



National Audit Office

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## **Report**

by the Comptroller  
and Auditor General

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**HM Treasury, Department for Environment, Food &  
Rural Affairs, the Water Services Regulation Authority**

# Thames Tideway Tunnel: early review of potential risks to value for money

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HM Treasury, Department for Environment, Food & Rural Affairs,  
the Water Services Regulation Authority

# Thames Tideway Tunnel: early review of potential risks to value for money

Report by the Comptroller and Auditor General

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Amyas Morse  
Comptroller and Auditor General  
National Audit Office

2 June 2014

The Thames Tideway Tunnel is a planned project to build a large sewer running under the River Thames. It is the government's preferred solution to the problem of spills from London's sewers into the tidal part of the River Thames. This review explains the roles of the different parties, identifies potential risks to value for money, and sets out what we expect good public sector management to look like.

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## Contents

Key facts	4
Introduction	5
Background	7
Setting clear project objectives	18
Appraising the options	20
Choosing the right delivery model	25
Managing taxpayer risk	29
Managing project costs and risks	31
Setting the right charge to consumers	36

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## Key facts

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**£4.2bn**

2013 estimate of the cost of the tunnel, excluding financing costs and tax (at 2011 prices)

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**£70–£80**

maximum expected impact on the annual bill of each of Thames Water's 5.23 million residential sewerage bill payers (at 2011 prices)

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**70p–£1.20**

estimated benefit for every £1 spent on the tunnel (excludes unquantified benefits)

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**£1.7 billion** original estimate of project costs, published in the Thames Tideway Strategic Study 2005 (2004 prices)

**£1.4 billion** of the planned £4.2 billion cost expected to be spent by Thames Water on the project (2013 estimate in 2011 prices). As at 31 December 2013, Thames Water had spent an estimated £0.5 billion on the project

**£2.8 billion** of the planned £4.2 billion is expected to be spent by an 'infrastructure provider', independent of Thames Water (2013 estimate in 2011 prices)

**4** number of alternative strategies considered by the Thames Tideway Strategic Study to address the problem of pollution into the Thames caused by spills from combined sewage overflows

## Introduction

**1** The Thames Tideway Tunnel (the 'tunnel') is a planned project to build a large sewer running under the River Thames for 25 kilometres from Acton in the West to Abbey Mills in the East. The tunnel is the government's preferred solution to the problem of spills from London's sewers into the tidal part of the River Thames. The project aims to limit pollution from storm overflows so as to comply with the European Urban Waste Water Treatment Directive and avoid fines from the European Commission for non-compliance. The project also aims to protect the water quality of the Thames Tideway for at least the next 100 years. The Planning Inspectorate is currently considering the detailed planning application for the project and is expected to make a recommendation to ministers in June 2014.

**2** The government expects the project to be completed in 2023, at an estimated cost of £4.2 billion (2011 prices, excluding financing costs). The tunnel will be privately owned and financed, and will be paid for by Thames Water's commercial and residential customers via increases in their sewerage bills. The government is considering providing some form of contingent financial support during the construction phase to safeguard the project against exceptional risks, where it considers this offers best value for money for taxpayers and Thames Water's customers.

**3** The Department for Environment, Food & Rural Affairs (Defra), the Environment Agency, HM Treasury, and the Water Services Regulation Authority (Ofwat) are all involved in setting up or overseeing the project, along with the project sponsor, Thames Water Utilities Limited (Thames Water).

### **Purpose of review**

**4** The purpose of this review is to:

- explain the roles of the different parties and the key areas of government involvement;
- identify potential risks to value for money for consumers and taxpayers; and
- set out what we expect good public sector management to look like, given the specifics of the project. These are the areas we are likely to focus on if we carry out a full audit of the project at a later date.

**5** To avoid influencing the outcome of ongoing competitions for the construction and financing of the tunnel, this review does not evaluate the value for money of the project to date. Furthermore, the issues raised in this report should not be taken to imply any audit judgement about the performance of the project.

## Scope of this review

**6** Our report draws on information in the public domain, and past National Audit Office and Committee of Public Accounts reports. We have spoken to the main parties involved in the project, but we have not reviewed their internal project documents or analysis.

**7** The first section of the report sets out the project background and the roles of the different parties involved. We then examine potential risks and set out what we expect good practice to look like in the six areas we believe are most critical to achieving value for money for consumers and taxpayers:

- **Setting clear project objectives.** Are the aims of the project clear, measurable and achievable? Is there a clear definition of success?
- **Appraising the options.** Has the preferred option been shown to be the most cost-effective way of meeting the project objectives compared with the alternatives?
- **Choosing the right delivery model.** Does the choice of delivery model maximise value for money in procuring the project?
- **Managing taxpayer risk.** If the government provides a contingent financial support package, will this help secure private finance at a good price without undermining investors' incentives to deliver a successful project?
- **Managing project costs and risks.** Are costs and risks well understood and do all parties have incentives to keep these as low as possible? Where the interests of private parties are not aligned with those of taxpayers or consumers, is there effective independent scrutiny and challenge of costs?
- **Setting the right charge for consumers.** Is the amount consumers will pay subject to appropriate scrutiny to protect consumers' interests?

**8** In some of these areas, the government and Ofwat have already taken important decisions, for example in setting project objectives and appraising options to meet those objectives. In other areas, important decisions remain to be made which may have a significant impact on value for money for consumers and taxpayers.



## Background

**1.1** Thames Water estimates that, as a result of up to 60 separate annual discharges from London's combined sewer overflows, 39 million cubic metres of untreated waste water spill into the River Thames every year. Much of the sewerage system serving London along the tidal River Thames was designed in the 19th century and consists of combined sewers. Combined sewers convey both foul sewage and rainwater run-off to sewage treatment works before it is discharged into watercourses. However, when combined sewers reach capacity (such as during heavy rainfall), the combined sewer overflows discharge excess untreated waste water directly into the River Thames. This avoids spills from manholes and the backing up of sewage which has the potential to flood roads and buildings.

**1.2** In 2000, Thames Water funded an initiative to assess the environmental impact of sewage spills into the Thames. It was known as the Thames Tideway Strategic Study and it issued its final report in 2005. The Environment Agency, Department for Environment, Food & Rural Affairs (Defra) and the Greater London Authority participated in the study, and the Water Services Regulation Authority (Ofwat) had observer status. The study was chaired by Professor Chris Binnie, an independent water consultant. The study proposed aesthetic, ecological and health objectives for the Thames Tideway based on the requirements of the 1991 European Urban Waste Water Treatment Directive (the Directive) and associated national regulations. The initial phase of the study primarily considered four broad strategies for reducing the impact of sewage spills. These were:

- interception of sewage spills;
- separation of rainfall and sewage within the sewer system;
- preventing rainfall from entering sewers; and
- installing sustainable drainage solutions (SuDS) across London.

**1.3** The study concluded that the only practicable strategy to meet all environmental objectives was the interception of sewage spills before they reach the river. The study rejected the other options at an early stage either because they were unfeasible, or because they were found not to fully meet environmental objectives and the requirements of the Directive.

**1.4** The study subsequently considered a range of options for implementing the preferred strategy of intercepting sewage spills, and concluded that a single full-length tunnel was the best option. The study originally estimated the cost of a single full-length tunnel at £1.7 billion (2004 prices) and the increase in Thames Water residential customer bills at £40 to £45 annually. This has since been revised by Thames Water to an estimated total cost of £4.2 billion (2011 prices) and a maximum increase in bills of between £70 to £80 annually. The Minister of State for Climate Change and Environment announced support for the Thames Tideway Tunnel in March 2007, following publication of an impact assessment by Defra.<sup>1</sup> The newly appointed Environment Secretary restated this support in 2010 and again in 2011.<sup>2</sup>

### **European Commission proceedings**

**1.5** In 2006, the European Commission initiated proceedings against the UK government for failing to comply with the Directive. In October 2012, the Court of Justice of the European Union ruled that the UK was in breach of the Directive. This has raised the prospect of a large lump-sum fine and daily fines being levied on the UK until it complies with the Directive. At the time of writing, the EU Commission had not initiated fine proceedings against the UK.

**1.6** The threat of fines has given an incentive to proceed with the timetable for the tunnel. The Court of Justice has not specified the level of fine that the UK would incur for continuing to breach the Directive, but if it were to fine the UK it would take into account the seriousness and duration of the breach of compliance and the UK's Gross Domestic Product. Previous fines imposed on other countries have been structured as a lump sum and ongoing penalty. For instance, in October 2013, the Court of Justice found Belgium in breach of its obligations under the Directive, resulting in a one-off lump sum fine of €10 million (£8.5 million) plus fines of up to €859,404 (£734,533) for each six-month period of further delay.<sup>3</sup>

<sup>1</sup> Defra, *Regulatory impact assessment – sewage collection and treatment for London*, March 2007.

