# Water Resources Management Plan

Appendix D – Deriving our investment plan

Water Resource Strategy team September 2019

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# APPENDIX D - Deriving our investment plan

An important stage in the water resources planning process is the identification and evaluation of the range of options we have available to us for managing the supply / demand balance over time.

For this WRMP, we used a screening process to exclude the least feasible options and to allow us to focus on those with the best potential for future development. The most feasible options were then taken forward for a more detailed cost / benefit assessment.

The options appraisal process is at a strategic level and does not preclude the need for further analysis as we implement our plan. This strategic process is not a substitute for the detailed option appraisal that would be needed to support project design and delivery.

# D1. Unconstrained supply/demand options

The first step of our options appraisal process was an initial assessment of the likely need for potential future supply and demand management options. As explained in Appendix C, we are confident that our supply system will remain in surplus for the whole planning horizon, and so we did not need to explore options for increasing our supply capability. Instead, we decided early on in our process that we should focus on options to reduce leakage, improve demand management and improve the resilience of our existing sources.

We formulated a list of potential water efficiency options that could be used to help customers reduce consumption, as summarised in Table D1.1. We then assessed which of these options could be taken forward for further development. Our approach to assessing these options is described in this Appendix.

Type of option	Comment
Align baseline water	Increase the DVW legacy supply area baseline water efficiency
efficiency activity with	programme to undertake as a minimum the same level of
wider Severn Trent	activity already offered to the wider Severn Trent customer
practice	base
New buildings:	Offer house builders advice on higher specification and more
Higher specification	water efficient fittings in homes (a selection of taps, showers,
water efficient fitting as	WC, bath, water butts).
standard	Alternatively, we could offer a financial incentive/subsidy if
	there is an extra cost for installing fitting of a higher water
	efficiency specification.
Distribution of free	This is a continuation of our current policy to promote and
water saving products	provide water saving devices to all customers.
	This part of our current offer to meet our statutory water
	efficiency duty and regulatory water efficiency targets
Domestic audit and	In addition to our own home audit and retrofit programme we
retrofit with 3 <sup>rd</sup> parties	will build partnerships with other organisations (e.g. social

Type of option	Comment
	housing and energy efficiency providers) where partners install
	water efficient devices in customer homes on our behalf
Education	Offering education to children and adults about the need for
	and benefits of using water wisely is a continuation of our
	current policy to promote water efficiency information to
	customers.
	This is part of our current offer to meet our statutory water
	efficiency duty and regulatory water efficiency targets
Rainwater harvesting /	Install rainwater harvesting / grey water reuse systems in
grey water reuse -	existing domestic properties.
retrofit domestic	
Rainwater harvesting /	Install rainwater harvesting / grey water reuse systems in new
greywater reuse –	build domestic properties.
new build domestic	

Table D1.1 - Range of identified demand-side unconstrained options

In addition to these water efficiency options, we considered options to increase the uptake of domestic water metering as described in Table D1.2.

Type of option	Comment				
Compulsory household	Our supply area is not designated an area of serious water stress				
metering	by the Welsh Government and NRW, and so we do not have				
	legal powers to compulsorily meter household customers.				
	However, we have tested whether such a policy could be cost				
	beneficial.				
Targeted accelerated	We would proactively install meters at property boundaries on a				
metering programme	geographical basis and use the metered data to inform our				
with 'persuaded	network management and leakage targeting. We will engage				
optants'	with household customers and inform them whether they could				
	have saved money had they been paying on a metered basis.				
	Water consumption insight would also be used to target water				
	efficiency activity.				

Table D1.2 - Options to increase uptake of domestic water metering

# Approach to Supply Side Options

If our initial assessment of the likely need for future supply options had identified a requirement to increase our supply capability, then we would have followed a structured and phased approach to identifying and appraising supply-side options. In that case, the stages of option formulation, appraisal and screening that we would have progressed is demonstrated in Figure D1.1. The process would have included a Strategic Environmental Assessment (SEA) of the options and overall programme, willingness to pay (WTP) studies and economic appraisal using tools such as the Environment Agency's Benefits Appraisal Guidelines (BAG).



