
Chapter 12

Wholesale Wastewater

This chapter sets out our plans for both our Wholesale Wastewater Network Plus and Wholesale Bioresources price controls. Each is described within its own section. In AMP7, we have started to shift our focus towards creating a customer-led business. This is reflected in our choices, goals and performance commitments outlined in this chapter, and elsewhere across the Business Plan.

Wholesale Wastewater Network Plus

Summary

This section of the chapter sets out our plans for the Wholesale Wastewater Network Plus price control. It describes how we will respond to our customers' priorities, the options we have assessed and how we will deliver these plans efficiently.

We currently provide wastewater services to around 4.6 million customers in Kent, Sussex, Hampshire and the Isle of Wight. Wastewater Network Plus revenue comprises around 70% of total regulated revenues.

Our region has a wealth of natural beauty, with over 80 bathing waters, 3,400 km of river, four Areas of Outstanding Natural Beauty (AONB) and the South Downs. A core focus of our wastewater plan is to protect and further improve these natural assets, whilst continuing to build operational resilience in the face of high population growth and increasingly extreme weather. The number of customers we serve is expected to rise by 15% by 2040. Our plan for AMP7 responds to these growing pressures with new investment in our network and treatment assets, but with an increasing focus on environmentally-sustainable approaches and greater use of data analytics to target activity.

In addition, we are assisting the Environment Agency (EA) and Ofwat with ongoing investigations in relation to the operation of some of our wastewater treatment works and reporting processes. We recognise the importance of getting the basics right and therefore we have put in place a change and asset improvement programme – Environment+ – to improve trust and build confidence with all our stakeholders. In other areas we have made significant improvements to services, internal flooding has reduced by 30% and pollution incidents by 60%, and we remain on track to deliver our programme to improve river and bathing water quality.

Chapter headlines at a glance

- The South East has one of the highest levels of growth in the country. We are investing in new infrastructure to meet this demand, working more collaboratively with key stakeholders and adopting more environmentally sustainable approaches, such as **Sustainable Drainage 2030¹**
- We aim to deliver upper quartile performance for the prevention of pollution and flooding in the home, both priority areas for our customers
- We plan to deliver one of the most ambitious environmental programmes to date, improving 537 km of river and seven bathing waters
- By extending our use of **Catchment First** approaches we will deliver wider benefits by reducing our carbon impact, improving biodiversity and reducing flood risks
- We will build greater trust in areas where we have not performed well, including improving the resilience of wastewater treatment performance through our Environment+ programme
- To deliver this, we plan to invest £2.3 billion (net of developer contributions). This is around £375 million higher than in AMP6, driven by a larger environmental programme – the Water Industry National Environment Programme (WINEP).

A snapshot of the areas of expenditure is shown below:

Figure 1: Overview of Wholesale Wastewater Network Plus gross expenditure

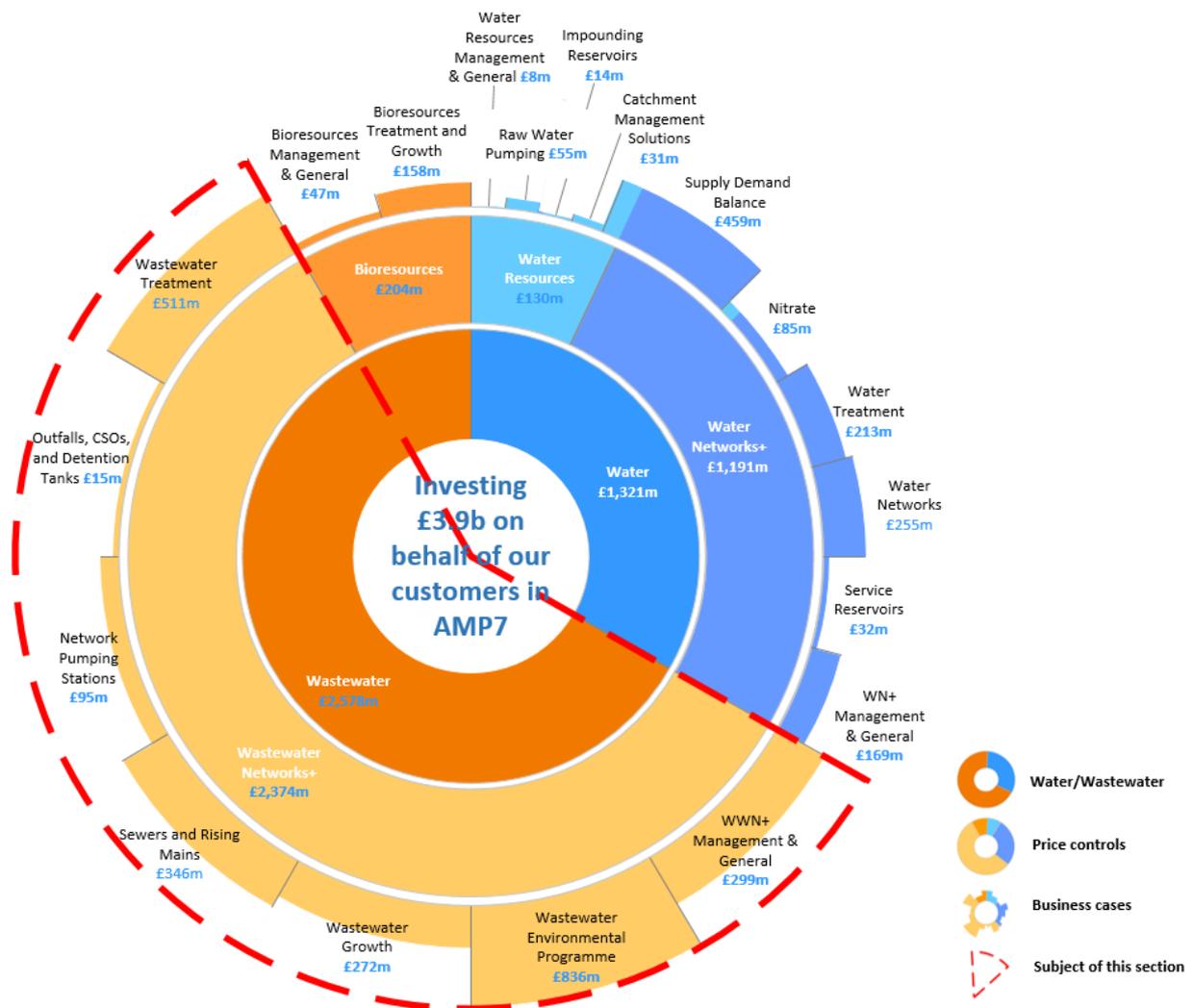


Table 1: Key features of the Wholesale Wastewater Network Plus price control

	Unit	AMP6 (2019/20)	AMP7 (2024/25)
Costs and RCV			
Totex (excl. WINEP)	£m (net)	1490	1439
WINEP	£m	410 ²	836
Cost Adjustment Claims (CACs)³	£m	120	92
Regulatory Capital Value (RCV)	£m	3,437	
Performance			
Internal flooding (including severe weather)	Incidents / year	398	350
External flooding (including severe weather)	Incidents / year	4718	3299
Treatment works compliance	% numeric compliance	99.03	100
Sewer collapses	Collapses / year	231	225
Pollution incidents	Incidents / year	116	82
River water quality	Km improved	n/a	537
Maintaining bathing water	Sites at excellent (new definition)	54	57
Good bathing water quality	Sites improved	0	5
Excellent bathing water quality	Sites improved	7	2

12.1 Context – we have made good progress in a number of areas but recognise the need to improve

In our business plan for 2015-20 we promised:

- a 25% reduction in sewer flooding in the home
- no increase in the number of external sewer-flooding incidents
- a 55% reduction in pollution incidents
- to aim for 100% compliance for wastewater treatment and maintain 97.7% as a minimum
- increase by seven the number of bathing waters with excellent water quality.

In some areas, we have delivered significant performance improvements. Since 2013/14, internal flooding incidents (including severe weather) have reduced by 30%, while pollution incidents have reduced by 60%⁴. These improvements are projected to continue over the remainder of the AMP. For 2017-18, the number of bathing waters meeting excellent standard was better than the previous two years but remains short of the target⁵. We are on track to deliver enhancement of seven additional bathing waters to an excellent standard, and the three scheme-specific Outcome Delivery Incentives (ODIs), Thanet, Woolston and Millbrook sludge.

We are implementing our Environment+ programme⁶ to improve our business processes, reporting and monitoring, supported by training and the development of a values-based ethical culture. This will ensure compliance and oversight, whilst also improving our assets and data quality.

(For more detail see Chapter 7.)

A summary of our performance against AMP6 Wholesale Wastewater Network Plus targets is shown below:

Table 2: Wholesale Wastewater Network Plus AMP6 performance commitments (PCs)

AMP 6 Performance Commitment	Target 2017/18	Actual 2017/18	Target 2019/20	Forecast 2019/20
Internal flooding incidents (excluding severe weather)	414	401	382	365
External flooding incidents (excluding severe weather)	9694	7100	9694	7810
Category 3 pollution incidents (including clean water)	158	131	158	120
Number of serious pollution incidents	4	4	0	2
WWTW numeric compliance (%)	100	98.38	100	99.03
Asset health	stable	stable	stable	stable
Number of blockages per km	0.58	0.49	0.58	0.49
Maintain bathing waters at excellent (nr)	54	53	54	50 ⁷
Bathing waters to excellent (nr)	na	na	7	7
Proportion of energy from renewables (%)	16.0	17.2	16.5	17.5

(For full details see Chapter 17.)

