### India-UK Water Security Capability Exchange Initiative

### **History of the Thames Clean Up**

**Dr Martin Griffiths** 

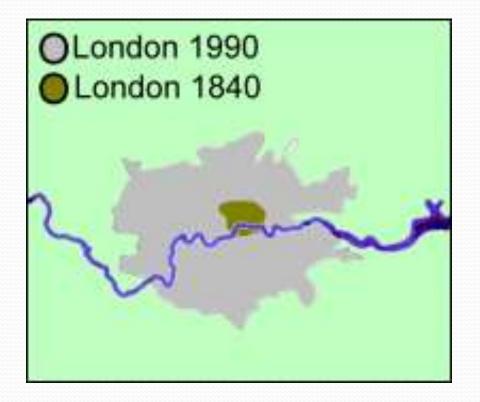
**UK** Expert

15 February 2016

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# Growth of the City of London



Inner London population in 1840 of about 3 million

In 2010 population of about 8 million

•By 2030 population expected to be 8.8 million

# **Public Health and Disease**



Cholera epidemics, the 'Great Stink' and miasmas combined to create a death rate in Britain's cities higher than at any time since the Black Death. The Government was forced to face up to the need for an urban planning policy.

### Understanding of Science



### A DROP OF LONDON WATER Punch, Jan.-Jun. 1850

# **Public Health Disasters**

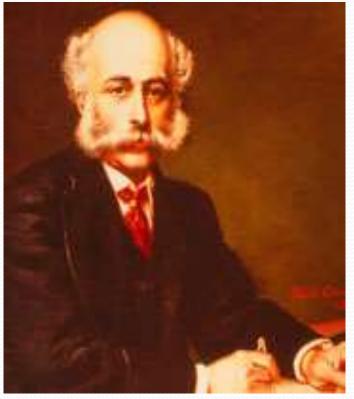


- DIPHTHERIA SCROFULA CHOLERA
- FATHER THAMES INTRODUCING HIS OFFSPRING TO THE FAIR CITY OF LONDON
- (A Design for a Fresco in the New Houses of Parliament)
- Punch July 1858

