In 2001 the independent Thames Tideway Strategic Study was set up to look at the problem and come up with a solution. In 2005 the study concluded that improvements to existing sewage treatment works and two tunnels to intercept the combined sewer overflows (CSOs) were the best solution. A lot of further work has been done since this study, which continues to reinforce its conclusions.

Three other ways to reduce the CSO discharges were considered as part of the study. Here are the reasons why they were ruled out:

**Separation of the sewerage system**

The root of the problem that London faces is the combined sewerage system. This means that rainwater and foul sewage all go into a single pipe.

A separate sewerage system is built with one pipe that conveys rainwater (normally to the nearest watercourse) and a second pipe that conveys foul water to a sewage treatment works.

Modern developments are built with separate systems, but a significant amount of London was built with the combined system.

Separating the combined system would involve building a second pipe and making sure that all connections from buildings and roads are connected into the correct system.

Initial estimates showed that the construction cost of a new foul sewerage system would be between £13bn and £20bn. The construction work would need to take place over several decades and the disruption to London would be enormous, requiring deep pipes to be constructed in almost every street.
Sustainable urban drainage systems (SUDS)

SUDS involve a variety of measures that reduce the amount of rainwater entering the sewerage system in the first place. They also slow down any rainwater that does enter the system. SUDS measures include green roofs (i.e. grassed ‘living’ roofs), soakaways, rainwater detention ponds, rainwater harvesting and grassy swales, but unfortunately they need a lot of space.

The implementation of SUDS in new developments is essential to help stop the situation getting worse. This will play an important part in ensuring the future-proofing of the Thames Tunnel, by helping to reduce the amount of surface water entering the system. They can also provide a full or partial solution to localised flooding issues. We are therefore playing a full part in promoting the use of SUDS through the London Plan. However, SUDS cannot resolve the massive problem of CSO discharges that already exists, and certainly not in any realistic timescale.

SUDS can enhance the environment, effectively manage surface water flooding and have a low carbon footprint, not to mention very low whole-life operating costs. However, there are limitations to sustainable drainage, particularly in the Greater London area, where the drainage systems are complex, most of the land is already developed and there is huge potential for flooding.

The scale of SUDS that would be necessary in London is not practical or cost-effective, taking into account the extent of densely built development that already exists in the capital and the underlying geology.

Retrofitting SUDS in London on this scale would have a detrimental impact on virtually every household, driveway, road and open space in every borough.

Retrofitting SUDS would take over 30 years and cost several times as much as the Thames Tunnel. The cost is estimated to be at least £13bn, and would not solve the problem.

### Case study

**Retrofitting of SUDS in the Putney and Wandsworth areas**

<table>
<thead>
<tr>
<th>Catchment area and number of hectares for modification</th>
<th>Cost (£m)</th>
<th>Reduction in the volume of discharge %</th>
<th>Approx number of football pitches required</th>
<th>Would the Urban Waste Water Treatment Directive (UWWTD) standard be met?</th>
<th>Cost of connecting the CSO to the Thames Tunnel (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Putney, 36 hectares</td>
<td>27</td>
<td>33</td>
<td>72</td>
<td>×</td>
<td>6.9</td>
</tr>
<tr>
<td>Putney Bridge, 52 hectares</td>
<td>45</td>
<td>76</td>
<td>104</td>
<td>×</td>
<td>44.6</td>
</tr>
<tr>
<td>Frogmore (Buckhold Road), 135 hectares</td>
<td>56</td>
<td>93</td>
<td>270</td>
<td>✓</td>
<td>25.4</td>
</tr>
</tbody>
</table>
**Bubblers and skimmers**

We currently use ‘bubbler’ and ‘skimmer’ boats to reduce the impact of untreated sewage overflowing to the River Thames. Biological material in the sewage reduces the amount of oxygen in the river, which can kill large numbers of fish, so our two bubbler boats inject oxygen into the river helping fish survive sewage discharges.

Our two skimmer boats skim off the surface litter that also gets into the river when the sewers overflow. The boats tackle the symptom, not the cause, and aren’t an effective, long-term solution. A substantial fleet would be required to keep up with the growing frequency of discharges. There are also severe limitations as to where these boats can go, due to tides and bridge heights.

**Storage and transfer**

None of the above options were considered viable, when compared with the benefits of building a tunnel with CSO interceptions.

A storage and transfer tunnel is a simple and robust solution to prevent large volumes of sewage discharging into the River Thames. It will:

- tackle discharges from the 34 most polluting CSOs
- provide storage to hold the discharges, avoiding the harmful pollution of the river
- transfer intercepted discharges to a sewage treatment works for process. We will also recover the sludge for energy generation
- provide a spine of continuous, safe and integrated storage that is available, no matter where the rainfall (and therefore the CSO discharges) is concentrated
- capture the ‘first flush’ of all CSO discharges, which is the most polluting part
- future-proof the impacts of London’s sewerage system on the river by providing flexibility and much needed extra capacity, for at least a century.
**Jacobs Babtie Review**

Ofwat commissioned a report by Jacobs Babtie to review the work and reports of the Thames Tideway Strategic Study. This was published in February 2006 and proposed additional options for dealing with the CSO discharges at potentially lower cost, but with lower CSO control.

The primary option comprised a hybrid solution based on four elements:

1. Enhanced primary treatment at Abbey Mills.
2. Construction of a west tunnel – a nine kilometre tunnel, 7.2m in diameter from Hammersmith to Heathwall, with an associated screening plant at Battersea and another at Earl Pumping Station.
3. The deployment of skimmer vessels.
4. A medium to long term strategy of implementing SUDS and other measures to reduce sewer flows.

The west tunnel, following a route under the River Thames, would store sewage until there was capacity in the current system to transfer it to the Beckton and Crossness sewage treatment works. The screening facility at Battersea would discharge into the river when the west tunnel was full.

Unscreened discharges would continue at all other CSOs not connected to the tunnel, with the exception of Earl Pumping Station.

Although cheaper to construct, this scheme was not adopted because the much shorter tunnel would not have enough volume to capture a sufficient proportion of the discharges.

Also, the current collection system has virtually no spare capacity that could be utilised to convey stored storm sewage from the tunnel for treatment. This would mean that sewage would need to be stored in the tunnel for long periods, waiting for spare capacity. This would lead to septicity and odour problems in the vicinity of the tunnel.

The enhanced primary treatment plant at Abbey Mills would only remove a small proportion of the polluting load, meaning environmental objectives would not be met.

The deployment of skimmer craft to remove sewage-derived litter in the river from the remaining unconnected and uncontrolled CSOs would not reduce the polluting load in the river. It would also not be compliant with the UWWTD.

For further information see our website: [www.thamestunnelconsultation.co.uk](http://www.thamestunnelconsultation.co.uk) or call us on 0800 0721 086.

Phase two consultation (Autumn 2011)