You don't swim in the sea at Blackpool … you just go through the motions.

This essay arises from the author's thoughts following module A3 and the sewage treatment section of the course. The author has recently moved to Blackpool, and has heard the joke above. The questions arising were:

"Why were Blackpool's beaches so filthy as to have gained the reputation referred to above? What was done to rectify the situation and why? What can be learned from this situation in a wider context?"

Blackpool hails itself as "the premier tourist resort in the UK". The Pleasure Beach with 7.5 million visitors a year is the most visited attraction in the country [National Statistics Online 2007].

In common with many towns in the UK Blackpool saw tremendous population growth during the late 19th and the 20th Centuries (see Appendix 1). Special to Blackpool was the very large number of visitors to the town, which added to the quantities of sewage and other waste produced. By 1989, as well as coping with the sewage disposal requirements of the local population of around 145,000 there was also the problem of the waste from 17 million day trippers and 4.2 million holiday makers whose average stay was 3-4 nights. [Walton p129]

Blackpool has always had a problem with its drainage. In the 1840s and 1850s the only means of sewage disposal were cesspools and ditches. The original "Black Pull" after which the town was named was Spen Dyke which ran down to near where the Central Pier is today [Blackpool History]. This took the brunt of the sewage which spread itself in large stagnant pools upon the sand.

In 1843 it was observed that 'when the wind blows in from the sea, which should be the best, the stench is past bearing" [Monks, 1967]

With the introduction of the 1848 Public Health Act a way was created of addressing public health issues through the establishment of urban government. In 1850 a government inspector found that 45 sewers and open drains trickled "prettily across the beach" at Blackpool and South Shore. [Walton p28]

The Public Health Act was adopted in Blackpool in 1851 and a Local Board of Health was elected, and it started to tackle the sewerage problem. "Amelioration of sea pollution was now considered an urgent necessity". [Hassan 2003, p61].

The sewerage scheme soon ran into problems. There was insufficient gradient in the early sewers made worse by the absence of a piped water supply to flush them out[1] thus making leaks and blockages more likely.

[1] Piped water was only introduced in Blackpool in 1864 from the Fylde Waterworks Company in Lytham. Within 3 years 2/3 of the houses were being supplied. In 1897-9 The Fylde Waterworks Company was taken over by the local authority after 20 years of complaints about the quality and volume of service in the summer, "including the occasional eel wriggling through household taps" (Walton 1998 p 59)

The errors were blamed on "incompetent surveyors and contractors".[Walton p30] This led to an overthrowing of the Health Board by the Ratepayers Association, after which the sewer construction ran smoothly and was completed in 1856-7. However they did not act on advice to have the sewage treated. At that time technologies for the treatment of sewage were unproven and "Blackpool, like most other seaside resorts, preferred localised pollution of the sea to the problems and expense of finding a site for sewage treatment works" [Walton p30].

Blackpool Corporation was keen to sustain a reputation for a healthy urban environment, and Blackpool Health Authority took a leading role in some public health measures, such as the compulsory testing of domestic drains and the control of infectious diseases. However they did not include in these health measures the treatment of sewage. There was continued discharging of untreated sewage directly into the sea, to the south of the Central Pier, through a steadily extended outfall pipe.

From 1909 the sewage was screened, to remove large solids, but still remained untreated when discharged into the sea.

In 1938 £760,000 was spent on a new sewerage system. This involved laying 18 miles of sewers and the installation of 3 new pumping stations. But once again the issue of marine pollution was overlooked, "despite occasional adverse comments in the local press and elsewhere" [Jones, 1939]. Another problem was that the sewerage system was a combined system where both foul water and rain water were combined. This led to high discharges of untreated sewage into the sea during periods of high rainfall and storm.

But Blackpool ignored the pollution. Walton [p128] quotes the official publicity guide for 1939 highlighting the beach as "a safe and healthy place for adults to exercise and children to play". The beaches "totally swept clean by the sea twice a day". They continued avoiding doing anything about the problem despite increasing awareness by tourists and the tourist industry alike.

"Blackpool was blighted because of its dirty seas, so the tourism bosses promoted the land-based attractions. They turned their back on the water." Craig Fleming, tourism correspondent for the Blackpool Gazette [Fleming 2001]

The visitor numbers continued to increase during the 1950s, 60s and 70's. It was the inland amusements around the Tower and the Golden Mile that attracted people, and took their money. The beach was not commercially important so the issue continued to be ignored by the local Corporation.