Our understanding of customer priorities

We used insight from our extensive engagement programme to develop a set of 10 outcomes to form the basis of our plan. Within each outcome, there are a number of objectives which we will strive to deliver.

Our PCs were derived from our initial view of customer priorities from Phase 1 of our research and validated and refined over the course of our engagement programme. Our success at meeting the outcomes for our customers will be measured by the PCs outlined in this chapter.

Wastewater priorities:

- Sewage flooding prevention is a high priority for customers who empathise with those that have experienced it. Despite us being above the national average in performance for internal flooding prevention, there is a high desire by customers to see the company improve its network to prevent it
- Pollution of rivers and watercourses was found to be an intermediate priority for customers who believe we have a duty to protect and enhance the environment. They want water and wastewater services to be delivered in an environmentally-friendly way, now and in the future, and they want us to ensure our bathing and river water quality is higher than the legal minimum
- While it is not considered as high a priority as the areas outlined above, customers are concerned that a future increase in rainfall due to climate change, an increasing population and more homes in the region will mean the current sewer network will not be able to cope. Customers expect us to ensure that future generations have access to the same level of wastewater services as we do today. Our customers' environmental awareness is increasing, and with that there is a growing expectation that we will use our own wastewater services to generate energy (such as the biodigestion of sludge to create biogas), as well as other sustainable energy technology.

While household, vulnerable and business customers generally prioritise categories that affect them daily, such as water quality, leakage and supply interruptions, future customers are more concerned with areas which are likely to affect them in the long term. In general, customers of the future place higher priority on environmental issues, including pollution and the use of renewable energies. (For our customer engagement insights see Chapter 4, and TA.4.1.)

Other drivers of change

Our region is undergoing significant environmental and demographic changes that require us to be smart and innovative in everything we do to ensure our operations are increasingly resilient, whilst maintaining affordable bills.

Key challenges in our region:

- With 3,400 km of main river, 83 bathing waters and two national parks in our region, the environment is important to our customers. Our plans include one of our largest-ever environmental programmes, improving the quality of rivers and coastlines in accordance with statutory requirements within WINEP.
- We face increasingly challenging weather, with more extreme rainfall, rising sea levels and accelerated coastal erosion. This means our sewers, pumping stations and treatment works need to be more resilient
- We have one of the UK's highest rates of population growth. This means increased capacity, new infrastructure and greater stress on the drainage network
- Growth also drives the need for tighter permits to maintain high-quality receiving watercourses, which require more stringent operating standards.

We fully support the Government's ambition "to leave the environment in a better state than we found it", as well as the wider objectives of its 25-year plan for the environment⁸. Our environmental programme and pollution strategy will directly enhance the water environment. Additionally, our transformational programmes **Catchment First**, **Sustainable Drainage 2030** and **Resource Hubs** respond to the need to do so in a way which enhances all aspects of the environment such as air quality, wildlife and sustainable use of resources. Ofwat's mandatory PCs will enable greater comparison between companies. They include methodology changes, such as no longer excluding severe weather from reported performance. We support these changes, recognising this better aligns with customers' concerns regarding extreme weather.

"The commitments by Southern Water on sewer flooding, surface water drainage and **Catchment First**/natural flood management were very welcome, and the committee supports the pledges to action and would be reluctant to see the business plan watered down in this area. The committee and Southern Water have agreed to increase our joint working in this area, to ensure government and water bill payers' money is used to maximum effect."

Martin Hurst, Chair, Southern Regional Flood and Coastal Committee

12.2 Our goals - we have set stretching goals with a focus on resilience and environmental improvement

By fully embedding our Environment+ programme⁹ in AMP6, we will set the foundations we need to deliver our AMP7 goals. Additionally, by continuing a culture of customer and community engagement, we will ensure we are always striving to deliver what our customers need and want.

By 2025 we aim to have:

- improved resilience through a 15% reduction in internal flooding incidents (from 2017-18) and the provision of additional network and treatment capacity for over 100,000 new homes
- enhanced the environment through a 40%¹⁰ reduction in pollution incidents and delivery of our environmental programme, improving 537 km¹¹ of local rivers, groundwater supplies and shellfisheries
- supported tourism in the region by improving bathing water quality at seven locations, achieving 97% of bathing waters at good standard or better
- improved operational resilience to maintain wastewater treatment compliance at a high standard, continuing to aim for 100% compliance
- fully-embedded a culture of partnership working, collaborating with other utilities, local authorities, landowners and businesses to build a more resilient water future for the South East.

By 2040 we aim to have:

- made flooding from sewers the exception, delivering resilience against more extreme weather through our sustainable drainage approaches
- achieved our ambition of zero pollution, with predictive analytics and automated control of our sewerage network as standard
- wherever cost effective, returned all our rivers and coasts close to their natural state¹²
- working collaboratively and with continuing customer support, brought all 83 bathing waters up to excellent standard
- fully-developed our **Resource Hubs**, recycling waste to provide power, heat, water, natural fertiliser and minerals to benefit local communities and the environment.

Our proposed PCs for the Wholesale Wastewater Network Plus price control are summarised below. In a number of cases the definitions have changed from AMP6.

(For further details see Chapter 6.)

Table 3: Wholesale Wastewater Network Plus AMP7 performance commitments

PC	Unit	2020/21	2021/22	2022/23	2023/24	2024/25
Internal sewer flooding (including severe weather)	Nr	371	365	359	354	350
External sewer flooding (including severe weather)	Nr	4129	3875	3637	3464	3299
Pollution incidents (Cat1-3) (wastewater only)	Nr	110	107	100	93	82
Treatment works numeric compliance	%	98.17	98.48	98.78	99.09	99.09
River water quality	Km	0	82.5	107.1	107.1	537.2
Sewer collapses	Nr	230	228	227	226	225
Maintain bathing waters at excellent	Nr (4 yr avg)	57	57	57	57	57
Improve bathing waters to good	Nr	-	-	-	-	5
Improve bathing waters to excellent	Nr	-	-	-	-	2
Effluent re-use	m3	See note				
Surface water management	Properties disconnected	See note				
Risk of sewer flooding in a storm	% properties	12.42	12.42	12.42	12.42	12.42

Combined Sewer Overflow monitoring	%	95	97	99	99.9	100
Whitfield Growth cost adjustment claim (CAC)	Scheme cost (£m)	-	-	-	-	26.4
Thanet sewers cost adjustment claim (CAC)	Scheme delivered	-	-	-	-	1

Note: effluent re-use and surface water management are reward-only PCs to support joint delivery of these new approaches and are part of *Sustainable Drainage 2030* and *Resource Hub* activities.

12.3 Our transformational programmes support the delivery of our goals

We engaged with customers to understand how they wanted service improvements to be delivered in their areas of priority. Both they and our other stakeholders have told us they want to partner with us to deliver on these priorities. They expect us to invest in initiatives that will protect and enhance the environment and ensure that future generations have access to the same level of wastewater services as we do today. (For more detail see Chapter 4.)

Based on this insight, we have shaped and refined four initiatives to support our wastewater ambitions, noting that these initiatives also support our ambitions in other price control areas

- **Catchment First** will improve river water quality through delivery of five phosphorous-reduction schemes as part of WINEP and is fundamental to improving water quality at seven additional bathing waters
- **Sustainable Drainage 2030** supports the delivery of an efficient growth programme, using more sustainable approaches to reduce flows and make the most of existing sewer capacity. Additionally, pilot projects indicate that this will support our external flooding targets
- **Resource Hubs** will enable us to deliver our customers' priority for environmentally-sustainable solutions and will move us towards the long-term ambition of carbon neutrality
- **Target 100** will support a more efficient growth programme by reducing demand for additional capacity within the sewerage system.

Additionally, this section sets out our strategies to deliver two, longer-term aims for our customers¹³, namely to:

- make flooding from sewers the exception
- achieve zero pollution incidents.

Scale:

Each day 743 million litres of wastewater are carefully screened, filtered and treated at our 365 treatment works, meeting strict environmental standards, before being returned to the environment.

Catchment First: Natural solutions to achieve a more resilient service and environment

Customers and stakeholders express strong support for **Catchment First** and ongoing catchment approaches. We found that all customer groups agreed that catchment management was one of the preferred methods for protecting and enhancing river quality in an environmentally-friendly manner, although they recognised an ongoing requirement for more conventional solutions.

Catchment First is a transformational programme spanning Water and Wastewater. It is about using collaborative, environmentally-sustainable approaches to deliver outcomes. This will also provide additional environmental benefits of reduced carbon footprint, support for biodiversity and a reduction in the need for chemical treatment.