<sup>2</sup> Press Release, Defra, 7 September 2010. The impact assessment also examined different solutions to the problem of sewage spills. See also written ministerial statement November 2011, available at: [www.publications.parliament.uk/pa/cm201011/cmhansrd/cm111103/wmstext/111103m0001.htm#11110358000003](http://www.publications.parliament.uk/pa/cm201011/cmhansrd/cm111103/wmstext/111103m0001.htm#11110358000003)

<sup>3</sup> Sterling values have been calculated using the 2010 average rate of €1.17 to £1.00. Available at: <http://curia.europa.eu/jcms/upload/docs/application/pdf/2013-10/cp130133en.pdf>

## **Current status of the project**

**1.7** In March 2013, Thames Water submitted an application for a development consent order to the Planning Inspectorate. The Planning Inspectorate is considering the proposal and will, by 12 June 2014, submit its report with recommendations to the Secretaries of State for Environment, Food and Rural Affairs and Communities and Local Government on whether or not to grant a development consent order for the project. Ministers' final decision is expected in early autumn 2014. If consent is granted, this will allow construction of the project to start in 2016 as currently planned.

**1.8** In the meantime, Thames Water is planning the Thames Tideway Tunnel, and has begun competitions for three packages of construction works – the West, Central and East sections. Thames Water has estimated that the contracts for these works packages are worth £300 million to £500 million, £600 million to £950 million and £500 million to £800 million, respectively.<sup>4</sup> On 29 October 2013, Thames Water announced the shortlists of consortia that will bid for each of these works packages. The competition for the right to finance, own and operate the tunnel is expected to start before the end of the tendering period for the construction works packages.<sup>5</sup> The procurements for both construction and the right to finance and own the tunnel are expected to reach financial close in 2015.

## **Proposed approach to delivering the project**

**1.9** Since the privatisation of England's water industry in 1989, water and sewerage companies have been responsible for planning and building sufficient infrastructure to provide water and waste water services to customers. The water regulator, Ofwat, is responsible for protecting the interests of consumers, by promoting competition where appropriate. Ofwat also has duties to ensure that companies properly carry out and are able to finance their functions. The government has proposed to follow this existing model for the tunnel project, but with some modifications described overleaf (paragraphs 1.11 and 1.12).

<sup>4</sup> These prices are subject to competition.

<sup>5</sup> The procurement for the finance is part of the procurement for an 'infrastructure provider', see paragraph 1.11.

**1.10** The government considers the tunnel to be a high risk project. Defra has set out a provisional view that the construction of the tunnel, if carried out within Thames Water's business, could undermine Thames Water's ability to provide existing services to customers at a reasonable cost.<sup>6</sup> This is because of:

- **Scale risk.** The project is large compared to the rest of Thames Water's business. The regulatory capital value of all of Thames Water's assets was £10.9 billion at March 2013, compared to the current estimated cost of the tunnel of £4.2 billion.<sup>7</sup>
- **Construction risk.** Underground construction carries higher risks than construction above ground. The Thames Tideway Tunnel is a major tunnelling project at depths of up to 70 metres below a major city. Although not unprecedented, this carries significantly different risks to the normal underground construction carried out by water and sewerage companies.
- **Management risk.** The size of the project and rapidity of expansion of capital expenditure would put significant stress on Thames Water's management and governance, and divert it from its mainstream business.
- **Regulatory risk.** The duration of the project extends well beyond a single five-year regulatory period, meaning Thames Water would need to commit to a substantial proportion of the investment without knowing what return on capital it could expect or how its costs would be covered.

**1.11** In order to help Thames Water manage these risks and reduce any potential impact on consumers or taxpayers, the government has been working with Ofwat and Thames Water to develop a bespoke approach to managing the project's risks. As is normal for a regulated utility, Thames Water will plan the project and pass all development (including land) costs on to its customers, with Ofwat monitoring and regulating these costs on behalf of consumers to ensure they are economic and efficient. But, in addition, Defra has proposed the creation of a special corporate entity known as an 'infrastructure provider' as permitted under the Water Industry (Specified Infrastructure Projects) Regulations 2013.<sup>8</sup> The infrastructure provider would build, own, operate and maintain the tunnel and be responsible for the financing of its functions. The infrastructure provider would be licensed and separately regulated by Ofwat.

<sup>6</sup> Defra, *Consultation: regime for special water and sewerage infrastructure projects in England*, February 2011. The consultation asserts that there are certain high-risk infrastructure projects that, if financed by water companies themselves, lenders would be likely to see increased risk in lending to the company and therefore charge a higher cost of capital to the water company which would in turn be passed on to consumers.

<sup>7</sup> Thames Water, *Annual report and financial statements*, 31 March 2013.

<sup>8</sup> Under powers conferred by the Water Industry Act 1991. The creation of the 'infrastructure provider' would be achieved by either Defra or Ofwat 'specifying' the project under the Specified Infrastructure Projects Regulations. Under the regulations, a project can be 'specified', meaning that the project must be put out for tender, and a separate Ofwat-regulated infrastructure provider finances and delivers the project. The regulations allow a project to be specified if it is of a size and complexity that threatens the existing water company's ability to provide services for its customers, and if specifying the project is likely to result in better value for money than if the project were not specified.

**1.12** At the time of writing, Defra had consulted on its proposed approach to allow the creation of an ‘infrastructure provider’, but had not made a final decision. If this approach is confirmed, the key aspects of the delivery model for the tunnel would be as follows:

- The costs of building and financing the tunnel would be largely determined through competitions run by Thames Water.<sup>9</sup> In addition to the ongoing competitions for the three construction contracts, Thames Water would run a separate competition to bid for the opportunity to run and own the project. The winning bidder would be designated the infrastructure provider and would be required to raise the finance for the project.
- Thames Water is required to consult the government and Ofwat on the terms on which elements of the project are put out to tender<sup>10</sup> but the government will not negotiate the contracts, nor participate in the selection of the winning bidders. Ofwat will monitor the procurement process.
- The infrastructure provider would own the tunnel and be responsible for financing the tunnel, overseeing its construction and operating it once complete. The infrastructure provider would have its own private investors and would be legally separate from Thames Water. Thames Water is precluded from bidding to be the infrastructure provider. The government would not be an investor in the infrastructure provider, except, potentially, under the terms of its contingent financial support arrangements.
- Thames Water has appointed Sir Neville Simms and Andrew Mitchell as Chairman and Chief Executive respectively of a new organisation that would be capable of becoming part of the infrastructure provider.
- The tunnel will be operated by the infrastructure provider as an integral part of the London sewerage system. The costs incurred by the infrastructure provider in constructing and operating the tunnel will be paid for via increases in Thames Water’s customers’ sewerage bills. Thames Water will pay the infrastructure provider from the relevant sums collected from customers.

<sup>9</sup> Including competitions to provide for both debt and equity finance.

<sup>10</sup> As required under the Water Industry (Specified Infrastructure Project) Regulations 2013, section 6(5).

- Ofwat would award the infrastructure provider a project-specific licence and regulate it in a manner similar to its regulation of water and sewerage companies.<sup>11</sup> Following construction of the tunnel, Ofwat would determine the infrastructure provider's revenue requirement for operating and maintaining the tunnel.
- During the construction phase, the government is also currently proposing to make available a package of contingent financial support designed to incentivise sufficient private investment for the project at a competitive price, and secure better value for money for customers.<sup>12</sup> This is made possible by legislation which allows the Secretary of State for Environment, Food and Rural Affairs to give financial assistance to the construction of exceptionally large or complex infrastructure works.<sup>13</sup> The contingent financial support package would mean that taxpayers were exposed to certain risks during the construction of the project. HM Treasury, Defra and Thames Water are currently working to agree the terms of this support to the infrastructure provider.

**1.13** In the event of any cost overruns, the arrangements for who would pay have not yet been announced so the extent to which Thames Water's customers are exposed to this risk is not yet known. Ofwat told us it will make sure there are incentives for the infrastructure provider to deliver the project on time and to budget.