In 1974 under local government legislation the Blackpool Corporation lost it responsibility for the state of the sea to the newly created Local Authority.
This led to dispute within local government and stagnation on the issue of what to do about the problem which was so obviously apparent but would cost so much financial and political capital to put right.

According to Walton [p156], "single party politics[2] which prevailed in the chamber until 1991 encouraged a climate of faction fighting and corruption allegations."

[2] The Conservative Party had a monopoly of power in the Blackpool Chambers

However it is important to remember that sewage disposal problems were not limited to Blackpool. By 1970, sewage from about 6 million people in England and Wales was discharged to the sea or estuaries. [Hassan p 71 (quoting the Jeger Report 1970, p3)].

Nor were they totally of Blackpool's own making. The urban conurbations of the North West all discharged their sewage untreated into the rivers (Manchester and Liverpool into the Mersey; Preston, Blackburn and district into the Ribble), and ultimately the sea along the North West Coast, leading to extensive pollution from Morecambe Bay down to Southport.

The root of the problem in Blackpool, and indeed throughout the world, was that the sea was regarded as an inexhaustible source of purification by dilution and dispersal. It was believed that the sea would dilute the harmful elements in the sewage down to a level where microbiological and UV processes could cause them to break down. It was also believed that the sewage would be dispersed by the tidal currents. [3]

Until the 1970's there was a lack of environmental and scientific information about coastal pollution. In 1972 the Royal Commission on Environmental Pollution devoted its third report entirely to coastal pollution. Its conclusion was that "British estuaries and coastal waters had been given too little protection by Parliament against gross pollution from industrial and domestic waste" [RCEP 1972]

The issue of whether "dilution and dispersal" via submarine outfalls was actually effective began being studied worldwide. Beder [1989] looked at the use of submarine outfalls in Sydney. She came to the conclusion that relying on dilution does not work for sewage disposal (p308).

> "Dilution is not the only mechanism that operates in ocean waters and various materials in the sewage tend to accumulate and agglomerate rather than disperse in the ocean or are bio-accumulated in the marine food chain. Moreover a narrow emphasis on dilution ignores the effect that continual discharge may eventually have on a finite body of water. There is evidence that sewage and sludge disposal to sea are causing a build up of pathogenic microorganisms and toxins in various parts of the world."

In 1982 Professor Cabrelli published research that showed a significant relationship between enterococcus density and swimming associated gastrointestinal illness [Cabrelli 1982]. Until this time the Government had been denying any significant health risk between sewage contaminated waters and those using them for recreation.[4]

But surely this could be ignored if the chances of contracting a disease were insignificant. After all, in Blackpool, the water was usually so cold that most people did not swim. They only went for a paddle.

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[3] This was the perceived "scientific" wisdom for over a century – despite early evidence to the contrary, such as the revelation in 1896 that local mussels, caught at the pier, were spreading enteric fever because of sewage pollution and were unfit to eat. [Walton p60]

[4] The list of diseases contractible from contaminated seawater is extensive: Acute diarrhoea; Paralysis/Meningitis, fever; Mild or influenzal, typhoidal illness; Respiratory disease; Enteritis/Gastro-enteritis; Rashes; Typhoid fever; Hepatitis; Salmonella infections; Herpangina; Bacillary dysentery; Conjuntivitis; Cholera; Immunolocal deficiency syndrome; Pheumonia and septicaemia; Hand, Foot and Mouth disease; Colonic ulceration; Herpes [Surfers Against Sewage, 2007]

In 1991 a survey published in the British Medical Journal showed that people going for a paddle in contaminated water, without even immersing their heads, were 25% more at risk from infection than those staying on the beach. Swimmers were found to be 31% more at risk and surfers at 80% more at risk from becoming ill. The reason that the more active sports have a greater risk associated to them is that there is greater potential for the ingestion of contaminated waters.

