

# Appendix 8.5.A - Claim WSX01- North Bristol sewerage strategy

Wessex Water

September 2018



**Wessex Water**

YTL GROUP

| Business plan section | Supporting document  |
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| 2                     | Addressing affordability and vulnerability                                 |
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| 4                     | Securing long term resilience  |
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## 1. Summary

This cost adjustment claim relates to completion of the North Bristol sewerage strategy. The first part of the strategy, the Frome scheme, was completed in 2018. The Trym scheme will be delivered by 2023. The table below provides a summary of the claim and the following sections provide more detail.

| Heading   | Summary  |
|---|--|
| Brief description   | The Trym sewer is the second phase of an integrated sewerage strategy for North Bristol agreed with Ofwat at PR14. The scheme supports development and regeneration in north Bristol, improves the performance of overflows and reduces flooding.  |
| Business plan table lines where the totex value of this claim is reported | Table WWn8 line A3   |
| Total value of claim for AMP7 (totex)                                     | £47.19m (gross of any implicit allowance)  |
| Price control   | Wastewater network plus  |
| Need for investment   | The investment is required to address existing issues, provide future proofing and to reduce flooding risk, pollution incidents and spills from our overflows into the environment.  |
| Need for cost adjustment  | The North Bristol sewerage strategy was an agreed cost adjustment claim at PR14, with a performance commitment to hold us to account in delivering the scheme. This is a continuation of the agreed strategy.<br>The Trym scheme is a large sewerage infrastructure project that is not adequately covered in the Ofwat cost baselines.  |
| Management control  | Some of the underlying reasons for the scheme, such as development, urbanisation and climate change are outside of management control. Known planning policies and research suggests that future conditions will increase pressures on our sewerage systems by at least 40%.<br>We have minimised the cost impact on customers by phasing the North Bristol sewerage strategy over two price control periods. We have delayed the investment as much as possible, but the need is now essential to serve new development and reduce flooding problems and pollution risks. |
| Best option for customers   | We appraised all feasible options at PR14 and concluded the best value option was the proposed North Bristol sewerage strategy, comprising the Frome and Trym schemes.<br>The proposed option was approved at PR14 and has the support of stakeholders, including the Environment Agency.  |

| Heading                    | Summary  |
|----------------------------|--|
| Robust and efficient costs | The scheme has been tendered under an OJEU process and a contract has been awarded to the most cost efficient tenderer.  |
| Customer protection        | <p>Customers will be protected through a scheme specific bespoke performance commitment.</p> <p>Additional protection is provided through the suite of performance commitments and ODIs, including customer service (flooding), environmental protection (pollution / overflows) and resilience measures.</p>  |
| Affordability              | <p>The programme of work outlined in the Cost Adjustment Claim was included in our draft business plan that was tested with customers between January and June 2018. The acceptability testing was designed to test customers' acceptance of our overall package of service improvements and bill impacts. Testing has shown that 96% of our customers find our business plan acceptable. Acceptability is above 80% across all demographic subgroups.</p> |
| Board assurance            | <p>The proposals have been subject to our board assurance process, which is described in detail in section 12 of the main business plan narrative and supporting documents 12.1 to 12.8.</p>   |

## 2. Background

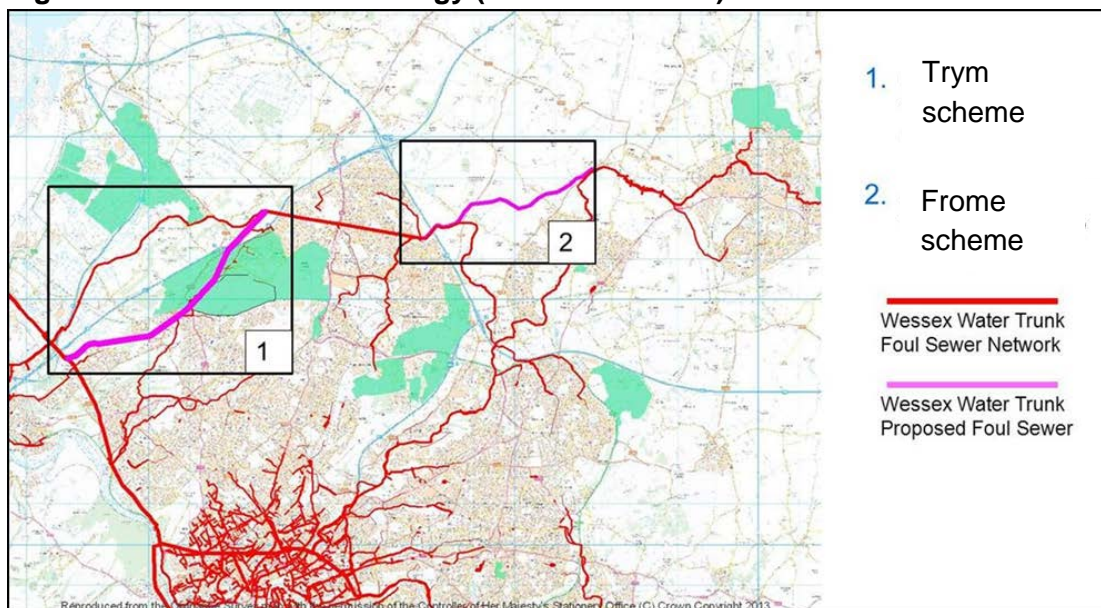
### 2.1 North Bristol Strategy

Significant development is planned to the north of Bristol. This, combined with urban creep and climate change, results in the Bristol sewerage network requiring significant investment. There are also several areas of existing hydraulic inadequacy in the Bristol sewerage catchment where improvements are necessary. In addition, there are overflows that currently cause an impact to the community and the environment that are addressed by the integrated strategy.

In our PR14 business plan, we proposed a major programme of strategic sewerage investment for the North Bristol area in AMP6 and beyond into AMP7. The scheme is an integrated solution to allow development to occur in Bristol and address other deficiencies on the existing trunk sewer networks such as existing flooding, pollution and combined sewer overflow impacts.

The North Bristol Strategy was approved by Ofwat at PR14. The strategy consists of two major schemes, the Frome and the Trym. Both schemes are needed to meet the objectives of the integrated strategy.

**Figure 2-1: North Bristol strategy (AMP6 and AMP7)**



The Frome relief scheme takes flow from Yate away from the Frome Valley sewers freeing up capacity in the Frome Valley and Bristol city centre to allow development to occur and improving the performance of the overflow at Yate. The second part of the strategy, the Trym scheme, conveys the flow from the Frome relief scheme directly to the treatment works in a new deep sewer which will also have connections from other existing sewers to reduce the risk of flooding and pollution.

The first part, the Frome scheme, has an AMP6 performance commitment for delivery by 2020. It is currently under construction and is due for completion in 2018.

The Trym Relief Sewer is the second part the north Bristol sewerage strategy and the subject of this cost adjustment claim. We were set an outcome delivery incentive (ODI) for achieving a Trym Relief Sewer delivery milestone within 2017/18 and a delivery date of 2022/23. The 2018 milestone was to demonstrate that the design, consultation and construction of the Trym scheme has been progressed sufficiently to allow completion of the scheme by 2023. We have met the milestone. The tendering process has been completed and we have awarded a contract for the delivery of the scheme.

The main elements of the proposed Trym scheme are:

- Over 5km of 2.8m diameter sewer and 1km of 1.8m diameter sewer.
- 5 intermediate shafts, up to 50m deep.
- Access roads and compounds.

## 2.2 Long-term planning

The city of Bristol is of national importance and is in the top 10 cities in the country at risk of surface water flooding. The city of Bristol and the town of Yate are served by Avonmouth Sewage Treatment Works (STW) 6 km to the north-west of Bristol city centre. It is the largest conurbation in the Wessex Water area serving 600,000 population.

Significant development has occurred over recent decades and significantly more is planned over the next fifteen years in the North of Bristol. This, combined with urban creep and climate change, will result in the Bristol sewerage network requiring major investment. There are already several areas with existing hydraulic inadequacy in the Bristol sewerage catchment where improvements are necessary. To support economic growth, we need to ensure that our long-term infrastructure is adequate.

Bristol City Council invested heavily in the 1970's and 1980s, constructing major sewers such as the Northern and Southern Foul interceptor sewers. They also built three of the four planned phases of the Frome Valley Relief sewer. Phase 3 (the missing link) was not constructed at the time - it was delayed until development occurred in Yate. That development is now being built, so Wessex Water is implementing the long-term plan. The final determination for PR14 included funding for the construction of the Frome Valley Relief sewer (phase 3) which is on track for construction by 2019.

In our PR14 submission, the North Bristol strategy also identified the need for another second phase major infrastructure scheme – the Trym relief sewer.

Levels of service, flooding, pollution and overflow operation, would deteriorate due to the recent and proposed development and would be made even worse by urban creep and climate change.

Our PR14 plan therefore included the Trym sewer as part of the North Bristol sewerage strategy as an overlap strategy. This was agreed by Ofwat and an PR14 Performance Commitment milestone was included to ensure that we were on track for delivering the Trym sewer scheme by 2023.

## 2.3 PR14 business plan submission

In our PR14 submission, we identified and justified the need for a both major infrastructure schemes in North Bristol – the Frome Valley scheme and the Trym relief sewer. These two major schemes are complementary and provide the next chapter in Bristol’s evolving strategic sewer network.

The costs included in our plan are summarised in the table below, both at 2012/13 process and inflated to 2017/18 using the CPIH index.

**Table 2-1: PR14 costs**

| Scheme | PR14 Costs<br>(£ m @ 2012/13 price base) |      | PR14 Costs<br>(£ m @ 2017/18 price base) |      |
|--------|--|------|--|------|
|        | AMP6                                     | AMP7 | AMP6                                     | AMP7 |
| Frome  | 25.3                                     | 0.0  | 28.7                                     | 0.0  |
| Trym   | 13.2                                     | 42.2 | 15.1                                     | 49.8 |

Wessex Water, South Gloucestershire Council and Heron Land worked closely together to agree the relevant s106 obligations relating to drainage. The overarching agreement between the parties recognised the need for a long term strategic solution to the areas drainage needs and placed a commitment on developers of the land to contribute equitably as part of a £4.6m total contribution. This income was factored in our AMP6 wastewater income submission

The Trym relief sewer is an overlap programme with pre-construction work planned in AMP6 and on-site delivery in AMP7.

