taking in Charge by the LA.	<b>10</b>
<b>Water Services infrastructure Refurbishment in Residential Estates for Taking in Charge</b> - Remediation works required to improve service levels in wastewater infrastructure in residential estates transferred to IW following Taking in Charge by the LA.	<b>9</b>
<b>Wastewater Minor Programmes Carryover</b> Flow Monitoring & Sampling, Wastewater Prog - HSQE, Energy efficiency-Wastewater, Small Plant Improvement, Critical Asset Programme, Minor Programmes - Inlet Works, Compliance with UWWD & WWDA, Process Optimisation, Pump Station Upgrades, Sludge Programme Network Survey, Nutrient Management, ECJ Projects.	<b>8</b>

<b>HSQE_A and HSQE_B</b> - Programmes to address known H&S issues at IW facilities.	<b>7</b>
<b>Automation</b> - provision of automated processes at WWTP to achieve opex savings.	<b>6</b>
<b>Sludge Upgrades Programme</b> – providing appropriate sludge management capability at WWTP sites will be captured in this programme. Sites not specifically listed as individual projects will be assessed for sludge storage, thickening and dewatering requirement as per the Wastewater Sludge Strategy requirements.	<b>5</b>
<b>CSO Monitoring Programme</b> - Installation of flow and event monitors at Combined Sewer Overflows.	<b>5</b>
<b>Wastewater Disinfection</b> – A number of WWTWs discharge into sensitive receptors and require disinfection to meet receiving water quality standards. This programme will address these sites in a prioritised manner.	<b>4</b>
<b>Inlet Works</b> – the provision of inlet works for existing WWTPs where doing so will improve compliance, increase capacity and prolong the operational life of the existing plant. All sites above a threshold and not listed as individual projects elsewhere in the Investment Portfolio will be assessed.	<b>3</b>
<b>Remaining Wastewater National Programmes (value &lt; €3m)</b>  National Programme for Interreg Projects, Site Security - Wastewater Sites, Untreated Agglomerations Study, Model Maintenance and Updating, Unit Cost Database for Pricing Sewer Network Assets, Sewer Network Capacity Study, Development of River Assimilative Capacity High Level Screening Modelling Tool, IW Initiated Licence Reviews, Urban Waste Water Compliance Strategy, WWTP Outfall Inspections - National Programme, Wastewater Investigations Programme, Flow Measurement Sampling Programme	<b>16</b>
<b>Wastewater National Programmes Total</b>	<b>320</b>

<b>Other Infrastructure National Programmes</b>	<b>Total €m 2017-2021</b>
<b>Data Capture / Planned Maintenance Programme:</b>	
Asset Register Data Capture Project involves the surveying of all WWTWs, WTWs, pump stations & reservoirs and input into the IW Asset Register.	<b>8</b>
Planned Maintenance Programme provides the required asset utilisation at the lowest life cycle cost while also ensuring the asset makes it to the budgeted end of life. Reducing the risk of failure of critical assets will improve the quality and reliability of services to customers.	<b>4</b>

<b>Welfare Facilities in WS &amp; WW Plants</b> - Provision of suitable welfare facilities for LA staff in Water & Wastewater Treatment Plants, i.e. toilets, canteen, showers, lockers, dry rooms etc.	<b>3</b>
<b>Depots/Stores (Inventory Management)</b>  A Depot Network at geographically strategic locations for inventory items that are not supplied directly to site by a supplier.  Inventory includes Materials (Pipes, Pumps, Valves, Fittings and Road Surface Furniture), Aggregates, Meters and Fittings (domestic and non-domestic) for Planned and Reactive Maintenance and New Connections. The aim is to manage all this inventory on Maximo, linking it to a workorder, asset and location. Machinery, Plant, Equipment and Tools are in scope for inclusion in the workorder.  A Logistics Network from the depots to site. This includes the fleet used by crews to carry out their work.	<b>6</b>
<b>Developer Provided Infrastructure Takeover Study</b> - Asset study to assess potential liability associated with transfer of Developer Provided Infrastructure to IW from both CAPEX and Opex perspective and examination of most economically efficient manner to inform and influence national strategy and provision to connect developments where pre existing commitment exists.	<b>5</b>
<b>National Specialist Equipment</b> - Provision of mobile equipment such as jet vacs	<b>9</b>
<b>Energy Efficiency Programmes</b> - Sustainable Energy Pilot, Sustainable Energy Resource Quantification, Heating Efficiency Programme, Lighting Efficiency Project.	<b>3</b>
<b>National Laboratory Strategy Implementation</b> - The laboratory strategy will involve either the refurbishment and extension of existing facilities or the development of facilities at one or more green field sites. All options under review would require a significant capital investment over the period 2017 to 2021.	<b>13</b>
<b>Other National Programmes Total</b>	<b>51</b>

### **Projects**

The list of both drinking water and wastewater projects that have been identified for inclusion in the Investment Portfolio are listed below. This list is subject to CER approval. Further details of project spend, dates, outputs, etc. are included in the Business Plan Questionnaire, submitted to the CER separately as part of the IRC2 review.

<b>Asset Class</b>	<b>AS Project Name</b>	<b>County</b>
Drinking Water	Carlow Water Conservation - Watermains Rehabilitation Project	Carlow
Wastewater	Borris WWTP	Carlow

Wastewater	Muinebheag & Leighlinbridge WWTP	Carlow
Wastewater	Tullow WWTP	Carlow
Wastewater	Carlow WWTP	Carlow
Drinking Water	Belturbet Water Supply Scheme	Cavan
Drinking Water	Cavan Regional Water Supply Scheme - Extension to Ballyhasie PWS	Cavan
Drinking Water	Kingscourt Water Supply Scheme - WTP Upgrade	Cavan
Drinking Water	Swanlinbar WTP	Cavan
Wastewater	Bailieborough WWTP	Cavan
Wastewater	Ballyjamesduff WWTP	Cavan
Wastewater	Cootehill WWTP	Cavan
Wastewater	Kingscourt WWTP	Cavan
Wastewater	Virginia WW Network	Cavan
Wastewater	Virginia WWTP	Cavan
Wastewater	Ballyvaughan WWTP	Clare
Wastewater	Clarecastle WW Network	Clare
Wastewater	Ennistymon WWTP	Clare
Wastewater	Kilfenora WWTP	Clare
Wastewater	Kilkee WWTP	Clare
Wastewater	Kilrush WWTP	Clare
Wastewater	Liscannor WWTP	Clare
Wastewater	Newmarket-on-Fergus WWTP	Clare
Wastewater	Quin WWTP	Clare
Wastewater	Shannon Town WW Network	Clare
Wastewater	Shannon WWTP Phase 2	Clare
Drinking Water	Banteer / Dromahane Regional Water Supply Scheme Ph 1	Cork
Drinking Water	Bantry Regional Water Supply Scheme - Extension to Kealkill	Cork
Drinking Water	Cape Clear Water Supply Scheme	Cork
Drinking Water	Castletownbere Regional Water Supply Scheme Ph1	Cork
Drinking Water	Cork City - Pressure Management	Cork
Drinking Water	Cork City - Water Conservation	Cork

Drinking Water	Cork City Water Conservation Stage 3 Works - Watermain Rehabilitation Phase 1 - Shanakiel to Tivoli Trunk Main Replacement Contract	Cork
Drinking Water	Cork City Water Supply Scheme - Upgrading Shanakiel Rising Main	Cork
Drinking Water	Cork County - Mains Rehabilitation Works	Cork
Drinking Water	Corks City Water Supply Scheme Network (Wilton Lee Road Trunk Main)	Cork
Drinking Water	Cork City Water Conservation Phase 1 WP 1	Cork
Drinking Water	Cork City Water Conservation Phase 1 WP 2	Cork
Drinking Water	Dunmanway/Clonakilty Regional Water Supply Scheme Ph1	Cork
Drinking Water	Inniscarra Regional Water Supply Scheme	Cork
Drinking Water	Midleton Water Supply Scheme - Interconnection to Inniscarra Regional Water Supply Scheme and additional storage	Cork
Drinking Water	Skibbereen Regional Water Supply Scheme (Lake Cross WTP)	Cork
Drinking Water	Skibbereen Regional Water Supply Scheme (Ballyhilty WTP)	Cork
Wastewater	Youghal Sewerage Scheme - WWTP DBOM	Cork
Drinking Water	Cork City Water Supply Scheme - Upgrade of WTP	Cork
Wastewater	Ballincollig WW Network	Cork
Wastewater	Ballingeary WWTP	Cork
Wastewater	Ballycotton WWTP	Cork
Wastewater	Ballyvourney/Ballymakeera Sewerage Scheme WWTP	Cork
Wastewater	Bandon Sewerage Scheme Phase 2 Network	Cork
Wastewater	Bandon WWTP	Cork
Wastewater	Bantry WW Network	Cork
Wastewater	Boherbue WWTP	Cork
Wastewater	Castlemartyr WWTP	Cork
Wastewater	Castletownbere WW Network	Cork
Wastewater	Castletownbere Waste Water Outfall	Cork
Wastewater	Castletownsend WWTP	Cork
Wastewater	Charleville WWTP	Cork
Wastewater	Coachford WWTP	Cork