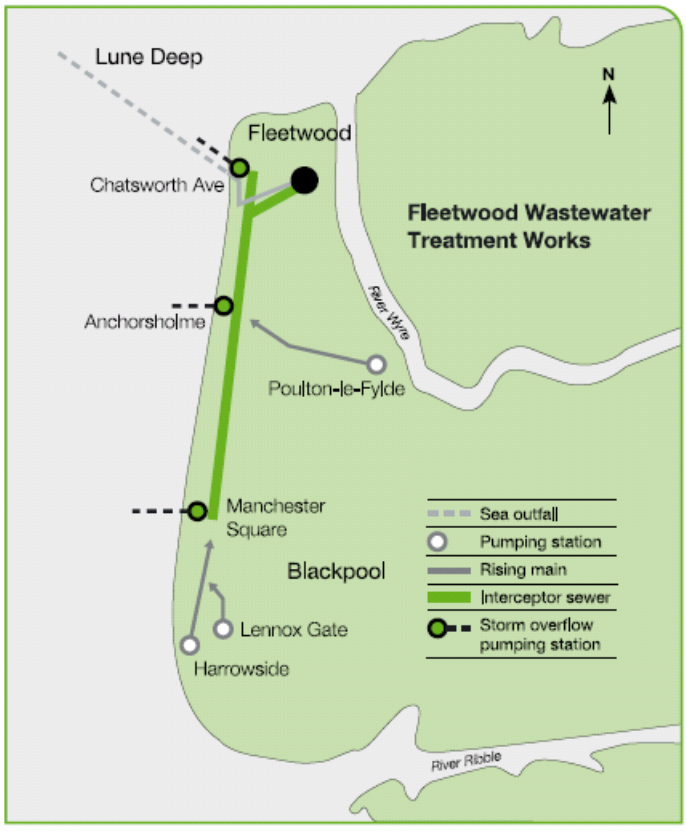
In Blackpool, the Environmental Epidemiology Research Unit from Lancaster University did a study of the prevalence of diseases occurring after children had been bathing. [Lancaster University, 1990] There was a significant overall increase in the mean number of symptoms shown be each child.

During the 1970s and 1980s the quality of bathing water had become an international issue, not least due to the "awakening" of the environmental movement. As Hassan (ch 8) puts it "in the 1970s a climate more conducive to environmental intervention emerged. Environmentalism took off as a mass political movement".

In December 1975 the EC Bathing Water Directive 76/160/EEC was agreed by the Council of Ministers. The Treaty of Rome 1957 had given the EC no power to act on Environmental matters. There was a convention that "the need to move into this area was justified on the grounds that disparities between member states environmental policies would distort competition" (McArthy, 1989). However 76/160/EEC gave them the competency they needed to act on the issue. The British Government, having just, finally, negotiated their way into the EEC, and keen to be seen as good Europeans, signed up to the Directive.

The deadline for compliance with 76/160/EEC was 1985. Although few knew it at the time this was a real turning point in the solution to the problem in Blackpool. The Government tried to get around its commitment to implement 76/160/EEC by not even naming Blackpool's beaches, and several others, as bathing beaches – despite evidence to the contrary from the behaviour of holiday makers.

In 1993, with Blackpool beaches (and others) still not complying with the directive, there was a judgment against the United Kingdom by the European Court of Justice. The UK was fined 100,000 euros per day for the non-compliance of Blackpool alone. This had a great effect and a £600 million major programme of improvements was instigated by North West Water (later United Utilities) covering the whole Lancashire Coastal area.



Initially the **"Sea Change"** £150 million project involved the construction of a new interceptor sewer 14 km long to the new Fleetwood Wastewater Treatment Works (Figure 1).

A diagram of the works and the process is in appendix 2.

The work was finished in 1996.

There were now no direct discharges to sea in dry weather. However the hoped for compliance was still elusive. So a second scheme **"Fylde2"** was embarked upon.

In Blackpool this focused on reducing the amount of storm water effluent entering the bathing waters. Limiting the discharge from the three pumped outfalls created in 1938 involved the construction of two 60,000 cubic metre storage tanks each 36m in diameter and 40m deep. They were sited under the Bloomfield Road car park in the town. (Figure 2).