Our PR14 business plan<sup>1</sup> stated: *‘For the proposed AMP-spanning Trym Relief Sewer, contributions will be sought as developers are expected to requisition connecting off-site sewerage. Detailed discussions with developers are not as advanced as those for FVRS3 but will develop as planning consents are granted and requisition requests are made. It is not expected that any income will be secured during AMP6 for this scheme which is scheduled to complete midway during AMP7’*

At PR14, the Consumer Council for Water (CCWater) specifically referred to the north Bristol relief sewer programme in its response to Ofwat’s draft determinations, noting the alignment with customer priorities, and explicitly stating:

*‘We know customers will value the outcomes delivered by this work.’<sup>2</sup>*

In the final determination, Ofwat accepted a special cost factor claim for the project.

<sup>1</sup> Chapter S1 appendix S1.i

<sup>2</sup> CCWater (2014) ‘CCWater response to: Ofwat’s Draft 2015-20 price control determination for Wessex Water’, page 6.



The PR14 final determination states:

*'In line with the Bristol sewerage strategy, additional capacity will be created in the Frome and Trym catchments. The Frome catchment scheme will be delivered within AMP6 and the Trym catchment scheme in 2022/23. A milestone for the Trym catchment has been introduced in 2017/18 which requires the company to demonstrate, in line with its delivery plan, that the design, consultation and construction of the Trym scheme has been progressed.'*<sup>3</sup>

As per our delivery plan, the construction of the Trym Relief Sewer project has been progressed, with the delivery contract being awarded on 20th March 2018.

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<sup>3</sup> Ofwat (2014) 'Final price control determination notice: company-specific appendix – Wessex Water', page 146.

### 3. Need for cost adjustment

In this section we provide evidence that the cost claim is not included in Ofwat's modelled baseline; and, that the allowances would, in the round, be insufficient to accommodate special factors without a claim.

The North Bristol sewerage strategy was a cost adjustment claim at PR14, with a performance commitment to hold us to account in delivering the scheme. This is a continuation of the agreed strategy.

The Trym Relief Sewer is a major investment. Following a competitive tendering process innovative design and active management of risk the estimated cost for completing the project in PR19 is £47.2m.

Ofwat's cost assessment models have not yet been published and therefore we are not able to assess whether the implicit allowance will be adequate to cover the cost of this project.

Our total wastewater network plus totex for PR19 is forecast to be circa £1,480m. The cost adjustment claim as a proportion of totex is circa 3.2% - i.e. greater than the 1% materiality threshold that Ofwat set out in its final methodology.

## 4. Management control

In this section we demonstrate that the cost is driven by factors beyond management control; and, that we have taken all reasonable steps to control the cost.

The drivers of growth and climate change are outside of management control. Intense rainfall can also occur anywhere and, in the future, will be more likely. If we do not invest, then flooding will increase by 50%. The following sections detail the future pressures of housing, urbanisation and climate change.

We have sought to minimise the costs to customers through considering a range of different options for meeting the need (see section 6). We deferred the programme from our PR09 'austerity' business plan but have included it in our PR14 and PR19 business plans as it is clearly needed. Our customers and regulators support this cost beneficial scheme.

We have used a competitive tendering process (see section 7) to appoint a contractor to deliver the project, which has minimised costs to customers.

### 4.1 Future pressures in North Bristol

Significant development is planned to the north of Bristol. This, combined with urban creep and potential climate change, means that the Bristol sewerage network requires significant investment.

To assess the impact of the future pressures we use computer hydraulic model simulations to predict levels of service for scenario planning. The 'Base' scenario is the existing system performance. This base scenario will show where we have headroom and where we don't; resulting in currently flooding risks, pollution and overflows to the environment.

The 'future' scenario is to assess the performance of the network when future development has been built and urbanisation and potential climate change occurs.

We can model 'virtual' scenarios to evaluate the performance of the systems without any more investment, with the Frome Valley scheme (FVRS3) and also the Trym sewer (TRS) constructed.

The predictions, presented in Section 5, show that flooding will worsen by more than 50% without intervention.

**Table 4-1: Scenario modelling**

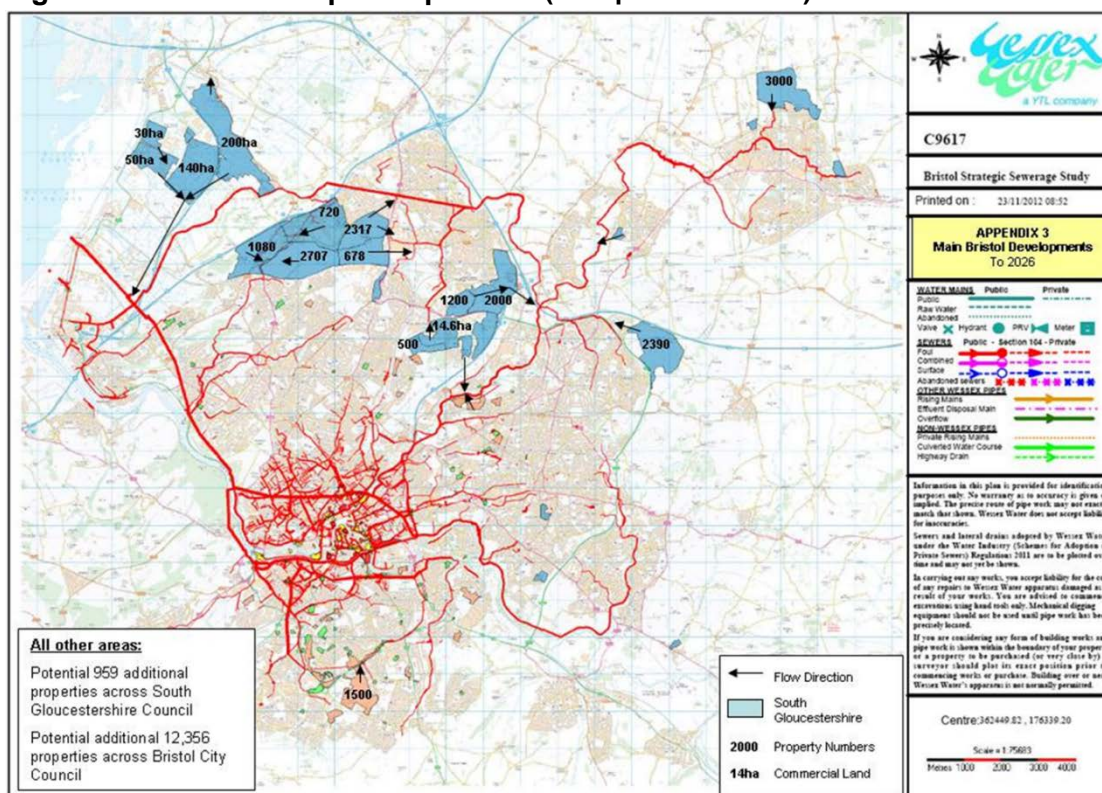
| Modelled scenario                  | Future Development | Urban Creep | Climate Change | FVRS Phase 3 | Trym Relief Sewer |
|------------------------------------|--------------------|-------------|----------------|--------------|-------------------|
| Base                               | X                  | X           | X              | X            | X                 |
| "Future" Impact Model (No Schemes) | ✓                  | ✓           | ✓              | X            | X                 |
| FVRS3 (No TRS)                     | ✓                  | ✓           | ✓              | ✓            | X                 |
| FVRS3 + TRS                        | ✓                  | ✓           | ✓              | ✓            | ✓                 |

### 4.1.1 Housing pressures

We have an obligation to provide off site foul sewer capacity for new development. The majority of the development within the Avonmouth STW catchment is proposed within the South Gloucestershire Core Strategy Examination, to the north of Bristol. This will impact the three named trunk sewers (Frome Valley Sewer, Frome Valley Relief Sewer, and Trym Trunk Sewer) which all have existing external foul sewer flood risk (within Wessex Water one in thirty year sewer design standards).

At the time of writing the PR14 plan, we were aware of 29,000 new properties being proposed in North Bristol by the year 2026. Many of these were starting construction, for example in Yate.

**Figure 4-1: New Development planned (as reported at PR14)**



The [Bristol Core Strategy](#) (June 2011) estimated that 29,000 new homes<sup>4</sup> will be required between 2011 – 2026 to meet housing needs. Construction work commenced quickly. According to [Bristol Councils Development Monitoring Report 2017](#) between 2010/11 and 2017 there have been 10,637 houses built. Completion rates have increased year on year with a greater average annual completion required to meeting the overall target of 29,000.

The [Bristol Local Plan Review](#) and the [West of England Joint Spatial Plan](#) have recalculated a requirement to 33,500 properties<sup>5</sup> between 2018 to 2036.

<sup>4</sup> Core Strategy paragraph 4.5.13

<sup>5</sup> Local Plan Review paragraph 1.4

The strategy to meet these increased housing needs includes urban intensification in a number of catchments achieved in part by a new tall building policy and allocating a small number of greenfield sites in south west Bristol and a larger allocation on the fringe of eastern Bristol in Brislington.

The southern extent of the Local Planning Area of South Gloucestershire is also within the Bristol catchment. The [South Gloucestershire Core Strategy](#) (December 2013) estimates that 22,545 new homes<sup>6</sup> will be required between 2013 and 2027 to meet housing needs. According to South Gloucestershire's [Authority's Monitoring Report 2017](#) between 2013 and 2017 there have been 5,879 housing completions<sup>7</sup>. Completions have increased year on year since 2013 with 2016/17 exceeding the average annual completion required for meeting the overall target of 22,545.

The [South Glos Local Plan Review](#) and the [West of England Joint Spatial Plan](#) has recalculated this requirement to 32,500 properties between 2018 and 2036. To meet the new requirements the review advocates completion of the developments planned in the core strategy, maximising brownfield development, allocating 5 further strategic developments, and allocating smaller scale development in rural areas.

Of the five new allocations in South Glos (Charfield, Thornbury, Yate, Coalpit Heath and a new garden village at Buckover) it is envisaged that Yate, Coalpit Heath and Chipping Sodbury will drain to Bristol (Avonmouth) STW.

The increasing pressures for housing is demonstrated in this recent [press article](#). The West of England (covering Bristol, Bath and North East Somerset, South Gloucestershire and North Somerset) is a high housing demand area. Across the region, the average house prices are more than 8 times average incomes.