Table 4: **Catchment First** examples (for Wholesale Wastewater Network Plus)

Our response	What we've been doing (AMP6)	What we will do (AMP7)
Catchment management regulatory programmes	<p>Working with the EA to develop a catchment management phosphate reduction proposal for the Blakes Gill catchment, addressing a permit change at Monks Gate WWTW.</p> <p>Establishing an integrated catchment management approach to manage multi-pollutants in Western Rother (EU Interreg funding secured).</p>	<p>Deliver at least five catchment management schemes to reduce phosphorous, addressing permit changes at a cost of £10.5m. This reduces our costs by circa 50% when compared to end-of-pipe solutions.</p> <p>Maximise opportunities to deliver natural flood management and wider benefits such as water quality through Catchment First schemes in AMP7 and in AMP8.</p>
Bathing water enhancement – catchment risk	<p>At four of the seven Bathing Water Enhancement Programme (BWEP) locations we have undertaken catchment risk assessments to identify upstream risks to bathing water quality (such as sources of faecal contamination from farm animals). We have worked with Natural England's catchment-sensitive farming officers to mitigate risk.</p>	<p>Apply learning to our AMP7 bathing water programme, improving bathing water quality at seven locations at a cost of £32.4m.</p>
Enabling and partnerships	<p>Widespread engagement with strategic and catchment stakeholders. Integrated Water Cycle Management (IWCM) project developed tools and instigated culture change. Five IWCM pilots are underway.</p> <p>Developing natural and social capital framework. Ongoing engagement with stakeholders to jointly design and deliver solutions. Establishing catchment working groups to facilitate internal integration.</p>	<p>Continue ongoing stakeholder engagement and maximise opportunities for joint design and delivery.</p> <p>Embed natural and social capital into business processes and decision making, including a new PC to implement natural capital accounting in three of our 10 river catchments.</p>

Sustainable Drainage 2030: Creating capacity across the sewer network

Our customers have told us that they want us to deliver innovative, environmentally-friendly and effective drainage systems to support growth and ensure the resilience of our wastewater networks for future generations.

Sustainable Drainage 2030 will transform our sewerage networks to ensure we support sustainable growth and are protected against climate change by bringing concepts of **Catchment First** into the urban environment. Customers want us to support growth and ensure regional resilience and have expressed strong support for our proposed initiatives to deliver **Sustainable Drainage 2030**. We will achieve this by combining traditional engineering methods with environmental approaches such as re-landscaping the natural environment to reduce flows, rain gardens, soakaways and sustainable drainage systems.

Table 5: *Sustainable Drainage 2030* examples

Our response	What we've been doing (AMP6)	What we will do (AMP7)
Surface water removal	Large-scale surface water separation in Portsmouth to reduce flood risk. Disconnected circa 7000 properties. Two smaller-scale schemes to relieve flooding that would otherwise be non-cost beneficial. Exploring options such as smart water butts and soakaways with local community.	Roll out targeted, small-scale separation schemes across the region to reduce internal and external flooding where conventional solutions are not cost beneficial. New ODI to incentivise schemes for up to 2,842 properties (no costs in plan, funded via reward-only ODI).
Sewer infiltration	Major investment to protect customers from flooding due to infiltration in more than 20 villages and towns across our region. Providing greater resilience to high groundwater.	Deliver 20 infiltration reduction schemes to reduce risk of flooding and breaching of the dry weather flow permit at the treatment works at a cost of £17.3m. This includes a large, two-AMP, infiltration reduction scheme in Chichester to prevent untreated discharges into the harbour during high flows and remove restrictions on housing development at a cost of £6.1m.
Collaborative planning	Developed drainage strategies for key catchments with feedback from EA and local authorities. Testing a more collaborative approach to longer-term infrastructure planning. Joint working with local authorities, developers and EA in pilot areas, such as Paddock Wood and Lidsey.	Jointly produce our long-term plans, an approach at the heart of our drainage strategy development. Support sustainable drainage and water reuse options in three new development areas – Ebbsfleet, Fawley and Otterpool.
Sustainable Drainage Systems (SuDS)	Working with developers to adopt SuDS schemes in Winchester and Sittingbourne. Discussions with lead local flood authorities (such as Kent County Council) on potential SuDs schemes to jointly fund.	Work in partnership with contribution of £1.7m to large SuDS scheme in Eastbourne to relieve flooding. New sewers for adoption code of practice to include SuDS schemes.
Intelligent sewers	Level and flow meters installed in critical sewers and pumping stations. Installing event-duration monitors at 489 overflows.	Make better use of technology to create a smart network. Expand use of level monitors across critical parts of the sewerage network. Develop predictive modelling software at a cost of £4m.
Education on fats, oils and greases (FOG) and unflushables	Delivered talks to schools and community groups. Visited households and food service establishments (FSE) in sewer blockage hotspots. Working with environmental health officers to check grease management in FSEs. Developing smart phone game to educate younger audiences.	Extend use of education in sub-catchments where FOG and unflushable material cause flooding and pollution through sewer blockages and failure of pumping stations at an additional cost of £2m.

Sustainable Drainage 2030:

By 2040, there will be widespread monitoring and control of our sewerage network and we will be using predictive analytics to target our actions to help us achieve our ultimate ambition of zero pollution.

Resource Hubs: transforming wastewater treatment works into community assets

Our research found that with increasing environmental awareness amongst our customers there is a growing expectation that we would use our own wastewater services to generate energy, such as biogas. Our treatment works can seem distant from the people they serve, while there is often a shortage of community facilities for our customers to use. So, we will transform our assets into **Resource Hubs** by recycling water, generating renewable energy, supporting community amenities and providing spaces for training. As well as increasing resilience and enhancing the natural, social and economic capital of communities, our **Resource Hubs** will continue to treat wastewater to the high standards expected by our customers.

Peacehaven Wastewater Treatment Works will be the first **Resource Hub**. However, this is more than just asset improvement, it is a philosophy we will apply to our larger assets, building on the good progress made during AMP6.

Table 6: **Resource Hub** examples (for Wholesale Wastewater Network Plus)

Our response	What we've been doing (AMP6)	What we will do (AMP7)
Heat from sewers	Running pilot to heat a lido/swimming pool near Brighton using the natural heat from sewers.	Roll out pilot to other locations with partners (costs covered by gate fee).
Community spaces	Providing successful Learn-to-Swim programme for over 25 years, while our talks to schools and communities reach thousands of customers a year, increasing awareness of FOG.	Using Peacehaven as the template, develop a community education and awareness facility. Support skills training in-house, whilst providing wider benefits at a cost of £0.5m.
Water re-use	New ODI proposed to support small-scale schemes. Three significant schemes included in Water Resource Management Plan (WRMP), recycling 46.5 million litres per day	Develop opportunities that are cost beneficial. Work with others to address concerns over microbiological contamination (no additional costs, covered by reward-only ODI). Design and commence construction of water reuse schemes at Sandown, Ford and Aylesford - £20m ¹⁴
Mineral recovery	We're part of a European project investigating resource recovery at wastewater treatment works, improving our understanding of nutrient recovery processes.	We will deploy on-site scale trials of resource recovery technology as part of our R&D programme.

Overall, customers express strong support for the outcomes that will be delivered by **Resource Hubs**. They want us to treat water as a precious, natural resource and avoid wasting it and use our own wastewater services to generate energy. They are supportive of the idea of recycling water for the benefit of golf courses and agricultural land. Customers also support indirect water re-use to supply drinking water. The **Resource Hub** approach is also a strong feature of our bioresources plan.

Aiming for zero flooding and pollution

Two of our highest customer priorities are the prevention of flooding and pollution. We have made significant progress in AMP6 but need to go even further to meet our customers' expectations. The Environment Agency and Natural England set out their objectives for water companies, our proposals are meet their aspirations for improving resilience and excellent performance, as set out in the Water Industry Strategic Environmental Requirements (WISER). Here we set out our longer-term strategies for both.

Pollution:

Aiming for zero pollution supports our customer outcome "Let's keep the rivers, lakes, reservoirs and coasts healthy and clean". We have a responsibility to protect and improve the environment, and our customers, other stakeholders and regulators rightly expect us to do this. Investing to avoid pollution incidents is a medium priority for customers and a high priority for the EA.

In AMP6 we have reduced category 1-3 pollution incidents by 60%, moving us to industry average¹⁵ and significantly reduced the number of serious incidents. Our plans for AMP7 aim for a 40% reduction in pollution incidents from a 2016 baseline, supporting the EA's strategic ambition¹⁶. We considered a range of options to deliver this.

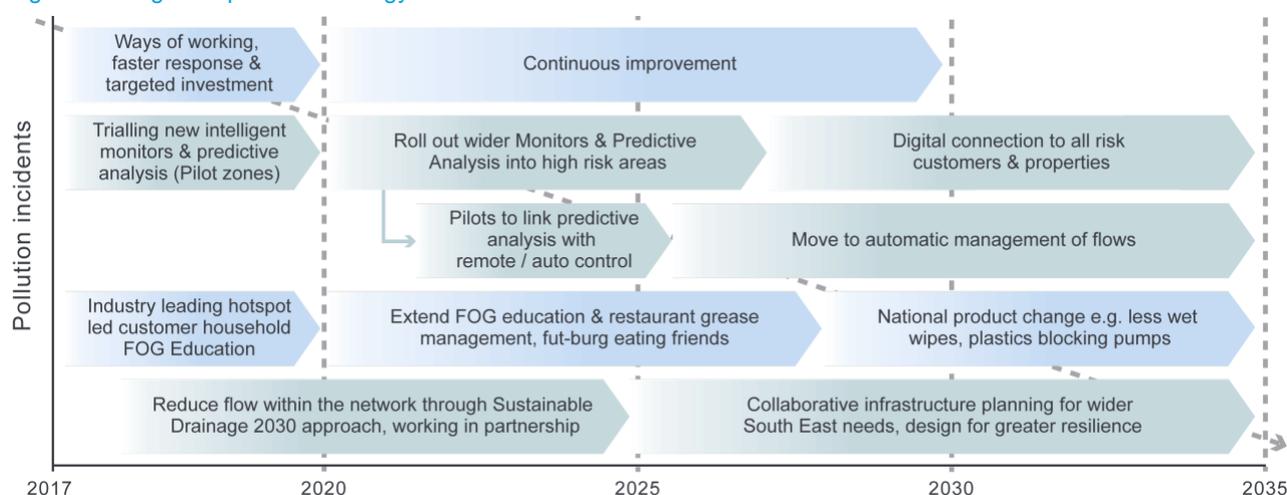
By adopting new ways of working, making better use of technology and working collaboratively, we can deliver this at a cost of £10.7 million. This represents a smaller impact on customers' bills than the more conventional options we considered¹⁷.