Wastewater	Cork City - St Patricks Culvert	Cork
Wastewater	Cork City WW Network	Cork
Wastewater	Cork City WWTP	Cork
Wastewater	Cork Lower Harbour - WWTP & - Networks (Carrigaline / Ringaskiddy Networks , Cobh Networks and Passage - West / Monkstown Networks)	Cork
Wastewater	Courtmacsherry / Timoleague Sewerage Scheme	Cork
Wastewater	Dripsey WWTP	Cork
Wastewater	Dunmanway WW Network	Cork
Wastewater	Fermoy WW Network	Cork
Wastewater	Inchigeelagh WWTP	Cork
Wastewater	Innishannon Sewerage Scheme (SLI) WWTP Upgrade	Cork
Wastewater	Kanturk WWTP	Cork
Wastewater	Macroom WWTP	Cork
Wastewater	Mallow Sewerage Scheme Network	Cork
Wastewater	Mallow WWTP	Cork
Wastewater	Midleton WW Network	Cork
Wastewater	Millstreet Sewerage Scheme WWTP	Cork
Wastewater	Mitchelstown WW Network	Cork
Wastewater	Mitchelstown WWTP	Cork
Wastewater	Newmarket WWTP	Cork
Wastewater	Rosscarbery/Owenahincha WWTP	Cork
Wastewater	West Cork WW Grouped DBO Scheme	Cork
Wastewater	Whitegate/Aghada WW Network	Cork
Wastewater	Whitegate/Aghada WWTP	Cork
Wastewater	Bantry WWTP	Cork
Drinking Water	Ballyshannon Regional Water Supply Scheme Ph1 - New WTP and extension to Ballymagourty, Cashelard and Bundoran	Donegal
Drinking Water	Donegal Countywide Watermain Rehabilitation Contract No.1	Donegal
Drinking Water	Gortahork/Falcarragh Water Supply Scheme	Donegal
Drinking Water	Inishowen Regional Water Supply Scheme Trunk Mains	Donegal

Drinking Water	Inishowen Regional Water Supply Scheme - Upgrade of WTP	Donegal
Drinking Water	Killybegs Regional Water Supply Scheme Upgrade of WTP and extension to Glenties/Ardara	Donegal
Drinking Water	Letterkenny WTW Goldrum	Donegal
Drinking Water	Lettermacaward Regional Water Supply Scheme - Upgrade of WTP and extension to Portnoo, Fintown and Glenties/Ardara	Donegal
Drinking Water	Lough Mourne Regional Water Supply Scheme - Upgrade of WTP	Donegal
Drinking Water	Owenteskna Water Supply Scheme - Upgrade of WTP	Donegal
Wastewater	Ballybofey/Stranorlar WW Network	Donegal
Wastewater	Ballybofey-Stranolar WWTP	Donegal
Wastewater	Ballyliffen WWTP	Donegal
Wastewater	Bridgend WWTP	Donegal
Wastewater	Buncrana WW Network	Donegal
Wastewater	Burnfoot WWTP	Donegal
Wastewater	Burtonport H.E. WWTP	Donegal
Wastewater	Burtonport WW Network	Donegal
Wastewater	Carrigart WWTP	Donegal
Wastewater	Donegal (Group B) Sewerage Schemes Wastewater Treatment Plants	Donegal
Wastewater	Dunfanaghy-Portnablagh WWTP	Donegal
Wastewater	Fahan WWTP	Donegal
Wastewater	Falcarragh WWTP	Donegal
Wastewater	Kerrykeel WW Network	Donegal
Wastewater	Kerrykeel WWTP	Donegal
Wastewater	Kilcar WWTP	Donegal
Wastewater	Kilmacrenan WW Network	Donegal
Wastewater	Kilmacrennan WWTP	Donegal
Wastewater	Letterkenny Sewerage Scheme (Network) All contracts	Donegal
Wastewater	Milford WW Network	Donegal
Wastewater	Milford WWTP	Donegal
Wastewater	Mountcharles WW Network	Donegal

Wastewater	Moville WWTP	Donegal
Wastewater	Ramelton WW Network	Donegal
Wastewater	Ramelton WWTP	Donegal
Wastewater	Raphoe WWTP	Donegal
Wastewater	Rathmullan Septic Tank Nr. 2 (WWTP)	Donegal
Wastewater	Rathmullan WWTP	Donegal
Wastewater	Gweedore WW Network	Donegal
Drinking Water	Balbriggan Water Supply Scheme Ph2 Jordanstown to Kilsough Trunk Main	Dublin
Drinking Water	Ballyboden Reservoir	Dublin
Drinking Water	Ballycoolen Trunk Main (Ballycoolen/Kingstown)	Dublin
Drinking Water	Dublin City - Water Conservation	Dublin
Drinking Water	Dublin City - Water Conservation Stage 3 Works Hotspots - Tranche 3	Dublin
Drinking Water	Greater Dublin Area Trunk Main Review	Dublin
Drinking Water	Malahide Water Supply Scheme - Additional Storage, Howth Water Supply Scheme Ph2 and Ph3	Dublin
Drinking Water	Old Connaught/Woodbrook Water Scheme	Dublin
Drinking Water	Peamount to Saggart Pump Station and Rising Main	Dublin
Drinking Water	Saggart Peamount Demand Transfer	Dublin
Drinking Water	Saggart Reservoir	Dublin
Drinking Water	Stillorgan Saggart Trunk Mains	Dublin
Drinking Water	Swords Watermain Rehabilitation Scheme	Dublin
Drinking Water	Vartry Regional Water Supply Scheme	Dublin
Drinking Water	Water Supply Project - East & Midlands Region	Dublin
Wastewater	Balbriggan Skerries Wastewater Treatment - Rush Road	Dublin
Wastewater	Balbriggan/Skerries Phase 3 Loughshinny WW Network	Dublin
Wastewater	Blanchardstown Sewerage Scheme	Dublin
Wastewater	Blanchardstown Link Sewer	Dublin
Wastewater	Dun Laoghaire-Rathdown Sewerage Scheme Ph1 Contract 2 Network Upgrade Tunnel	Dublin
Wastewater	Doldrum Bay WW Network	Dublin

Wastewater	Goatstown Rd Local Network Reinforcement	Dublin
Wastewater	Greater Dublin Drainage Project	Dublin
Wastewater	Johnstown Rd, Cabinteely Local Network Reinforcement	Dublin
Wastewater	Kinsealy Local Network Reinforcement	Dublin
Wastewater	Landscape Rd, Churchtown Local Network Reinforcement	Dublin
Wastewater	Liffey Siphon (Rosie Hackett Bridge)	Dublin
Wastewater	Liffey Siphon Refurbishment	Dublin
Wastewater	Lusk Local Network Reinforcement	Dublin
Wastewater	Malahide WW Network	Dublin
Wastewater	Newcastle Local Network Reinforcement	Dublin
Wastewater	North Docklands Sewerage Scheme	Dublin
Wastewater	Old Connaught Local Network Reinforcement	Dublin
Wastewater	Oldcourt Local Network Reinforcement	Dublin
Wastewater	Portmarnock South Local Network Reinforcement	Dublin
Wastewater	Rathmichael/Shankhill WW Network	Dublin
Wastewater	Ringsend - City Centre - WW Network	Dublin
Wastewater	Ringsend - Rathmines and Pembroke - WW Network	Dublin
Wastewater	Ringsend WWTP	Dublin
Wastewater	Rush Road Pumping Station & Gravity Sewer	Dublin
Wastewater	SDZ North Docklands Ancillary Water Services	Dublin
Wastewater	South Docklands SDZ Sewerage Scheme	Dublin
Wastewater	Swords WW Network	Dublin
Wastewater	Swords Network Old Town / Mooretown	Dublin
Wastewater	Swords-Malahide Drainage Area Plan	Dublin
Wastewater	Torquay Rd. Leopardstown Local Network Reinforcement	Dublin
Drinking Water	Carraroe Water Supply Scheme	Galway
Drinking Water	Galway City Water Conservation	Galway
Drinking Water	Galway County Water Conservation Stage 3 Works - Phase 2 Works	Galway
Drinking Water	Inis Oir Water Supply Scheme	Galway
Drinking Water	Inismean Water Supply Scheme	Galway