The government's interim package supports the Mayor's with ambitious plans to deliver more homes and tackle affordability challenges. It includes:

- £3 million of funding for specialist support to help the region deliver large housing development
- taking 2 Housing Infrastructure Fund projects through to the next stage of assessment for funding
- exploring the potential for a deal with housing associations in the region to deliver more affordable homes

West of England Mayor, Tim Bowles said: *'We have worked closely with government to secure this announcement, which will see millions of pounds invested in delivering new homes in the West of England. We know that we need more homes, to buy and rent - homes where they are needed at prices people can afford.'*

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<sup>6</sup> Core Strategy paragraph 1.27

<sup>7</sup> Appendix A Actual and Expected House Completions 2006-2027 net

**Table 4-2: Increase in additional property need from PR14 to PR19**

| Reference                | Description                                     | Council | PR14 Property need | PR19 Property need |
|--------------------------|---|---------|--------------------|--------------------|
| ST78SW/ 329              | North Yate                                      | SG      | 3,000              | 3000               |
|                          | NEW PR19 North West and West Yate               | SG      |                    | 2000               |
|                          | NEW PR19 Chipping Sodbury                       | SG      |                    | 1500               |
|                          | NEW PR19 Coalpit Heath                          | SG      |                    | 1800               |
|                          | NEW PR19 Whitchurch                             | Banes   |                    | 2500               |
|                          | NEW PR19 Land at Bath Road, Brislington         | BCC     |                    | 750                |
| ST57NE/ 122 (ST57NE/ 95) | Charlton [Land South of Filton Airfield]        | SG      | 2,707              | 2707               |
| ST67NE/ 312              | Land East of Emersons Green                     | SG      | 2,390              | 2390               |
| ST58SE/ 198              | Northfield Filton Aerodrome Charlton Hayes      | SG      | 2,317              | 2.317              |
| ST67NW/ 338              | East of Harry Stoke                             | SG      | 2,000              | 2000               |
| BSA1401                  | Hengrove Park                                   | BCC     | 1,500              | 1500               |
| ST67NW/ 307              | Harry Stoke                                     | SG      | 1,200              | 1,200              |
| ST58SE/ 199              | Haw Wood  | SG      | 1,080              | 1080               |
| ST58SE/ 213              | Cribbs Causeway North Commercial South          | SG      | 720                | 720                |
| ST58SE/ 214              | Filton Aerospace Cluster [East Filton Airfield] | SG      | 678                | 678                |
| ST67NW/ 308              | Wallscourt Farm [Hewlett Packard]               | SG      | 502                | 502                |
| SPS01                    | Land at Avon Street and Silverthorne Lane       | BCC     | 500                | 500                |
| ST67NW/ 247              | LECHL   | SG      | 500                | 500                |
| -                        | All other developments less than 500 props*     |         | 9,297              | 12197              |
|                          | <b>Totals</b>                                   |         | <b>28,391</b>      | <b>37,526</b>      |

#### 4.1.2 Urban creep pressures

As well as assessing the sewer capacity headroom for future housing, our computer hydraulic models have been used to simulate how the performance of the trunk sewer system in Bristol will deteriorate further because of urbanisation (urban creep) and climate change.

These phenomena have the effect of increasing rainfall runoff, increasing the risk of flooding, pollution and CSO spill.

The UKWIR report (Ref 10/WM/07/14) researched this in 2009 by studying aerial photography of over half a million houses. Bristol was one of the Cities used in the samples. The conclusion was that urbanisation rates of between 0.4m<sup>2</sup>/house/year and 1.1m<sup>2</sup>/house/year. When applied this increased predicted flooding volumes by 20% and CSO spills by 29%.

The report refers to the Urban Creep research that Wessex Water undertook, as shown in Figure 4-2.

#### **Figure 4-2: Urban creep study extract**

**Wessex Water Urban Creep Study (2008)**<sup>10</sup>; Richard Allitt Associates Limited (RAA) was commissioned by Wessex Water (WSX) to undertake a pilot study to assess the increase in impervious areas due to the phenomenon known as urban creep. The definition of Urban Creep used in this study was:-

*“The additional surface water load to the sewerage network (foul or surface water) caused by increased impermeable area from developments at sub-property level.”*

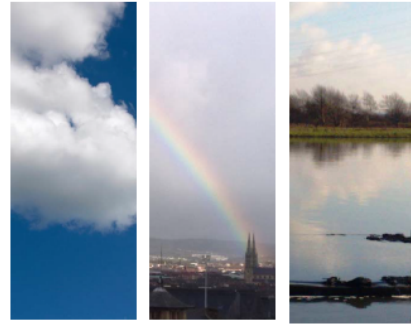
*This study examined the actual changes in impermeable surfaces against time by assessing many different sources of data, including; historic and current mapping, aerial photography and site visits to confirm drainage types. This complex analysis was applied to 30 study areas, which were carefully selected to allow a direct comparison of targeted areas. Ten study areas in three towns were selected to ensure a controlled mix of combined, partially separate and fully separate areas to allow a balanced sample to be assessed. This pilot study was not intended to be statistically representative (this would require a much larger sample of study areas and towns) but was commissioned to provide an indicative insight into possible trends.*

*An average impermeable area increase of 0.38 m<sup>2</sup> per property per year in foul systems and 0.7 m<sup>2</sup> per property per year in surface water systems was attributed to urban creep. Over time, this is a substantial increase and will clearly increase the risk of urban flooding and maybe as significant as climate change, its effects should be investigated further.*

### 4.1.3 Climate change pressures

Climate change has a similar effect as urban creep, in that more rainfall runoff is predicted in the future which will lead to more runoff. A decade ago typically a 10% to 20% uplift in rainfall intensities were applied to allow for potential climate change.

In Ofwat's report 'Future impacts on sewer systems in England and Wales' in 2011, all WaSCs provided computer predictions of the impacts of development, urban creep and climate change. The predicted increases in sewer flooding from the above pressures (growth, urban creep and climate change) are shown in the table below. Climate change will have the largest impact if rainfall intensities increases by 2040 as expected (if the UKCP09 medium emissions scenario for 2040 become reality).



### Future Impacts on Sewer Systems in England and Wales

Summary of a Hydraulic Modelling Exercise  
Reviewing the Impact of Climate Change,  
Population and Growth in Impermeable Areas  
up to Around 2040  
June 2011

A report prepared for Ofwat



**Table 4-3: Increase in future flooding  
(extracted from report for Ofwat – see right)**

| Median increase in sewer flooding, % | 50 <sup>th</sup> percentile |
|--------------------------------------|-----------------------------|
| Population growth                    | 5                           |
| Property creep                       | 12                          |
| Climate change                       | 27                          |
| <b>Combined</b>                      | <b>51</b>                   |

Since this report, many other research projects have been undertaken, which confirm the findings.

The UKWIR report Design Intensity for Sewer Design (ref 17/CL/1017) undertaken in 2017 gives a wider range of possibilities of rainfall uplifts, as stated in the table below.

**Table 4-4: Potential rainfall uplift for 30 year storms**

|            |                  | 2030 | 2050 | 2080 |
|------------|------------------|------|------|------|
| South east | Central estimate | 10%  | 15%  | 25%  |
|            | High estimate    | 20%  | 35%  | 65%  |



## 5. Need for investment

In this section we set out the incremental improvement that the proposal will deliver; provide the evidence that the investment is required; and show how we have engaged with customers and our customer challenge group.

The delivery of the Trym Relief Sewer constitutes an integral part of the overall drainage strategy for the region. The Trym relief sewer once constructed will allow the optimal performance of the Frome scheme and will then allow the performance of the overflow at Yate to be improved.

### 5.1 Existing performance

The Bristol catchment is a combined sewer system and has a significant response to rainfall. The Frome Valley scheme delivers both Combined Sewer Overflow (CSO) benefits, reduced flood risk and allows development to occur. There are eleven combined sewer overflows that will benefit from the Frome scheme, but most benefits are from three of these.

The overflow in Frome Valley that caused the most complaints was known as Cog Mill CSO. Residents formed a campaign group for sewerage improvements to be made, specifically to address the Cog Mill CSO. Their campaign was recently shown on the BBC local news. The Figure below shows how they took sanitary debris collected after an overflow spill in 2013 from the banks of the river, to aid their campaign.

**Figure 5-1: Photograph of sewerage debris arranged to form a campaign against Wessex Water**

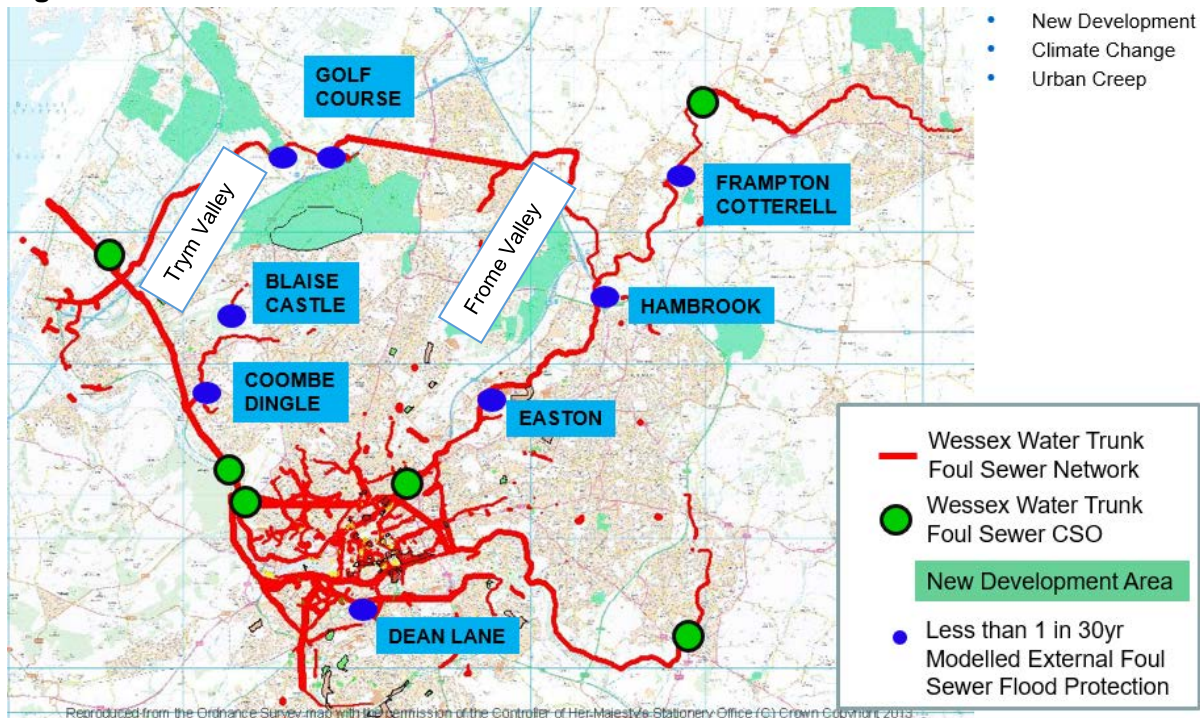


When this was shown on BBC local news, we had started constructing the Frome Valley Sewer improvements, which will allow optimisation of the performance of the overflow at this location.