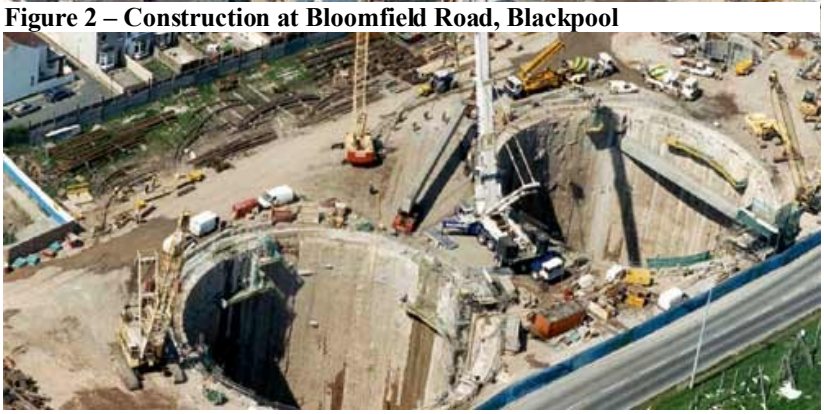
Under storm conditions, water is discharged into the tanks by gravity, remaining there until the flows in the wastewater network return to normal. It is then pumped to the WWTP in Fleetwood for treatment via the Fylde interceptor sewer tunnel.

Figure 1 - "Sea Change" Interceptor Sewer

Meanwhile, the existing water works at Southport, Hesketh Bank, Preesall, and Preston were upgraded with new ultra-violet disinfection equipment installed; Preston's performance was improved; and Southport storm water management was improved.

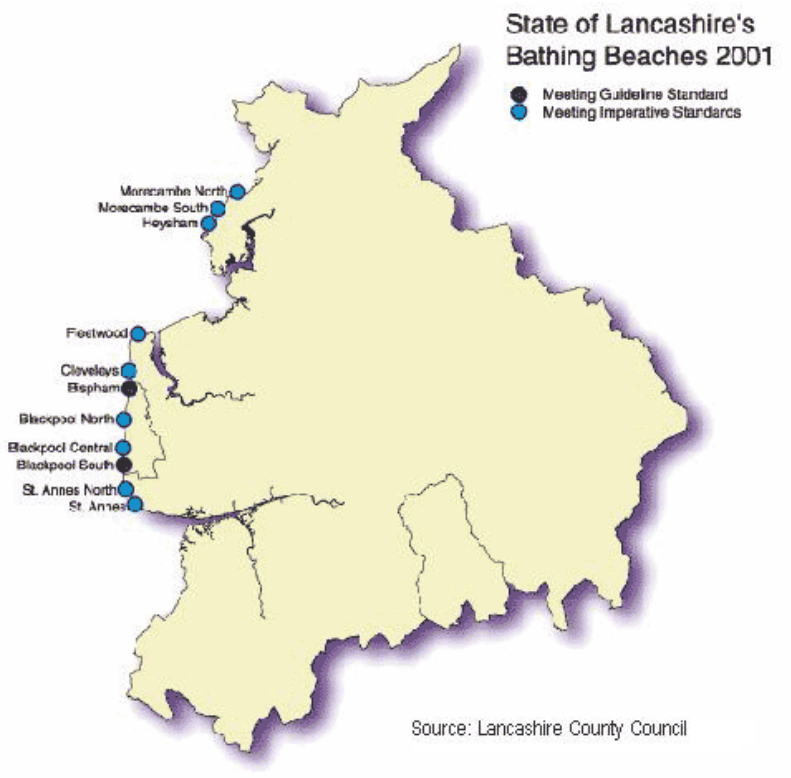
As a result, in November 2000, for the first time, all three of Blackpool's main beaches passed European bathing water standards.[5] [6] [This is Lancashire, 2002].

Figure 2 – Construction at Bloomfield Road, Blackpool



[5] An updated Bathing Water Directive [2006/7/EC] with simplified testing procedures (2 parameters instead of 19) and more easily understandable public data provision has been agreed by the EC for implementation in 2008.

[6] This does not mean that there is no risk of catching a disease – for "Excellent" under the new Directive standards there is still a 3% chance of contracting a disease after immersing ones head. See Appendix 4



However, there is still some dispute about the water quality. Professor Bryan Ellis[7] giving evidence to the Select Committee on Science and Technology, 17th January 2006 stated:

> "There is a considerable body of evidence that shows despite upgrading of sewage treatment plans, in Blackpool for instance and the Ribble Estuary, that in fact bacterial flows are still non-compliant in terms of the Bathing Water Directive. These are directly related to flushing from agricultural land use rather than the urban areas and sewage treatment works. So there is a major area there I think that still needs investigation in terms of the sources and the costs attached to those."

