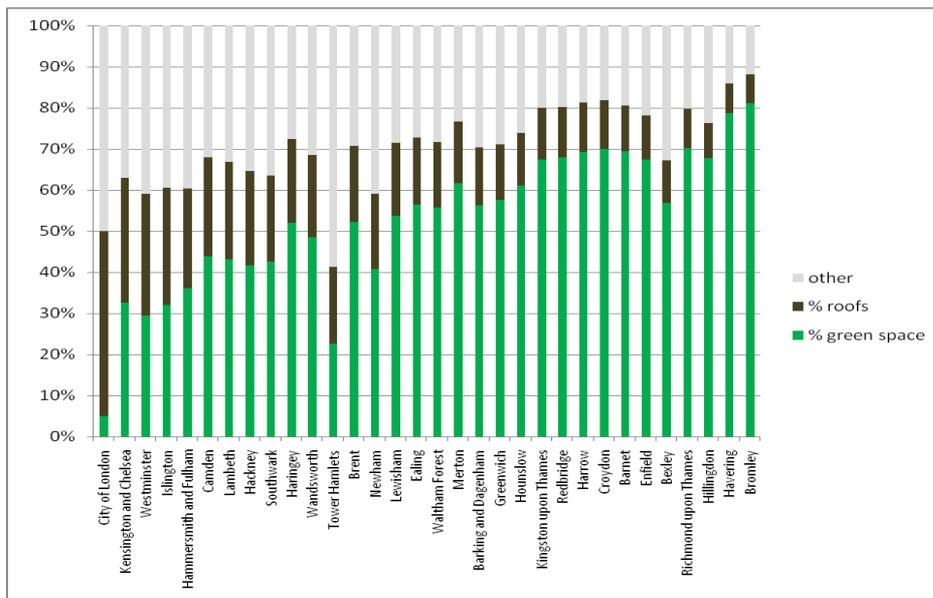


## Introduction

The basic problem is the runoff generated by impermeable surfaces: roads and roofs. Either the capacity to hold and carry the runoff is increased, the Thames Tideway approach, or the runoff is reduced. Whereas the outer London suburbs still have large proportions of their areas in open space, the inner London boroughs are largely covered by roads and roofs. Given the shallow depths at which the utilities have been buried under road surfaces, the scope following the Japanese example and installing permeable pavements on existing roads is likely to be limited. This leaves roofs as the obvious place in which to intervene.



The simplest intervention strategy is the installation of rainwater harvesting and the costs of the Thames Tideway – around £2800 for each of the properties which have created the problem - transform the economics of retrofitting rainwater harvesting to existing buildings. If rainwater harvesting avoids the need to build the Tideway then it is worth spending up to £3.6 billion on rainwater harvesting. But the individual property owner will additionally, by using the rainwater collected to flush toilets and for laundry, also cut both their water bill and their wastewater bill. As the water used to flush toilet is some 30-35% of domestic water consumption, water and wastewater bills ought to fall accordingly. The customer base as a whole will also benefit because reducing water consumption and wastewater discharges will delay the need to construct new reservoirs and wastewater treatment plants.

## The Proposal

First to separate the surface water drainage charge from the general wastewater charge. In practice, for the average dwelling, this charge is about £25/year. Then to change to charging by impermeable area. Secondly, to temporarily add a surcharge to the charge per unit area of impermeable surface which would average £75/year. The additional charge across some 8 million Thames Water charge payers will yield an additional £600 million a year; of that £540 million a year will be used to fund a programme to install rainwater harvesting, the remaining £60 million being allowed to Thames Water to cover the costs of

administering the programme. The programme will provide an allowance of up to £200 per m<sup>2</sup> of roof converted to rainwater harvesting, split 50:50 into a zero interest loan to be repaid over 25 years and a grant. This figure is deliberately set on the high side when compared to the figures quoted by installers of rainwater harvesting systems and the development of the market should also be expected to reduce costs.

On this basis, the annual loan repayment would not exceed £160/year (for a roof of 40m<sup>2</sup>, roughly the size of the roof of a house) whilst the householder would no longer have to pay surface water drainage charges and might be expected to also save around £60 year from reduced water and sewage bills. Hence, on average, the additional costs to a household taking up the offer would be zero for 25 years and then to result in savings of £85/year.