The pressure from the campaign group was so significant over the past decade, we have recently relocated the Cog Mill overflow into Hoovers Lane. This was to reduce the impact of the overflow by providing fine screens and ensure resilience by constructing a pumping

station to allow pumped assistance when the river levels were high. This CSO improvements scheme was designed to allow the future Frome Valley scheme to be built.

**Figure 5-2: Locations of the overflows that the North Bristol scheme benefits**



The Trym Sewer will relieve the under-capacity sewer which runs along the valley formed by the river Trym. It will be a 2.4m diameter tunnel, with some sections of open-cut construction. It would run at depths of up to 44m providing conveyance, flow diversion and 30,000m<sup>3</sup> on-line storage.

**Figure 5-3: Flooding in Bristol golf course**



Bristol Golf Course floods regularly on the Frome Valley Relief Sewer (FVRS) Phase 1 in a less than 1 in 2 year rainfall event. Once the storage provided by this sewer is fully mobilised, additional incoming flows spill over a bypass weir and enter the existing continuation sewer, which overloads the sewer resulting in significant external foul flooding. There is also a property directly connected to the FVRS Phase 1, which is protected from flooding by a double NRV due to surcharging in the FVRS Phase 1 sewer.

**Figure 5-4: Flooding in Blaise Castle area**

The Frome scheme has the potential of exacerbating flood risk along the FVRS phase 1 and 2.

There is an existing major flooding risk along the Trym sewer, for example at Blaise Castle (see photo). Over 500m<sup>3</sup> are predicted to flood from this manhole during a major storm.

Significant development is also planned for Filton Airfield in this area, which will increase flood risk further.

In September 2012, the National Lottery funded walking path through the SNCI (Site of Nature and Conservational Interest) Blaise Castle Estate was damaged by surcharging on the foul sewer.



The Frome and the Trym schemes deliver the strategy to address these issues and were supported by many stakeholders. The following is a quote from the Environment Agency:

*'We wish to confirm our support for the North Bristol Sewer scheme. We have records of sewage flooding and pollution incidents along sections of the Frome Valley Trunk sewer and Trym Valley area which we understand occur because of inadequate sewer capacity'*

## 5.2 Future performance

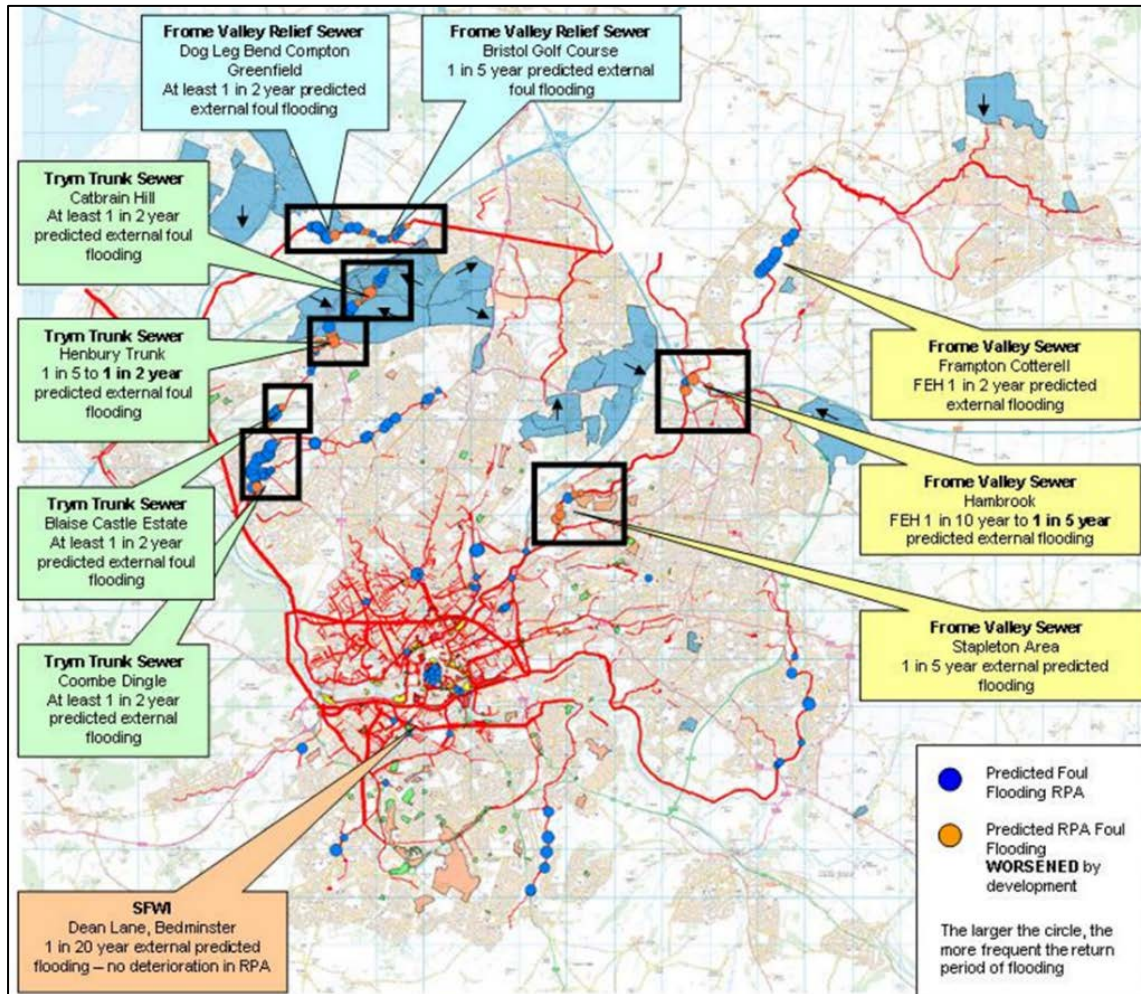
By constructing the Frome and Trym schemes, we will see an immediate improvement of 25% in terms of number of spills and volume spilled to the environment. There will be a reduction of 10 spills per year.

The strategy reduces the predicted CSO spill volumes by 16,000 m<sup>3</sup> during a typical 1 in 1 year storm.

Furthermore, once the Trym scheme is built, we will be able to optimise the performance of the Cog Mill overflows further. The strategy will prevent 33,000m<sup>3</sup> of sewage being discharged into the river Frome every year.

The Trym scheme will also reduce flooding from 37 locations for a 1 in 30 year event. This will avoid 15,000m<sup>3</sup> of flooding from being discharged into property and the environment. The locations are shown in Figure 5.

**Figure 5-5: Future performance of the North Bristol sewerage system - flooding**



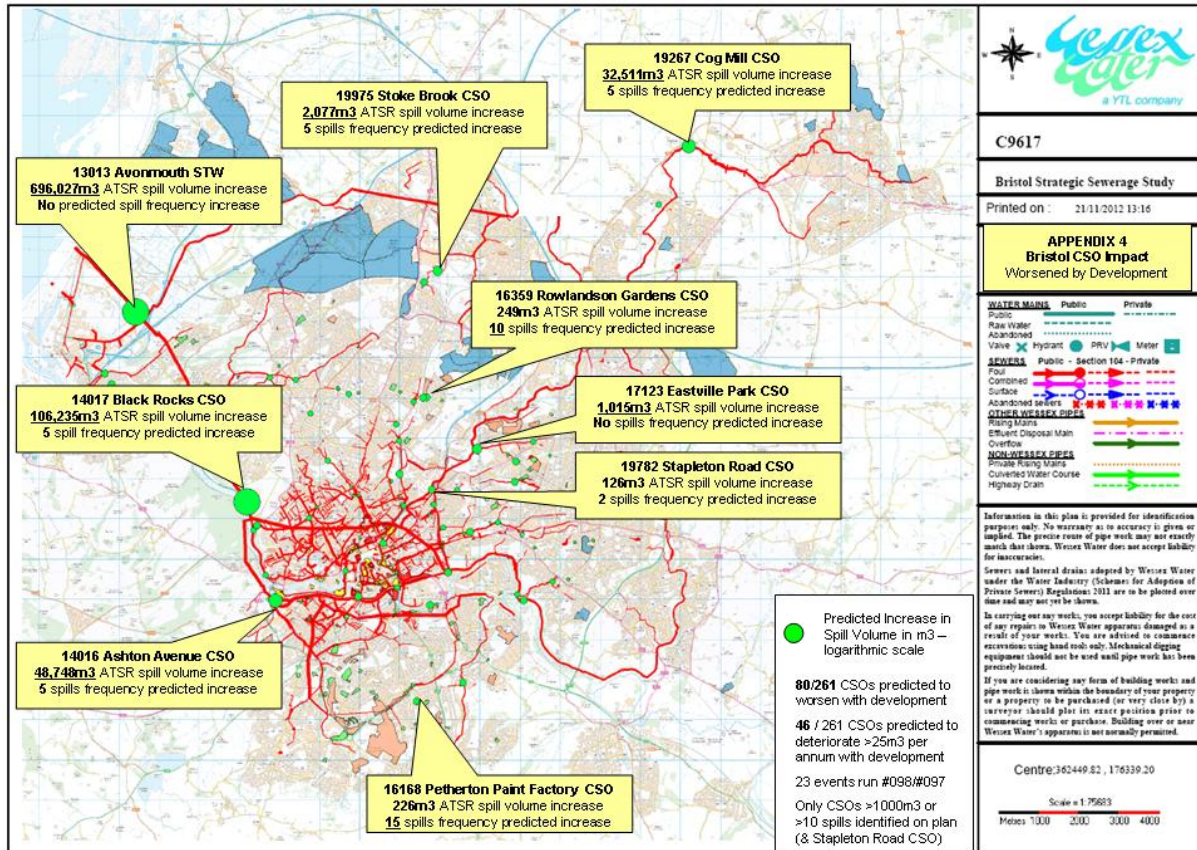
If the Frome and Trym schemes were not constructed, the predicted flooding would increase due to the future pressures, as detailed in the table below. The North Bristol Strategy will remove the flooding at the locations near the new sewers for a 1 in 30 years storm event, and provide a significant improvement in flood risk in the downstream system.