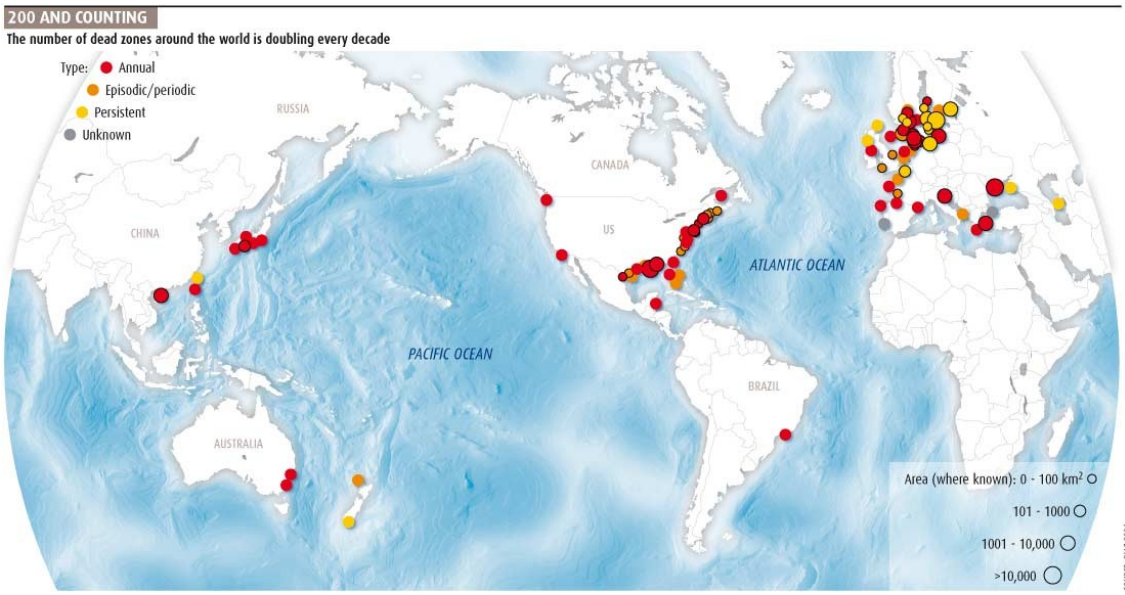
So despite all the expenditure the issue has not been completely resolved. The problem is so complex, and there are so many reasons for the pollution (some of which are only now coming to light) that a concerted range of measures is required to solve it.
Further, the problem of pollution of coastal areas, highlighted by the case of Blackpool, is not limited to the UK. It is a global problem. Ironically, given the locations of the EU institutions responsible for forcing the investment in Blackpool, in 2003 Belgium was reported as having the dirtiest water in the world. [Pierce, 2003].

In 2006 the 2nd UN Water Development Report highlighted the issue again:

"The world's sinks for pollution are filling up fast – rivers, seas, atmosphere. The water sector has done little long-term forecasting or scenario development, but what has been done suggests that 'the problem of water is the most important global scale issue of the present century' (Simovic, 2002). In particular, the current use of clean water for the dilution and transport of wastes is not sustainable."

[7] Emeritus Professor, Urban Pollution Research Centre, School of Health and Social Sciences, Middlesex University, UK

There is evidence that increasing concentrations of nutrients in areas of the ocean due to human waste pollution cause reduction in the oxygen levels due to bacteriological activity. This in turn leads to the creation of dead zones. The number of these has been doubling every decade. [New Scientist 7th Dec 2006 pp38-42]. When human waste dumping, whether by direct discharge or the dumping of sewage sludge, is reduced the ecosystems do recover, but not completely.



Source New Scientist

It is clear that we currently do not understand fully the effect of tides and currents on the dispersal and dilution of pollution in the seas and oceans, nor what factors affect the efficacy of the processes we continue to rely on for the disposal of sewage in the sea. Yet humankind persists in its reliance on these processes as it is seen as more economical than having to treat the effluent before discharging it.

It has been seen that there are an increasing number of areas in the world's oceans which are becoming barren due to the pollution caused by discharge and run-off from human pollution. Globally there is a problem with pollution of seas and water courses. The problem with pollution of the water systems in many ways echoes that of pollution of the atmosphere by greenhouse gases causing climate change. Humankind appears to be exceeding the capacity of the natural systems to deal with the waste products we produce.