In practice, in order to get the highest return, the combined package should be offered on a competitive basis: those properties yielding the highest reduction in runoff per £ being the first to be included. The programme would not be extended to new properties since the costs of installing rainwater harvesting are much lower for such developments; the total costs of complying with all water requirements to achieve Level 6 of the Code for Sustainable Homes has been estimated as around £2500 a dwelling. For new developments, rainwater harvesting, SUDS, or green roofs are instead part of the planning requirements.

The result is that after six years, some 510,000 m<sup>3</sup> of runoff may be expected to be removed from the sewers in the case of a 30 mm rainfall event, the example used by Thames Water as showing the scale of the problem. At that time, £1.7 billion in grants will have been paid out and £1.7 billion in loans will outstanding but being paid back over periods up to 25 years. The repayments on those loans are then available to reduce the surface water drainage charge to others.

	charge for surface water	25 year £0.63 m <sup>2</sup>		required vol for 0.030 storm storm		1.2 m <sup>3</sup> assuming 40m <sup>2</sup> roof 0.03				
	assumed roof area	40 m <sup>2</sup>								
	new total charge per m <sup>2</sup>	£2.50		100						
	number of customers	8,000,000								
	total revenue		£800,000,000							
	expenditure on current system		£200,000,000							
	allowance for management		£60,000,000							
	available for loan		£540,000,000							
allowance	200 m <sup>2</sup>	£8,000	67,500	loan %		0.5 grant	%		0.5	
	total area per year		2,700,000		0.03					
	total vol reduction per year		81,000							
	years to	470000	6							
	cost per m <sup>3</sup>	£6,667								
	cost to	470000	£3,133,333,333							
	loan term	25								
	annual repayment	£160								
	savings - surface water	£100								
	water consumption	£30								
	sewerage	£30								
	total savings	£160								
	net increase	£0								
	year	1	2	3	4	5	6	7	8	9
	available £	540,000,000	540,000,000	540,000,000	540,000,000	540,000,000	540,000,000	540,000,000	540,000,000	540,000,000
	outstanding loans £	270,000,000	270,000,000	540,000,000	810,000,000	1,080,000,000	1,350,000,000	1,620,000,000	1,890,000,000	2,160,000,000
	repayments £	-	10,800,000	21,600,000	32,400,000	43,200,000	54,000,000	64,800,000	75,600,000	86,400,000
	total available for year £	540,000,000	550,800,000	561,600,000	572,400,000	583,200,000	594,000,000	604,800,000	615,600,000	626,400,000
	schemes	67,500	68,850	70,200	71,550	72,900	74,250	75,600	76,950	78,300
	savings in year (m <sup>3</sup> )	81,000	82,620	84,240	85,860	87,480	89,100	90,720	92,340	93,960
	cumulative savings (m <sup>3</sup> )	81,000	163,620	247,860	333,720	421,200	510,300	601,020	693,360	787,320
	total schemes	67,500	136,350	206,550	278,100	351,000	425,250	500,850	577,800	656,100
	total grants	270,000,000	545,400,000	826,200,000	1,112,400,000	1,404,000,000	1,701,000,000	2,003,400,000	2,311,200,000	2,624,400,000
	total loans issued	270,000,000	545,400,000	826,200,000	1,112,400,000	1,404,000,000	1,701,000,000	2,003,400,000	2,311,200,000	2,624,400,000

The proposal has been developed from the strategies adopted in many cities in Germany and on the down spout disconnection programme adopted in Toronto, a programme which was introduced to avoid a similar solution to that embodied in the Thames Tideway.

This is very much a preliminary calculation but it is sufficiently promising as to require development. Compared to the Thames Tideway proposal:

- The target figure for reducing discharges to the Thames is achieved after only 6 years and are reduced from the beginning of the programme whereas the tunnel will only deliver benefits after it has been completed and the sewers are connected to it.
- It has a lower capital cost; after 6 years, £1.7 billion has used in grants and a further £1.7 billion is outstanding in loans, the repayments from which will be available thereafter to reduce customers bills.
- The initial increase in customers' bills is comparable to that proposed to fund the Thames Tideway but after six years bills fall back to below their present levels.
- The installation of rainwater harvesting is likely to be more labour intensive than the Thames Tideway and benefit more SMEs; the stimulus to economic recovery will be correspondingly higher.
- It involves a shift to sustainable urban water management and avoids the temporary fix or 'end of pipe' approach of the Thames Tideway.
- It results in the reduction in the demand for water in an area which is water scarce and water abstraction is already causing significant environmental damage.