# Awareness of Science and Leadership

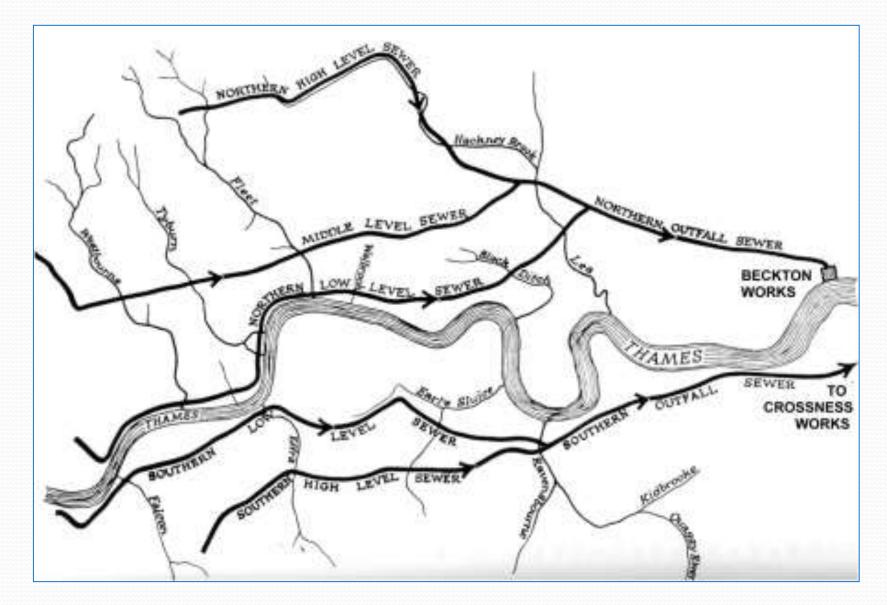


# **Engineering Solutions**



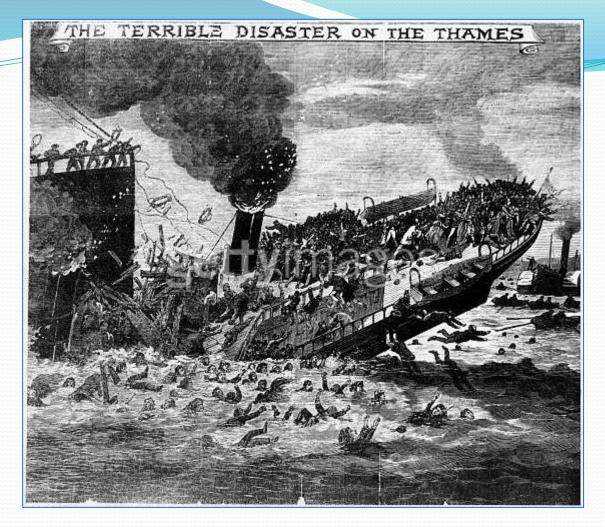
As a result, Parliament passed an enabling act to raise £3million to build a network of giant intercepting sewers, pumping stations and treatment works, designed by the engineer **Sir Joseph Bazalgette**. This network has been much improved and extended over the years, but still forms the backbone of London's sewerage system today.

### Bazalgette London Sewer map - 1880



# Thames Sewer – River Fleet





### **DISASTER** prompts further action

In 1878 the Thames pleasure Steamer'*Princess Alice*', with about 800 people on board, sank, with the loss of 600 lives, in the vicinity of the Beckton outfall after colliding with another vessel the '*Bywell Castle*'. An Inquiry into the accident found that the deaths had been accelerated by the putrid state of the water.

### **Crossness and Beckton Sewage Works**



A Royal Commission was appointed in 1882 to look into the state of the River around the Outfalls and this resulted in new treatment methods being introduced at both Beckton and Crossness

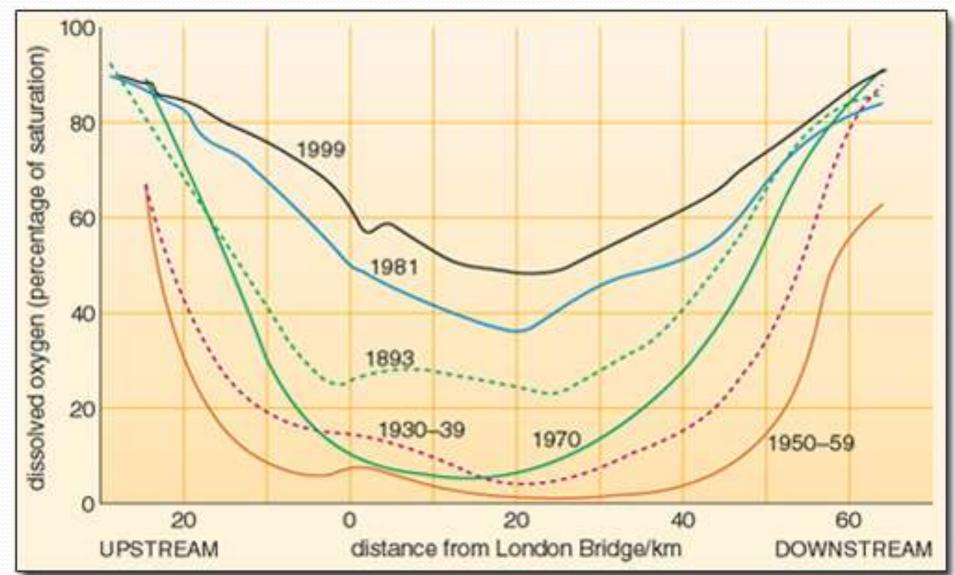
### Thames salmon recovery - 1970s



Prompted significant further clean up and allowed fish to live in the Tidal Thames

### **Recovery of Dissolved**

### Oxygen in Tideway



### **Recovery of fish populations well**

### documented

The pike is the most voracitus fish-eating carnivore of all the British freshwater species. Specimens of more than 20kg

tran been recorded Company in the clear freelwater mich making

Ekcherned.