Drinking Water	Leenane Water Supply Scheme	Galway
Drinking Water	Terryland WTP Provision of New Intake & Rising Main to West of City	Galway
Drinking Water	Tuam Regional Water Supply Scheme Extension Phase 1 and Phase 2	Galway
Wastewater	Ahascragh WWTP	Galway
Wastewater	Athenry WW Network	Galway
Wastewater	Athenry WWTP	Galway
Wastewater	Ballinasloe WW Network Contract No. 2	Galway
Wastewater	Ballygar WWTP	Galway
Wastewater	Carraroe Waste Water Outfall	Galway
Wastewater	Eyrecourt WWTP	Galway
Wastewater	Galway City WW Network	Galway
Wastewater	Glenamaddy WW Network	Galway
Wastewater	Mountbellew WWTP	Galway
Wastewater	Oughterard Sewerage Scheme WWTP Upgrade	Galway
Wastewater	Roundstone WWTP	Galway
Wastewater	Roundstone Wastewater Outfall	Galway
Wastewater	Spiddal WW Network	Galway
Wastewater	Spiddal WWTP Expansion	Galway
Wastewater	Portumna WWTP	Galway
Wastewater	Tuam WWTP	Galway
Drinking Water	Central Kerry Regional Water Supply Scheme - Upgrade of Lough Guitane WTP	Kerry
Drinking Water	County Kerry Water Conservation	Kerry
Drinking Water	Kenmare Water Supply Scheme	Kerry
Drinking Water	Kerry Water Conservation Mains Rehabilitation	Kerry
Drinking Water	Kilgarvan Water Supply Scheme	Kerry
Drinking Water	Lauragh Water Supply Scheme	Kerry
Drinking Water	Mountain Stage Water Supply Scheme	Kerry
Drinking Water	Water Conservation Mains Rehab - Derry Listowel	Kerry
Wastewater	Ardfert SS - WWTP Upgrade	Kerry
Wastewater	Castlemaine WWTP Upgrade	Kerry
Wastewater	Kenmare WWTP	Kerry

Wastewater	Kilcummin WW Network	Kerry
Wastewater	Listowel WW Network	Kerry
Wastewater	Tralee WW Network	Kerry
Wastewater	Castleisland WWT	Kerry
Drinking Water	Srowland Water Pumping Station and Trunk Main	Kildare
Wastewater	Celbridge Local Network Reinforcement	Kildare
Wastewater	Kildare Sewerage Scheme Network	Kildare
Wastewater	Leixlip Transfer Pipeline	Kildare
Wastewater	Lower Liffey Valley Sewerage Scheme WWTP	Kildare
Wastewater	Osberstown Sludge Hub	Kildare
Wastewater	Upper Liffey Valley Sewerage Scheme	Kildare
Wastewater	Upper Liffey Valley Sewerage Scheme Phase 3 Contract 2A (Network)	Kildare
Wastewater	Upper Liffey Valley Sewerage Scheme Phase 3 Osberstown WWTP Upgrade	Kildare
Drinking Water	Gowran Water Supply Scheme	Kilkenny
Drinking Water	Kilkenny Regional Water Supply Scheme - Upgrade of Troyswood WTP and Kilkenny Regional Water Supply Scheme - Outrath Reservoir	Kilkenny
Drinking Water	Kilkenny Water Conservation Mains Rehabilitation	Kilkenny
Drinking Water	Thomastown Water Supply Scheme - Extension to Inistioge Water Supply Scheme	Kilkenny
Wastewater	Inistioge WWTP	Kilkenny
Wastewater	Mullinavat WWTP	Kilkenny
Wastewater	Piltown WWTP	Kilkenny
Drinking Water	Laois Water Conservation Stage 3 Works	Laois
Drinking Water	Portarlinton Regional Water Supply Scheme - Additional storage	Laois
Drinking Water	Portarlinton Regional Water Supply Scheme - Upgrade of WTP	Laois
Wastewater	Laois Grouped Towns Sewerage Scheme Network	Laois
Wastewater	Laois Grouped Towns Sewerage Scheme WWTP	Laois
Wastewater	Mountmellick Sewerage Scheme Phases 2 and 3	Laois
Wastewater	Portarlinton Sewerage Scheme	Laois
Wastewater	Portarlinton Sewerage Scheme WWTP (Inlet Works)	Laois

Wastewater	Portlaoise WW Network	Laois
Wastewater	Portlaoise WWTP	Laois
Drinking Water	North Leitrim Regional Water Supply Scheme - Upgrade of WTP and Extension Kiltyclogher	Leitrim
Wastewater	Drumshanbo WWTP	Leitrim
Wastewater	Manorhamilton WWTP	Leitrim
Wastewater	Mohill WWTP	Leitrim
Wastewater	Dromcollagher WW Network	Limerick
Drinking Water	Clareville Regional Water Supply Scheme Extension	Limerick
Wastewater	Limerick WWTP	Limerick
Wastewater	Castletroy WWTP	Limerick
Drinking Water	Longford - Water Conservation	Longford
Drinking Water	Longford Central Regional Water Supply Scheme Ph1 - Upgrade of WTP and extension to Lanesborough and Newtowncashel Water Supply Schemes	Longford
Wastewater	Longford WW Network	Longford
Drinking Water	Drogheda Regional Water Supply Scheme - Upgrade of WTP	Louth
Drinking Water	Drogheda to Staleen Trunk Main	Louth
Drinking Water	Dundalk Water Supply Scheme - Upgrade of WTP	Louth
Drinking Water	Louth (Dundalk) Water Conservation	Louth
Wastewater	Ardee WW Network	Louth
Wastewater	Ardee WWTP	Louth
Wastewater	Blackrock WWTP	Louth
Wastewater	Blackrock, Dundalk Local Network Reinforcement	Louth
Wastewater	Carlingford WWTP	Louth
Wastewater	Clogherhead WWTP	Louth
Wastewater	Drogheda WW Network	Louth
Wastewater	Drogheda WWTP	Louth
Wastewater	Dundalk WWTP	Louth
Wastewater	Omeath Sewerage Scheme Wastewater Outfall	Louth
Wastewater	Rathmullen Rd, Drogheda Local Network Reinforcement	Louth
Drinking Water	Inishturk Water Supply Scheme- Upgrade of WTP	Mayo

Drinking Water	Lough Mask Regional Water Supply Scheme	Mayo
Wastewater	Ballinrobe WWTP	Mayo
Wastewater	Ballyhaunis WWTP	Mayo
Wastewater	Belmullet, Foxford & Charlestown Sewerage Scheme Network & WWTPs	Mayo
Wastewater	Killala Sewerage Scheme Network & WWTP	Mayo
Wastewater	Claremorris WWTP	Mayo
Drinking Water	Kells Oldcastle Water Supply Scheme - Upgrade of Loughbane WTP	Meath
Drinking Water	Kells Oldcastle Water Supply Scheme - Upgrade of Clavins Bridge WTP	Meath
Drinking Water	Meath Countywide Water Conservation Project: Watermains Rehabilitation	Meath
Drinking Water	Navan Mid-Meath Regional Water Supply Scheme Ph7 - New Dowdstown WTP	Meath
Drinking Water	Navan Mid-Meath Regional Water Supply Scheme Ph8 - Upgrade of WTP Sludge Treatment	Meath
Wastewater	Enfield WWTP	Meath
Wastewater	Kells (Meath) WWTP	Meath
Wastewater	Kells Sewerage Scheme	Meath
Wastewater	Stamullen WWTP	Meath
Wastewater	Dunshaughlin WWTP	Meath
Wastewater	Trim WWTP	Meath
Wastewater	Navan WWTP	Meath
Drinking Water	Lough Egish Regional Water Supply Scheme - Upgrade of WTP	Monaghan
Drinking Water	Monaghan Water Conservation	Monaghan
Wastewater	Carrickmacross WWTP	Monaghan
Wastewater	Castleblaney Sewerage Scheme Phase 1 WWTP	Monaghan
Wastewater	Monaghan Town WW Network	Monaghan
Drinking Water	Birr Water Supply Scheme - Upgrade of WTP and Additional Storage	Offaly
Drinking Water	Offaly - Water Conservation - Edenderry Francis Street, Edenderry South East	Offaly
Drinking Water	Tullamore Water Supply Scheme Phase 5 Water Treatment Plant Upgrade (Clonaslee)	Offaly