(For more information on our options assessment, see TA12.WW07.)

Our long-term strategy for achieving zero pollution incidents is focussed around four core themes:

1. **Operational excellence:** addressing the basics of improving operational processes, new commercial arrangements to incentivise performance and a focus on preventing repeated incidents has delivered significant benefits. Further opportunities are limited but this will now move into a continuous improvement phase
2. **Smart networks:** we are currently trialling greater use of network monitoring and predictive analytics, as we move to a smart¹⁸ network. We plan to roll this out into high-risk catchments and pumping stations, extending into the wider network in AMP8
3. **Fats, oils and grease (FOG):** we will extend our FOG and unflushables campaign and continue to push for changes to how products are designed and marketed
4. **Sustainable Drainage 2030:** we will adopt new ways of working, with increased focus on collaboration with customers and local authorities, such as disconnecting surface water drainage. We see this as moving to a more collaborative infrastructure planning model in the longer term to improve resilience across all utilities.

Figure 2: Long-term pollution strategy



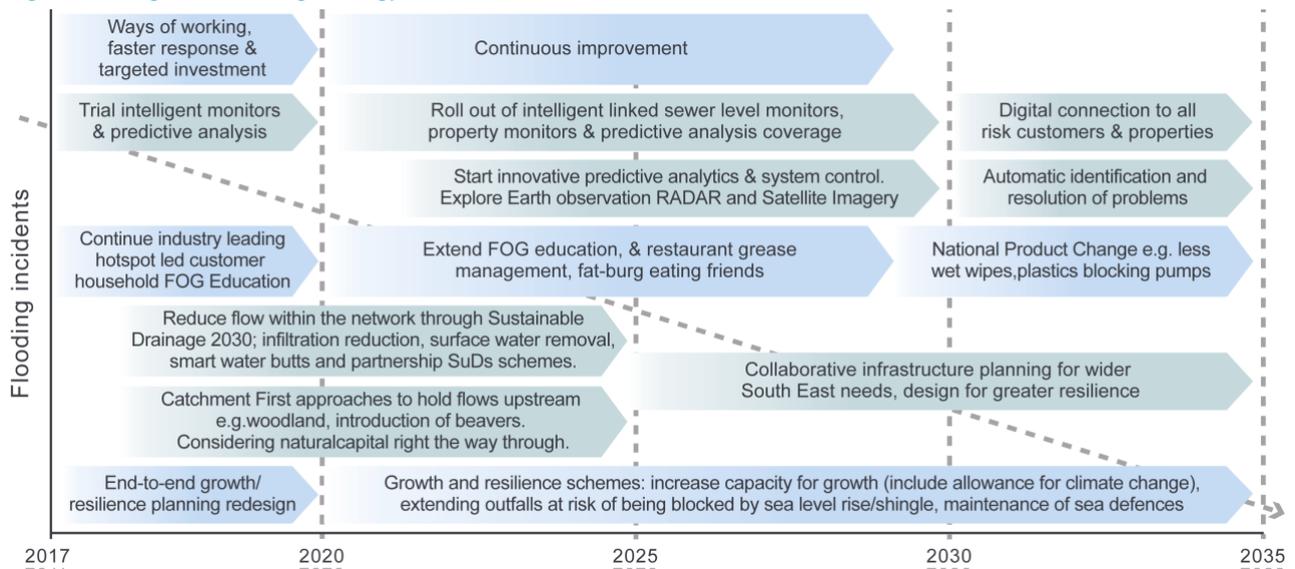
Flooding:

Aiming for zero flooding incidents supports our customer outcome “The services we provide are effective and fit for the future”. Sewage flooding prevention is a high priority for customers, who have a strong wish for us to improve our network to prevent it.

In AMP6 we have reduced internal flooding incidents by 30%, moving us to above industry average¹⁹. Our plans for AMP7 aim for a further 15% reduction. We considered a range of options to deliver this. With many of the root causes of flooding being similar to pollution, the approaches for both have many areas of similarity.

By adopting new ways of working, making better use of technology and working collaboratively, we can deliver this at a cost of £10.2 million. This represents a smaller impact on customers’ bills than the more conventional options we considered: (For more information on our options assessment, see TA.12.WW04)

Figure 3: Long-term flooding strategy



12.4 Overview of costs - our costs are driven by a commitment to resilience and environmental improvements

Total proposed investment is £2,275 million (net of developer contributions), made up of £1,224 million Botex and £1,051 million enhancement. This is significantly greater than AMP6, which is £1,900 million on a like-for-like basis. This increase is driven by a significantly-larger environmental programme, which has increased from £410 million²⁰ in AMP6 to £836 million for PR19.

This investment relates to the network of treatment works, pumping stations, sewers, outfalls and detention tanks. These assets are a critical part of the South East’s infrastructure. They each play a vital role in providing services to our customers, supporting growth, minimising flood risk and protecting the environment.

We need to continue to improve these vital assets and meet our customers’ specific expectations and priorities. As explained above, our customers and stakeholders want us to increase resilience, reduce flood risk and cater for anticipated growth in sustainable ways²¹.

Specific proposals are set out in individual business cases which describe the area of investment and options for delivering the required level of performance.

These are summarised below.

Table 7: AMP7 expenditure – summary of business cases for Wholesale Wastewater Network Plus

Wholesale Water Resource (17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case	Totex		Totex	
WW01	Wastewater Treatment	£	510.8	£	0
WW02	Network Pumping Stations	£	83.2	£	12.0
WW03	Outfalls, CSOs and Detention Tanks	£	10.6	£	4.5
WW04	Sewers and Rising Mains	£	329.8	£	16.0
WW05	Wastewater Growth	£	0	£	271.9
WW06	Wastewater Environmental Programme	£	–	£	803.6
WW06	Bathing Waters	£	–	£	32.4
MG02	Data and Information Systems	£	167.1	£	0
MG1,3,4	Management & General Other (Buildings, Fleet, R&D.)	£	131.7	£	0
	Gross Total	£	1,233.2	£	1,140.5
	Grants and Contributions	£	9.4	£	89.1
	Net Total	£	1,223.8	£	1,051.4

This table excludes £76 million for sewer adoptions. Although this cost is included in Ofwat data table WWS2 it is not a Southern Water expenditure item.

In each business case, options have been assessed at a programme level and at scheme level:

- For enhancement proposals we have used cost-benefit analysis to assess options, with benefits primarily based on willingness to pay. Final selection also took account of a wider triangulation of customer priorities
- Our base maintenance options are based on least whole-life cost, reflecting that performance remains constant between options.

(Our methodology is explained in TA.14.5.) (Our rationale for selection of preferred options is explained within individual business cases.)

WW01 Wastewater Treatment

This business case covers the expenditure required to maintain and operate wastewater treatment works (Botex only).

We recognise there have been issues with compliance and reporting at some of our 365 wastewater treatment works (WWTW). We are addressing this through our Environment+ programme, which started in 2017. This programme of work is driving an environmental compliance culture whilst improving our assets and data quality. Our plans for AMP7 build on this foundation, providing greater resilience and aspiring to deliver upper quartile industry performance on treatment works compliance.

(For information about Environment+ and other compliance programmes, see Chapter 7.)

Table 8: Wastewater Treatment AMP7 Totex

Wholesale Wastewater Network Plus (gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case	Totex		Totex	
WW01	Wastewater Treatment	£	510.8	£	0
Key components of AMP7 spend					

WW01	Improve resilience by mitigating 17 high priority named risks	£	170.1
WW01	Invest to maintain compliance at 365 treatment works	£	141.2
WW01	Fund innovation and optimisation projects	£	7.3

These key components represent a total expenditure of £318m, and 62% of the total business case spend.

We assessed four programme-level options using deterioration modelling software and an assessment of site-specific risks. Our preferred option is to maintain overall expenditure in line with AMP6 which has the lowest whole-life cost. Additional costs will be required to support the capital maintenance needs on sites being upgraded as part of our significantly larger environmental and growth programmes.

The key features of our plan to drive performance, resilience and efficiency in Wastewater Treatment are as follows:

- We will improve resilience by investing in 17 high priority named sites identified through our risk framework. We have recently incorporated failure mode, effects and criticality analysis (FMECA) and are further developing our framework to include a catchment-based assessment of resilience to external shocks and stresses²². The three most significant schemes to improve operational resilience are Redgate Mill WWTW, East Worthing WWTW and Aylseford WWTW
- We will optimise our performance and efficiency through our Operational Excellence²³ programme, by facilitating a more collaborative approach to planning and working, for all teams in an operational area, using geographically-based performance hubs. Additionally, we will continue our optimisation programme at a cost of £7.3 million as part of our investment to improve efficiency
- We will improve resilience at our treatment works, using our remote monitoring of effluent performance and enhancing our data analytics capability to predict emerging risks. We already make significant use of temporary or mobile plant to support temporary risk periods and will continue to improve resilience through this approach.