**Table 5-1: Predicted flooding (30 year design storm)**

| Scenario flood volumes (m <sup>3</sup> ) in locations | Baseline (2017) | Predicted flooding if future pressures occur (growth, urban creep, climate change) (2050) | Predicted flooding with future pressures and with the Frome and Trym schemes are built (2050) |
|---|-----------------|---|---|
| Golf Course area                                      | 11,094          | 12,018  | 0   |
| Frampton Cotterell                                    | 2,531           | 3,263   | 0   |
| Cribbs sewer  | 6,185           | 6,804   | 0   |
| Blaise Castle area                                    | 8,300           | 8,720   | 0   |
| Coombe Dingle   | 12,750          | 12,500  | 4,972   |

The overflow performance at Cog Mill will see a 25% improvement in performance from the scheme. Over time if climate change occurs then by 2080 the performance will be eroded back to the existing levels of performance, without further intervention.

Figure 5-6: Future performance of the North Bristol sewerage system - overflows



## 6. Best option for customers

In this section we demonstrate how we have selected the best option for customers, including how the proposal delivers outcomes that reflect customers' priorities, identified through customer engagement; and the assurance from our customer challenge group. We also describe the optioneering process that we have followed including consideration of alternative options, risk and impact on the environment.

### 6.1 Background

The project was originally appraised to address the issues of development and overflow performance in Yate to the north east of Bristol. A detailed options report was submitted listing all the options considered in our PR14 business plan.

Due to the extent of the significant existing system underperformance (flooding, pollution and overflow operation) the traditional solution of increasing infrastructure was the only feasible option.

Bristol Council's and the Environment Agency's letters of support for the North Bristol Strategy are provided in Annex A.

More sustainable solutions such as water butt and separation schemes would not be possible for solving such problems on the trunk sewer. However, this could be used to ensure climate change does not erode performance in the local sewers, hence we are a partner in the RESCCUE project, as briefly described in the case study below.

#### Case study 1 - Resilience to cope with Climate Change in urban areas (RESCCUE)

Wessex Water has been working closely with Bristol City Council and other European members involved in the RESCCUE project to investigate how Bristol can be more resilient to climate change in the future.



This is a four year study, mostly funded by Europe, will focus on three European cities that are participating in the scheme; Barcelona, Bristol and Lisbon.

Although Bristol Council are promoting green solutions, they understand that sustainable solutions are only part of the solution, and major works are required to address the current trunk sewers performance immediately to enable growth and regeneration. They also confirm that the objectives of the Trym sewer align with Bristol's Local Flood Risk Management Strategy. See Annex A for their supporting letter.

Wessex Water are now a consortium member of RESCCUE. The EU funding contribution will be passed to Bristol Council's consultants to undertake complex modelling of the cities flood risks.

Major infrastructure is needed. The proposed integrated North Bristol strategy provides multiple benefits including provision of foul sewerage capacity for new development to the

north of Bristol, reducing sewer flooding in the Blaise Castle area, minimising the risk of pollution in the Frome and Trym rivers and reducing spill frequency at CSOs.

Thus, the strategy meets several of the expectations set out in WISER: reducing sewer flooding, reducing pollutions, effective drainage and resilience.

We have engaged with customers (specifically campaign groups in Frome). Through this work customers were engaged in defining the priority of the North Bristol overlap programme as a whole.

We have regularly engaged with our technical auditor (Mott Macdonald) on progress of the Trym sewer. This ensured there is clear understanding of the needs, options and of what progress needed to be demonstrated by March 2018 in order to achieve the regulatory performance commitment milestone. Annex B contains the auditors letter demonstrating we met the Trym milestone.

## 6.2 Proposed options

The agreed solution to the north Bristol issues was the construction of the Frome relief sewer and the Trym relief sewer. Both schemes are required, but these were phased over 2 AMP cycles for delivery.

The main elements of the Frome scheme are:

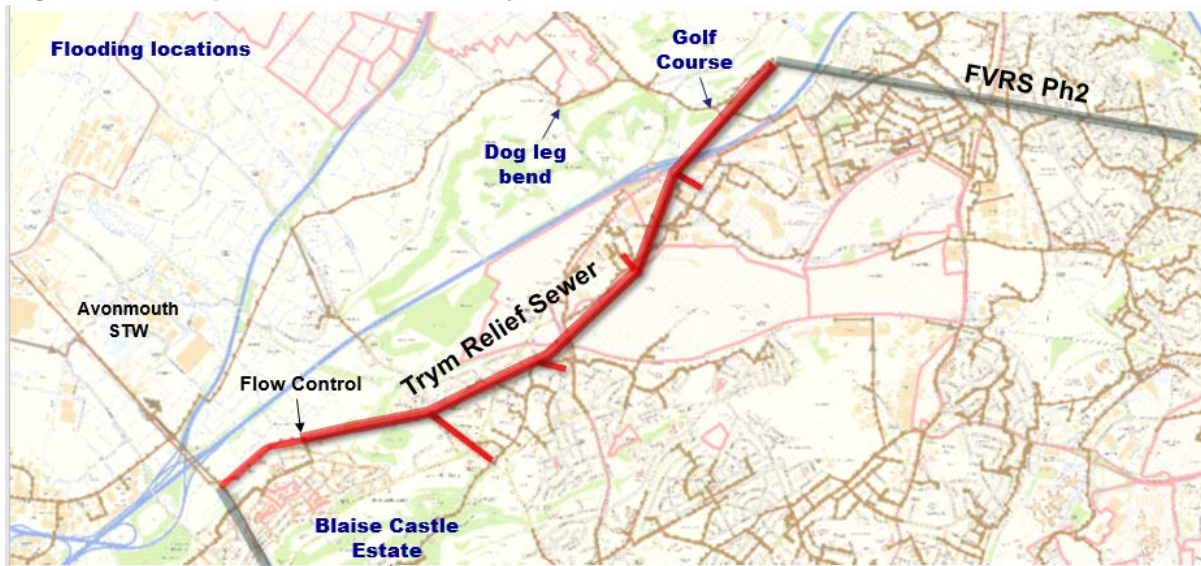
- 5km of 1.5m diameter gravity sewer, providing 8000m<sup>3</sup> of storage.

This scheme is currently under constructed as detailed in Section 7.

The main elements of the Trym scheme are summarised in the figure below and comprise:

- 5km of 2.8m diameter sewer and 0.9km of 1.8m diameter gravity sewer, providing 30,000m<sup>3</sup> of storage
- The sewer will be 50m deep at its deepest
- Flow control penstocks, with instrumentation to enable 'real time control'
- Access roads and compounds

There are performance commitments to ensure delivery of this significant investment.

**Figure 6-1: Proposed route of the Trym sewer**

The proposed sewer will be a deep tunnel providing 30,000 m<sup>3</sup> of storm storage, mobilised through the use of automatic level controlled penstocks and designed to ensure no deterioration in the performance of existing overflows, and significantly reduce flooding and pollution risks, allowing for future growth and climate change. In the short term there will be significant benefits to the systems' performance.

There are two operating scenarios with the Frome valley scheme. On completion of the construction of the Frome scheme and before the Trym Relief sewer scheme is operational, the 8,000 m<sup>3</sup> of storage managed through controlled penstocks, will ease upstream flooding and enable development in the North Bristol catchment. If all the flows from North Bristol were passed forward at this point in time, this would result in more downstream flooding, which we want to avoid.

On completion of the Trym Relief scheme the availability of the downstream storage, the Frome Valley sewer will function as a transfer sewer (with no storage function ) to transfer flows directly from the Frome scheme to Trym scheme where the 30,000m<sup>3</sup> storage will be mobilised using actuated penstocks. These penstocks will be able to be operated in near-real-time to optimise the performance of the sewerage system.

### 6.3 Rejected options

Our option study considered many options and their costs and benefits, as summarised in the table below.

The scale of the existing flooding means that the only affordable and sustainable solution is to provide the traditional solution of new infrastructure. A green solution involving removal of surface water would require every road in Bristol city to be dug up and new surface water sewer laid; this is not feasible.



**Table 6-1: Summary of discounted options**

| Description of Option                   | Comments   |
|---|--|
| CSOs on the river Trym                  | Amenity value of river Trym & new consenting of CSOs make it an unviable option.   |
| Surface Water Removal                   | High risk, high cost option. Urban surface water removal on such a massive scale is unproven. Some isolated areas likely to be suitable but not enough to cater for long term development flows.       |
| Infiltration reduction in Yate          | Flow surveys in 2011 point to poor build quality of housing drainage in 1960-1980s, extremely difficult and costly to track & remedy.  |
| Upsizing/Duplicating Frome Valley sewer | Extremely challenging working environment, likely to require 13km upsize and increase spills at Hotwells and Black Rocks CSOs. Cost estimated at £70-£100m.  |
| Upsizing/Duplicating Trym Trunk sewer   | Highly intrusive to Blaise castle estate, increase spills at Black Rocks CSO, 4.5km upsize, excessively expensive & unlikely to address full flow requirements.  |
| New STW at Yate                         | Finding suitable land packages proven difficult. New consent likely to require tertiary treatment High whole life cost (New consent deemed unlikely). Bristol STW has sufficient current capacity.     |
| Pumped solution for Frome scheme        | A pumping station and shallow rising main could potentially have a lower Capex than a gravity sewer solution but the Opex is much higher. The more sustainable and lowest Totex solution was proposed. |

Appendix S3.iii of our PR14 submission contains the full options report (WSX - Appendix S3.iii - PR14 Bristol strategic sewerage study 2012).

## 6.4 Cost benefit analysis

Our methodology and the results of cost benefit analysis are described in supporting document 3.3 Cost-benefit analysis.

Cost benefit analysis on the two north Bristol strategic capacity schemes has demonstrated that they are both cost beneficial, individually and as a strategy.

**Table 6-2: North Bristol cost benefit analysis**

| Programme  | NPV of benefits - costs<br>£m | CBA outcome     |
|--|-------------------------------|-----------------|
| PR14 North Bristol proactive capacity investment | 74.93                         | Cost beneficial |
| PR19 North Bristol strategy                      | 17.9                          | Cost beneficial |

## 7. Robustness and efficiency of costs

In this section we provide the evidence to show that the cost estimates are robust and efficient; and, where appropriate, the third party assurance on the robustness of the cost estimates.

### 7.1 Frome scheme

At PR14, we estimated that the cost of the AMP6 Frome sewer spend to be £25.3m in 2012-13 prices. Chandler KBS were engaged to review the estimates produced. Their independent assessment of costs for the north Bristol strategy yielded similar, but slightly higher results.

Since submission, in 2016, we undertook more optioneering and re-estimated the costs using new information, such as site investigation data, which reduced the risk allowance in the estimates due to more certainty.

Two Frome options were costed:

- Option 1 is a gravity sewer, oversized for buildability and to provide storage which can be used to manage flows
- Option 2 is new pumping station lifting flows into a new gravity sewer.