Figure D1.1 - The stages of an option appraisal process

The first step of the options appraisal process would be to carry out an initial assessment of a wide range of potential future supply-side and demand management options and review their viability. A screening process would be employed to exclude the least feasible options and allow focus on options with the best potential for future development. The most feasible options would then be taken forwards for a more detailed engineering and environmental assessment. Figure D1.2 provides an overview of the screening and selection process that we would adopt.



Figure D1.2 - Supply side option screening and selection process

Our scheme development stage would seek to increase our understanding of schemes so that appropriate and informed decision making could be subsequently carried out. This would include consideration of the following:

- Customer and stakeholder views, obtained through workshop, discussion and consultation.
- Costs
- Deployable output benefits
- Delivery risks
- Environmental impacts
- Alignment with investments by other stakeholders
- Programme requirements
- Uncertainties and opportunities

# D2. Scheme rejection log and list of feasible options

Having identified no requirement for supply-side options to be considered, we focussed our option identification process on interventions to reduce leakage, improve demand management and improve the resilience of our existing sources. These options were collated to form a 'long list', otherwise known as an unconstrained list of potential options. Options on the unconstrained list were then subjected to a screening process to identify those that should be excluded from the final plan.

We used a series of high level questions to screen out the least feasible options. Where there was an overall negative response to any of the six key questions, the option was screened out, unless there was a compelling reason to take the option through to the feasible list.

We shared these screening criteria with the EA and NRW at an early stage and we made some minor adjustments to the screening criteria on the basis of their feedback. At a water resources stakeholder forum in September 2016 we shared our option screening approach, the screening criteria we proposed to use and the scope of our Strategic Environmental Assessment (SEA). We held breakout discussions on the proposed screening criteria and sought views on our decision making framework. Following this engagement with regulators and stakeholders, we confirmed the screening criteria shown in Table D2.1 below, and proceeded with the unconstrained options screening process.

# Appendix D: Deriving our investment plan

Ref	Scre	eening Criteria	Y / N
1	Doe	s the option address the problem?	Y / N
	a)	Is the scale of the option proportionate to the needs of the Water Resources Zone or a rea where there is a potential future shortfall?	Y / N
	b)	Will the option have a highlikelihood of being able to mitigate against future deployable output loss due to climate change impacts or licence changes to existing sources?	Y / N
2	Doe	s the option avoid breaching any statutory &/or regulatory constraints?	Y / N
	a)	Is the option likely to be acceptable in terms of planning and statutory environmental constraints local to the scheme (e.g. internationally or nationally designated sites), subject to any reasonable mitigation measures?	Y / N
	b)	Does it cause serious damage or deterioration to the WFD water body? E,g. Category 1 and 2 Environment Agency's Achieving Sustainable Abstraction	Y / N
3	ls th	e option promotable / does it meet customer and stakeholder expectations?	Y / N
	a)	Could this option have a negative impact on the customer experience at the tap? E.g. supply, pressure, water quality (taste, odour, discolouration), compulsory metering (customer complaints PR09)	Y / N
	b)	Does the option compliment other parts of Severn Trent Water's business planstrategy and deliver wider benefits, e.g. supply resilience, quality and capital maintenance?	Y / N
	c)	Is the option likely to be acceptable to local (non-statutory) stakeholder groups, subject to reasonable mitigation?	Y / N
	d)	Does the option avoid customer discrimination or social equity issues?	Y / N
	e)	Does the option clearly represent one of the more favourable development options for this specific source of water?	Y / N
4	Do	we have confidence that the option will succeed?	Y / N
	a)	Is the option scalable and operationally flexible to meet changing STWL supply/demand needs?	Y / N
	b)	Is there a high level of confidence that the option will be technically feasible?	Y / N
	c)	Is the option resilient under a range of external future scenarios? E.g. licence reform, water quality, climate change, political & legislative changes	Y / N
	d)	Could the option deliver the benefits without the need for extensive trials, research and development?	Y / N
	e)	Is likely that a Public Water Supply Abstraction licence be secured?	Y / N
5	ls th	e proposed option subject to Welsh legislation?	Y / N
	a)	Does it satisfy Welsh Government's expectations for new water exports from Wales? E.g. the Future Generations & Wellbeing Act requirements?	Y / N
	b)	Would the people of Wales be disadvantaged by this option?	Y / N
6	Sho	uld the option be taken through to the Constrained List?	Y/N