(More detail is provided in TA.12.WW01)

WW02 Wastewater Pumping Stations AMP7 Totex

We have 3,321 Wastewater Pumping Stations²⁴ (WPS) – one of the highest number of pumping stations per km of sewer²⁵. Our targeted investment on improved ways of working for WPS has been a significant factor in achieving a 72% reduction in category 1 to 3 pollutions and a 50% reduction in internal flooding attributed to our WPS between 2014 and 2017.

Despite these improvements, WPS remain one of the primary causes of pollution incidents. Growth for new developments and adopting former private pumping stations is forecast to increase the number of WPS to over 3,600 by 2025. We also have a high number of coastal pumping stations where predicted sea level rises are increasing the risk of flooding of our assets.

Table 9: Wastewater Pumping Stations AMP7 Totex

Wholesale Wastewater Network Plus (gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case				
WW02	Network Pumping Stations	£	83.2	£	12.0
Key components of AMP7 spend					
WW02	Base maintenance WPS	£	79.5		
WW02	Technology led strategy to flooding and pollution associated with WPS			£	10.7

These key components represent a total expenditure of £90m, and 95% of the total business case spend.

The key activities of our plan to drive performance, resilience and efficiency are as follows:

- Enhancing our assessment of criticality and resilience, taking a catchment view of the potential impact on the environment. This is aimed at improving resilience to external shocks and ensuring maintenance planning takes full account of environmental sensitivity and customer flooding consequences
- £10.7 million of enhancement expenditure has been included to reduce the number of pollution incidents, in line with our customers' priorities. We will increase the number of flow meters and network monitors, which, combined with improving data analytics, will enable us to predict and respond to emerging risks. Additionally, we will improve resilience through a mix of improving standby pumping arrangements and exchanging pump types that are prone to blocking. This is our most cost beneficial option to meet our pollution targets, although it will be more challenging to deliver than more conventional options
- Investment to maintain and improve resilience across all pumping stations. The most significant scheme is for Portobello Pumping Station in Brighton at a cost of £5.1 million, protecting a large stormwater pumping station from coastal erosion.

(For more detail see TA.12.WW02)

WW03 Outfalls, Combined Sewer Overflows and Detention Tanks

We have a coastline of 700 miles which contains 1,514 coastal and estuarine outfalls. Outfalls are used to release treated effluent to rivers and the sea. Combined Sewer Overflows (CSO), Emergency Outflows (EMO) and Detention Tanks are used to prevent stormwater flooding. We have 2,185 outfalls (includes short sea outfalls), 27 long-sea outfalls, 791 CSOs, 148 EMOs and 85 Detention Tanks.

We reduced the number of category 1 to 3 pollution incidents attributed to CSOs and Detention Tanks from 14 in 2014 to four in 2017. However, the number of internal flooding incidents attributed to the blockage of outfalls by shingle or tidal locking (high tide preventing the release of effluent) increased from zero in 2014 to 23 in 2015 and seven in 2017. We need to increase and refocus investment to protect them from emerging challenges, including increasing the inspections of our long sea outfalls to better understand their conditions and maintenance needs.

Table 10: Outfalls, CSOs and Detention Tanks AMP7 Totex

Wholesale Wastewater Network Plus (gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case				
WW03	Outfalls, CSOs and Detention Tanks	£	10.6	£	4.5
Key components of AMP7 spend					
WW03	Maintenance of short sea outfalls	£	2.5		
WW03	Blackrock Pumping Station	£	1.4		
These key components represent a total expenditure of £7.0m, and 46% of the total business case spend.					

The key activities of our plan to drive performance, resilience and efficiency are as follows:

- Increase maintenance of our short sea outfalls to provide greater resilience to tidal locking and blockage by sediment, reducing the risk of flooding
- Provide greater resilience by extending the outfall at Blackrock Pumping Station in Brighton, preventing it being blocked by sediment to protect homes and businesses against flooding
- Replace CSO screens and telemetry to ensure we maintain and improve the quality of rivers and bathing waters. (For more detail see TA.12.WW06, TA.12.WW03 & TA.12.WW04.)

WW04 Sewers and Rising Mains

We have 39,541 km of sewers including 1,500 km of rising mains²⁹. This is expected to grow through new developments and the adoption of rising mains associated with private pumping stations, not adopted in AMP6.

Reducing internal flooding is a high priority for customers, while avoiding pollution incidents is a medium priority. Failures are primarily caused by blockages, collapses or rising main bursts. We have reduced the number of pollution incidents from sewers by 50% and 30% from rising mains between 2013 and the present. Similarly, we have reduced internal flooding by 30% over the same period. We need to go further than this to meet the expectations of our customers and regulators.

Table 11: Sewers and Rising Mains AMP7 Totex

Wholesale Wastewater Network Plus (gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case				
WW04	Sewers and Rising Mains	£	329.8	£	16.0
Key components of AMP7 spend					
WW04	Rehabilitating Sewers and Rising Mains	£	75.5		
WW04	Reduce groundwater infiltration	£	17.3		
WW04	Technology-led approach to internal and external flood protection	£		£	16.0
WW04	Network operating costs	£	208.8		
These key components represent a total expenditure of £319m, and 92% of the total business case spend.					

The key activities of our plan to drive performance, resilience and efficiency are as follows:

- We will maintain the health of our underground assets by rehabilitating 73 km of sewers and 13 km of our highest-risk rising mains. Our preferred option constrains costs in the shorter term to support affordability, enabling us to increase expenditure for infiltration reduction investment
- We will reduce groundwater infiltration into our sewerage system through 20 infiltration reduction schemes, including the first phase of a 10-year plan to reduce infiltration issues in Chichester
- Having assessed options to enable a step change in flood prevention performance, our preferred option is a technology-based approach, with linked sewer monitors and data analytics. It includes flood mitigation work for both internal and external flooding. It is the most cost beneficial option and initial feedback from pilots is positive, providing a relatively low-cost option to meet our ambitious flood prevention targets
- Our flood enhancement programme includes a partnership scheme in Eastbourne where we will deliver a large sustainable drainage scheme with the EA, at a cost of £1.7 million.

(For more detail see TA.12.WW04)

WW05 Wastewater Growth

Increased housing and population are crucial for the continued success of the South East's economy. We anticipate high levels of growth, which presents a major but not insurmountable challenge for our wastewater assets. We need to ensure we have appropriate capacity in our drainage and treatment network to support the delivery of new homes and businesses, minimising any impact on existing customers.

Supporting sustainable growth is a priority for stakeholders at all levels. Government recognises the critical role infrastructure providers play in supporting housing developments, and we support many of its proposals in its Housing White Paper – including the consideration of more sustainable

building standards^{26 27}. We are improving our service to developers, with more proactive planning, improved customer service and faster delivery.

In AMP6 we will have invested £170 million, more than originally planned in our PR14 business plan of £150 million (gross expenditure, 2017/18 prices). This is particularly evident within the wastewater network as increasingly large developments and new towns are underway. Our investment has facilitated growth and ensured no detriment to flood prevention or pollution performance.

Table 12: Wastewater Growth AMP7 Totex

Wholesale Wastewater Network Plus (17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case				
WW05	Wastewater Growth – gross costs	£	0	£	271.9
WW05	Developer contributions	£	0	£	-89.1
Key components of AMP7 spend					
WW05	Wastewater Treatment capacity increase – excluding Whitfield			£	96.7
WW05	Whitfield growth scheme (with cost adjustment claim)			£	31.4

These key components represent a total expenditure of £128m, and 47% of the total business case spend.

The key activities to drive performance, resilience, efficiency and improved customer service are as follows:

- We will increase network capacity to meet growth in the region. Costs are based on 15 high growth catchments and an allowance for non-specified growth in other areas of our region. Gross costs are partly offset through infrastructure charges for developers
- We will increase capacity at 18 wastewater treatment works, including a new treatment works at Whitfield, near Dover (see CACs)
- We will improve our efficiency and developer services measure of experience (DMeX) performance, by re-engineering our growth planning and delivery approach, integrating our planning process with developers, local authorities and the EA to provide more resilient solutions
- We will drive efficiency and increase resilience through **Sustainable Drainage 2030**, such as extensive surface water removal. In addition to our standard efficiencies in our overall plan, we have applied an additional stretch efficiency to our growth programme of £70 million.

(For more detail see TA.12.WW04 & TA.12.WW05.)

WW06 Wastewater Environmental Programme

We have planned investment to enhance the environment, maintain resilience and improve the quality of watercourses. This is one of our largest environmental improvement programmes. The WINEP for AMP7 outlines our wastewater obligations to improve and protect the water environment. WINEP3 includes new environmental drivers and tighter permits. Our change mechanism for unconfirmed elements is described in TA WW06.

Where customers support it, we will go beyond the statutory minimum. Our bathing water programme is included within this business case, enhancing bathing water quality at a further seven bathing waters to ensure our customers have the standards they expect. Due to an ongoing investigation, some drivers do not have individual schemes identified in WINEP3. In these cases, we have applied the EA driver guidelines to identify which schemes will be required. The needs and costs have been independently assured.

Through these environmental improvements, customers will benefit from improved ecology in rivers, streams and shellfish waters.

Table 13: Wastewater Environmental Programme AMP7 Totex

Wastewater Network Plus (Gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case				
WW06	Wastewater Environmental (aligned to WINEP)	£	0	£	836.0
Key components of AMP7 spend					
WW06	Bathing Water enhancement			£	32.4
WW06	Environmental improvements for WINEP			£	803.6
These key components represent a total expenditure of £836m, and 100% of the total business case spend.					