The cost estimates for these options are provided below:

**Table 7-1: Frome options**

| Option                        | Capex Cost (£m) | Totex Cost (£m) |
|-------------------------------|-----------------|-----------------|
| 1. Frome - Gravity            | 20.3            | 20.4            |
| 2. Frome – Pumped and gravity | 20.9            | 21.2            |

Uplifted to 2017/18 price base

The gravity solution Option 1 provides more flexibility and has the lowest capital and operational costs (hence lowest whole life cost) and was the option selected for construction.

The delivery costs are more efficient than the submitted costs mainly due to more certainty and innovative design allowing scope reduction, as summarised below:

- We competitively tendered the design and build NEC Option A lump sum contract with many of the project risks passed to the Contractor
- The choice of contract and procurement method reduced the amount of Wessex supervision required
- We originally envisaged the entire sewer would be tunnelled due to the depth and ground conditions. However, the selected contractor elected to install 60% of pipework using open cut method significantly reducing costs
- The tunnelling was split in to 5 shorter drives and completed using pipejacking method reducing the cost when compared with traditional tunnelling methods
- Early engagement and accommodation works agreed with landowners prevented significant route changes and reduced loss of business compensation claims
- 5 critical service crossings (4 gas, 1 oil) achieved without any significant changes to route or design required

- Reached agreement with the EA to cross the River Frome with very limited cover removing the need to alter route
- Gravity solution was achieved despite the critical service, road and river crossings meaning no pumping stations or other more costly design solutions were required
- Significant ground conditions risk was mitigated by extensive ground investigation work carried out pre-tender
- Majority of open cut works completed during the summer months reducing impact of weather.

The Frome scheme is well advanced. Below are some photographs showing the scale of construction Frome scheme.

**Figure 7-1: Frome Valley relief sewer photographs**

Drone footage of compound



Drone footage of pipeline



Tunnelling machine craned into shaft



Tunnelling machine boring



M5 motorway crossing



Open cut section with pipes



Tunnel machine breaking into shaft



Inside the Frome sewer



## 7.2 Trym scheme

At PR14, we estimated that the cost of the Trym Relief Sewer as £13.2m in AMP6 and £42.2m in AMP7 £55.4m in total at 2012/13 prices. Chandler KBS were engaged to review the estimates produced. Their independent assessment of costs for the north of Bristol sewer programme yielded similar, but slightly higher results.

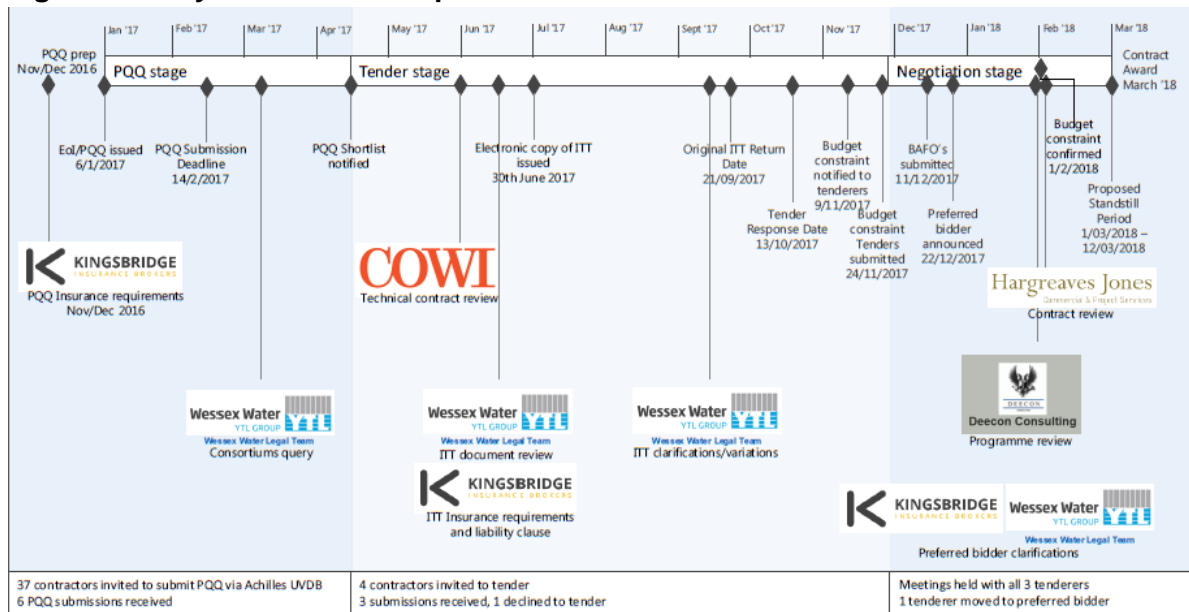
### 7.2.1 Tendering process

The scale of this project meant that the tendering process was governed by European utilities regulation, specifically the Procurement Directive 2014/25/EU. This legal framework is designed to ensure that contracts are awarded transparently, and that all potential bidders are treated equally. The Directive sets out detailed guidance around the procurement process for projects of this scale. We used Achilles, a global leader in supply chain risk and performance management in the infrastructure sector, to manage our tendering process for this project. Specifically, we used the QSN option via the Achilles Utilities Vendor Database (UVDB) as the call for competition. This is a long established and well known Qualification System used by the industry. Typically, the Achilles database advertises the project requirement as per legal requirement under European legislation for the Official Journal of the European Union (OJEU) for projects of this size and value. Contractors are invited to join the database and register for a variety work types they wish to deliver. Achilles connects the clients and the deliverers.

We ran a pre-qualification process following which four companies were issued with tender documents for a design and build contract (from an initial list of around 60 potentially eligible contractors). Submissions were received in October 2017 from four contractors.

The figure below shows the tender process for the Trym Relief Sewer.

Figure 7-2: Trym sewer tender process



The process involved four stages:

#### Stage 1 – Achilles search

- The initial selection of Contractors was identified via Achilles UVDB supplier search
- 67 contractors are registered in Achilles against the product code 4.1.7 tunnelling and shafts - design and construct.
- Further search criteria were added to ensure the required standards of health, safety, quality and environmental management systems were met and that the contractor was financially sound:
  - third party accredited EMS, QMS, HSS,
  - minimum turnover of £80 million (twice the contract value),
  - have a valid or update due UVDB account
  - are interested in working in the Wessex Water region
- 37 contractors met this criteria; 30 contractors were excluded as didn't reach the minimum criteria detailed in the search, the excluded suppliers were immediately notified via Achilles.

#### Stage 2 – Pre-Qualification

- Via Achilles, the 37 contractors were invited to complete a Pre-Qualification Questionnaire (PQQ) and submit to confirm their interest.
- 6 suppliers submitted PQQ's via Achilles for assessment.
- The outcome of the assessment produced scores and ranking.
- The top four contractors were shortlisted to be invited to tender.
- The tender list was approved by WW Directors
- The two unsuccessful suppliers were informed and debriefed

#### Stage 3 - Tender

- The tender called for:
  - a worked up Tender Design Report
  - Programme
  - Response to several questions covering PR, Design and Construction Methodology, Programme and Project Resources.
- A single stage tender process was chosen as was determined to be the most efficient and cost effective given that an element of outline design had already been undertaken to remove the need for further optioneering by the tenderer.
- During the tender period Balfour Beatty Utility Solutions declined to tender citing several reasons including the transfer of ground risk, unliquidated key dates, time investment into alternative options and scoring mechanism (price quality ratio).
- 3 tender submissions received and opened in accordance with the Company Procurement Rules
- Following receipt of the initial submissions the selection team were informed of a budget constraint which capped contractor spend on the project to £5m before the end of AMP6. As a result, the tenderers were asked to confirm, via the sealed bid process opened in accordance with the Company Procurement Rules, the impact on their initial tender submission.

#### Stage 4 – Tender Assessment and Reviews

- The tender submissions were assessed by the selection team
- Tender review meetings were conducted with all three tenderers. Details notes from these meetings have been recorded.
- At the meetings the contractors were invited to submit Best and Final Offers (BAFO) taking into account qualifications their initial bids had not allowed for.

- BAFO submissions were treated as sealed bids and opened in accordance with the Company Procurement Rules
- Contractor selected utilising tender assessment technical and best value criteria

The delivery contract was awarded on 20th March 2018.

The contractor is responsible for the design development, detailed design and construction of all permanent and temporary works, including the hydraulic design, to achieve the objectives of the project. The contract is an NEC Option C - target cost.

### **7.2.2 Environmental considerations**

Due to the predominantly urban environment that the proposed tunnel passes through, the main environmental impact is envisaged to be the temporary social impact on the local communities near the tunnel shafts and the temporary impact to the local highway network due to the increase in vehicle movements associated with the removal of excavated material from site.

To minimise the social impact within the city, the original high level design has been amended and the number of tunnel shafts originally proposed has been reduced from 6 to 4. In addition to the removal of 2 tunnel shafts, all material excavated from the new tunnel is to be removed from one main drive shaft located close to junctions 18 and 18a of the M5, thus allowing quick access to the motorway network for vehicles transporting material offsite.

In addition to the reduction in the number of tunnel shafts, Wessex Water and the appointed principal contractor are currently investigating options for local reuse of excavated material to reduce the carbon footprint and environmental impact associated with offsite disposal. Local reuse of the material will also further reduce the temporary impact on the local highway network within the suburb of Lawrence Weston. Options being investigated include the potential for ground reprofiling and landscaping to improve recreational opportunities and provide social betterment and the improvement of local wildlife habitat to increase biodiversity.

Ecological phase one surveys have been undertaken for all areas affected by the works and follow up surveys to confirm the presence of protected species are currently ongoing. Should the presence of protected species be found, licenses from Natural England will be obtained and mitigation will be undertaken to ensure no impact to the species occurs prior to construction works commencing. Wessex Water would seek to undertake enhancements and compensation where appropriate.

### **7.2.3 Efficiencies**

The successful contractor had the lowest tender price because of their innovative design. The changes in the design since the PR14 submission include:

- the successful contractor proposed just one tunnel drive from the downstream to upstream end. This uses the topography and produces many efficiencies and reduces the need for intermediate shafts

- significant reduction in the size and number of major civil structures. The single drive leads to considerable logistical efficiencies in only having one tunnel launch site, rather than the six required under the PR14 option
- For the tunnelled section, the PR14 estimate assumed seven circular shafts of between 7.5 m and 10.5 m diameter (depths from 4.0 m to 28.9 m deep) and 6 3.0 m diameter tunnel drives between them. The proposed solution uses two 6 m diameter 30m deep circular shafts, one 2.4 m diameter 30 m deep bored drop shaft and two rectangular connection chambers at each end of the tunnel (5 structures in total).