Natural sculpting of niver barnes. encourages flora

and found

### Rigch

A shoaling species of the freshwater reaches down infactorises. They usually grow to a length of about 25cm and a

weight of up to lig The scawning season for reach is in May or early Jone. Like the perch they may be found a considerable distance descriver during periods of impy rainfail.

### Roach Bream Hybrid

Many species related to carp form hybrids when should of fish mingle at spawning sites. Roach bream hybrids are difficult to identify with certainty and need to be investigated by an expert, who may be able to determine the hybrid from the number and shape of the pharwages) teeth. The body of a mach bream hybrid is name along than that of a reach, and is alightly less deep-loodled than bream. Quite constron in the Thanse titleway, but few are Introperso riturnet de line besirgerent.

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### Salmon

The exciting discovery in 1974 of an adult salmon, the first for 150 years, suggested that the Transe reight core again be clean enough to support its passage. Accordingly, Thurses Water Authority instigated a Jaimus Reliabilitation Programme which is nationed overland. Migrating kowsiles and resurring adults are new thermosily takes.

### Small

The strict is a cousts of the selmon which also moves toward free water to spawn. It grows notifly to about 20cm and matures when two years old. Smelt have large mouths and teeth which give the fait an appropriate property of. The smell give has a characteristic usual of succession. Life the salmon, the scaelt reads good water mailty and habitat to thrive. Recent increases to the smalt population is new of our best industions of a much improved river. Intell are now alundarit in the Thursex Pre-spawning shoats congregate below Grovesend during the later winter months. In Marth, the stypals ascend to apase near Wandsworth. By are then distributed throughout the estuary for the summer months.

### Sand Smelt

The said might or silverside, grows to 15cm, and sames an intense alivery line airing for had to tail. Now consistent in the rises, the species anyon in the Composith area in June.

### FISHES OF THE THAMES ESTUARY The fight spectre listed before here been paught in the tics: River Thereas

Thernes Revtine meniori andra from Konstein

Latures (Ultramand Titory Mice 1964, The Halls not necessarily instable of the spaces that are contently present.

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### Tub Gurnard The name gurnard in said to be derived from the French word. gragher, meaning to grunt, and garnards have the resultation. among fishermen for grunting when taken from water. The British rud-caught record for this large

verse munistrate population

species is 5 1951g. Toursil up to Rrich, this is the commonist gurrard in the Thanes, Coloured red, like the to red girmand, it can be remognized by the brilliant peacock blueedged pectoni firs.

### Herring

Stand Britain there are two main groups of herring (the largest growing to 37cm) differing in distribution, lifespon, mumber and size of aggs laid, spowning times, growth rate and size. Young benings which live off planktoric crustanes. streal in large escaptes and after als months in coustal waters. take to the norm sea. They do not jobs should of large Terrings until they manage, at three, four at five years. As a young flah, common in the river below Woolwich in the autarut and winter. Together with Juvenile agent, was once mught as "whitehait", and sold in the taterns of Greenwich and Blackwall.

### Spret

The special is the antalast member of the herring family and turnly grown larger than them. Their shet is entirely planktoric and hugh should can offer be fixed in coasial waters. Sprats offer incise right less rivers. Sprass are common in the Thanes up to Greenwich during most months of the year, but their numbers yeak in the autumn and early winter.



Five-bearded Rockling With two harbers by the namita, two on the appen to and one on the chin. the live-hearded incluing is constant among weeks and brasiders in rocky

I had on the martial



siture gools and shallow wates It grows to 20tm and its found all round lisitate. The commonent of all the racklings in the Thanes, found up to Edds.

### 50/e

The sale is believed to feed almost entirely by night and he half. baried in the sand during the day. It can grow up to 60cm. Sole differ from other flatish by having tongue shaped todes Max fish taken in the inner Trusten are hoverlies. hat further put at the mouth of the natury large fish weighing 1kg are encountered. The sole is one of the commonest fish in the lower extuary, and is found in large numbers throughout the year. Young fail name up as far as Greenwich thoring the late summer.