Table D2.1 - Unconstrained List of Options - Screening Criteria

We assessed each of the options on the unconstrained list against the screening criteria, and recorded our decisions as we progressed through this list. Using this screening and engagement process, we created our scheme rejection log, which summarises the reasons for excluding any options from our list of feasible options. The log also shows the list of feasible options that we took forward for more detailed cost / benefit and SEA appraisal. The high level scheme rejection log and the full list of feasible options can be found in Table D2.2.

Option name	1 Does the option address the problem?	2 Does the option avoid breaching any statutory &/or regulatory constraints?	3 Is the option promotable / does it meet customer and stakeholder expectations?	4 Do we have confidence that the option will succeed?	5 Is the proposed scheme subject to Welsh legislation?	6 Should the option be taken through to the Constrained List?	Key Reason for rejection
Align baseline water efficiency activity with wider Severn Trent practice	N	Y	Y	Y	Y	Y	While there is no supply / demand need to increase baseline activity, it would meet stakeholder expectations for more ambitious plans.
Infrastructure charges	N	N	n/a	N	n/a	N	Option unfavourable. Proposed OfWAT policy would remove opportunity to deliver these schemes.
Compulsory metering programme	N	Ν	Ν	Y	Y	Ν	Option is not valid. We are not in a designated water stressed area so cannot compulsory meter our household customers. DVW meter penetration is already above 60%
Non Household	N	N	N	Y	Y	N	Option is not valid in Chester. This is a retail activity and need to better understand their plans for this activity as the market develops.

Table D2.2 - High level scheme rejection log and feasible options

# D3. Our recommended options

## D3.1. Leakage reduction

Based on our understanding of regulators' policy expectations, stakeholders views and consideration of how our wider PR19 improvement plans will deliver associated leakage benefits, our dWRMP set out a proposal to adopt a leakage reduction plan that achieves a 15% reduction by the end of AMP8. However, during the consultation period, several key stakeholders challenged this proposal to spread the reduction over two AMPs, feeling that this approach was not ambitious enough.

We have listened to stakeholders and policy makers and have included a 15% reduction in leakage in AMP7 with a straight line glide path from 2019/20 - 15% by end of AMP7; 29% by end of AMP8; 50% by 2044/45.

This is an incredibly stretching target. In our region, leakage reduction is not required to meet the supply / demand balance as our balance is currently in surplus; and this situation is not projected to change within the planning horizon. All of the additional activity to achieve the leakage reduction must be delivered within existing cash and affordability constraints that our customers have agreed to. We will be looking for ways to derive multiple benefits from other investment areas. For example, the programme to meet a tighter lead standard means we can target leakage on customer supply pipes, additional instrumentation (flow and pressure loggers) needed to report against the standard definition will help us target leakage and as part of achieving our target reduction in drinking water quality complaints we will be doing a programme of air valve inspection and maintenance and we will be aligning this work with the proactive leakage programme. We believe the additional investment that we are making in 2018/19 and 2019/20 in monitoring control, metering and systems will also help us target improvements in a cost effective way. Work on the detailed leakage strategy will be completed by July 2019 and we will provide more detail on request to stakeholders after that date. The leakage reduction targets proposed in are shown in table D3.1.

	2020-	2021-	2022-	2023-	2024-	2025-	2026-	2027-	2028-	2029-
	21	22	23	24	25	26	27	28	29	30
Llandinam and Llanwrin	0.14	0.29	0.43	0.57	0.71	0.84	0.96	1.08	1.20	1.32
Llanfyllin	0.08	0.16	0.24	0.32	0.40	0.46	0.53	0.60	0.67	0.73
Saltney	0.01	0.02	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.09
Wrexham	0.20	0.41	0.61	0.82	1.02	1.19	1.37	1.57	1.71	1.89
Total	0.44	1.87	1.31	1.74	2.18	2.55	2.92	3.29	3.66	4.03

Table D3.1 - WRMP19 leakage reduction profile (MI/d)

# D3.2 Water efficiency

For AMP 7, we have made a decision to increase our baseline water efficiency programme. This will ensure we meet our on-going statutory water efficiency duty as well as helping customers reduce their demand for water.