Drinking Water	Tullamore Water Supply Scheme - Upgrade of Clonaslee WTP	Offaly
Drinking Water	Tullamore Water Supply Scheme (Contract 3) - Development of Sources - BH6	Offaly
Drinking Water	Tullamore Water Supply Scheme (Contract 3) - Development of sources -BH3	Offaly
Wastewater	Banagher WWTP	Offaly
Wastewater	Birr WWTP	Offaly
Wastewater	Edenderry WW Network	Offaly
Wastewater	Tullamore WW Network	Offaly
Drinking Water	Boyle Water Supply Scheme - Extension to Grangemore Water Supply Scheme	Roscommon
Drinking Water	NE Roscommon & Ballyleague Regional Water Supply Schemes Water Treatment Plants - DBO	Roscommon
Drinking Water	North Roscommon Water Supply Scheme - Upgrade of WTP	Roscommon
Wastewater	Boyle WW Network	Roscommon
Wastewater	Monksland WW Network	Roscommon
Wastewater	Roscommon Sewerage Scheme	Roscommon
Wastewater	Ballagherreen WWTP	Roscommon
Drinking Water	Lough Talt Regional Water Supply Scheme - Upgrade WTP	Sligo
Drinking Water	Sligo and Environs Water Supply Scheme (Ph 2) - Upgrade of WTP	Sligo
Drinking Water	Sligo - Water Conservation	Sligo
Drinking Water	Sligo Water Conservation Stage 3 Lough Talt Regional Water Supply Scheme	Sligo
Wastewater	Ballinacarrow and Environs WWTP	Sligo
Wastewater	Ballymote WWTP	Sligo
Wastewater	Collooney WWTP	Sligo
Wastewater	Grange/Strandhill/Tubbercurry Sewerage Scheme WWTPs Upgrades	Sligo
Wastewater	Mullaghmore WWTP	Sligo
Wastewater	Rosses Point WW Network	Sligo
Wastewater	Sligo Sewerage Scheme	Sligo
Drinking Water	Ardfinnan Regional Water Supply Scheme - New WTP and Additional Storage	Tipperary

Drinking Water	Clonmel Regional Water Supply Scheme - Graigue Watermain & Borehole	Tipperary
Drinking Water	Clonmel Regional Water Supply Scheme - New WTP and Additional Storage	Tipperary
Drinking Water	Coalbrook WTP - New Source	Tipperary
Drinking Water	Fethard Regional Water Supply Scheme - Upgrade Mullinbawn WTP	Tipperary
Drinking Water	Nenagh Town Water Conservation	Tipperary
Drinking Water	Thurles Regional Water Supply Scheme - New WTP	Tipperary
Wastewater	Ballina WWTP	Tipperary
Wastewater	Cashel WWTP	Tipperary
Wastewater	Fethard WWTP	Tipperary
Wastewater	Nenagh WW Network	Tipperary
Wastewater	Nenagh New WWTP	Tipperary
Wastewater	Nenagh WW Network Advance Works	Tipperary
Wastewater	Newport WWTP	Tipperary
Wastewater	Roscrea WW Network	Tipperary
Wastewater	Thurles WW Network	Tipperary
Wastewater	Tipperary-Town WWTP	Tipperary
Wastewater	Cahir WWTP	Tipperary
Drinking Water	LCB Water Supply Scheme - Extension from LCB Lismore Deerpark	Waterford
Drinking Water	Ring/Helvick Water Supply Scheme - New Source, Reservoir and Network Contract	Waterford
Drinking Water	Tallow Water Supply Scheme	Waterford
Drinking Water	Waterford County - Water Conservation	Waterford
Drinking Water	Ballinacourty/Deelish Water Supply Scheme - Contract 1 (Network)	Waterford
Drinking Water	Dungarvan Water Supply Scheme - Additional Storage	Waterford
Drinking Water	Dunmore East Water Supply Scheme Network Upgrade and Extension	Waterford
Drinking Water	LCB Water Supply Scheme - New WTP and Additional Storage	Waterford
Wastewater	Passage East WWTP	Waterford

Drinking Water	South Westmeath Regional Water Supply Scheme (Athlone and Mullingar)	Westmeath
Wastewater	Athlone Main Drainage WWTW Upgrade C2	Westmeath
Wastewater	Athlone Sewerage Scheme Interim WWTP Upgrade	Westmeath
Drinking Water	Gorey Regional Water Supply Scheme Contract 4 (Water Treatment Plant, Reservoir & Pumping Station)	Wexford
Drinking Water	Wexford - Water Conservation	Wexford
Wastewater	Arhurstown Waste Water Outfall	Wexford
Wastewater	Ballyhack and Environs WWTP	Wexford
Wastewater	Duncannon WWTP	Wexford
Wastewater	Enniscorthy Main Drainage	Wexford
Wastewater	Enniscorthy WWTP	Wexford
Wastewater	Fetherd-on-Sea WWTP	Wexford
Wastewater	Kilmore Quay Village and Environs Waste Water Outfall	Wexford
Wastewater	Wexford WWTP DBO	Wexford
Drinking Water	Enniscorthy and Sow Regional Water Supply Scheme	Wexford
Wastewater	Ferns WWTP	Wexford
Drinking Water	Mid Wicklow Water Supply Scheme	Wicklow
Drinking Water	Wicklow County Water Conservation Works Stage 3 Contract 3	Wicklow
Wastewater	Arklow and Environs WW Network	Wicklow
Wastewater	Arklow WWTP	Wicklow
Wastewater	Avoca WWTP	Wicklow
Wastewater	Greystones WW Network	Wicklow
Wastewater	Wicklow Local Network Reinforcement	Wicklow
Wastewater	Baltinglass WWTP	Wicklow
Wastewater	Blessington WWTP	Wicklow

## Appendix D – Approach to Growth in the Investment Plan

The challenge of providing for population and economic growth is one of making careful, timely and cost-effective investments in new plants and upgrades, with due regard to the uncertainty in growth forecasts. This requires close interaction with the preparation of spatial planning policy at the national level and with regional and local development planning. In this investment plan, we are seeking to provide the critical headroom in our plants and trunk networks to meet organic growth, while making long term plans for future needs. In addition, we recognise the need to support strategic and priority development zones requiring infrastructure to enable urgent housing and socio-economic growth in line with our Connections policy (currently an interim policy pending approval by the CER to a long term policy).

In the latter half of 2015, the pace of developer enquiries has accelerated markedly and we are receiving representations from planning authorities and development agencies on the need to cater for significant development in the short and medium term. This is particularly intense in larger urban centres and a key feature is the urgent need for housing development to meet current shortages and the Government's recently published action plan<sup>32</sup> on housing.. The extent of serviced land is limited and an agreed approach is required involving national, regional and local planning authorities, together with Irish Water and in consultation with the CER, in order to meet this challenge.

Irish Water is committed to its objective, as stated in the WSSP, to facilitate growth in line with national and regional economic and spatial planning policy. Irish Water faces challenges in addressing planning and growth in the Investment Plan due to current uncertainty in relation to national and regional strategies and RBMPs. This impacts on our approach to addressing economic growth, demographics, settlement hierarchy and environmental constraints. Target populations and core strategies in RPGs and the majority of County Development Plans were based on 2006 Census which were not reflected in population growth achieved in subsequent years.

Accordingly, as an interim measure pending development of the new National Planning Framework and regional plans, IW commissioned the Economic and Social Research Institute (ESRI) in June 2013 to prepare population projections up to 2041. ESRI projected population and new household formation at a regional and county level. IW then used the ESRI population projections at county level to estimate the average annual growth over 30 years (2011 to 2041), as a percentage of the 2011 population, for each county under two categories:

- Significant urban areas (towns with greater than 1,500 pop in 2011) ; and
- Urban areas (towns with less than 1,500 population in 2011).

Growth rates over three alternative design periods, 2015 to 2025, 2015 to 2035, and 2015 to 2040, were then estimated for the above categories for each county and applied to drinking water supply and wastewater projects as described below. More detailed social and economic modelling was carried out across the Greater Dublin Area (GDA) in support of

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<sup>32</sup> Rebuilding Ireland, an Action Plan for Housing and Homelessness, DHPCLG, July 2016

developing long term sustainable water supply and wastewater solutions for the GDA and the broader Eastern and Midlands Region. Further growth models will be developed as part of the National Water Resources Plan.