### Sea Lamprev

The sea language is a primitive havings fish which lives as a paratite on fish in the sea such as cod. Interarrants extern and then die in Sesteware atreans in the party summer. Now rare in the UK and

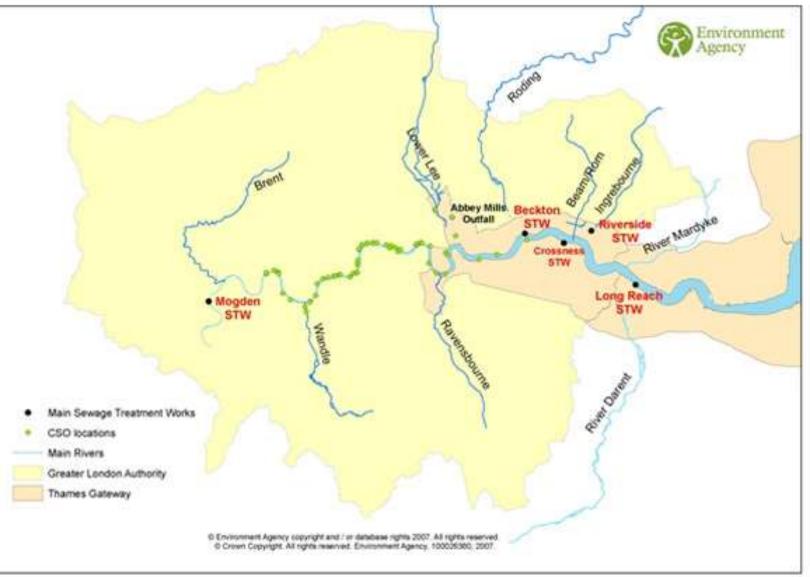


mellig pred d appending habitat and water applies it has begun to spowit in the upper estuary near flattes in the last few years.



### Remaining Issues – Combined Sewer

## Overflows



### Remaining Issues – Combined Sewer

### Overflows



Combined sewer overflow point in Vauxhall on the River Thames (photograph: Environment Agency)

Image 3 of 11

## Remaining Issues – Combined

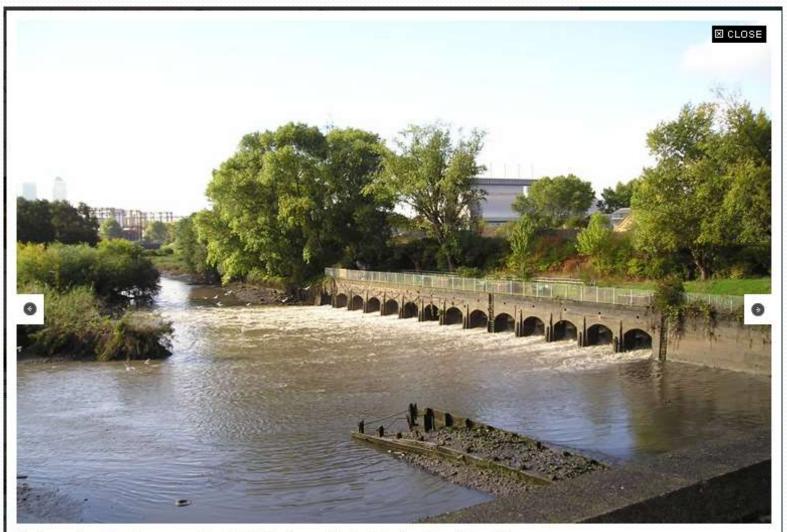
### Sewer Overflows



Combined sewer overflow point in Putney on the River Thames (photograph: Environment Agency)