The use of combined foul and drainage water sewers means that contamination during periods of excess rainfall is significant. With global climate change, and the expected increase in storms and rainfall in certain parts of the world, the need for storm overflow storage tanks to be designed into existing sewerage plans, and for the separation of foul water and run-off sewerage systems becomes ever more apparent.

The beaches in Blackpool were polluted because sewage was dumped untreated into the sea to let natural processes deal with it. It was deemed too financially and politically difficult for the Blackpool Corporation to do anything about the pollution issue, so it was not tackled. It was only once political and financial pressure was put upon the UK government by the EC, following the introduction of the first Bathing Water Directive in 1975, that anything was done to change the way things were approached.

The need for further urgent action has been highlighted by numerous reports on both climate change and water pollution, and it will need to be seen whether there are, or will be, any agencies or alliances arising with the competency and political will to apply similar fiscal pressures to those applied to the UK Government in the 1970s and 1980s.

The limitations on the essay:

Due to the Holiday period there were no tours to the Fleetwood Water Treatment Plant available. The author therefore had to rely on the published literature about the plant instead of first hand evidence.

It proved extremely difficult to find any published details of whether the UK actually paid any of the fines imposed. References differed from "threatened with fines of £87,000" to "were fined £70,000 per day". The author could find no reference to any payment actually being made in from an authoritative source.

Information given to Select Committees was found to be slightly different depending which "expert witness" was being questioned. In the essay the replies used were those that agreed with the majority of the evidence to the Committees and other published papers.

There are several official histories of Blackpool which vary in some details as to the origins of the town. Again the majority view was taken, as it did not have a material effect upon the essay.

There are large gaps in the available data on overall visitor numbers to Blackpool. It was very difficult to trace back to prime sources, particularly those used by Hassan, as some were unpublished academic papers.

Appendix 1 – Population growth of Blackpool

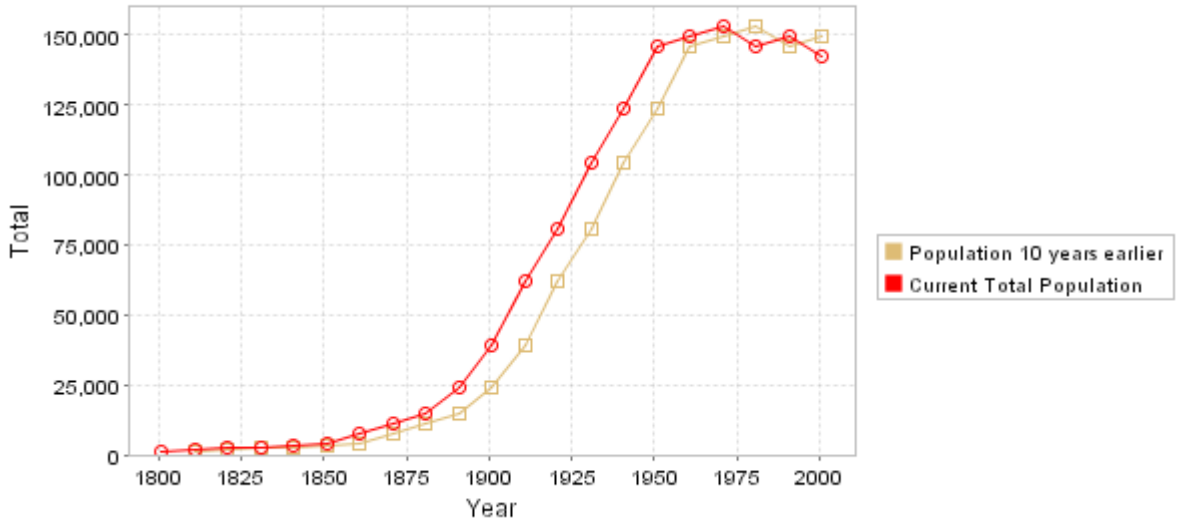
Population of Blackpool

1831	943
1841	1378
1851	2564
1861	3907
1871	7092
1911	58,371
1921	73,800
1931	101,553
2004	151,000*

Visitor Numbers

1872	850,000
1931	3,850,000
2004	11,000,000

Source Walton "Blackpool" except * NSA



Population change in Blackpool 1800 – 2004

Source:
http://www.visionofbritain.org.uk/data_cube_chart_page.jsp?data_theme=T_POP&data_cube=N_TPop&u_id=10091731&c_id=10001043&add=N Accessed 3/1/07

Appendix 2 – The Sewage Treatment Plant at Fleetwood

1 Interceptor sewer
Wastewater and rainfall from Blackpool and Fleetwood enter the works through a new interceptor sewer.