In line with customers', stakeholders' and regulators' priorities, we have included more collaborative, sustainable options, such as catchment management. Scheme options have been assessed using our Totex hierarchy²⁸, looking at catchment-based, collaborative or pump-away options before end-of-pipe. Selection has been based on cost benefit or best whole-life cost, as appropriate.

The key activities of our plan to drive performance are as follows:

- We are extending our wastewater catchment management programme to deliver phosphorus reductions in five catchments. In delivering these schemes we will work closely with key catchment partners such as river trusts and wildlife groups, as well as the EA and Natural England
- Bathing water quality continues to be a high customer priority and our bathing water programme will enhance the water quality at a further seven bathing waters
- We have used our Totex hierarchy²⁹ to assess alternative lower-cost options, such as elimination of chemicals at source, catchment-based or pump-away options rather than treatment-based solutions
- We will improve biodiversity through our environmental programme. Four SSSI improvement sites and a further five SSSI investigations are planned. Additionally, we are introducing a new PC to use natural and social capital accounting in three of our 10 river catchments
- We continue to test more innovative technologies through our R&D programme.

(For more detail see TA.10.1)

MG02 IT investment (Wastewater)

Our centralised IT management and general capability provides a shared service across our water and wastewater network to support the technology hardware, software, networks, data centres, facilities and operational technology devices. Our wastewater network would be unable to maintain our services without the technology infrastructure that underpins our operations.

Furthermore, the need to deploy linked sewer level monitors and flow meters across our estate to drive our predictive analytics capability needs to be supported by a robust technology infrastructure. We need to significantly invest in IT to support our business strategy, which is focused on shifting how we operate to being **brilliant at the basics**.

Table 14: Data and Information Systems (Wholesale Wastewater Network Plus allocation)

Wholesale Wastewater Network Plus (gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
Ref	Business case	Totex		Totex	
MG02	Data and Information Systems	£	167.1	£	0
Key components of AMP7 spend					
MG02	Operational real time control and monitoring	£	16.0*		
MG02	Driving insight with data	£	18.0*		
MG02	Information Security	£	25.0*		
These key components represent a total expenditure of £59m, and 35% of the total business case spend.					

*Our investment in the centralised data capabilities is shared across both wholesale waste and water investments.

The key activities of our plan to drive performance are as follows:

- We will support our pollution and flooding strategies by investing in operational, real-time control and monitoring to enable improved forecasting and proactive network flow management
- We will put in place more efficient production planning, forecasting and management, by investing in centralised data capabilities to improve operational awareness and support, reporting and decision-making. We will use predictive models to enable our operations to proactively monitor and manage issues and incidents before customers are impacted
- We recognise that cyber security is a major threat so we are investing in improving information security platforms to protect our customers and their data
- We will improve asset resilience by investing in the refresh of operational technology systems to provide greater insight and control over the assets in our wastewater network.

*Our investment in the centralised data capabilities is shared across both wholesale waste and water investments.

(For more detail see TA.12.WW07 & TA.12.MG02)

Cost adjustment claims

We are proposing three cost adjustment claims (CACs) related to Wholesale Wastewater Network Plus. We developed and applied a consistent framework and process for reviewing and assessing all CACs.

The final claims we have included are:

- **Bathing waters (£32.4 million):** this claim relates to work to improve the bathing water quality and long-term resilience of seven bathing waters, enhancing the water quality, amenity value and economy in the local areas. This is a customer-driven claim. Our customers consistently tell us that the quality of the bathing waters in our region is a key priority for them. This is why we propose to improve five bathing waters classed as sufficient or poor to good and improve two bathing waters from good to excellent
- **Growth: Whitfield (£26.4 million):** this claim relates to work required for a sewage treatment solution for a growth hotspot in the Whitfield development, where we will see significant, concentrated growth at levels far higher than the national average. This is unlikely to be adequately funded through the modelled cost allowance
- **Thanet Groundwater Protection Scheme (£32.9 million):** this claim is to carry out the third phase of Thanet Sewer groundwater scheme, which will prevent the risk of pollution of groundwater sources. This scheme is a statutory requirement under WINEP3.

We have proposed such adjustments only where they are absolutely necessary and appropriate to deliver well-evidenced needs for our customers, in line with Ofwat's CAC guidance requirements.

(For more information see Chapter 14.)

Wholesale Bioresources

Summary

This section of the chapter sets out how we will deliver customers' priorities for our Wholesale Bioresources price control.

We treat 119,000 tonnes of sludge a year at 16 Sludge Treatment Centres (STCs), and forecast treating 133,000 tonnes by 2030³⁰. We use conventional digestion and were amongst the first companies in the UK to recycle 100% of the treated produce to agriculture. Renewable biogas is produced from the treatment process, enabling us to generate over 17% of our energy needs³¹.

New technology and the introduction of the bioresources market in 2020 present opportunities to work in new ways to deliver benefits for customers and the environment. Transforming wastewater treatment works to **Resource Hubs**, collaborating with neighbouring companies and continuing to improve our processes will allow us to better realise the inherent value within waste.

Benchmarking has shown that our costs to deliver the Wholesale Bioresources price control are efficient³² in comparison to the industry, achieved by using conventional technology as effectively as possible.

Chapter headlines at a glance

- Through **Resource Hubs** we are changing how we think about waste. We will unlock value by adopting new ways to reuse and recycle resources, such as using food waste or energy crops to increase renewable energy generation
- We will use the opening market to reduce costs and improve resilience – starting with two collaborative projects with Wessex Water
- By rationalising the number of treatment sites and optimising our operations to produce some of the highest biogas yields in the industry, based on conventional anaerobic digestion, we will ensure our bioresources treatment and disposal is as efficient as possible
- We are one of the first companies in the UK to achieve independently-certified, 100% compliant sludge recycling to farmland³³. We will continue to evolve our services to meet farmers' and landowners' needs
- Total proposed investment for the period is £204 million, which compares to an AMP6 investment of £170 million on a like-for-like basis. This is a 20% increase which improves resilience, including increased expenditure on data and information systems, enables further expansion of renewable generation and enables development of **Resource Hubs**. A snapshot of the areas of expenditure is shown below.

Figure 4: Overview of bioresources expenditure

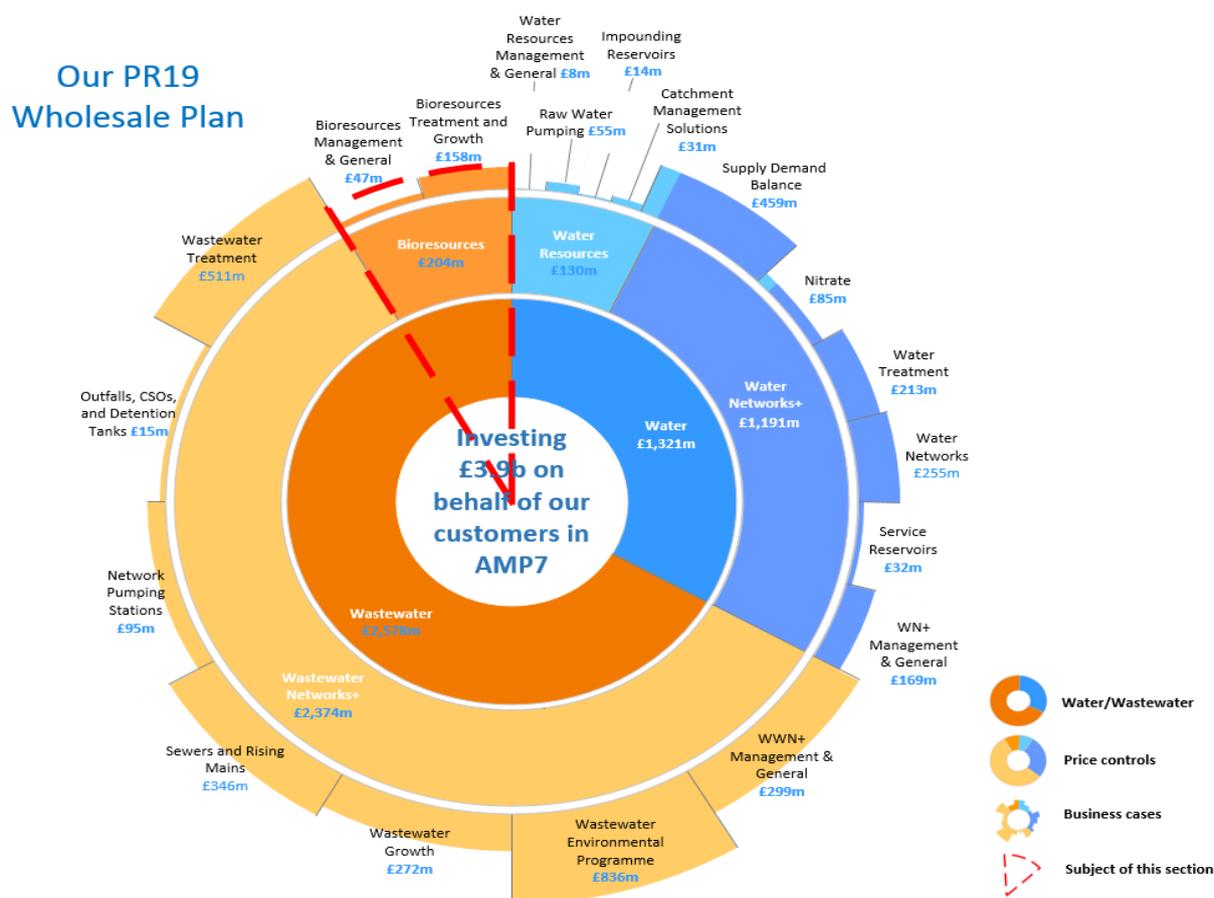


Table 15: Key features of the Wholesale Bioresources price control

	Unit	AMP6 (2019/20)	AMP7 (2024/25)
Totex investment	£m (net)	170	204
Regulatory Capital Value (RCV)		201.2	
Satisfactory bioresources recycling	% compliance	100%	100%
Renewable energy	% of total used	17.5%	24%

12.5 Context - against a background of solid performance, new opportunities arise with the opening market

At PR14 we committed to increase the amount of energy we use from renewable sources to 16.5% by 2020. We have already achieved this and predict using 17.5% in 2019-20.