**1.14** **Figure 1** shows the expected flow of money between different parties, and oversight by Ofwat.

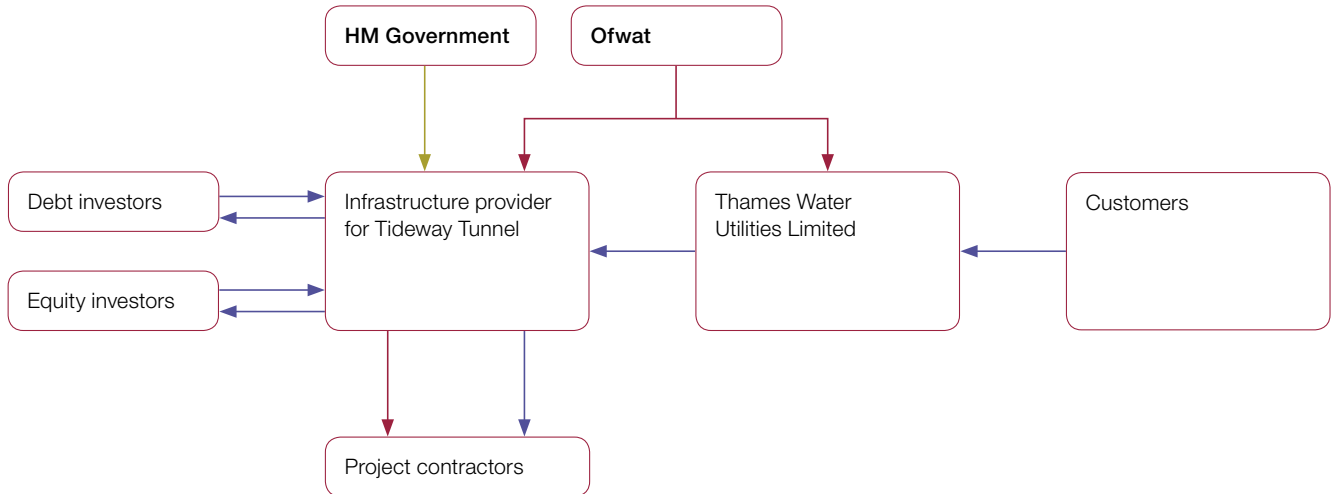
11 Subject to certain adaptations specifically designed and agreed with Ofwat to meet the requirements of an infrastructure provider.

12 At the time of writing, the terms of the financial support package had not been agreed or made public. However, the legislation means that financial assistance may take the form of a grant, loan, guarantee or indemnity, the provision of insurance, or the acquisition of shares in or securities of a body corporate.

13 The 1991 Water Industry Act, section 154B, as amended by the Water Industry (Financial Assistance) Act 2012.

**Figure 1**

Flow of money between different parties



- Flow of money
- Government financial support package
- Oversight role

**Note**

1 In addition, the infrastructure provider may pay the government a fee relating to the financial support package, although at the time of writing this had not been confirmed.

Source: National Audit Office

## Roles and responsibilities

**1.15** There are a number of public organisations involved in this project, including Thames Water, Defra, the Environment Agency, Ofwat and HM Treasury. **Figure 2** sets out their respective roles.

**1.16** **Figure 3** on page 16 and 17 shows a timeline of key events in the project's lifetime.

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### Figure 2 Roles and responsibilities

<b>Thames Water</b>	<p><b>Has been responsible for initiating and commissioning the tunnel project</b>, including:</p> <ul style="list-style-type: none"><li>● funding the Thames Tideway Strategic Study to identify appropriate environmental objectives for the Thames tideway and to propose solutions which meet these objectives;</li><li>● assessing the proposed approach to deliver the Thames Tideway Tunnel and liaising with government stakeholders to agree this;</li><li>● assessing whether different engineering options comply with environmental objectives (following discussions with the Environment Agency);</li><li>● running public consultations on the project and submitting the application for development consent for the tunnel; and</li><li>● preparing the outline design for the project and specifications for works to be constructed by the infrastructure provider, including producing initial cost estimates (which will be prepared by its contractor CH2M Hill).</li></ul> <p>If the project is specified by government, Thames Water will be responsible for:</p> <ul style="list-style-type: none"><li>● setting up and procuring an infrastructure provider, which will take over responsibility for developing the design and for financing, building and operating the Thames Tideway Tunnel;</li><li>● acquiring land necessary for the construction of the tunnel, until the infrastructure provider takes this over;</li><li>● carrying out early building works, until the infrastructure provider takes over; and</li><li>● billing customers for the costs of the tunnel and paying relevant sums to the infrastructure provider.</li></ul>
<b>Defra</b>	<p><b>Has overall policy responsibility for the water and sewerage sector, and is the lead government department for this project.</b> Its responsibilities include:</p> <ul style="list-style-type: none"><li>● overseeing UK compliance with European water quality and waste water standards;</li><li>● assessing the risk that the UK will be fined and the likely scale of fines;</li><li>● meeting relevant duties under the Water Industry Act including that water and sewerage companies are able to finance their functions;</li><li>● providing the project's senior responsible owner within government;</li><li>● preparing any legislation that is necessary for successful delivery of the framework for an infrastructure provider and project;</li><li>● 'specifying' the project under the Specified Infrastructure Project Regulations; and</li><li>● designing and appraising a government financial support package.</li></ul>

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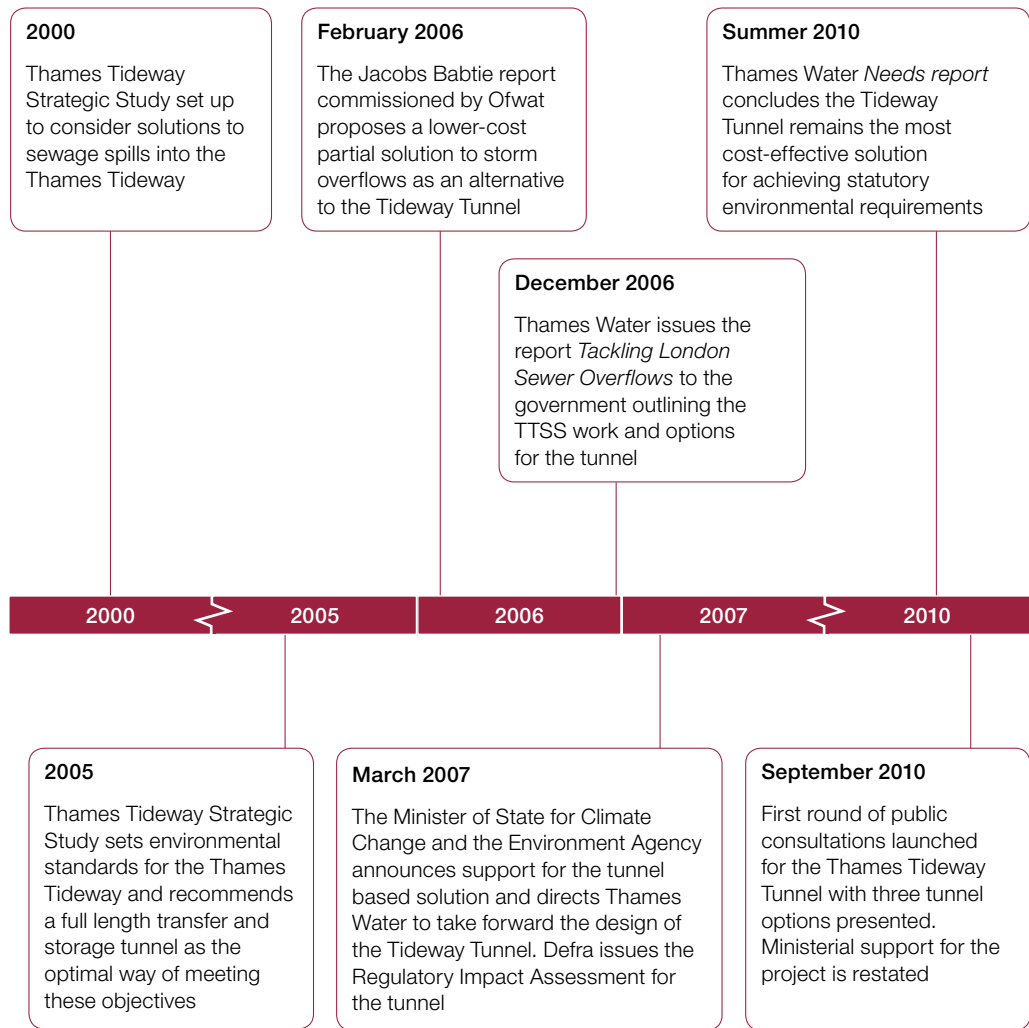
**Figure 2** *continued*