#### 7.2.4 Trym costs

The table below compares the latest estimates with our PR14 submission, all at 2017/18 prices. It shows that the innovative design, competitive tendering process and active management of risk has led to savings of circa 8%.

**Table 7-2: Trym costs**

| Trym sewer         | 2015/16 to 2019/20 | 2020/21 to 2024/25 | Total |
|--------------------|--------------------|--------------------|-------|
| PR14 submission £m | 15.1               | 49.8               | 64.9  |
| PR19 plan £m       | 12.6               | 47.2               | 59.8  |
| Variance £m        | 2.5                | 2.6                | 5.1   |
| Variance %         | 16.6%              | 5.2%               | 7.9%  |

In addition to the main contractor's costs, other costs required to deliver the project include:

a) Environmental mitigation and third party costs:

- Carrying out environmental mitigation works such as wildlife relocations / protection. Licensed contractors may be required; where possible specialist work will be tendered.
- Archaeological watching briefs. Framework consultants will be used with competitively tendered schedules of rates, with prices obtained from two or more
- Fees will be payable to the local Highways Authority for traffic management licenses and noticing.
- Compensation costs will be payable to landowners for sites occupied under statutory notices or negotiated licenses.
- Land purchase for permanent compounds associated with tunnel control apparatus; this will include conveyancing fees and associated costs.
- Utility diversions, to enable connections into the existing sewer network.
- Commissioning of the telemetry systems will be completed by the in-house; Procurement and free issue of particular equipment may be necessary to ensure compatibility with existing systems.
- Procuring the installation of telephone lines from BT and power connections from the local suppliers. This work cannot be tendered.



b) Project Management

- coordination of in-house teams with the main contractor and other third party organisations, contract administration, cost control and progress reporting; all by an in-house project management team.

c) Risk management, allowances for

- Restricted access to site caused by landowner or physical constraints
- Temporary access arrangements or work needed to enter the existing sewer network due to its existing condition
- Unexpected work to divert unchartered services
- Unexpected or escalating environmental mitigation costs
- Unforeseen planning constraints
- Additional land purchase costs
- Additional third-party consents, approvals
- Additional compensation costs
- Increase designed scope due to necessary changes
- Additional building surveys and damage
- Business claims and compensation due to disruption.

## 8. Customer protection

In this section we set out how customers are protected if the investment is cancelled, delayed or reduced in scope; and how this is linked to outcomes and a suitable outcome delivery incentive in our business plan.

### 8.1 Trym milestone performance commitment (2018)

There is a PR14 performance commitment that included a 2018 milestone to ensure we started delivering the Trym scheme in AMP6.

We have regularly engaged with our technical auditor (Mott Macdonald) on progress of the Trym sewer. This ensured there is clear understanding of the needs, options and of what progress needed to be demonstrated by March 2018 in order to achieve the regulatory performance commitment milestone.

Enabling works for the Trym scheme have already been completed under the Frome Valley scheme construction. This was the oversizing of elements of the Frome sewer to accommodate future flows that would pass to the Trym sewer. We have also undertaken significant site investigation to achieve a robust cost estimate.

To demonstrate achieving the milestone we presented the progress to the auditor in a meeting in March 2018. The following documentation was shown:

- Outline Design Complete and Stage 1 Reports issued demonstrating -
  - On Programme
  - Schematic drawings available
  - Environmental consultation ongoing
  - Site and investigation complete
  - 3rd Party consultation ongoing/programmed
  - Extensive Ground investigation complete
- Trym Relief Enabling works (part of FVR3) Construction complete
- Tunnelling Contractor appointed – (Award Report tabled)
- Logistical challenges being planned
- Detail design commenced
- Trym programme key dates
- Programmed commencement on site November 2019
- Programmed planned completion Autumn 2022

Annex B contains the auditors letter demonstrating that we met the Trym milestone.

### 8.2 Proposed Trym delivery (2023) performance commitment

We are proposing an AMP7 bespoke performance commitment to ensure delivery of this significant investment by 31<sup>st</sup> March 2023.

This will have a financial penalty for non-delivery.

Customers will also be protected from under delivery through the financial incentives related to the following proposed performance commitments and metrics:

- Risk of flooding from all public sewers due to hydraulic capacity.
- Resilience: Properties at risk of flooding in a storm
- Pollution incidents
- Environmental Performance Assessment (as pollution incidents are two of the metrics within this overall environmental measure).

## 9. Affordability

The programme of work described in this supporting document was included in our draft business plan that was tested with customers between January and June 2018.

The customer research is designed to test whether customers find the plan acceptable and affordable. The stimulus material covered our overall package of service improvements, statutory enhancements and bill impacts. We tested our plan with household customers, business customers, retailers, those in vulnerable circumstances and industry stakeholders. Results were triangulated across a variety of qualitative and quantitative methodologies to maximise the robustness of both the sample and conclusions.

Testing has shown that 96% of our customers find our business plan acceptable. Acceptability is above 90% across all demographic subgroups. Those in vulnerable circumstances were slightly less accepting of the plan than other groups, but still at a very high level.

A large majority of household customers (92%) consider our plans are affordable for them. Over 90% of businesses found the plan to be affordable. Vulnerable customers also found the plan acceptable and affordable and were positive about the assistance that we provide to this group.

Full details of our acceptability testing can be found in *Supporting document 1.1 Summary of research findings* and details of how we address affordability and vulnerability are included in *Supporting document 2.1 Vulnerability strategy*.

## 10. Board assurance

The proposals have been subject to our board assurance process, which is described in detail in section 12 of the main business plan narrative and supporting documents 12.1 to 12.8.

Section 12 of the main business plan narrative includes the following statements that are relevant to this supporting document:

The full Board confirms that, in our view, the proposals within the Business Plan are consistent with and should allow the company to deliver against its statutory obligations, now and up to 2025.

We, the Board of Wessex Water, understand our accountability for this Business Plan. We are unequivocal in our assurance that the Plan is both high-quality and deliverable. We also confirm that it is consistent with our long-term vision for the company and our strategy.

The Board assures that this plan is informed by customer engagement and the views of the Wessex Water Partnership (WWP), and that the performance commitments contained within it reflect customer priorities, are stretching and reporting is robust.

The Board confirms that the expenditure projections contained within this Business Plan are robust and efficient, and that large investments are deliverable and best for customers.

## Annex A. Letters of support for the North Bristol sewerage strategy



**Reply to** Patrick Goodey  
**Telephone** 0117 9223206  
**E-mail** Patrick.goodey@bristol.gov.uk  
**Our ref**  
**Your ref**  
**Date** 20 April 2018

Dear David,

As the Lead Local Flood Authority for the Bristol City administrative area, we write to you to offer our support for the ongoing North Bristol Sewerage Strategy, including the proposed Trym Valley Relief Sewer scheme.

As one of the top ten cities in the country at risk from surface water flooding, we very much welcome and support the strategy for a number of reasons. Firstly, it will support the growth and regeneration of our city and neighbouring areas by providing capacity in the sewer network to accommodate the significant growth and regeneration proposed in the north Bristol area, specifically the Cribbs Patchway New Neighbourhood and the emerging West of England Joint Spatial Plan. Secondly, the strategy will reduce existing flood risk to the River Trym valley, an area of the city that is at risk of flooding from many sources, including infrastructure capacity. Thirdly, the strategy will reduce pollution incidents to the Trym valley, specifically the Blaise Castle estate, which is a popular and important visitor attraction and recreation facility in the city. Finally, as one of the Rockefeller Foundation's 100 Resilient Cities, we welcome the strategy as it will increase the resilience of the city against the future impacts of climate change.

We note that the strategy objectives also align very closely with the objectives of our Bristol Local Flood Risk Management Strategy as well as the Environment Agency's Flood Risk Management Plan.

Please let me know if there is any other support we can provide to you to help promote or progress the strategy.

Yours sincerely,

Patrick Goodey, Flood Risk Manager  
On Behalf of the Flood Risk Management team

**Flood Risk Management** Adam Crowther  
100 Temple Street, Service Manager  
PO Box 3176, Bristol Strategic City Transport  
BS3 9FS

**Website**  
[www.bristol.gov.uk](http://www.bristol.gov.uk)



creating a better place  
for people and wildlife



Mr Julian Welbank  
Head of Asset Strategy  
Wessex Water Services Ltd  
Claverton Down Road  
Claverton Down  
Bath  
BA2 7WW  
(Delivered by email)

Our ref: Wessex Water  
Your ref:  
Date: 23 April 2018

Dear Julian

Re: Cost Adjustment Claims - North Bristol Sewerage strategy and Wastewater treatment works capacity programme

As promised via email, here is our official line on the two cost adjustment claims you are proposing to submit to Ofwat, as named above.

Our primary focus in these situations is to ensure that the environment is not put at risk. If a cost-adjustment mechanism is the best way to manage this risk, in a way that also protects customers, then we can give in-principle support for proposals by water companies on a case by case basis. In these two situations, we can support (in principle) these cost adjustment claims, with the caveat that both would need to meet Ofwat's materiality thresholds and evidence requirements. Our support does not provide any indication that the proposals would meet these criteria. When any company asks us for in-principle support for cost adjustment claims, we require them to provide assurance that the cost-adjustment is not a substitute for poor planning by the company and is a genuine area of uncertainty/difference. We have received this assurance from you separately.

Yours sincerely

A handwritten signature in blue ink that reads "Jeremy Bailey".

Jeremy Bailey  
Account Manager - River Basin Management Services (RBMS)  
National Operations, Environment Agency

customer service line 03708 506 506  
[gov.uk/environment-agency](http://gov.uk/environment-agency)



Mr Jonson Cox  
 Chairman - Ofwat  
 4<sup>th</sup> Floor, 21 Bloomsbury Street  
 LONDON  
 WC1B 3HF

Date: 17 April 2014  
 Your Ref:  
 Our Ref: AD/jpm/ofwat  
 Enquiries to: Josie Matthews  
 Tel: (01454) 863851  
 E-mail: CECRDIRECTORATE@southglos.gov.uk

Dear Mr Cox

### **ENABLING GROWTH IN SOUTH GLOUCESTERSHIRE AND NORTH BRISTOL**

The South West of England has a long history of attracting businesses and people from across the UK and the world. This growth is reflected in the Core Strategy for South Gloucestershire Council which has been formally adopted and highlights the significant levels of new housing, commercial, industrial and associated infrastructure required to enable this increase. Over 28,000 new homes are projected by 2027 across the local authority area, placing significant demands on the utility networks across the region.