Table 16: AMP6 performance commitments (PCs) and projected performance

AMP6 performance commitment	Target 2017/18	Actual 2017/18	Forecast 2019/20 ²⁰
Proportion of energy from renewables (%)	16.0	17.2	17.5

Our understanding of customer priorities

Customers expect us to ensure that future generations have access to the same level of wastewater services as we do today. Our customers' environmental awareness is increasing, and with that there is a growing expectation that we will use our own wastewater services to generate energy (such as biodigestion of sludge to create biogas), as well as other sustainable energy technology. In general, customers of the future place higher priority on environmental issues, including pollution and the use of renewable energy. However, in comparison to other areas, such as flooding or pollution, investment in renewables was a lower priority.

When asked specifically, customers felt measuring our use of renewables was a simpler, more tangible PC than measuring our carbon footprint. Disposing treated biosolids to agricultural land is cost effective and improves soil condition. We work closely with farmers to ensure we deliver a service that meets their requirements. As competition for landbank (the area of land available for disposal) space increases, we will refine our offer to farmers, by providing an enhanced product from **Resource Hubs**, dedicated account management or tailored delivery schedules and storage.

(For our customer engagement insights see Chapter 4 and TA.4.1.)

Other drivers of change

Our region is undergoing significant environmental, demographic and regulatory changes, presenting additional pressures and new opportunities. To develop our bioresources strategies we reviewed external threats and opportunities and company-specific strengths and weaknesses, summarised in the following table.

Table 17: Summary of risks and opportunities³⁴

	Strengths	Weaknesses
Internal	<ul style="list-style-type: none"> Efficient production of biogas and renewable energy Distributed assets allow flexibility and incremental change Good relationship with farmers to ensure land recycling of sludge Mature optimisation approach to target the delivery of innovation within bioresources Relatively optimised and efficient sludge transport arrangements. 	<ul style="list-style-type: none"> Many small wastewater sites, distributed assets increase logistics and cost, few major road links Widespread populations, no particularly large conurbations, east/west split of key treatment sites Planning restriction for imports to some large sludge centres.
	Opportunities	Threats
External	<ul style="list-style-type: none"> Opening sludge market provides more options for sludge treatment or utilising third-party capacity. We have boundaries with two WASCs Resource Hubs will transform how we treat bioresources to produce energy, minerals, and water Use of food waste or energy crops to increase energy production (although regulatory constraints) Growing market for small-scale energy production Local community energy projects and financing provides options to jointly create energy at our STCs. 	<ul style="list-style-type: none"> Increasing sludge throughputs due to population growth and increased sludge production from the larger environmental programme Increasing competition for landbank from neighbouring companies and tighter regulations Increasing energy costs to treat waste over the medium term Regulatory constraints limit benefits from food or crop co-digestion Potential risks to agricultural use from, for example, microplastics and pharmaceuticals.

Our bioresources and **Resource Hubs** plans support Government's goal to use "resources from nature more sustainably and efficiently"³⁵ and manage pressures on the environment by "minimising waste". **Resource Hubs** will support soil health and reduce carbon emissions.

12.6 Our goals - we have set stretching goals with a focus on environmental sustainability

Recycling every drop of water means making the most of the utility of water. For bioresources, this means producing high-quality natural fertiliser and, in the long term, providing 100% of the energy we need from renewable sources.

Our AMP7 target of 24% renewables is a balanced position, reflecting that renewables are important to customers, but not one of their priority areas. Our target is based on continuing to increase gas yields and introducing more energy-efficient technology. Proposals are fully supported by customers' willingness to pay³⁶ and will reduce whole life costs.

By 2025 we aim to:

- recycle 100% of treated biosolids to agricultural land
- increase our proportion of renewable energy to 24%
- have trialled innovations based on the opening market and **Resource Hub** approaches, ensuring major capacity upgrades in AMP8 maximise the value for our customers.

By 2040 we aim to:

- fully-develop **Resource Hubs**, recycling waste products to provide power, heat, natural fertiliser and minerals to benefit local communities and the environment
- be utilising the optimal mix of technology and third-party resources for the most cost-efficient delivery of our bioresources.

Our PCs for the Wholesale Wastewater Network Plus price control through AMP7 are shown below. The profile reflects early delivery of new Combined Heat and Power (CHP) systems.

Table 18: Bioresources performance commitments

PC	Unit	2020/21	2021/22	2022/23	2023/24	2024/25
Satisfactory bioresources recycling	%	100	100	100	100	100
Renewable generation	%	20	20	24	24	24

12.7 Our Resource Hubs transformational programme supports the delivery of our goals and long term strategy

Throughout our customer insight, carbon and the use of renewable energy has been highlighted as important to customers. Our research found that with increasing environmental awareness amongst our customers there is a growing expectation that we would use our own water and wastewater services to generate energy (such as biogas) and utilise more sustainable energy technology at sites and on assets. Furthermore, customers do not want us to cause environmental harm when providing water and wastewater services.

Resource Hubs: transforming wastewater treatment works into community assets

As noted in section 12.5 above, Peacehaven WWTW has been chosen as the first **Resource Hub**, and the **Resource Hub** philosophy will ultimately apply across our larger sites and facilities. In addition to Wastewater Networks Plus, the **Resource Hub** approach will support delivery of our bioresources plan, as illustrated by the examples below.

Table 19: **Resource Hub** examples (for bioresources)

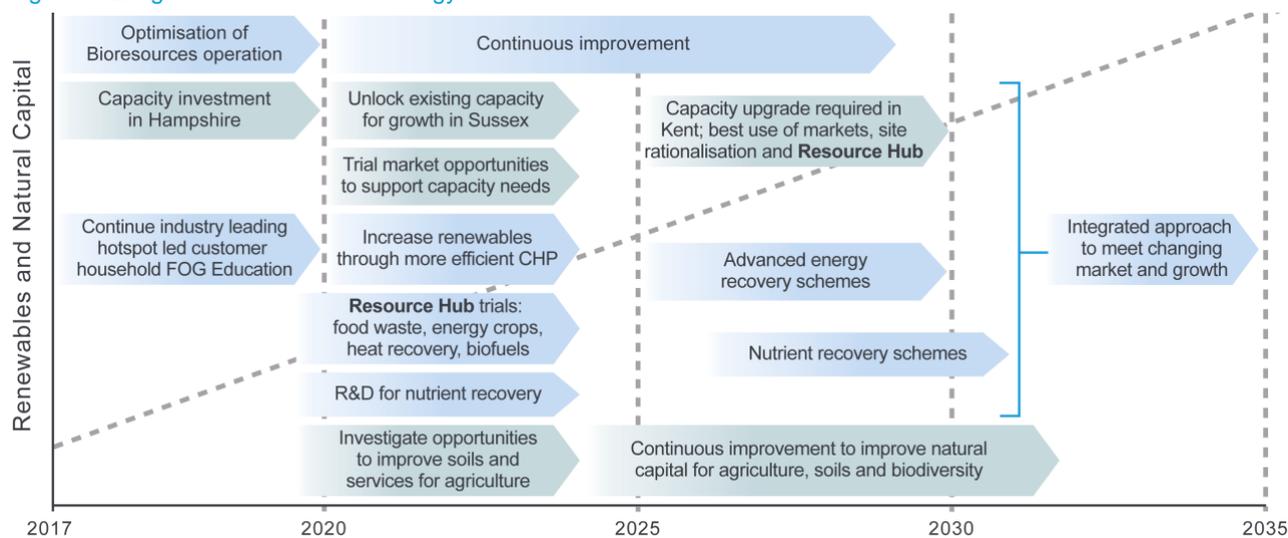
Our response	What we've been doing (AMP6)	What we will do (AMP7)
Energy from sludge	Generating energy from biogas at our 16 STCs, with three of these now energy neutral as a result.	Increase energy production through using new CHP engines at an overall cost of £14m. 10 sites will become net energy exporters.
FOG digestion to improve biogas yields	Trialling the injection of FOG into our digester at Ashford.	Use FOG in our digesters at Peacehaven Resource Hub .
Circular economy	Working with our university partners to assess how our Resource Hubs can play an even greater role in the circular economy.	We will deploy on-site scale trials of resource recovery technology.
Mineral recovery	We're part of a European project investigating resource recovery at wastewater treatment works, improving our understanding of nutrient recovery processes.	We will deploy on-site scale trials of resource recovery technology, part of our R&D programme.
Co-digestion opportunities	Working with local energy co-operatives and councils to explore co-digestion opportunities at our sites.	We will enhance our gas yield through food waste digestion or energy crops – we are exploring options in Southampton.