## Roles and responsibilities

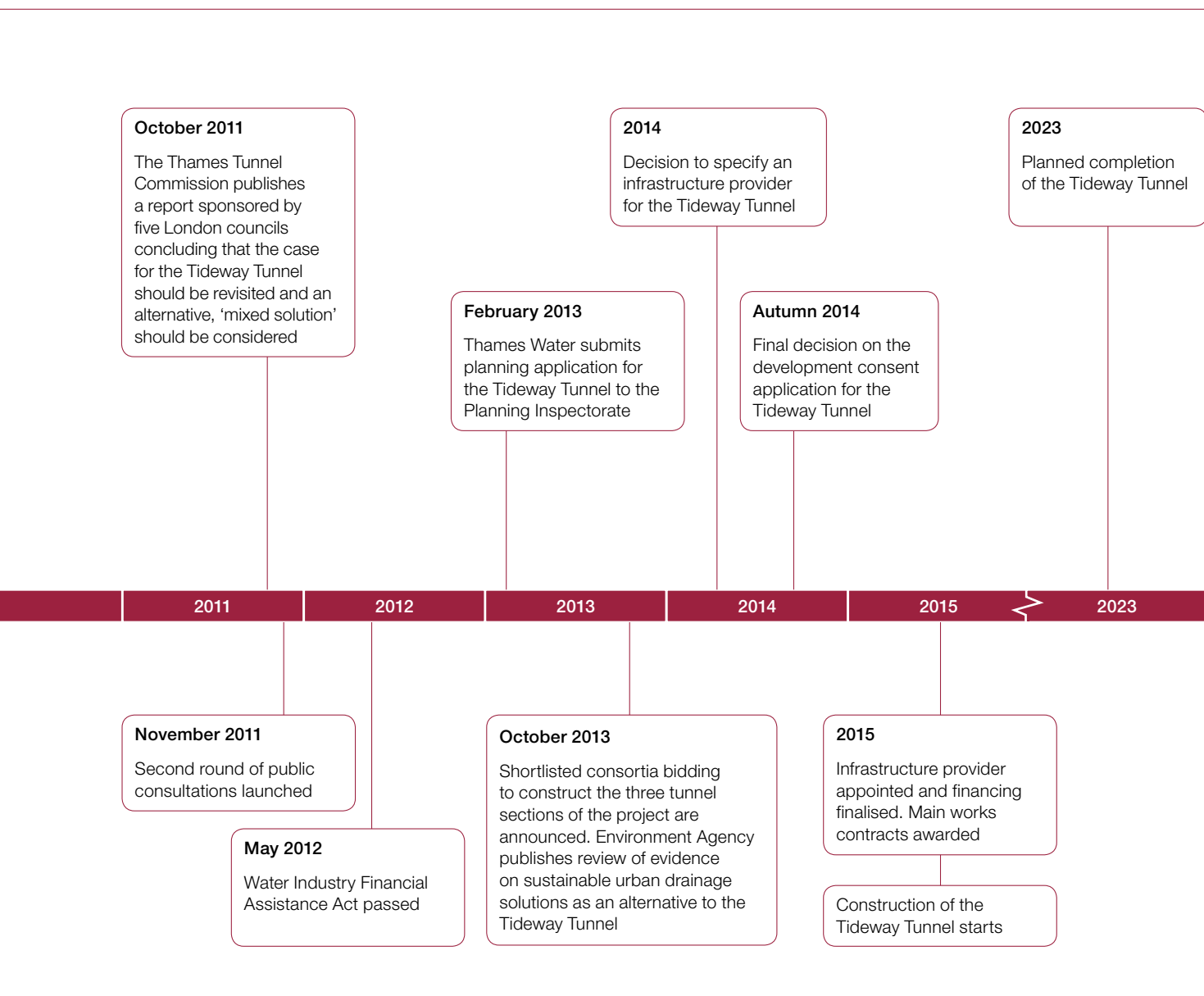
<b>The Environment Agency</b>	<p><b>Is the environmental regulator in England.</b> Its responsibilities in relation to the Thames Tideway Tunnel include:</p> <ul style="list-style-type: none"> <li>● requiring Thames Water to investigate the impact of sewage spills on the tidal River Thames and to identify and implement solutions to limit pollution, so as to comply with the Urban Waste Water Treatment Directive;</li> <li>● ensuring the appropriate environmental design criteria are used;</li> <li>● specifying the unsatisfactory combined sewer overflows that need to be addressed;</li> <li>● working with Thames Water to assess the effectiveness of proposed solutions to achieve the environmental objectives and standards and sufficiently limit pollution from storm spills;</li> <li>● regulating discharges of storm sewage to limit pollution, through the issue, variation and enforcement of environmental permits;</li> <li>● advising Defra on technical aspects within the Environment Agency's remit, for example the appropriateness of the project's environmental objectives and standards;</li> <li>● reporting to the Secretary of State for Environment, Food &amp; Rural Affairs on England's compliance with environmental standards; and</li> <li>● reviewing the evidence for the viability of sustainable urban drainage systems as an alternative to the Thames Tideway Tunnel (at Defra's request).</li> </ul>
<b>Owat</b>	<p><b>Has statutory duties to protect the interests of consumers and ensure that water companies can properly carry out and finance their functions.</b> For this project, this includes:</p> <ul style="list-style-type: none"> <li>● commissioning an independent review of the work and reports of the Thames Tideway Strategic Study;</li> <li>● scrutinising Thames Water's approach to, and costs of, delivering the project;</li> <li>● carrying out regulatory oversight, including designating the infrastructure provider and issuing its licence under which the costs of building the tunnel will be reimbursed by consumers; and</li> <li>● scrutinising the infrastructure provider's activities, including ongoing costs following the construction phase.</li> </ul>
<b>HM Treasury</b>	<p><b>Their role is to ensure that Defra manages risks to the Exchequer effectively and has made sure that the project is affordable and provides value for money for taxpayers.</b></p> <p>The HM Treasury spending team:</p> <ul style="list-style-type: none"> <li>● scrutinises any government support package to ensure the level of risk taken on is proportionate and that the analysis which underpins this decision is robust;</li> <li>● approves any financial commitments where the sums exceed Defra's delegated authority; and</li> <li>● scrutinises the project via the Major Projects Review Group process (joint with the Cabinet Office).</li> </ul> <p>Infrastructure UK:</p> <ul style="list-style-type: none"> <li>● provides commercial advice and support to Defra.</li> </ul>

Source: National Audit Office, based on descriptions provided by the responsible parties

**Figure 3**  
Timeline



Source: National Audit Office



## Setting clear project objectives

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Clear, measurable and achievable project objectives allow the government to compare different solutions effectively and demonstrate value for money. Objectives that do not satisfy these criteria may lead to poor decision-making, or make it hard to determine whether a project has achieved its aims.

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### Stated objectives

**2.1** The Department for Environment, Food & Rural Affairs (Defra) has stated two closely related objectives for the tunnel:<sup>14</sup>

- to reduce the number and environmental impact of sewage spills from the sewers and treatment systems serving London; and
- to ensure compliance with the European Union's 1991 Urban Waste Water Treatment Directive (the Directive).

**2.2** The Directive requires member states to have systems that collect and treat waste water in urban areas under all normal local climatic conditions. However, recognising that it is not possible to construct collecting systems and treatment plants that treat all waste water during situations such as unusually heavy rainfall, the Directive allows member states to decide on appropriate measures to limit pollution from combined sewer overflows. The Directive does not define what is an acceptable level of pollution. In transposing the Directive into UK law in 1994, the government created a legal requirement on water and sewerage companies to limit pollution from combined sewer overflows. Government guidance sets out criteria which indicate whether spills from overflows are 'unsatisfactory'; any spills categorised as such require further work as they are considered to cause unacceptable levels of pollution.

### How objectives are assessed

**2.3** The Thames Tideway Strategic Study developed environmental standards which the Environment Agency determined were appropriate in assessing pollution into the Thames Tideway from unsatisfactory spills. The standards were based on three environmental objectives:

- **Aesthetic** – to reduce aesthetic pollution from sewage-derived litter along the Thames Tideway to the point where it ceases to have significant adverse effect.
- **Ecological** – to protect the ecology of the river by maintaining sufficient levels of dissolved oxygen in the Thames Tideway.
- **Health** – to protect the health of recreational users of the Thames Tideway by substantially reducing the elevated health risk caused by intermittent sewage spills.

<sup>14</sup> Department for Environment, Food & Rural Affairs, *Regulatory impact assessment – sewage collection and treatment for London*, March 2007.

**2.4** The Environment Agency told us that it assesses compliance with the Directive by reviewing reports of pollution from members of the public, reports of spills from water companies, and other monitoring data. If any of these indicate that an overflow is causing unacceptable pollution, and has therefore become 'unsatisfactory', it considers what action is required.

**2.5** Although the Environment Agency assesses compliance with the Directive, it is a matter of interpretation by the European Court of Justice whether a country is actually in breach of the Directive. This is discussed further in the next section.

### **Value for money**

**2.6** To protect value for money we would expect the Environment Agency to have:

- set environmental standards that are measurable, achievable and based on the best evidence available at the time, and ensure that these standards continue to remain relevant and fit for purpose;
- carried out appropriate due diligence if it has relied on the work of others to set standards (for example, if it has relied on the Thames Tideway Strategic Study);
- understood the effectiveness, and the costs and benefits of proposed solutions to sewage spills when recommending to Defra how to meet the requirements of the Directive;

and Defra to have:

- taken reasonable steps to understand how exactly compliance with the Directive is interpreted by the European Commission, such as what would constitute an acceptable timescale for compliance.