### **Remaining Issues – Combined**

### Sewer Overflows



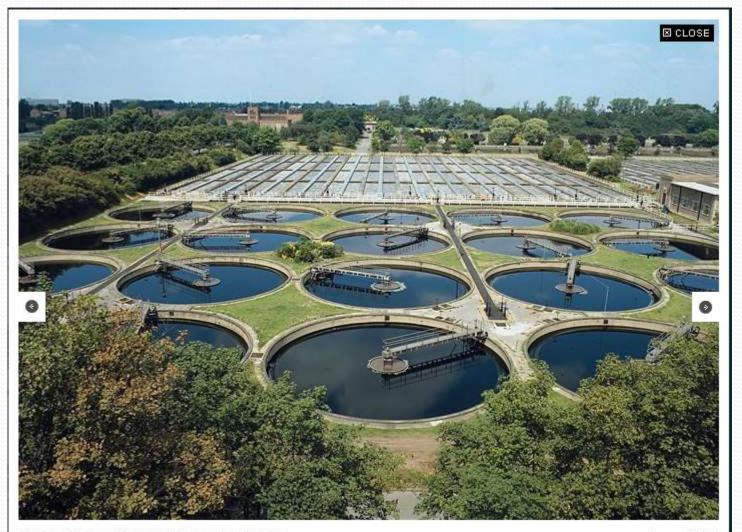
The largest combined sewer overflow (CSO) discharges into the River Lee from Abbey Mills Pumping Station. The Lee Tunnel will help prevent more than 16 million tonnes of sewage mixed with rainwater overflowing from this CSO each year.

Image 5 of 11

### Remaining Issues – Oxygen Injection Thames



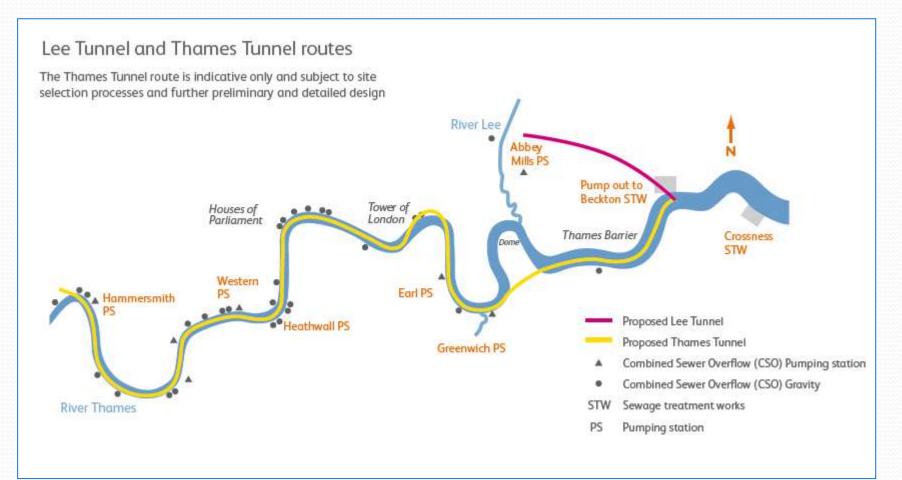
# Remaining Issues – Need to continue improvement of treatment



Mogden Sewage Treatment Works, West London

### London Environmental Issues – Water Quality

### Long Term Solution – The Thames Tunnel – cost £3 billion approx



**Thames Water - Tideway Tunnel** 

### Why does London **need** th Thames Tunnel?

The River Th as clean as think. Sewage overstretches network is pod the capital's



Ten reasons why London **needs** the Thames Tunne

The River Thames has become an environmental and public health hazard. Sewage regularly overflows into the river from London's Victorian sewerage system.

 The current network of major sewers, founded 150 years ago, was designed for a aty of four million people and is no longer big enough to meet the needs of modern day London. The aty's population is now approaching eight million.

3 In a typical year, the atty's sewers discharge 39 million cubic metres' of untreated sewage into the River Thames – enough to fill the Royal Albert Hall 450 times.

14 The discharges are the last significant source of pollution in the total River Thames. Mixed with rainwate; the sewage content of the discharges ranges from 10 to 90 percent, depending on conditions.