In line with our wider water efficiency programme and our understanding of customer, regulator and Government expectations, we will offer a range of water efficiency services to our customers. We expect the key metrics to deliver on our statutory duty will be:

- Provide information to all consumers on how to save water. This includes maintaining our provision of direct engagement with schools and adult groups and providing information for non-household customers.
- Provide a range of water saving products which are free to customers on request.
- Provide discounted higher value water saving products (e.g. water butts, showerheads).
- Develop links with third parties to form partnerships internal and external to take advantage of scheduled visits to promote water efficiency and to retrofit water efficient devices.
- Provide water efficiency advice and access to free water saving devices as part of our free meter optant programme (FrOpt).

In Figure D3.1 below we provide our current expectations of how we will deliver our baseline activity, further explanation of these activities are detailed below. Over time the balance between free products, product installation, and education may change in response to the available opportunities and customer expectations.



Figure D3.1 - Breakdown of forecast activity in AMP7

In developing our proposals, we have made reference to:

- Environment Agency (EA) / Natural Resources Wales (NRW) Final Water Resource Planning Guidance.
- Defra Guiding Principles for water resource planning
- Water Strategy for Wales
- Waterwise Evidence Base Reports and National Strategy
- Market Transformation Programme
- Waterwise Water Efficiency Strategy for the UK
- Our own water efficiency programme and, consumption modelling forecasting analysis
- Water Strategy for Wales
- We have also engaged with Environment Agency and Natural Resources Wales.

To inform our WRMP19, we have assessed the viability of a range of potential water efficiency options building on insight gained from Severn Trent Water's programme:

- providing free products to our household customers on request;
- subsidising higher value water saving products for our household customers;
- carrying out water efficiency audits and install water saving products in the homes of our household customers Home Water Efficiency Check (HWEC) programme;
- incentives for housebuilders to build new properties to 110 litres per person per or less;
- to work with social housing to carry out water efficiency audits and install water saving products in the homes of social housing tenants;
- to continue to provide education and advice to our household customers on how to use water more wisely;
- rainwater harvesting / water reuse options;
- metering options.

As detailed in appendix C we are confident that our supply system will remain in surplus, however we increasing our baseline demand management programme to reflect the level of service offered to Severn Trent's customers. Options to be included in our new baseline programme are:

## Free and paid water efficiency products

We will increase the range of free and paid for water efficiency products offered to customers. The improved product offers will align the levels of service offered to customers in the Severn Trent region.

#### **Appendix D - Our Options**

#### Home Water Efficiency Audits

We will carry out proactive water efficiency audits and install water efficient products in our customers' homes (HWEC).

The size of the programme is finite and limited by the number of household customers and assumed uptake rates. We have trialled this approach during AMP6 in the Severn Trent area and we currently see an uptake rate of approximately 20% which we expect to be maintained.

#### Customer education

Customer engagement on water efficiency and demand is critical to driving down demand and reducing Per Capita Consumption (PCC) in the long term. We are supporting further work in partnership with other companies to develop a national communications platform and develop new, innovative ways to engage and motivate customers. We see this partnership approach as key to engaging customers. We are also supporting the review of water labelling, in partnership with Defra and Welsh Government, to advise them on potential water labelling options for the UK.

This joined up multi-stakeholder approach to customer engagement is essential to have and effective influence on customer behaviour and drive down demand. We would welcome the opportunity to work with the Consumer Council for Water as a key stakeholder in customer engagement.

We will continue to engage and educate customers on how to use water wisely. Over time, opportunities to retrofit water efficient devices will reduce. Engagement and education to promote behaviour change will become increasingly important to help customers reduce their demand for water.