## Appraising the options

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Considering all appropriate options at key decision points is essential to achieving value for money in any project. For example:

- Our 2013 report on *Progress in delivering the Thameslink programme*<sup>15</sup> found that: “The Department [for Transport] has followed best practice in recalculating the benefit–cost ratio at key decision points and has consistently chosen the option with the best ratio out of those that addressed its key strategic objective of reducing overcrowding in the longer term.”
  - Our 2010 report *Procurement of the M25 private finance contract*<sup>16</sup> found that hard shoulder running – an alternative to widening the M25 – had not been fully explored. The report concluded that: “the [Highways] Agency could have achieved a materially better value for money outcome by... recognising the potential cost saving implications of hard shoulder running.”
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### The need to comply with the Directive

**3.1** The need to comply with the obligations of the Urban Waste Water Treatment Directive (the Directive) to collect and treat urban waste water under all normal climatic conditions is a key consideration in appraising the options for this project, especially in light of the large fines the UK is likely to face for non-compliance. However, the environmental benefits of addressing the problem of spills from combined sewage overflows, for example in terms of biodiversity, health and river use are also important.

**3.2** The government’s most recently published cost–benefit analysis estimates that the tunnel will generate quantifiable benefits of between 70p and £1.20 for every pound spent on it. This is a low benefit to cost ratio when compared to benchmarks commonly used in central government appraisal, although in common with many other large infrastructure projects there are potential benefits which have not been quantified.<sup>17</sup> Furthermore, the cost–benefit analysis does not include the potential benefit of fines avoided, and the tunnel would still be better value for money than other options if the key objective is to comply with the Directive, and alternative options cannot achieve compliance at a better cost–benefit ratio.

15 Comptroller and Auditor General, *Progress in delivering the Thameslink programme*, Session 2013-14, HC 227, National Audit Office, June 2013.

16 Comptroller and Auditor General, *Procurement of the M25 private finance contract*, Session 2010-11, HC 566, National Audit Office, November 2010.

17 For example, the Department for Transport’s value-for-money (VfM) guidance categorises projects with a benefit–cost ratio of between 1 and 1.5 as ‘low VfM’.

**3.3** A complication in appraising options is that it can be difficult to know in advance which options will result in compliance with the Directive. To avoid the UK being fined, the Commission would need to agree:

- that the UK has systems in place that collect and treat all urban waste water under usual climatic conditions (including seasonal variations);<sup>18</sup> or
- that such systems are either not technically feasible, or cannot be achieved without the costs incurred being disproportionate to the benefits obtained.<sup>19</sup>

**3.4** The Directive does not define the precise level of sewage spills (frequency or volume) that would be permissible into the Thames or any other receiving waters. In 2008, the European Commission indicated to the UK that an acceptable spill frequency “not entailing excessive cost” could cover “a range of up to 20 spills per year taking place at times of heavy rainfall with a varied spill frequency depending on local situations and in particular the status of the receiving waters in each case”.<sup>20</sup> Subsequently, the European Court of Justice clarified that “Contrary to what the United Kingdom fears, [the Commission] does not propose a strict 20 spill rule but points out that, the more an overflow spills, particularly during periods when there is only moderate rainfall, the more likely it is that the overflow’s operation is not in compliance with [the] Directive”.<sup>21</sup>

**3.5** The Environment Agency is confident the Thames Tideway Tunnel will remedy unsatisfactory sewage spills and that this will help secure compliance with the Directive.

## **Alternatives to the tunnel**

**3.6** As set out in paragraph 1.2 the alternative strategies to intercepting sewage spills which were considered by the Thames Tideway Strategic Study, included:

- separation of rainfall and sewage within the sewer system;
- preventing rainfall from entering sewers; and
- installing sustainable drainage solutions (SuDS) across London, which would reduce sewage spills by reducing the rate at which rainwater enters the sewer system.

**3.7** The study, which reported in 2005, examined these three strategies alongside an approach to intercept sewage spills before they enter the river, and concluded that interception was the only practical strategy to meet all environmental objectives. Subsequently, the study team considered a number of options for intercepting sewage spills, and concluded that a full length tunnel was the preferred solution.

<sup>18</sup> The European Court of Justice has stated that “in order to meet the objective of protecting the environment, the concept of ‘sufficient performance’, although not defined numerically, must be understood as meaning that, under usual climatic conditions and account being taken of seasonal variations, all urban waste water must be collected and treated.” Judgment of the Court, 18 October 2012, Case C-301/10.

<sup>19</sup> This issue is raised in Annex I of the Directive, and paragraphs 62–69 of the Court Judgment, 18 October 2012, Case C-301/10.

<sup>20</sup> Commission of the European Communities, Additional Reasoned Opinion Infringement No. 1999/5132, 27 November 2008.

<sup>21</sup> Judgment of the European Court of Justice, 18 October 2012, paragraph 28.

**3.8** In 2006, a review by consultants Jacobs Babtie considered alternatives, including a combination of options which combined shorter tunnels with treatment and re-oxygenation measures. The review estimated this would capture approximately 70 per cent of sewage spills at approximately 50 per cent of the cost of the large tunnel option preferred by the Thames Tideway Strategic Study.<sup>22</sup> However, modelling work done by Thames Water concluded that this option would not achieve the target level for dissolved oxygen by 2020 if the effects of climate change were included.<sup>23</sup> On this basis Defra decided to exclude the Jacobs Babtie option from consideration.<sup>24</sup>

### Concerns over appraisal process

**3.9** Some stakeholders have expressed concerns about the option appraisal process which has led to the Tideway Tunnel being the preferred option:

- The 2011 Thames Tunnel Commission report (sponsored by 5 of the 14 London boroughs affected by the tunnel) claimed that alternatives to the tunnel had never been adequately tested.<sup>25</sup> The report also noted that significant pieces of analysis underpinning the choice of design were based on reports and results of computer modelling that have not been placed in the public domain, making their predictions hard to independently validate.
- In 2012, and again in 2014, Professor Chris Binnie, the former chairman of the Thames Tideway Strategic Study, published a response to Defra's 2011 cost-benefit analysis, arguing that the benefits of the tunnel had been overstated because of unrealistic assumptions.<sup>26</sup>
- Professor Binnie has also argued that further research is needed to confirm the most cost-effective route to compliance.<sup>27</sup> He has argued that faulty assumptions in the modelling used to support the Environment Agency's conclusions on SuDs have overstated the number of spills that would occur if a SuDS-only solution were employed. He also asserts that a combination of SuDS, other measures (such as sewer separation, real time control and detention tanks used where economic to do so), and upgrade works to the sewage system due for completion in 2015 would likely secure continuing compliance with the Directive. He points out that a combination of options was never explored in the original option appraisal in the Thames Tideway Strategic Study.<sup>28</sup>

22 Ofwat with Jacobs Babtie, *Thames Tideway strategic study independent review – phase 1 final report*, February 2006.

23 Thames Water, *Tackling London's sewer overflows volume 2 – modelling and compliance*, Objectives and Compliance Working Group Report, December 2006.

24 Defra, *Regulatory impact assessment – sewage collection and treatment for London*, March 2007, p. 18.

25 *Report of the Thames Tunnel Commission*, October 2011, p. 29.

26 C Binnie, *Thames Tideway Tunnel costs and benefits analysis*, April 2012 and revised version February 2014.

27 C Binnie, *Thames Tideway: Measures to protect the river environment from the adverse effects of waste water discharges*, November 2013.

28 The Lee Tunnel and upgraded sewage treatment plants at Mogden, Beckton and Crossness.



**3.10** As this report is not evaluative in scope (see paragraph 5) we have not assessed these claims. However, such claims emphasise the importance of independent government scrutiny and quality assurance over the options appraisal in order to win public confidence that value for money has been secured.

**3.11** Following these concerns, the Environment Agency published a review of available evidence in October 2013 on the feasibility and cost-effectiveness of SuDS as a solution to the problem of sewage spills into the Tideway.<sup>29</sup> The Environment Agency's review found that:

- There is a lack of data relating to the costs and benefits of SuDS and this is an obstacle to making definitive cost-effectiveness comparisons with the Tideway Tunnel.
- The only work to explore the cost of wide-scale implementation of SuDS in London was carried out for Thames Water's 2010 *Needs Report*. The *Needs Report* estimated that a full-scale roll-out of SuDS would cost around £13 billion (at 2010 prices), a figure which was arrived at by extrapolating from the cost of small-scale SuDS pilots.<sup>30</sup>
- The available evidence shows that SuDS alone cannot achieve the Thames Tideway environmental objectives and standards. Although intensive use of SuDS would result in a significant reduction in sewage spills this would not be sufficient for compliance with the Environment Agency's environmental standards – and thus with the Directive.
- There are also institutional barriers to delivering SuDS (because there are a large number of stakeholders who would need to cooperate to retrofit SuDS across London).

<sup>29</sup> Environment Agency, *An assessment of evidence on sustainable drainage systems and the Thames Tideway standards*, October 2013.

<sup>30</sup> Thames Water, *Needs Report*, 2010, p. 63.