The key steps for using the growth model are summarised as follows:

### Water Supply

- Considered the supply area for the project as a Water Resource Zone (WRZ), a number of inter connected Water Supply Zones (WSZ), or WSZ as appropriate;
- Used growth to 2025 and 2035 and applied to current demand, subject to the following:
  - Include current domestic and non-domestic demand at treatment plants;
  - Unaccounted For Water (UFW) targets set based on the WSSP; and
- Headroom of 20%; 15% and 10% based on classification of the supply area (in accordance with Regional Planning Guideline designation as large urban settlement, regional gateway, other towns), with resilience provided by designing to deliver 24 hour production capacity in 20 hour normal daily operating period.

### Wastewater Treatment

- Used the projected growth from 2015 to 2025, as appropriate depending on whether population of agglomeration is less or greater than 1,500, as the 10 year growth rate;
- Current load was based on reported load in Annual Environmental Reports (AERs), data book or assumptions based on population;
- Used current BOD load, as PE, at treatment plant and applied 10 year growth rate, with local adjustment to take account of industry or holiday peaks;
- Added 20%, 15% and 10% headroom depending on classification of agglomeration (in accordance with Regional Planning Guideline designation as large urban settlement, regional gateway, other towns); and
- Where a negative growth rate was identified by the model, growth rate considered as 0% but 10% or appropriate added for headroom.

### Wastewater Networks

- Identified settlements where growth in population would be greater than 5% from 2011 to 2021 based on average annual growth rate over 30 years, indicating pressure on the wastewater network; and
- Where growth pressure was identified, a network upgrade was designed to cater for anticipated 25 year growth (2015 to 2040).

The interim growth model, pending a new national spatial planning framework, is considered to be a reasonable approach to identify growth requirements for interventions assessed as part of the investment planning process used in developing this Investment Plan.

More in depth analysis of growth requirements will be carried out at the detailed design stage for projects that are included in the investment plan. This will include a review of the

current Development Plans, settlement hierarchy and core strategies and interaction with the relevant planning authority(s) to ascertain the “Plan” driven projected growth in the area.

Where the growth in a centre is substantially different than that projected in our growth models there will be a need to do a sense check to determine the appropriate design loads for the project.

The domestic and commercial/institutional demand or load, calculated as above, may be significantly different from the reported loading /demand. In such cases, the measurement and calculation of loading/demand will be verified and thereafter a comprehensive assessment of contributions to demand from large users will be carried out, such that a reasonable level of balance as between measured and assessed demand is achieved.

It is anticipated that any new population projections and targets resulting from the National Planning Framework and Regional Spatial and Economic Strategies will inform this subsequent analysis at project stage.

## Appendix E – Stakeholder Consultation and Customer Research

### Stakeholder Consultation

The following table is a list of those stakeholders who responded to the Emerging Investment Plan issued for consultation on 14 January 2016. A number of respondents made multiple submissions.

<b>Stakeholder / Organisation</b>
Association of Architectural Conservation Officers (AACO)
Carlow County Council
Chambers Ireland
Clare County Council
Clew Bay CLAMS Group
Cork County Council
Department of Jobs Enterprise & Innovation
Dublin City Council
Dun Laoghaire Rathdown County Council
EMRA (Eastern and Midlands Regional Assembly)
EPA
Fingal County Council
HSE
IBEC
Inland Fisheries Ireland
Kerry County Council
Kildare County Council
Kilkenny County Council
Laois County Council
Limerick City & County Council
Mayo County Council
Meath County Council
Noai Partnership
NWRA (Northern & Western Regional Assembly)
Public Water Forum (including individual members)
SRA (Southern Regional Assembly)
Tipperary County Council
Transport Infrastructure Ireland (TII)
Waterford County Council
Waterways Ireland
Wexford County Council
Wicklow County Council

*The following is a list of key themes advanced by respondents to the EIP and the IW response to same.*

### Growth Projections and Alignment with Other Plans

A number of LAs raised concerns on the approach taken in the Investment Plan to alignment with spatial plans, including core strategies, and forecasting growth. There were concerns that the Investment Plan would not provide the infrastructure to accommodate future growth in the most likely and important locations. It was considered that the population projections prepared by the ESRI (Economic and Social Research Institute) were not appropriate for use in the preparation of an Investment Plan.

#### *Irish Water Response*

Irish Water is committed to its objective, as stated in the WSSP, to facilitate growth in line with national and regional economic and spatial planning policy. In our engagement with stakeholders we highlighted the challenges in addressing planning and growth in the Investment Plan due to current uncertainty in relation to national and regional strategies and RBMPs.

These challenges impact on our approach to addressing economic growth, demographics, settlement hierarchy and environmental constraints. Target populations and core strategies in Regional Planning Guidelines and the majority of County Development Plans were based on 2006 Census, and are not aligned to population growth achieved in subsequent years. Accordingly, in June 2013 IW commissioned the ESRI to prepare population projections to 2041. This model was used to forecast future growth in demand in the case of water supply and BOD (P.E.) load in the case of wastewater treatment.

The Investment Plan includes a number of additional measures to address the concerns raised:

- Our approach to growth is set out in Appendix D; it sets out the steps that will be taken at the detailed design stage of projects being advanced under the Investment Plan.
- Regional and economic spatial strategies will be considered in the expected update to this Investment Plan for the next regulatory period commencing on 1 January, 2019, as set out in section 4.6 of this document.
- Reinforcement for Growth National Programme. The programme objective is to identify bottlenecks in the drinking water and wastewater networks across the country and to remove the bottlenecks, most pressing, over the investment period.
- Network Extensions Water and Wastewater - provision of strategic water and wastewater infrastructure to enable priority development lands to be serviced where housing provision can most effectively contribute to resolving the current housing deficit.

## Provision of Water Services and Economic Development

A number of respondents commented on the important role of drinking water services in supporting economic development. These respondents noted that the provision of world class water and wastewater services, at appropriate quality levels, is vital to support long term economic growth, maintain and grow the broad enterprise base, continue to attract high levels of foreign direct investment and retain and create jobs, particularly in key growth sectors such as food and drink, life sciences, ICT, manufacturing and tourism sectors. The importance of meeting enterprise needs in Dublin and in key regional locations was emphasised.

### *Irish Water Response*

It is an objective of Irish Water that the interventions in the Investment Plan should be balanced across the various drivers including supporting economic development, provision of safe and secure drinking water supplies, minimising the impact of wastewater discharges on the environment and maintaining our asset base. We believe that this objective is reflected in the Investment Portfolio for the IP2 period.

## Need for Prioritisation

A number of respondents commented on the need for prioritisation and provided their view on priorities for investment; examples include:

- providing sufficient water services capacity in Dublin;
- delivering water services to support economic growth, including strategic sites and business parks;
- water infrastructure must be delivered on a phased basis based on evidence of demand, only where a critical need has been identified;
- reducing leakage;
- WWTW that are overloaded where they are having a deleterious effect on receiving waters; and
- plants that are on the EPA Remedial Action list and agglomerations identified by the EPA Action list.

### *Irish Water Response*

The objectives as set out in the WSSP and IW Business Plan align with the priorities identified by respondents. The Investment Plan sets out the approach taken to optimisation of intervention options by examining their contribution to specific performance targets. This is detailed in section 2 and Appendix B.

## Drinking Water Quality

A number of respondents raised issues on drinking water quality, including:

- Microbiological contamination, including cryptosporidium;
- THMs;

- Lead;
- Pesticides; and
- Oil spillages.

It was suggested that IW should also become active at catchment management level through support, including financial where appropriate, for local projects. There is support for inclusion of source protection in the context of microbiological, nutrient and pesticide reduction. However, there is concern that source protection will not resolve all pesticide non-compliances.

### *Irish Water Response*

Irish Water has committed in the WSSP and IW Business Plan to key targets in relation to ensuring a safe and reliable water supply. IW is in the process of preparing and implementing Drinking Water Safety Plans to protect our water supplies in accordance with international best practice. This Investment Plan includes individual projects and National Programmes to address existing deficiencies in our drinking water assets.

It also includes a number of interventions to support the implementation of source protection measures. It includes a proposal for an Interreg project, as a cross border initiative with Northern Ireland Water, that will pilot source protection initiatives. In addition, it includes a number of key studies that will incorporate source protection, for example, Pesticide Strategy, Ground Water Source Protection Plans, and Catchment Management Strategy

### Rationalisation of Water Supplies

A number of respondents were supportive of the proposals to rationalise water supplies. It supports, among other things, public health policy and higher grade treatment systems in a greater proportion of public water supplies. While the benefits were acknowledged, there are challenges that also need to be considered:

- It may result in increased abstraction from lowland surface water sources. Such changes in source profile may increase risk of contamination from, for example, pathogenic species of cryptosporidium, oil spillages or inappropriate pesticide usage.
- Balancing short term risk of non-compliance and long term improvement via rationalisation.
- Possible reduction in surface water abstraction locations resulting in increased abstraction pressures at existing abstraction locations.