#### D3.3 Metering

Previous Dee Valley Water WRMPs set out an ongoing approach to household metering that has been led by customer demand for the free meter option. To date, this has resulted in a meter penetration rate of 60% across the Wrexham and Chester Water Resource Zones (WRZs).

We see metering as key to delivering the long term demand reduction and lower PCC ambition set out in the Welsh Government's Water Strategy for Wales and UK Government's 25 Year Environment Plan, as well as the ambition of our stakeholders and customers to use water wisely. As a result, we are including the introduction of proactive metering in our WRMP for Hafren Dyfrdwy. However, we are also mindful that, while Welsh Government recognise the role that metering has to play in encouraging reduction in consumption, they are also clear that any approach to metering would need to be delivered in conjunction with innovative charging structures in order to ensure that households with affordability issues are protected. We will need to work with them and other interested parties to develop a metering and demand management package that benefits and protects our customers while delivering reductions in water use.

Therefore, our plan is for proactive metering to commence in AMP8 in the new Llanfyllin WRZ (formerly part of the Shelton WRZ in Severn Trent) and AMP9 in the rest of the Hafren Dyfrdwy supply area. When assessing the benefits of a persuaded optant strategy (implementing metering through engagement and collaboration with householders), we have taken a precautionary approach to the demand management impact of an average 10% demand reduction. This is less than the 16.5% reduction reported by Southern Water, reflecting the fact that customers would not be forced to adopt measured charges. Our current thinking is that to secure the full benefits would require us to adopt an external metering policy and combine this with a policy of helping customers tackle supply pipe leakage on their properties.

Through both our trials in AMP6 and the yearly phase of the programme in AMP7 in our Severn Trent supply area, we will closely monitor meter installation rates and progress with the roll out. This will provide greater insight for implementation of our metering strategy in Hafren Dyfrdwy in AMP8 and AMP9. Based on current technology and processes, and the metering programmes of other water companies, either already delivered (93% Southern Water) or planned (95% Anglian Water), we believe that ambition beyond 95% is realistic, with innovation. A shortfall of 5% would only equate to an increase of 0.4% on household demand, or the equivalent of 1.06 litres per household, meaning minimal impact in the plan. Given there is no supply deficit in the Hafren Dyfrdwy areas, the impact on any shortfall in metering / demand management will be negligible. Close monitoring of the programme will allow us to continually assess the likely impact of metering shortfalls and develop further mitigation approaches. An example of a mitigation approach would be offering bespoke inhome audits, advice and devices including leak alarms for properties that we are unable to meter.

However, given the timeframe for delivery we also recognise the potential for innovation in more advanced metering technology, including non-intrusive metering and flow measurement that will provide additional options and opportunities to enable us to install meters in currently challenging locations. Advanced metering and flow measurement technology is already developing to the point that low cost non-intrusive flow measurement devices are a realistic opportunity over the timescale for our programme to help us reach the 100% ambition.

We believe that there are wider demand management benefits that will result from increasing metering coverage, especially if we target the delivery on a geographical basis. In particular, we view the need for increased meter coverage to be a crucial enabler to delivering our very ambitious leakage reduction strategy. Currently around 46% of our household customers are not metered, and that means we have to estimate their consumption when we monitor leakage performance on our network. That makes it very difficult to distinguish changing consumption patterns from any leakage breakout on our network.

By increasing the number of metered properties on our network, we will have greater visibility of changing water demand patterns and better control of our network performance. This will make leaks easier to detect, and will mean we are able to deploy leakage repair more effectively and efficiently. This improvement in leakage detection and repair performance will be crucial to us achieving our challenging 15% leakage reduction target in AMP7 and our long term ambition to reduce leakage by 50% by 2045.

# D3.4 Other options

In addition to the options discussed above, we are also considering other actions within the context of the WRMP which will have wider benefits for the environment and our customers while providing long-term best value. We are keen to look for opportunities to collaborate with neighbouring water companies and other key stakeholders to deliver against the Welsh Government's well-being goals and embrace their vision for the sustainable management of natural resources.