## Value for money

**3.12** To protect value for money we would expect Ofwat, Defra and HM Treasury to have ensured that:

- There was a comprehensive appraisal of a broad range of options (including the most cost-effective combination of measures), using cost–benefit analysis carried out in accordance with HM Treasury’s *Green Book* guidance in place at the time.
- Where options were ruled out on the grounds that they were not feasible, there was a robust evidence base for such decisions.
- For the final shortlist of options, the cost–benefit analysis estimated the monetary value of any significant wider impacts, for example long-term health benefits.
- The criteria for assessing different strategies and options were directly linked to the achievement of the government’s environmental objectives, and compliance with the Directive. In particular, different strategies and options should have been assessed taking into account European Commission and Court of Justice statements on what constitutes acceptable or unacceptable sewage discharges.
- Sensitivity analysis was used to test the forecast environmental impact of each option (given the inherent uncertainty of forecasts).
- Appraisal of different strategies and options is revisited to ensure it incorporates the most up-to-date data on feasibility, costs and benefits, and environmental assumptions and reflects technological developments. This ensures the decision to proceed with the tunnel continues to be justified compared to the alternative approaches. For example, the increase in the estimated cost to Thames Water’s customers since the original Thames Tideway Strategic Study (see paragraph 1.4) should be fully reflected in the current assessment of the different strategies and options, and in Defra’s assessment of whether the current estimated cost of the tunnel would now constitute ‘excessive cost’.
- All the appraisal work has been subject to quality assurance to check for errors and scrutinise the underlying assumptions in models. In particular, any Thames Water analysis is subject to rigorous independent scrutiny by Ofwat, Defra or HM Treasury (given the natural interest of Thames Water’s shareholders in securing a profit on their investment, which may diverge from the interests of taxpayers and consumers). This should include access to any models used in the appraisal process and the ability to review the models in depth.

## Choosing the right delivery model

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The ‘delivery model’ defines the roles and relationships of the parties involved in constructing and operating the project. The choice of delivery model has its own value-for-money implications, distinct from the choice of engineering solution.

The choice of financing route – in particular whether to use public or private finance – is a key aspect of any delivery model and merits separate scrutiny. Our previous work on privately financed projects indicates that using the private sector to finance and deliver projects can bring benefits, but is not suitable at any price or in all circumstances.<sup>31</sup>

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### Possible delivery models for the tunnel

**4.1** In England, infrastructure in the water industry is financed, owned and operated by privately-owned water and sewerage companies, and is paid for by the customers of those utility companies via their bills. If the tunnel were to be built under this regulated utility model, Thames Water would be directly responsible for financing, building and operating the tunnel, as is the case with other new water and sewerage infrastructure. Thames Water would raise the finance itself, on the strength of its own balance sheet, and Ofwat would regulate Thames Water’s proposed costs for the tunnel and the financial return allowed on the investment.

**4.2** However, the government’s view, set out recently for consultation<sup>32</sup> is that the Tideway Tunnel is of a size and complexity that could threaten Thames Water’s ability to provide services to its customers and so the government is considering modifications to the standard regulated utility model for this project (paragraphs 1.9 to 1.12).

**4.3** Given the unusual nature of the project, one option would be for the public sector to pay for the construction of the tunnel using government funds, although it could require legislation to take the project outside the existing regulatory framework.

**4.4** Another alternative is to adapt the regulated utility model so that the tunnel is specified as a separate project which is delivered by an independent infrastructure provider. This is government’s preferred delivery model, as discussed further overleaf.

<sup>31</sup> National Audit Office, *Private finance projects*, Paper for the Lords Economic Affairs Committee, October 2009.

<sup>32</sup> Defra, *Thames Tideway Tunnel: draft reasons for specifying the project as a specified infrastructure project and issuing a preparatory work notice*, November 2013.

## Preferred delivery model

**4.5** The government is proposing to proceed with a model in which the tunnel will be built, owned and operated by an infrastructure provider which is legally separate from Thames Water. Defra's current consultation document argues that this approach will lead to better value for money for customers and taxpayers than if the project was delivered by Thames Water. This is because:

- any government support would be clearly limited to the project only, and not extend to Thames Water's wider business;
- the cost of financing would be determined through a competitive process, rather than by the regulatory settlement as is the case for routine infrastructure; and
- it avoids the risks associated with the project having the effect of increasing the cost of financing for all of Thames Water's activities (which could in turn increase the cost of all of Thames Water's services to its customers).

**4.6** The proposed infrastructure provider would secure the necessary private capital to invest in construction of the tunnel, and once the tunnel is complete, it would provide the services of the tunnel to Thames Water in return for payment gathered from Thames Water customers. In addition to the competitions for tunnel construction (which would have happened under any delivery model because neither Thames Water nor the public sector has large-scale tunnel construction capacity), Thames Water's procurement of a private sector owner for the infrastructure provider is intended to help secure the lowest cost of capital and keep costs down for customers.

**4.7** External commentators, such as Sir Ian Byatt, the former director general of Ofwat, have expressed concern about the fact that Thames Water will not be financing the tunnel itself. Sir Ian argues both that alternative solutions would have provided better value for money and that Thames Water's reluctance to finance the tunnel itself arises from its recent strategy to increase its borrowing and pay substantial dividends to its owners. He believes this has weakened its credit rating and left it unable to borrow further without injecting equity into its balance sheet. He further argues that if Thames Water were to decline to inject equity it should lose its licence and give other companies the opportunity to invest in ways that would ensure compliance with the Directive.<sup>33</sup> Ofwat's position is that:

- due to the comparative scale and complexity of the tunnel, even a conventionally financed water and sewerage company that has lower levels of borrowing would find it difficult to deliver a project like the tunnel under the normal regulatory model without threatening its ability to provide services for its customers;
- Thames Water's dividend payments have not put it in breach of its appointment conditions and that Thames Water has continued to fulfil its licence obligation to maintain an investment-grade credit rating; and
- any failure of Thames Water to inject further equity does not provide a legal basis for terminating the licence.

33 | Byatt, *Thames Tunnel; a critique of a flawed project*, August 2013.

**4.8** We plan to report separately on the regulatory oversight of the financial structures of utility companies in the water sector, including how the regulator sets the cost of capital for infrastructure investment.

### **Reliance on competition**

**4.9** The government has consulted on a proposed delivery model for the tunnel which is heavily reliant on competition to secure value for money. The final costs of delivering the tunnel by this route are unknown, since they will be decided through competitive bargaining. This places a strong obligation on Ofwat to ensure that Thames Water's tendering process delivers value for money, including that it attracts sufficient competition. Thames Water has a legal obligation to ensure the competitions comply with procurement law, otherwise it is open to potential challenge from bidders. However, there is a risk that because Thames Water is procuring the construction contracts but is not an investor (and therefore has no direct financial interest in the project), it has limited incentive to keep the price down.<sup>34</sup>

**4.10** Our work on government contracts with the private sector, has found that value for money is most at risk during the final stage of negotiations. This period is typically characterised by negotiation with a single preferred (or final) bidder, which can weaken competitive tension. Although government is not leading the procurement, there is also a risk that the desire to avoid fines from the European Commission may mean there is pressure from government to conclude negotiations quickly, thereby undermining the value for consumers secured in the final stage of negotiations.

<sup>34</sup> Thames Water may have a wider interest in the success of the project, arising for example from reputational issues to do with increases in customer bills and the financial risk of rising customer bad debt.

## Value for money

4.11 To protect value for money we would expect HM Treasury, Defra and Ofwat to:

- have carried out a full cost–benefit analysis of alternative delivery and financing options. This should have included an assessment of Thames Water’s ability to finance the tunnel itself;
- protect public value in overseeing Thames Water’s preparatory activities to support the project, including its procurement of contracts to build and finance the tunnel by:
  - ensuring Thames Water has appropriate incentives to achieve value for money in these activities, and is independent of the infrastructure provider once that competition is complete;
  - developing a well-informed view of what the construction and financing of the tunnel should reasonably cost, developed through the use of appropriate benchmarks; and
  - developing credible plans for an alternative delivery model in the event that the price achieved through competitions is poor value for money (compared with a reasonable cost, as specified in the previous bullet). In doing so, they will need to form a clear view of the potential costs and benefits of pursuing the alternative model.

And Ofwat to ensure:

- that it devotes sufficient resources, with the appropriate expertise, to actively monitor the effectiveness of the tendering processes and ongoing delivery by the infrastructure provider.

## Managing taxpayer risk

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A common theme in our reports is that, irrespective of contractual terms, when large projects providing public services do not go as planned, cost overruns and/or service failure can ultimately revert back to the taxpayer.