S This pollution kills fish, damages wildlife and carries pathogens such as hepatitis A and faecal streptococa, which threaten human health. It's a serious problem – and getting warse. 6 More frequent and especially in summ problem, as is the in surfaces able to sor as 2mm of rainfall i sewage discharge.

? Years of independe concluded that the timely and cost-effi solution. Alternativ: more, be more disn not achieve the env standards required.

British tax payers wi having to fund heft the UK is confirmed the Urban Waste W Directive.

9 Other world-leading Paris, Stockholm, Hi Washington DC, an similar schemes.

A dean, healthy Riv essential for the proreputation of Brital Future generations forgive us for failing unacceptable probil

# Doing nothing is **not an option**

The current severage system is 1 full to capacity with simply nowhere for excess flows to ga, opart from into the River Increases and further permeable surfaces are lost, CSO discharges will continue to rise. It is no exaggeration to say that, in the future, we are likely to see CSO discharges during dry weather and not just ofter rainfail

Doing nothing will simply result in:

- more frequent overflows
- environmental damage continued increased health
- risks to recreational users
  worse litter blight
- an adverse impact on the attractiveness of the water frontage

the risk of heavy fines being imposed on the UK.

### The Thomes Tunnel will provide greater robustness and flexibility for the future impacts of population growth and changes in the pattern of rainfull.

Our generation has reaped the

benefits of visionary 19th century

planning and construction by St

contemporates. The needs and

generations of Londoners will

surely be no less than our own. With the Thames Tunnel, we can

create our own legacy for them,

which will still be functioning in

loseph Bazalgette and his

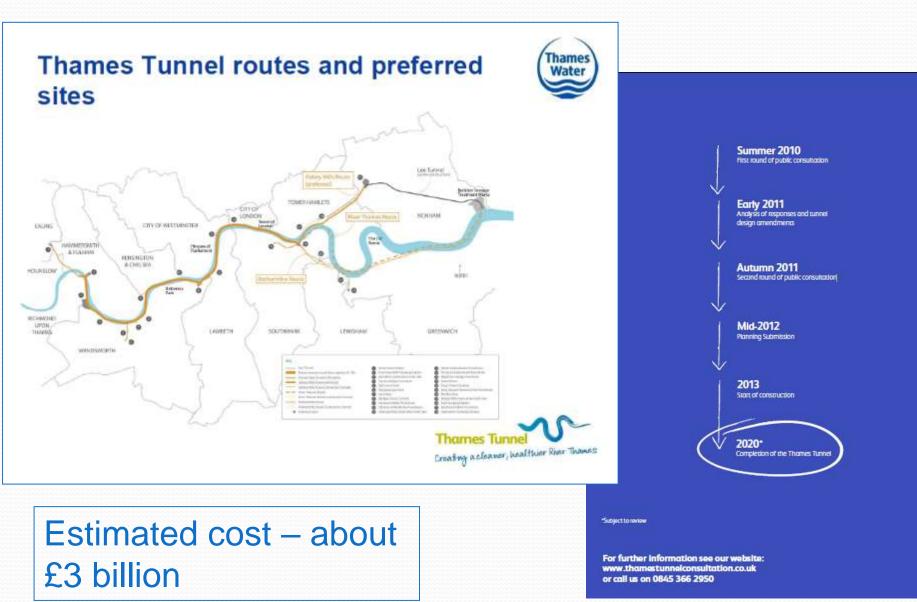
expectations of future

the 22nd century.

The recommended full kength storage tunnel (Abbey Mills route) adheves compliance with the UWWTD and environmental objectives. It is the most cost effective scheme, involving the least disruption to residents, businesses and transportation when compared to alternatives. It also has the shortest implementation time, which will inclinate Defin's target date for completion.

At the same time the Thanes Tunnel, which will last for at least 100 years, will ensure our severage system is modernised and ready to meet the needs of a growing population and the demands of future generations.

### **Thames Water - Tideway Tunnel**



### Benefits to London of good river environment £xx billion ++