As a water resource need is not the main driver for these actions, they have not been passed through the screening criteria and will be costed out through the development of our PR19 Business Plan. However, as there is a clear link to water resources planning we will set out a brief overview of them below.

#### Maintenance and improvements programme for impoundment reservoirs

We have fourteen impounding reservoirs, eleven situated within our Wrexham WRZ and the other three within the Llanfyllin and Llandinam & Llanwrin WRZs. The yield assessment carried out on the Wrexham reservoirs as part of the Aquator modelling – described in Appendix A – indicated that there may be greater inflows into the reservoir catchments than is currently captured in the reservoirs. These altered flows could be caused by natural changes to the environment or man-made developments within the catchments, which would be out of our control, but we also believe that reinstating a pro-active maintenance programme for leats and reservoir infrastructure will improve capture rate of inflows.

The reservoir engineers within Hafren Dyfrdwy have pulled together a proposed investment programme for the next AMP which is set out in our PR19 Business Plan. The long term plan set out aims to deliver the following key benefits for customers:

- We will safeguard all of the communities in the vicinity of the reservoirs by fully complying with the Reservoirs Act 1975 and all subsequent amendments. This Act is a public safety statute and is designed to lower flood risk to people and property downstream.
- We will ensure that the reservoirs are upgraded and maintained to a safe and serviceable condition. This will enhance system resilience by increasing the reliability of this water resource and therefore maximise the use of the lowest-cost sources to treat. There is strong overlay with our strategy for ensuring resilience in the round.

In addition to safety and resilience considerations, our customers have told us the importance they place on the natural environment and having access to green spaces. Our impounding reservoirs contribute to their lives by offering them such access. Our PR19 business case for reservoir investment includes consideration of how we can further meet customer needs by enhancing access and the facilities at the sites where it is appropriate and cost effective to do so. These sites also play a key role in meeting our biodiversity duty.

#### Investigating source of taste and colour issues at impoundment reservoirs

We experience seasonal high manganese levels (driving discolouration issues) and algal blooms (driving taste issues) at some of our impounding reservoirs in the upper Dee catchment. These spikes are shown in the charts below. Increased levels of 'colour' (an indicator of Manganese) make the water more expensive to treat, impact the taste of the water and increase the risk of discolouration.





Figure D3.2 - Trends in colour and algal blooms at our impounding reservoirs

The processes installed at our water treatment works mean that we cannot use sources if algal blooms are significant. Our current solution is therefore to reduce abstraction from these reservoirs when issues arise. Whilst this option avoids the risk of increased water quality

complaints, it restricts our flexibility and makes our raw water system less resilient. This is especially true when these issues are in the summer months when we should use these reservoir sources to supplement our river abstractions that may be under low flow restrictions.

We are confident that there are viable solutions available at catchment level to remove the taste and colour issues. We therefore intend to investigate the cause of the increasing manganese levels and algal blooms, and address the issues at source. Considering the implementation of catchment management interventions to manage our taste, colour and risks at impounding reservoirs, we anticipate that this will not only reduce treatments costs, but also give us access to these sources throughout the year. This will provide additional resilience in our water resources.

Our on-going AMP6 programmes have demonstrated that significant benefits are accrued from delivering catchment solutions relative to having to implement costly treatment solutions. We are confident that our expanded programme, set out in our PR19 business plan, will protect these savings at the same time as delivering wider water quality, resilience and environmental benefits.

In our willingness to pay research, we asked respondents to state their top three improvements, prompted by the list of service attributes provided. In both Mid Wales and North Wales improvements in the taste and smell of tap water were the most prioritised improvement.

# D4. Greenhouse gas emissions

# Our company approach to greenhouse gas emissions

Greenhouse Gas (or 'carbon') emissions contribute to climate change and need to be reduced. In 2016-2017, as primary antecedent to Hafren Dyfrdwy, Dee Valley Water's total operational emissions were 8.4 ktCO<sub>2</sub>e per year, driven primarily by the use of electricity to treat and pump water to our customers. On top of this, there are emissions in the supply chain from outsourced maintenance and construction activity.