In the past, the government has provided contingent financial support to some large infrastructure projects, and these have sometimes been called upon with substantial losses to the taxpayer. For instance, we reported in 2012 how the Department for Transport's guarantee to subsidise shortfalls of international travellers on the Channel Tunnel Rail Link was called upon when the actual number of international travellers on the line was substantially below the initial forecasts.<sup>35</sup>

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### Design of the contingent financial support package

**5.1** For a project as large as the Tideway Tunnel, the cost of finance represents a substantial part of the overall cost, especially as consumers will pay interest on the capital invested over several decades. The government currently believes that it will need to provide a contingent financial support package to the infrastructure provider to enable it to secure financing at a reasonable cost.<sup>36</sup> Ofwat, Infrastructure UK, HM Treasury, Defra and Thames Water are working to agree the terms of the financial support package. However, the government has already said that support is likely to be offered in the event of severe debt market disruption, significant cost overruns, or any risks which prove to be uninsurable by the private sector.<sup>37</sup> Such support has been made possible through changes to the Water Industry Act 1991 (by the Water Industry Financial Assistance Act 2012).

**5.2** The challenge for the government in designing its support package is to reach a settlement that is sufficiently attractive to the private sector to promote competitive bidding for the financing of the tunnel, while still ensuring there are strong incentives to deliver and that consumers do not pay more than they need to.

**5.3** Transferring risk to the public sector to achieve lower financing costs can represent a false economy if not carefully managed. The danger is that any form of government contingent financial support to investors in the infrastructure provider will have the effect of reducing their exposure to certain project risks, and this can reduce their incentives to manage those risks – potentially making such risks more likely to materialise.

<sup>35</sup> Comptroller and Auditor General, *The completion and sale of High Speed 1*, Session 2010–2012, HC 1834, National Audit Office, March 2012.

<sup>36</sup> HC Deb, 3 November 2011, c41WS.

<sup>37</sup> Hansard HL, Grand Committee, 24 October 2013, column GC488.

## **Value for money**

**5.4** To protect value for money for taxpayers we would expect HM Treasury to work with Defra and Ofwat to:

- ensure there is a robust business case for any contingent government support package, that is that it demonstrates the benefits justify the additional risks that taxpayers are likely to bear;
- maintain a clear audit trail of the analysis setting out the value of any financial support package and calculations of how much the taxpayer could be ultimately liable for, and in what circumstances;
- avoid providing financial support in a way that undermines the incentives of investors to make the project a success, and design the support to align the incentives of the different parties with those of taxpayers and consumers, as far as possible;
- understand the circumstances in which these incentives are likely to break down or be insufficient, and put effective oversight in place to manage these risks; and
- protect the public purse by ensuring that payments by Thames Water to the infrastructure provider (if one is used) would have at least equivalent status to Thames Water's other creditors in the event of Thames Water experiencing financial distress.



## Managing project costs and risks

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Our 2011 review, *Initiating successful projects*, concluded that the record of both the private and public sectors in delivering government projects has been mixed, with substantial numbers of projects completed late, over budget or failing to deliver the outcomes expected.<sup>38</sup>

Achieving value for money normally requires that:

- the key parties involved in delivering a project have strong incentives to manage down costs and risks;
  - risks are held by the party best able to manage them;
  - there is good-quality project data on costs and risks, combined with an honest reporting culture that supports a shared and realistic view of project progress; and
  - where incentives are weaker and do not align with taxpayer or consumer interests, there is effective independent oversight and scrutiny of costs and risks.
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**6.1** In the case of the Thames Tideway Tunnel, any risks that materialise and lead to increased costs could potentially be passed on to consumers and/or taxpayers.

**6.2** The original cost estimate for the tunnel was £1.7 billion (2004 prices). The current cost estimate for the tunnel of £4.2 billion (2011 prices) includes a more detailed assessment of a number of different elements including planning, construction and management costs, but excludes tax.<sup>39</sup> Reflecting construction and other risks, the estimated cost of the tunnel also includes some contingency. The budget is not a 'central' estimate; Thames Water estimates that there is an 80 per cent chance the final construction cost of the project will be £4.2 billion or less.

**6.3** In addition to the £4.2 billion estimate, Thames Water customers will also pay for the costs of financing the project and the running costs once the tunnel is operational. It is important that government and Ofwat ensure there is strong downward pressure on all cost elements to ensure Thames Water customers do not pay more than they need to for the tunnel. The ways that government and Ofwat intend to protect Thames Water customers from potentially excessive costs are set out overleaf.

<sup>38</sup> National Audit Office, *Initiating successful projects*, December 2011.

<sup>39</sup> The previous 2006 £1.9 billion (2011 prices) budget estimate did not include development or management costs, currently estimated at £1.4 billion. Nor did it include any contingency.

## Planning costs and risk

**6.4** Thames Water is responsible for planning the project. Ofwat allows it to collect revenues from customers to cover its costs of planning the tunnel, and permits it a financial return on those costs at the same rate as its other investment activities. There may be an incentive for Thames Water to make the case to Ofwat to spend more on the planning stage than is needed because Thames Water receives an allowed return on investments approved by Ofwat. Therefore, it is essential that Ofwat has access to data on Thames Water's planning costs and scrutinises them carefully. Ofwat has engaged the firm Mott McDonald to advise it in this work.

**6.5** Any delay in securing planning approval is likely to increase Thames Water's planning costs. Uncertainty around planning approval may also increase the risks that bidders face, leading them to increase their bids, and hence raise the cost to customers. The severity of the planning risk and the ability to mitigate it depends on the political sensitivity of the project, the national planning process, and the quality of planning and consultation by Thames Water.

## Construction costs and risk

**6.6** The construction of the tunnel has been divided into three separate contracts which Thames Water is competing in order to secure the best price. In the event of any cost overruns, whether it is the contractor or customer that pays will depend on the detailed specification of the contracts.

**6.7** It is important to incentivise good contractor performance, and to be able to distinguish between poor performance and unexpected events. Thames Water is procuring construction of the tunnel using the same type of contract that was used to procure the main Olympic Stadium and much of the infrastructure for the London 2012 Olympics.<sup>40</sup> This type of contract aims to incentivise good contractor performance because contractors take a share of any cost savings and cost overruns.

**6.8** Under such contracts, contractors' exposure to risks that they are deemed unable to manage is minimised by specifying the compensation payable should such risks arise. This provision aims to reduce uncertainty and hence lower the contract tender price. Effective management of this type of contract relies on transparent cost information, and good cost monitoring throughout the project's life. This in turn requires a culture that supports honest reporting and good and timely decision-making.

**6.9** In addition to incentivising good performance through appropriate contracts, Ofwat told us that it would also place incentives on the infrastructure provider to deliver on time and cost, although the details of these incentives have not yet been announced.

<sup>40</sup> Known as a NEC3 Option C contract (target contract with activity schedule).

## Finance costs and risk

**6.10** Under the proposed delivery model, Thames Water would run a competitive tender for the right to own and run the infrastructure provider (which includes securing the project's financing). This competition is intended, in part, to secure the best cost of capital for the construction phase of the project. There is a risk that the infrastructure provider will be unable to secure financing at a reasonable cost, or that financing is not available when needed for contractual payments. Mitigating this risk depends on the effectiveness of the initial competition for financing, and the nature of the financing terms that the competition secures. Financing costs will be paid for by customers.

## Operational risk

**6.11** Another potential risk is that the completed tunnel does not operate as expected and therefore does not achieve the intended environmental benefits, in particular, that it does not secure the UK's compliance with the Directive. This could result in fines on the UK government (paid for by taxpayers) as well as the cost of remedial measures or an alternative engineering solution to ensure compliance with the Directive (paid for by Thames Water customers). Whether any such costs would have a direct financial consequence for Thames Water or the infrastructure provider would depend on the specific circumstances, and whether it could be demonstrated that there was any error or fault on their part. Defra, Ofwat and the Environment agency argue that Thames Water has a legal duty to meet the requirements of the Urban Waste Water Treatment Regulations (under section 94 of the Water Industry Act), and that a breach of this duty could expose Thames Water to enforcement action by Ofwat, and potentially the Environment Agency.

**6.12** The £4.2 billion budget does not include the cost of running and maintaining the tunnel. It is important that the 'whole life' cost of the tunnel represents value for money, – in other words that completing the construction of the tunnel on time and to budget is not achieved at the expense of excessive ongoing maintenance costs. The useful economic life of the tunnel could exceed 100 years,<sup>41</sup> but this will depend on the tunnel being resilient to future environmental and social factors. The challenge for the government and Ofwat is to incentivise Thames Water and the infrastructure provider to design and build a tunnel which has a long economic life, with long-term maintenance and operating costs that are as low as possible.

## **Other risks**

**6.13** Other risks to large construction projects such as the tunnel include natural disasters or the risk that construction causes damage to the surrounding environment. Although the likelihood of such risks materialising are usually very low, the costs of certain types of damage, for example damage to the Underground network caused by tunnelling, are potentially very high. As a result such risks are either impossible or very costly to insure. If the government support package insures against such remote risks, taxpayers would bear the costs should these risks materialise. This points to the importance of sound analysis to understand how much taxpayers could be liable for, and in what circumstances, as outlined in paragraph 5.3.