Long-term plans to 2040

We will maintain flexibility in future strategies and make full use of the opening of the sludge market to deliver solutions cost effectively. By adopting real options appraisal, also used as part of our 2019 WRMP, we will be able to assess different strategic pathways and make confident choices at key decision points.

Our long-term strategy is shown in Figure 4 and is based on our options appraisals set out in TA.12.BR01 Bioresources Treatment and Growth. At this time, it is not cost effective to invest in advanced bioresources treatment, as we have maximised biogas yields using existing assets. The next key landmark is 2024 when we will need to make decisions on significant capacity investment in Kent. This gives us the time to use and assess market and **Resource Hub** opportunities.

Figure 5: Long-term bioresources strategy



The four key themes illustrated in Figure 5, above, are:

- **Process optimisation:** continuing to improve efficiency and performance
- **Capacity enhancement:** using the market to maximise opportunities to meet high levels of growth in the region
- **Resource Hubs:** much greater use of renewables, reuse and recycling and using resources from nature more sustainably and efficiently

- **Supporting agriculture:** ensuring we provide the service and products that support farmers and agriculture.

“The prospect of generating more electricity at your wastewater treatment works is an exciting one – especially with the potential of us joining forces to digest food waste and potentially provide renewable heat and power to local homes.”

Richard Crouch, Southampton City Council

12.8 Overview of costs - our costs are driven by a commitment to environmental sustainability

Total proposed investment for the period is £204 million, which compares to an AMP6 investment of £173 million on a like-for-like basis. This is an 18% increase which enables important resilience work, which includes data and information systems, a further expansion of renewable generation and development of **Resource Hubs**.

Benchmarking has shown that delivery of the bioresources price control is efficient³⁷ in comparison to the industry, achieved by using conventional technology as effectively as possible. For example, by using biocages – essentially a large strainer – to thicken sludge, we reduced transport costs and increased biogas yield. We have developed an optimisation model to deliver continued improvements to efficiency and resilience.

Table 20 sets out the investment cases that are included within the bioresources price control. The primary one is BR01 Bioresources Treatment and Growth which sets out the details and options considered to deliver our targets.

Table 20: Wholesale Bioresources price control summary

Wastewater Investment (gross – 17/18 price base)		Botex (£m)		Enhancement (£m)	
BR01	Bioresource Treatment and Growth	£	150.3	£	7.4
MGO2	Data and Technology	£	24.7	£	0
MG1,3,4	M&G Other (Buildings, R&D, Fleet)	£	21.8	£	0
	Gross Total	£	196.8	£	7.4
	Grants and Contributions	£	0	£	
	Net Total	£	196.8	£	7.4

Investment proposals: Our bioresources plans

Power costs have been allocated between Wholesale Wastewater Network Plus and Wholesale Bioresources in line with regulatory accounting guidelines. Where there is only a single electricity meter at a co-located site, the power costs have been split using the power ratings of the sewage and sludge assets on site. Any sales produced by Combined Heat and Power (CHP) units are included in bioresources as income treated as negative expenditure.

We assessed the viability of investing in advanced bioresources treatment, but determined that this was not cost effective at this time, as we have maximised biogas yields using existing assets.

All options considered in the preparation of our AMP7 plan are set out in the bioresources business case:

- For enhancement proposals we have used cost-benefit analysis to assess options, with benefits primarily based on willingness to pay. Final selection also took account of a wider triangulation of customer priorities

- Our base maintenance options are calculated on least whole-life cost, reflecting that performance remains constant between options.

(Our methodology is explained in TA.14.5.)

Having assessed these options, and taking account of this real options approach, our most cost- beneficial approach for AMP7 is based on:

- piloting **Resource Hubs** at Peacehaven – we will create and deliver these with our stakeholders and communities (£2 million)
- optimising existing bioresource operations, including refurbishment of digesters to maintain treatment capability and ensure safe operation (£137 million)
- upgrading CHP assets and increasing renewable generation through more efficient technology (£14 million)
- providing capacity for growth by unlocking operational constraints through optimising transport and the provision of new sludge reception facilities at Budds Farm STC (£4 million)
- making full use of market opportunities to support capacity requirements. We have agreed in principle with Wessex Water to import and export sludge at two sites, Millbrook STC and Fullerton STC.

12.9 We have updated our Bioresources RCV allocation to reflect feedback from Ofwat

To support the setting of separate price controls it is necessary to allocate the wastewater Regulatory Capital Value (RCV) between Wholesale Bioresources and Wholesale Wastewater Network Plus. We submitted our initial bioresources RCV allocation proposals to Ofwat in September 2017.

In Ofwat’s feedback in February 2018, the two most material issues raised were that:

- our unit costs were very much higher than our peers, based on normalised capacity
- we had removed any spare capacity in excess of 10% from our valuation.

To address the first issue, we asked Mott MacDonald to carry out an independent review of our asset costing and related assumptions and provide recommendations for updating the costs. Their review identified a number of issues which had a material impact on the costing. The effect of these recommendations was to reduce the net Modern Equivalent Asset Value (MEAV) by £123.5 million (42%). (For Mott MacDonald’s technical report see TA.12.3.)

In respect of the second issue we have now included all capacity that will be available at 2020 within our updated valuation. This increases the valuation by £23.3 million.

The net impact of making these and a number of other minor changes is to reduce the RCV allocated to bioresources from £292.1 million (in March 2017 prices) to £201.2 million (in March 2018 prices).

The key movements are shown below:

Table 21. Reconciliation of movements in bioresources RCV allocation

	Net MEAV (£m)
September 2017 submission	292.1
Inflation from March 2017 to March 2018	9.8
Inclusion of spare capacity	23.3
Change to the unit cost of assets	(123.5)
Adjustment to discount factor	(0.4)
Net RCV (%)	201.2

(For other Ofwat recommendations and our response, see TA.12.2.)

Technical Annexes:

TA.12.WW01	Wastewater Treatment	Investment case
TA.12.WW02	Network Pumping Stations	Investment case
TA.12.WW03	Outfalls, CSOs and Detention Tanks	Investment case
TA.12.WW04	Sewers and Rising Mains	Investment case
TA.12.WW05	Wastewater Growth	Investment case
TA.12.WW06	Wastewater Environmental Programme	Investment case
TA.12.WW07	Flooding and Pollution Strategies	Investment case
TA.12.BR01	Bioresources Treatment and Growth	Investment case
TA.12.MG02	Data and Information Systems (M&G)	Investment case
TA.12.1	Wastewater AMP7 Comparative Industry Performance Assessment	Performance targets
TA.12.2	Response to February 2018 feedback in initial Bioresources allocation proposals	Supporting RCV analysis
TA.12.3	Mott MacDonalds PR19 Bioresources RCV allocation	Supporting RCV analysis

References:

- 1 See Table 5
- 2 PR14 Final determination uplifted to 17/18 prices
- 3 AMP6 CACs include Woolston, Thanet Groundwater, Bathing Waters (with implicit allowance included)
- 4 2017/18 performance compared to Final Determination starting level
- 5 Southern Water Annual Performance Summary 2017-18
- 6 See Chapter 7: Delivering Resilience in the Round
- 7 The forecast of 50 bathing waters is based on average annual performance over the last 4 years. It excludes the 7 to excellent.
- 8 A Green Future – Our 25 Year Plan to Improve the Environment (Defra, 2018)
- 9 See Chapter 7: Delivering Resilience in the Round
- 10 When compared to 2016, in line with the EA and Natural England’s Water Industry Strategic Environmental Requirements, describing a 40% reduction as excellent performance
- 11 Data table WWS18 Line 7
- 12 Defined in statutory guidance to the Environment Agency provided for its work in developing River Basin Management Plans
- 13 See our strategic statement ‘Lets Talk Water’
- 14 See TA.11.WN01 Business Case – Supply Demand Balance
- 15 Water and Sewerage Companies Environmental Performance Assessment for 2017 (Environment Agency, 2018)
- 16 Water Industry Strategic Environmental Requirements (WISER), Table 1 section on excellent performance
- 17 See TA.12.WW02 Network Pumping Stations and TA.12.WW07 Flooding and Pollution Strategies
- 18 An automated sewerage network that can detect and respond to changes in flow to reduce risk of flooding & pollution - see TA12.WW07
- 19 2016-17 Shadow Reporting Data (ACR Ofwat, 2017)
- 20 PR14 Final determination uplifted to 17/18 prices
- 21 See also Chapter 4: Customer and Stakeholder Engagement and Participation
- 22 See Chapter 7: Delivering Resilience in the Round
- 23 See Chapter 7: Delivering Resilience in the Round
- 24 Including over 770 former private pumping stations, See TA.12.WW02
- 25 2015-16 industry datashare - prior to adoption of private pumping stations in 2016
- 26 Fixing our broken housing market (Ministry of Housing, Communities and Local Government, 2017)
- 27 We contributed to the “Bricks and Water” report (Westminster Sustainable Business Forum, 2018)
- 28 See TA.14.5 PR19 Approach to Optioneering
- 29 See TA.14.5 PR19 Approach to Optioneering
- 30 Data table Bio1
- 31 Southern Water Annual Performance Summary 2017-18
- 32 Unit cost analysis APR data and Oxera industry study
- 33 As accredited by the Biosolids Assurance Scheme
- 34 See TA.12.BR01 Bioresources Treatment and Growth
- 35 A Green Future – Our 25 Year Plan to Improve the Environment (Defra, 2018)
- 36 See TA.12.BR01 Bioresources Treatment and Growth: Options section
- 37 Unit cost analysis APR data and Oxera industry study