We recognise that we need to reduce our direct carbon emissions and influence our indirect emissions. Our long term aim is to continually reduce carbon emissions, in a way which provides value for our customers. Considering carbon emissions in our planning processes is a key way to do this.

The price we, and others, pay for energy and environmental taxes mean that there is an increasingly close link between cost and our carbon impact. These costs are increasing as the UK moves to a low-carbon economy. So aside from our commitment to play our part in reducing emissions, impact on our customers' bills is a key reason to focus on carbon emissions.

We consistently track and project our operational emissions in line with Government guidance using the UKWIR Carbon Accounting Workbook for calculating operational greenhouse gas emissions<sup>1</sup>. We publish this information annually in our annual performance report.

# Our changing boundary

As described in Section 1 of our WRMP, we realigned our company boundary in 2018 forming the new company 'Hafren Dyfrdwy' for our customers and operations in Wales. This activity resulted in parts of the former Dee Valley Water area that were in England being transferred into Severn Trent. Similarly, parts of the pervious Severn Trent area that were in Wales were transferred into Hafren Dyfrdwy. All aspects of our service, customers and operational assets within the transferred areas were moved to the respective company – with the exception of Elan Valley assets which remain part of Severn Trent.

In our draft WRMP, we demonstrated the effect that our WRMP proposals will have on our carbon emissions using a baseline of the 2016-17 carbon emissions data for comparison. In order to retain a suitable comparison, we have adjusted the baseline to be representative of the revised company boundary. Our approach has been to apply the relative proportion of carbon emissions for each area (as reported in Q1 2018), to the 2016-17 baseline for each company as reported in the 2017-18 Annual Performance Reports:

## Severn Trent Water

•	WE1 Size of our carbon footprint – Water (2016-17 actual)	250 ktCO2e

• **SD1** Size of our carbon footprint – Waste (2016-17 actual) 207 ktCO2e

<sup>&</sup>lt;sup>1</sup> Carbon accounting in the UK Water Industry: methodology for estimating operational emissions, report no 08/CL/01/5

- Size of our carbon footprint Water (England) proportion (Q1 2018) 98.36 %
- Size of our carbon footprint Water (Wales) proportion (Q1 2018) 1.64 %
- Size of our carbon footprint Waste (England) proportion (Q1 2018) 99.12 %
- Size of our carbon footprint Waste (Wales) proportion (Q1 2018) 0.88 %

# Dee Valley Water / Hafren Dyfrdwy

•	C1 Gross operational greenhouse gas emissions (2016-17 actual)	8.385 ktCO2e
•	Gross operational greenhouse gas emissions – (England) proportion	
	(Q1 2018)	22.24 %
•	Gross operational greenhouse gas emissions – (Wales) proportion	
	(Q1 2018)	77.76 %

Our revised 2016-17 baseline carbon emissions can therefore be best represented as shown in Figure D4.1.



Figure D4.1 Waterfall diagram showing the approach to revising the carbon emissions baseline

Following this approach, the revised 2016-17 baseline is therefore 12.4 ktCO2e comprising:

- Carbon footprint Water 2016-17 approximated for new boundary 10.61 ktCO2e
- Carbon footprint Waste 2016-17 approximated for new boundary 1.82 ktCO2e

## Our approach to carbon in the water resource management plan

Our approach to considering carbon impacts in this WRMP has been to assess the carbon impacts of the different activities and include these as part of the selection process to establish the preferred programme of options and interventions within the planning period.

Our approach is based on the 2012 UKWIR guidelines<sup>2</sup> which includes:

- Guidelines to estimate embodied and operational carbon associated with water company projects.
- Guidelines for carrying out whole-life costing including carbon values.

<sup>&</sup>lt;sup>2</sup> UKWIR (2012) 'A framework for accounting for embodied carbon in water industry assets' (CL01/B207)

• Guidelines for what carbon prices and emissions factors to apply in whole life costing.

We believe that our approach strikes the right balance between our intention to minimise our carbon footprint and our other commitments to customers.