### *Irish Water Response*

This rationalisation approach was outlined in the WSSP and will be further developed within the National Water Resources Plan. The WSSP sets out the objective of a rationalised approach towards fewer schemes based on larger and more sustainable sources to provide reliability of service, network resilience and value for money to our customers. There are further measures that Irish Water is taking to address the specific issues raised by respondents.

- It is acknowledged that it will take a number of investment cycles to achieve the desired level of rationalisation of water supplies. This Investment Plan includes a number of measures, such as the Disinfection Programme, that will address water quality in those supplies where rationalisation will not occur for some time.
- Irish Water is committed to the Drinking Water Safety Plan approach and this will address any potential risks that will arise in the rationalisation approach.

### Stormwater

A number of respondents commented on various aspects of stormwater, including the approach set out on Pages 25-26 of the Emerging Investment Plan. Issues raised include the following:

- New developments be allowed to discharge into the combined sewer network where no other viable options are available and subject to discharge limits based on a Sustainable Urban Drainage System (SUDs) process so as to avoid limitations on the scope for infill development in cities and towns.
- Concern that if stormwater flowing to combined sewers is not addressed soon then Combined Sewer Overflows (CSOs) will continue to be an issue particularly in sensitive water body catchments.
- Potential implications for national road drainage in urban locations where road drainage is connected into combined sewers.
- While it is acknowledged that CSO discharge issues are complex and are unlikely to be addressed in Irish Water's immediate works programme, there are potential health risks to persons engaged in water recreation activities in the vicinity of these CSO discharges.
- Avoid burdening LAs with excessive costs in relation to future storm water and that the costs of installing storm water separation to be borne by Irish Water.

### *Irish Water Response*

As noted in section 1 there are a variety of policy matters where exact funding requirements have not yet been determined and which may impact on the funding needs of IW – this includes the treatment of storm water. Under the legislation establishing Irish Water, IW does not have any responsibility for storm water sewers. However, Irish Water has responsibilities for storm water entering our combined sewer networks, which exist in the older networks in all cities and towns. CSOs are a feature of these combined sewer networks and there are significant historic issues with these CSOs that need to be addressed.

We set out in the Emerging Investment Plan our proposed approach for storm water separation and this aligns with a submission on the issue to the CER as part of the implementation of IRC1. It is recognised that storm water is an issue that requires a collaborative approach by multiple stakeholders, including the CER. In this context, Irish Water has developed and is operating nationally in line with the Stormwater MOU with LAs, as submitted to Water Services Transition Office (WSTO) and as supported by DPHCLG.

There are a number of interventions in the Investment Plan which will assist in determining the impacts of CSOs and the development and implementation of solutions to minimise impacts on the environment and achieve compliance with regulatory requirements, including the following:

- National Programme for Drainage Area Plans; and
- CSO Monitoring and Survey.

#### Rural Villages and Unserviced Areas

A number of respondents were of the view that the Investment Plan should include for the provision of wastewater and drinking water services in small towns and rural villages to facilitate social and economic growth and maintain sustainable rural communities.

#### *Irish Water Response*

IW is engaging with DPHCLG and other stakeholders as part of a Rural Water Sector Working Group and it will address rural villages and unserviced areas. Issues that will need to be considered include the following:

- Planning framework and context;
- Funding arrangements;
- Mechanisms to support community engagement and ensure that there is take up on any infrastructure provided so as to avoid stranded or under utilised assets; and
- Potential pilots.

#### Developer Provided Infrastructure

A number of respondents raised issues with the current proposals on Developer Provided Infrastructure (DPI). It is considered that the approach set out is very limited considering only those developments which are contiguous to Irish Water networks.

#### *Irish Water Response*

The IP2 Investment portfolio includes a study with the objective to assess the most sustainable solution for management of DPI assets, whether this be transfer to IW or an alternative solution. It is considered that this is an appropriate intervention at this time, given the demands for investment and the current level of knowledge of DPI not adjacent to IW networks.

#### SCADA/Telemetry

Respondents made a number of comments on SCADA/Telemetry:

- There is a need for timely identification of incidents. The reaction to such incidents has presented difficulties in the past in the case of small treatment plants with no

staff on site for much of the time. While the use of telemetry has been increasing in recent years it should be universal;

- Welcoming the proposals to establish a national telemetry system; and
- The need for the provision of an alarm system on discharges, prioritised based on public health and environmental impact.

### *Irish Water Response*

The establishment of a national telemetry system is critical for the effective operation of the drinking water and wastewater asset base, in terms of improving performance and reducing costs. This Investment Plan includes works at asset level, with the investment in the core infrastructure and supporting communications platform included separately in the Non-Network Capital Investment submission to the CER.

### Novel Techniques

A number of respondents were of the view that IW should make provision for applied research to support water technology innovation. Irish Water should aim to deploy novel techniques and technology to improve performance at small scale water and waste water treatment plants and to drive operational efficiency savings.

### *Irish Water Response*

Innovation in the provision of drinking water and wastewater services will be integral to delivering benefits in efficiency, customer service and water and environmental quality.

We will investigate alternative and innovative solutions in relation to both new projects and for the upgrading of existing plants and networks. Investment decisions will be based on solutions that provide the lowest whole life cost whilst also meeting our energy and carbon commitments.

For example, the recent upgrade to the Clonakilty Wastewater Treatment Plant, which involves the use of new Nereda wastewater technology, is a good example of the use of innovative technology. This technology facilitates treatment of wastewater within a third of the spatial footprint compared with conventional wastewater treatment processes.

### Information on Projects and National Programmes

Respondents made a number of observations on the information included in the consultation document on projects and national programmes, including the following:

- Difficult to link projects listed in Appendix B of the Emerging Investment Plan with water supply zones and agglomerations;
- Provision of additional detail on projects e.g. estimated dates for completion of works; and
- It is considered that the programmes and plans would also benefit from timelines and phasing, to ensure prioritisation of critical projects.

### *Irish Water Response*

IW has taken a number of measures to address these concerns:

- Amended project names, where appropriate, to provide a better indication on the outline scope of the project.
- The level of detail outlined by some of the respondents is not appropriate to include in this Investment Plan document and instead is included in the Business Plan Questionnaire submission to the CER as part of the IRC2 review.

### Focus on Specific Issues

A number of the submissions were focused on specific issues e.g. on provision of services to a specific location, protection of the historic built heritage including historic paving and our approach to rainwater harvesting.

#### *Irish Water Response*

IW will address each of these issues in a manner as appropriate to the specific issue. For example, in the case of the protection of the historic built heritage including historic paving, we will ensure that our Envirokit tool addresses the issues raised.

### Request for Additional Projects

The majority of the LAs requested that additional projects be included in the Investment Plan.

#### *Irish Water Response*

The submissions did not identify any projects that could be omitted to facilitate the inclusion of these additional projects. As outlined earlier in the paper, investment need exceeds available budgets. It will take a number of investment cycles to address the various deficiencies in the asset base. The investment planning approach is based on optimising the portfolio of interventions that can be undertaken as part of this Investment Plan for the IP2 period. We believe that this is a better approach than the previous system and one that will be more beneficial to the customer, the water services network, the economy and the environment in the long-term.

### Comments outside of scope of consultation

Some LAs used the opportunity of the consultation process to make submissions on water services issues not related to planning.

#### *Irish Water Response*

Irish Water will take account of these submissions as part of data collection and ongoing collaboration with LAs in the development of strategies and implementation of projects and programmes under the Investment Plan.

## **Customer Research**

### **Our Approach to Customer Research**

Our Customer Research involved a three step approach:

- *Development of Service Measure Framework (SMF)*: The SMF provides a mechanism to understand the current risk to a range of service areas and how proposed investment impacts that service risk. The change in service risk by each investment is quantified and valued through best practice whole life costing techniques such as Cost Benefit Analysis.
- *Customer Priorities Study*: To establish domestic and non-domestic customer priorities across a range of drinking water and environmental service areas aligned to the Service Measure Framework; and
- *Scoping the Value Transfer*: Valuing the benefits of proposed investments through a value transfer technique. The priorities study was augmented with benefits transfer valuations using readily accessible worldwide literature to develop a full set of valuations to be used in Cost Benefit Analysis (CBA).