## **Independent oversight and scrutiny**

**6.14** The risks described above demonstrate the need for well-designed contracts which align incentives and share risks appropriately. However, good contracts cannot, on their own, ensure successful delivery. There will still be areas where incentives for value for money are weak, so the tunnel project will require strong, ongoing public sector scrutiny from Ofwat.

**6.15** The existence of a government support package in particular, demands effective scrutiny of costs and risks. As explained in paragraph 5.3, a government support package can potentially reduce investors' incentives to manage those risks that are borne by government. The government can partly mitigate this by ensuring there are sufficient independent investors not protected by government support (usually equity investors), but there is also a need for effective independent oversight of the infrastructure provider by Ofwat in order to protect consumer interests.

## Value for money

**6.16** To protect value for money we would expect HM Treasury, Defra and Ofwat to work together to manage project costs and risks by:

- carrying out detailed scrutiny of proposed project costs for the ‘whole life’ of the project, including planning and other upfront costs currently being incurred by Thames Water, as well as the maintenance and running costs once the tunnel has been built;
- understanding the liability of Thames Water and the infrastructure provider in the event that the tunnel is built but does not achieve compliance with the Directive (this should be fully understood before the government specifies the project);
- developing a clear and shared understanding of how the financial consequences would be split between the private sector, taxpayers or consumers in the event of cost overruns or if key risks materialise, and ensure this is acceptable to all parties concerned;
- using this assessment to identify the risks that will need to be most carefully managed in order to reduce to a minimum the chance that consumers will pay more than they need to or that any government support package would be called upon; and
- negotiating contracts with ‘open-book accounting’ to promote effective cost control during construction, and enable Ofwat and government to retain a sufficient understanding of the costs and risks to consumers and taxpayers respectively.

HM Treasury, Defra, Ofwat and the Environment Agency should work together in:

- ensuring there is an independent assessment of the design specification of the tunnel, which confirms that the tunnel will:
  - be likely to have a long economic life, with long-term maintenance and operating costs which are as low as possible; and
  - deliver the intended reduction in sewage spills into the River Thames in order to comply with the Directive.

In providing continuing oversight over the project, we would expect Ofwat to:

- monitor and incentivise the quality of project management during construction and operation (including incentivising completion of the tunnel on time and to budget);
- ensure there is independent oversight of costs (and the risk of cost overruns) during the construction period, with mechanisms to take action to protect consumers and taxpayers from unnecessary costs at an early stage; and
- ensure that the infrastructure provider provides a strong executive centre, structured in line with best practice in UK corporate governance, and that it provides high quality management information to allow investors to take informed decisions quickly.

## Setting the right charge to consumers

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In our 2013 report, *HM Treasury: Planning for economic infrastructure*,<sup>42</sup> we concluded that a failure by government to assess the impact of new infrastructure on consumer bills could lead to consumers facing financial hardship and unplanned taxpayer support being required. In any project that is to be funded by consumers, it is important that the profile of repayments is carefully considered in its own right, both on value for money and affordability grounds.

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**7.1** In the privatised water sector, the cost of investing in infrastructure is paid for by customers through their bills. In line with this approach, the government intends that all the costs of the tunnel, including planning, construction and ongoing maintenance, will be funded by those customers who are connected to the sewerage system operated by Thames Water, through their bills. Other than moving to a geographical area served by a different utility company, customers will not legally be able to avoid the additional charge.

**7.2** Thames Water estimates that the peak impact of the tunnel on customer bills will be up to £70 to £80 per year on a typical household water bill and that the project will add £40 to the average household bill by 2019-20. It is not yet clear over how many years the cost of the tunnel will be charged to customers. The final impact of the tunnel on customer bills will depend on the bids received for constructing and financing the tunnel, and whether actual costs are higher or lower than planned.

**7.3** The cost to customers will also be affected by the timing and phasing of the project delivery and the period over which the costs are recovered. Shorter payback periods will mean a higher annual charge on bills but a lower cost in total. Conversely, if costs are spread over a longer period, the annual charge will be lower and therefore more affordable for more customers, but customers will pay more in total.

<sup>42</sup> Comptroller and Auditor General, *HM Treasury, Planning for economic infrastructure*, Session 2012-13, HC 595, National Audit Office, January 2013.

## How consumer charges may be set

**7.4** Ofwat currently plans that the way the annual charge is set will vary according to the stage of the project:

- In the current planning phase, Thames Water bill payers are already paying for Thames Water's costs in developing the project, as part of the revenues that Ofwat permits Thames Water to collect. Thames Water has purchased land for the project on the basis that Thames Water's customers will pay the costs of land and benefit from the sale price when the land is no longer needed.<sup>43</sup> Thames Water estimates that planning and development costs are expected to account for around 20 per cent of the total £4.2 billion cost of the project.
- During the construction of the tunnel, the level of the annual charge that is added to consumers' bills is likely to be determined by the profile of repayments that the infrastructure provider makes to its investors and lenders. This profile of repayments will be determined by the competition for financing.
- Once the tunnel is constructed, Ofwat will regulate all annual charges to consumers.

**7.5** When Ofwat regulates consumer charges, it sets the cost of capital, and the time period over which investments are repaid. Together, these determine the total cost paid by consumers and how this cost is spread over time. While some water infrastructure is paid back over periods ranging from 15 to 45 years, sewers are currently treated as if they do not depreciate, meaning that consumers pay interest on the total costs annually, in perpetuity.<sup>44</sup> The payback period for the tunnel is not yet known. **Figure 4** overleaf illustrates how the annual charge to Thames Water customers could vary significantly depending on different payback periods and rates of cost of capital.

**7.6** We calculate that the estimated maximum £80 annual charge on Thames Water sewage customer bills would equate to around £418 million in annual revenue for the project,<sup>45</sup> excluding revenues from commercial customers. When compared with the scenarios in Figure 4 overleaf, this indicates that an annual £80 increase for each Thames Water bill payer is likely to be a worst-case scenario. However, given the uncertainty over the costs of construction and the cost of finance, it seems prudent for Thames Water to be using an upper-end estimate of the annual cost on customer bills at this point in the project.

<sup>43</sup> Thames Tideway Tunnel, application for development consent, Funding Statement (September 2013), paragraph 5.4.

<sup>44</sup> For the 2015–2020 price control period, Ofwat has moved to a new approach to depreciating both infrastructure and non-infrastructure assets, where companies will propose to the regulator a proportion of their expenditure to be added to the underlying capital base, and the depreciation rate.

<sup>45</sup> Calculation based on 5.23 million residential bill payers.

**Figure 4**

Illustration of how the average and maximum annual costs to consumers of a £4.2 billion project may vary depending on the cost of capital and repayment period (£, nominal)

**Benchmark: A maximum of £80 per household per year = £418 million annual revenue from residential customers**

Cost of capital:		3.5%	4.5% (Current cost of capital)	5.5%
		Annual Cost (£m)	Annual Cost (£m)	Annual Cost (£m)
Repaid over 50 years	(highest)	229.5	271.1	312.7
	(average)	157.5	178.5	199.5
Repaid over 100 years	(highest)	188.2	230.1	271.8
	(average)	115.5	136.5	157.5
Interest paid in perpetuity	(highest)	147.0	189.0	231.0
	(average)	(constant)	(constant)	(constant)

**Notes**

- 1 This table indicates the possible maximum and average annual cost to Thames Water bill payers if a £4.2 billion project were to be regulated in line with other water sector infrastructure.
- 2 'Repaid over 50 years' and 'repaid over 100 years' assumes an initial ten-year construction period where interest is paid but there is no depreciation as the asset has not yet been completed. From 11 years, the asset depreciates evenly until the end of the repayment period (50 or 100 years).
- 3 Average annual cost is the average over the repayment period, excluding the ten-year construction period. The annual interest charge is calculated based on the value of the asset at the start of the year before depreciation. Depreciation is charged at the year end. The annual cost is the sum of the interest and depreciation charges for the year.

Source: National Audit Office analysis



## **Value for money**

**7.7** To protect value for money for consumers we would expect HM Treasury, Defra and Ofwat to:

- work together to ensure that the profile of repayments and its impact on consumer bills is explicitly taken into account by Thames Water when they assess bids and negotiate with bidders;

and Ofwat to:

- explicitly assess alternative repayment profiles to understand their impact on value for money and affordability at the points when it approves the amounts that Thames Water customers can be charged (during the planning phase and post-construction);
- ensure that the amount customers pay matches the profile of the infrastructure provider's own repayments, so that when these repayment costs fall, that fall is passed on to consumers; and
- ensure that, given consumers are currently paying for the purchase of land to enable construction of the tunnel, the proceeds from the eventual sale of that land are returned to Thames Water bill payers.

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