As described in Appendix D1 and D2, no supply-side options have been prepared for the Hafren Dyfrdwy area. Had the outcome of that assessment been different, requiring a series of supply-side options to be prepared, we would have incorporated the carbon impacts of each option into the decision making process by including a cost of carbon in our decision making tool. This would then have been used to derive the preferred programme of options, supporting our identification and prioritisation of lower-carbon solutions.

## Carbon impacts of the water resource management plan

We have estimated the operational carbon emissions impact of the supply and demand measures outlined in our final WRMP using the following approach:

- The baseline operational emissions for water supply activities was calculated using the most recent final version of the UKWIR Carbon Accounting Workbook (version 11, April 2017). The baseline was adjusted to provide an approximation of the effect of revising the company boundary.
- Changes to the baseline emissions have been estimated based on the projected changes to the overall distribution input, which represents planned levels of leakage and demand (for example due to growth or water efficiency measures). These factors influence the energy requirement to pump and treat water and hence affect carbon emissions. There is a decrease in distribution input during the planning period equating to a projected reduction of approximately 1.2 ktCO2e/yr of operational carbon emissions by 2044/45.
- Changes to the energy efficiency of our operations and our renewable energy generation from water services assets have *not* been included. These measures are discussed further below.
- Changes to the emissions intensity of grid electricity has *not* been included.

The impact on operational carbon emissions for the water production and supply part of our business is shown in Figure D4.2.



Figure D4.2 – Annual operational carbon impact of the WRMP

The projected impact from our WRMP is a small reduction in our annual operational carbon emissions, compared to the revised baseline, by the end of the WRMP19 planning period.

Taking into account the effect of a continuing national move to lower-carbon energy as projected by Government, our total emissions and emissions intensity may decrease significantly more than this over time, as the majority of our emissions result from our consumption of grid electricity.

#### Measures to reduce our carbon impact

The options set out in our WRMP that ensure we can meet the future demand for water form only part of our overall investment plans. Our wider investment plans, and the estimated carbon impacts of these schemes are set out in more detail in our PR19 business plan. As part of our overall PR19 plan we will be continuing measures to reduce our overall carbon emissions. The beneficial effects of these wider initiatives have not been included in the carbon projections in our WRMP. The main actions regarding carbon emissions that we included in our wider PR19 plan are summarised below.

#### Energy Efficiency

Approximately 93% of our company emissions come from grid electricity consumption – primarily used in pumping water around our network. This is due to our relatively high number of distribution pumping stations required by the rural nature of our region and undulating topography. We are currently reviewing the energy efficiency of our pumping assets and, based on this information, will decide whether efficiency could be improved by

operational change or spend to save investment. We will investigate 'Spend to save' investments including, for example, replacement or refurbishment of inefficient pumps, pump monitoring and control optimisation.

#### Renewable energy

We are currently developing our renewables policy and which will establish our long term plan to contribute to the Severn Trent group ambition to self-generate 50% of our energy requirements. The more renewable energy we generate, the lower our carbon footprint. In the regulated business, the main opportunity for renewable energy production comes from sludge in the wastewater part of the business and hydroelectric power generation from the water side of the business. There is less scope for renewable energy in the wastewater side of the business in Wales due to the very small volumes of sludge. However, in the water part of the business we are looking at hydroelectric power initiatives at our upland reservoir sites and installing floating solar panels at some of our reservoirs, particularly at sites prone to algal blooms as this will have dual benefit of reducing energy and treatment costs.

#### Optimisation in delivery and innovation

There are a number of ways by which we can reduce carbon impacts as we deliver our plan. We are committed to engaging with markets to deliver greater efficiency and innovation, enhance resilience and support our performance during the planning period. We expect this engagement to promote design innovation and provide consistent challenge of our supply chain to come up with low-carbon solutions and use newer, more efficient technologies. As the WRMP planning period progresses, we expect to take advantage of innovations and improving technology to reduce our carbon emissions.

#### Other initiatives

Other measures to reduce our carbon emissions include improving our transport efficiency and research into better ways to manage our process emissions. We will continue to monitor our operations and future technological developments across the water sector and beyond to identify opportunities for reducing our carbon emissions.