### **Methodology - Customer Priorities Study**

Our study method followed international best practice for undertaking customer research studies and, in particular, practice in the UK water services industry. The language and style of the surveys was tested with customers through a series of focus groups and in-depth interviews. Once the survey was tested with customers, it was piloted and the results reviewed. This showed the survey was working well, with high levels of engagement from customers. The fieldwork was conducted with domestic and non-domestic customers using a face to face approach. The two key questions asked of customers were:

- Which service areas are most important to customers?
- How customers value relative improvements in these areas?

The study is described below. There is also a separate report describing the execution of the customer research and its findings.

### **Our Customer Research Scope**

The customer research was undertaken between June and August 2015 and the sample size was c. 1,100 customers (1002 domestic and 100 non-domestic). With respect to domestic customers, quotas controlled gender, age, social class, region and area factors in order to replicate the known population statistics. The margin of error was 2%. No firm quotas were set for non-domestic customer but the survey did canvass the views of businesses of various sizes and industries from around the country.

The research examined customer preferences for different service improvements. Service improvements across the whole of IW's drinking water and wastewater functions were presented to customers. These service improvements were based on the SMF, developed as part of the investment planning process, and described above.

Respondents completed a face-to-face 20-25 minute survey covering a range of questions about water and wastewater services and were asked to rank different aspects of service in priority order. Service was defined in terms of 16 measures covering the following three areas:

- The quality of tap water;
- The availability of the water supply; and
- Wastewater and environmental compliance.

### Output from Customer Research

Domestic (household) and non-domestic (business) customers share very similar views to each other. Figure 1 and Figure 2 below show the relative importance of the service improvements.

Based upon the service improvements presented to customers, **drinking water quality** has the highest priority for customers, both domestic and non-domestic, followed by **leakage**. The importance of these two service improvements reflects that customers consider these to be 'fix all' solutions, i.e. fixing these will improve other aspects of service.

**Lead** in water is the next highest priority, for both domestic and non-domestic. There were high levels of awareness and understanding of the issue from media coverage and debate at the time that the survey was undertaken. The fourth highest priority was dealing with **internal sewer flooding**. Customers expressed the view that while the current level of service around internal sewer flooding is good, the impacts on customers when such incidents occur are so severe that it should remain a priority. This is a key area where the available data on customers at risk is incomplete and needs to be developed from models and empirical data.

There was considerable sympathy across customers for those affected by **water aesthetics** (discolouration, taste and smell), or affected by **drinking water restrictions** (e.g. BWNs). It should be noted that the issue of 'hardness' in drinking water generates a very high level of customer complaint in Ireland due to the number of 'hard water' sources, especially in midlands and southern regions. However the Drinking Water Regulations (SI 122 of 2014) do not include any parametric values for water hardness. On this basis, IW does not install systems to artificially soften water as part of the water treatment process.

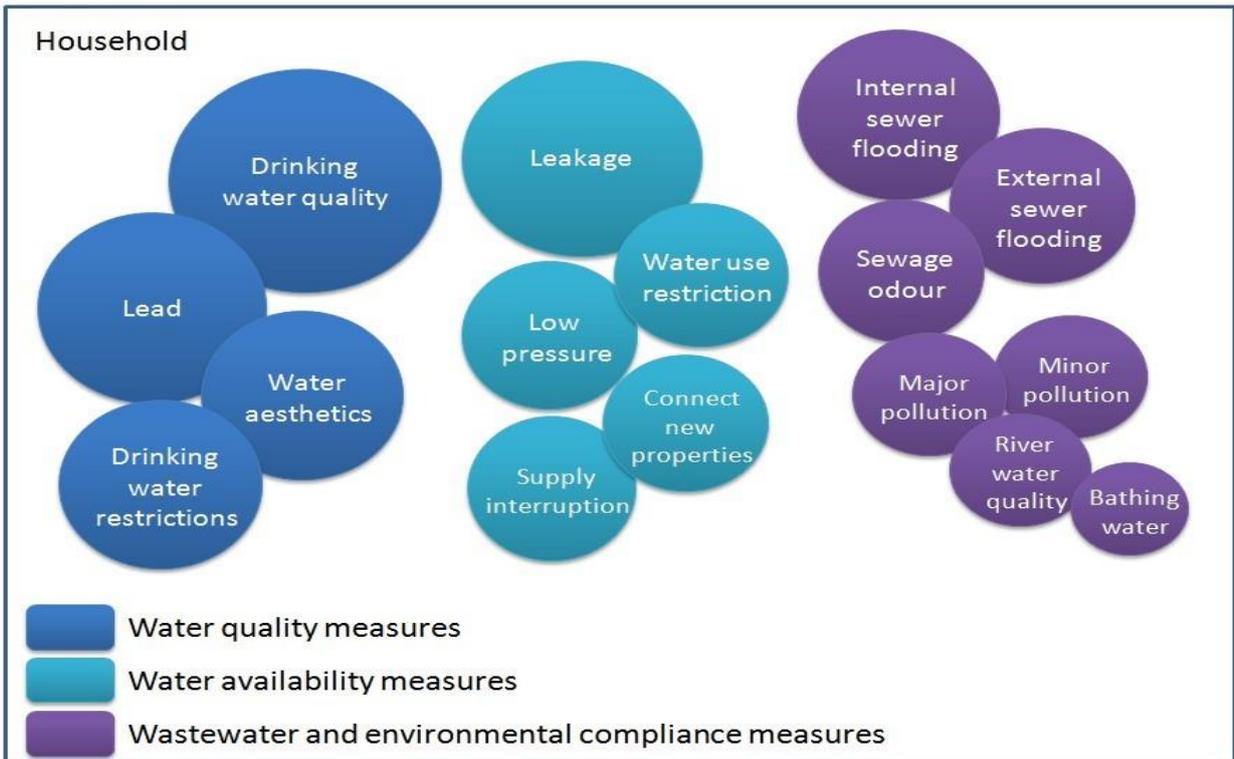


Figure 1 – Domestic Customers' Priorities

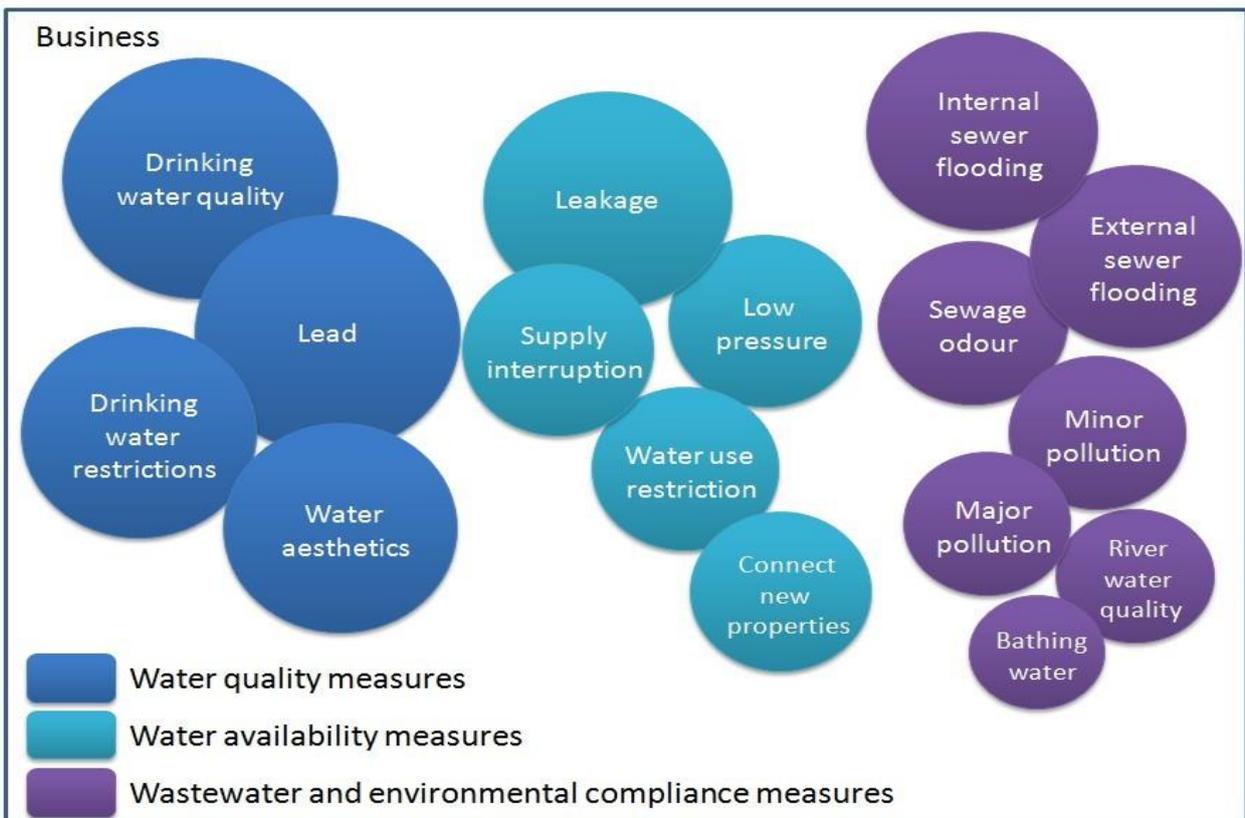


Figure 2 – Non Domestic Customers' Priorities

The overall ranking for proposed improvements for all customers combined is shown in the table below:

Service Area Priority	Priority Weighting	Priority Ranking
Drinking water quality	1.000	1
Leakage	0.737	2
Lead in water	0.728	3
Internal sewer flooding	0.588	4
Water discoloration, taste & smell	0.575	5
Drinking water restrictions	0.565	6
External sewer flooding	0.542	7
Persistent low pressure	0.448	8
Supply interruptions	0.436	9
Water use restrictions	0.432	10
Connecting new properties	0.411	11
Sewage odour	0.383	12
Minor pollution incidents	0.311	13
Major pollution incidents	0.298	14
River water quality	0.239	15
Bathing Water Quality at Beaches	0.183	16

**Table E.1 – Customers' rankings of service area priority**

### Factors that drive priorities

As well as understanding relative priorities across all customers, it is important to understand if there are differences in views across the customer base. Understanding what drives customer views can allow IW to consider where we may need to target additional support or mitigation for customers.

The survey data was reviewed according to how different segments of the customer base expressed their priorities. This involved segmenting the data into the different customer types and observing differences in the estimated weights. Statistical tests were used to confirm the results.

### *Domestic Customers*

- There are regional differences in views on drinking water restrictions and supply interruptions, with domestic customers in Munster the most concerned.
- Domestic customers in Munster were also the most concerned about water use restrictions.
- Domestic customers in Ulster were less concerned with wastewater and environmental issues than the other provinces.
- Other factors, such as income and socio-economic group, have little or no impact on the results.

### *Non-Domestic Customers*

Primary and industrial customers placed a higher weight on drinking water quality than those in tourism, retail and services. There were no notable differences across the regions.

### **Relative Value**

Customer choices were used to infer or estimate the relative value of changes to each measure of service improvement. The ranking questions in the survey were subject to econometric analysis by IW. While a measure of monetary value was not included in the survey, a review of the existing benefits literature provided some monetary estimates for service changes. For example:

- Environmental impacts, such as river quality;
- Water quality issues, such as removal of lead from water;
- Health and safety; and
- Congestion, etc.

The remaining values were interpolated by using the ranking and experience from similar studies. This approach allows for the principles of cost benefit to be applied to the assessment of investment options.

## Appendix F – Financial tables supporting IP2 submission.

Category	Target Spend 2017-2021 €m
<b>National Programmes</b>	<b>1,377</b>
Water National Programmes	909
Wastewater National Programmes	402
Other Infrastructure National Programmes – National Labs, Inventory Management, Depots etc.	66
<b>Capital Maintenance</b>	<b>813</b>
<b>Projects</b>	<b>2,614</b>
Water Projects	1,103
Wastewater Projects	1,511
<b>Total</b>	<b>4,804</b>

Table F.1 Draft Investment Portfolio (2015 monies, rounded)

Category	Total €m 2017-2021
<b>National Programmes</b>	<b>963</b>
Water National Programmes	591
Wastewater National Programmes	320
Other Infrastructure National Programmes – National Labs, Inventory Management, Depots etc.	51
<b>Capital Maintenance</b>	<b>552</b>
<b>Projects</b>	<b>2,074</b>
Water Projects	841
Wastewater Projects	1,233
<b>Total</b>	<b>3,588</b>

Table F.2 Final Investment Portfolio subject to CER approval (2015 monies, rounded)

<b>Category</b>	<b>2017 €m</b>	<b>2018 €m</b>	<b>2019 €m</b>	<b>2020 €m</b>	<b>2021 €m</b>	<b>Total €m</b>
Wastewater Projects	186	264	300	277	206	<b>1,233</b>
Water Projects	156	186	201	178	119	<b>841</b>
National Water Programmes	78	82	111	133	187	591
National Wastewater Programmes	34	34	69	85	97	320
National Water and Wastewater Programmes	6	25	5	8	7	<b>51</b>
Capital Maintenance - Water Services Above Ground (WSAG)	10	11	10	28	42	<b>100</b>
Capital Maintenance Water Services Below Ground (WSBG)	39	41	65	75	87	<b>306</b>
Capital Maintenance - Wastewater Above Ground (WWAG)	4	8	10	20	30	<b>72</b>
Capital Maintenance - Wastewater Below Ground (WWBG)	4	8	12	19	30	<b>73</b>
<b>Total</b>	<b>516</b>	<b>660</b>	<b>783</b>	<b>824</b>	<b>805</b>	<b>3,588</b>

**Table F.3 Final Investment Portfolio subject to CER approval breakout (2015 monies rounded)**

## Appendix G – Investment Outputs

The following list provides IW's Indicators and expected outcomes for the IRC2 period (2017-2018) and the IP2 period (2017-2021).

- Indicator: This column refers to the investment output category.
- WSSP Starting Point: This column refers to the baseline identified in the Water Services Strategic Plan.
- Expected Outcomes by end 2016: This column refers to IW anticipated outcomes by the end of the IRC1 period, 2014 - 2016, and identifies the starting position for the IRC2 period
- Expected Outcomes by end 2018: This column refers to IW anticipated outcomes by the end of the IRC2 period, end 2018, based on the constrained expenditure of €3.588 billion.
- Expected Outcomes by end 2021: This column refers to IW anticipated outcomes by the end of the IP2 period, end 2021, based on the constrained expenditure of €3.588 billion.

Indicator	WSSP Starting Point	Expected Outcomes by end of 2016	Expected Outcomes by end of 2018	Expected Outcomes by end 2021
Number of people on Boil Water Notices (BWN)	23,079	4,057	1,041	0
Number of WTP's on the RAL	121	71	41	0
Compliance with the parameters for Lead in Drinking Water	Estimated as 85 – 95%	Establish baseline	-	98% compliant <sup>33</sup>
Environmental Assessments and Plumbo-solvency Control Plans	-	-	200 WTWs <sup>34</sup>	-
Replace Backyard Lead Shared Service	40,000 (circa)	38,701	<36,000	<22,000
Replace Individual Lead Service Connection Pipes	140,000 (circa)	139,716	<136,000	<117,000
Leakage	0	60 megalitres per day of savings	117 megalitres per day of savings	226 megalitres per day of savings
Rationalisation of WTP's	918	0	12	105
WWTW's - Compliance with UWWTD	>1,722,000 p.e.	>2,359,000 p.e.	>2,361,000 p.e.	>4,839,000 p.e.
Overloaded WWTW's >2000	45	27	24	6
Overloaded WWTW's <2000	113	97	82	74
No. of agglomerations with no treatment or preliminary treatment only	44	38	19	0
WWTWs – compliance with Emission Limit Values	-	14	36	64
Sewer Flooding	-	-	1 project in progress	12 projects in progress
Energy Efficiency Improvement	Energy consumption 527GWh/yr	12%	20%	33% <sup>35</sup>
Headroom – Water	-	54% <sup>36</sup> 10% <sup>37</sup> 44% <sup>38</sup>	54% >9% 38%	60% >7% 30%
Headroom – Wastewater	-	54% <sup>39</sup>	56%	59%
Network Capacity – Nr of supply zones with updated hydraulic models	-	Establish register	0	12
Network Capacity – Nr of agglomerations covered by DAP	-	Establish register	14	36

**Table G.1 - Investment output targets for IRC2 and IP2 period**

<sup>33</sup> Subject to technological alternative to lead replacement being available (orthophosphate dosing)

<sup>34</sup> The assessments will further inform the works required at the individual sites.

<sup>35</sup> 33% is the NEEAP 2020 target

<sup>36</sup> a) 60% of plants meeting headroom targets of: 20% in large urban areas, 15% in Regional Gateway Towns, 10% at all other plants

<sup>37</sup> b) Capacity headroom in GDA and mid-Eastern Region to be greater than >15%

<sup>38</sup> c) Reduce % of plants with headroom of <15% from 44% to 30%,

<sup>39</sup> 60% of plants meeting headroom targets of: 20% in large urban areas, 15% in Regional Gateway Towns, 10% at all other plants