Investment in strategic water and sewerage infrastructure is key in facilitating this growth and indeed in the absence of this investment the council's ambitious housing and employment delivery targets within the Core Strategy could well be put at risk.

I understand that Wessex Water is seeking to deliver significant investment in new sewerage infrastructure between 2015 and 2020 to ensure the large developments in North Yate, Filton, Cribbs Patchway, Harry Stoke and Emersons Green, can be brought forward to the timetable established by the Core Strategy. Many of these developments are already at an advanced stage within the planning process. Work has started on site for nearly 8,000 properties, planning permission has been granted for another 4,000 and the remaining sites are either pending planning decisions or will be required to be brought forward without delay to ensure housing delivery targets are met in the later part of the core Strategy plan period. To retain developer confidence and ensure a continuous supply of new housing within South Gloucestershire it is essential that any uncertainty over the plans to invest in and deliver the required strategic sewerage infrastructure is avoided.

I would therefore like to express our wholehearted support for the plans Wessex Water has recently submitted to deliver vital and timely drainage infrastructure for this area, to enable the planned housing and employment growth to take place without hindrance.

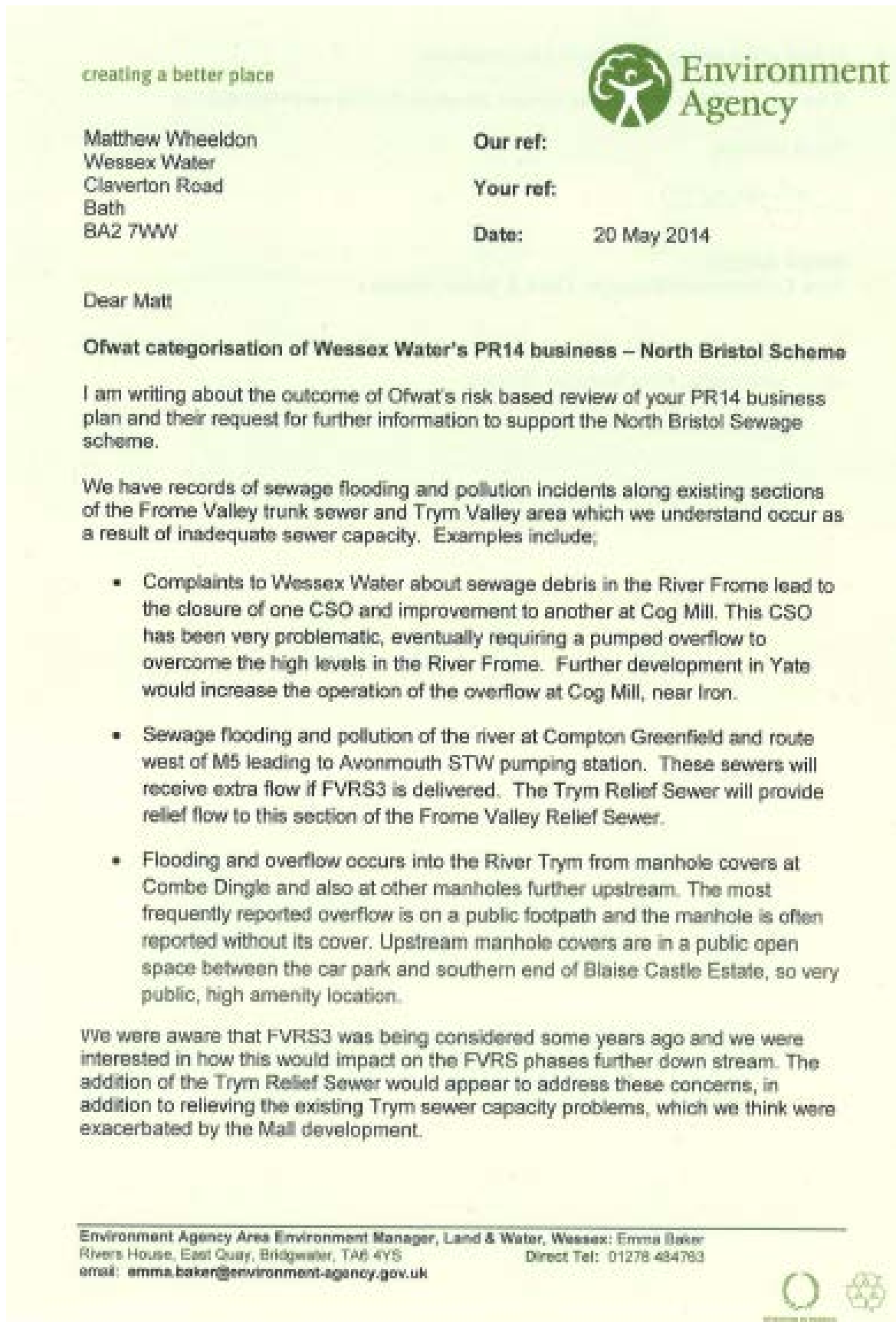
Yours sincerely

**Amanda Deeks**  
 Chief Executive

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Amanda Deeks - Chief Executive  
 Chief Executive & Corporate Resources Department, PO Box 300, Civic Centre, High Street, Bristol BS15 0DS  
 Telephone: 01454 868009 [www.southglos.gov.uk](http://www.southglos.gov.uk)





In light of the above, we support your proposals.

If we can be of any help please contact Jonathan Ponting on 01392 442134.

Yours sincerely

A handwritten signature in black ink, appearing to read 'E. Baker', written in a cursive style.

**EMMA BAKER**  
Area Environment Manager, Land & Water, Wessex

cc: Nick Gupta, Area Manager, Wessex

## Annex B. Auditor letter confirming Trym milestone achieved



Phil Wickens  
Director of regulation  
Wessex Water  
Claverton Down  
Bath  
BA2 7WW

### Performance commitment S-C3 - North Bristol Sewer Scheme

**Our Reference**  
351224TA18

17 April 2018

22 Station Road  
Cambridge CB1 2JD  
United Kingdom

Dear Phil,

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This letter summarises my review of your progress in delivering your AMP6 performance commitment S-C3, the North Bristol Sewer Scheme.

### Background

At the 2014 price review (PR14) you made a commitment to deliver improvements to trunk sewers in north Bristol in line with your sewerage strategy. The strategy will improve sewerage systems in both the Frome and the Trym catchments, in both cases diverting wastewater flows away from Bristol city centre. The completed schemes will provide the extra sewerage capacity to support the substantial growth in housing in north Bristol.

Owing to the cost of delivering these two large strategic trunk sewers, the programme has been phased over two funding periods. The performance commitment has a measure for delivery of each of the two projects, with a penalty payments system for non-delivery of each.

### Description of the performance commitments

At the PR14 Final Determination, Ofwat published details of the agreed performance commitment:

**Detailed definition of performance measure:** "In line with the Bristol sewerage strategy, additional capacity for the Frome catchment will be delivered in 2018/19 and [the] Trym catchment in 2022/23."

**Performance commitments:** Frome scheme delivered by 2019-20.  
Trym scheme 'milestone' by 2017-18.

**Additional detail on the measurement:** "In line with the Bristol sewerage strategy, additional capacity will be created in the Frome and Trym catchments. The Frome catchment scheme will be delivered within AMP6 and the Trym catchment scheme in 2022-23. A milestone for the Trym catchment has been introduced which requires the company to demonstrate, in line with its delivery plan, that the design, consultation and construction of the Trym scheme has been progressed."

Ofwat's document also set out details of the penalty payments to be made for late delivery or for non-delivery by 2019-20. The penalty payment would apply for each year of delay up to the end of AMP6, after which the full penalty for non-delivery would apply. The penalties would exceed the cost of delivery estimated at PR14.

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### Scope of assurance review

Since 2015-16 you have provided us with regular updates on the progress of both the Frome and the Trym sewer schemes as outlined below:

#### Frome scheme

- Presentation of plans of the proposed sewer scheme, likely construction methods and approach.
- Visit to the contractor's site office and various points along the route.
- Presentation of aerial videos of the pipeline route whilst construction was in progress.
- Presentation of updates on progress and the expected completion of the scheme.

#### Trym scheme

- Presentation of plans of the proposed sewer scheme, likely construction methods and approach, and approach to consultation.
- Presentation of updates on progress and the expected completion of the scheme.
- During the Frome scheme site visit, shown aspects of preparatory work for the Trym scheme.

### Findings

#### Frome scheme

In March 2018 you forecast the Frome scheme will be delivered by August 2018 and in use by the end of 2018.

Complex works have been completed in sensitive environmental conditions, to deliver a very shallow river crossing (where there is minimal pipe cover) and a motorway crossing. Significant proportions of the route have been tunnelled, allowing the pipe to pass deep underground and eliminate the need for sewage pumping.

Much of the work has been carried out near houses or through private land. Careful consultation with local stakeholders and landowners has enabled the project to progress whilst limiting disruption to neighbours and their businesses. You employed a tunnelling engineer in your team to provide more 'client side' experience in working with the contractor.

From our observations of progress made, the quality of project management and forecasting, we consider the forecast delivery date to be reasonable.

#### Trym scheme

During our various update meetings, you explained your progress in developing plans for the Trym scheme. You have chosen to allow the bidding contractors to propose the final route details and designs so that they can offer their experience to reduce costs or disruption. You have conducted site surveys and invited bidders for the project.

You have begun consultation with local stakeholders (MPs), for what will be a major construction project in a developed area. Detailed consultation will take place as the contractor finalises the construction work plan.

During the Frome scheme delivery, you completed a small section of Trym scheme tunnelling because it was close-by and suited the division of work between the two projects.



In March 2018 you showed that you had completed the tender process and had awarded the contract, the largest single contract that Wessex's networks team has let.

From our observation of the small section of construction delivered, and the award of the final design and construction contract, you have clearly made progress on the Trym scheme.

#### Conclusions

To the extent of our understanding of your project, based on our site visit and the evidence provided at update meetings:

**Frome scheme:** We conclude that the Frome scheme is on track to meet your performance commitment date of 2018-19.

**Trym scheme:** We conclude that you have met your performance commitment milestone date of 2017-18, to have progressed the design, consultation and construction of the scheme.

Yours sincerely,

[by email]

Andrew Heather  
 Technical assurer  
 T 01223 463498  
 andrew.heather@mottmac.com

#### Document record

| Issue | Date      | Author    | Checker  | Approver  | Purpose                       |
|-------|-----------|-----------|----------|-----------|-------------------------------|
| 1     | 9 Apr 18  | A Heather | J Newton | A Heather | First issue.                  |
| 2     | 17 Apr 18 | A Heather | J Newton | A Heather | Correction to PR14 reference. |

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