2 Solids removal
Six screens take out all solids larger than 6mm, such as paper, sticks, cloth and other items. These are washed and compressed, and fall into skips on automatic turntables.

3 Grit removal
Sand and grit which has been washed down sewers is removed in three 'bendy channels', a new method invented by employees of United Utilities. The grit mostly comes from the roads, and is taken away for landfill.

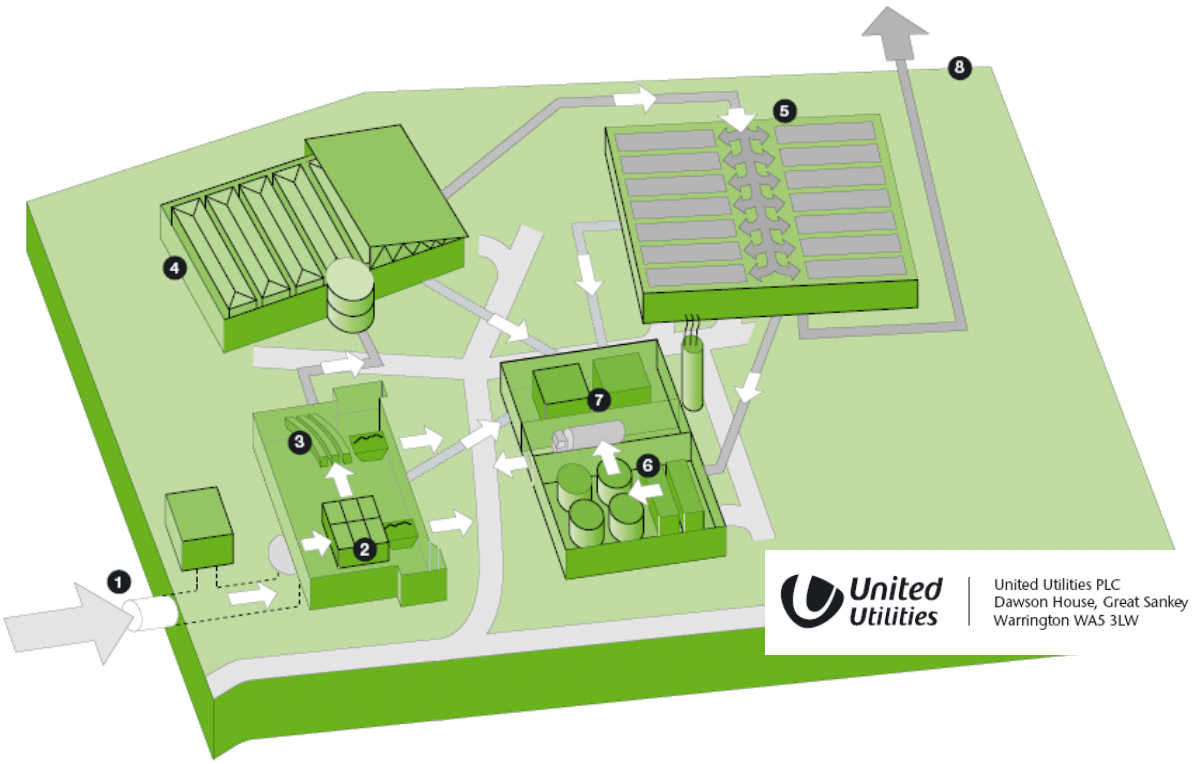
4 Biological treatment
66 honeycombed discs, called submerged biological contractors (SBCs), slowly turn in the flow of wastewater. The SBCs provide a home for millions of bacteria which 'eat' any harmful micro-organisms and other pollutants in the wastewater.

5 Settlement
After biological treatment, the flow of wastewater is slowed down in 14 large settlement tanks, where any solid particles fall to the bottom. These form a liquid sludge at the bottom of the tanks, which is removed every two hours.

6 Sludge
The watery sludge is thickened in two gravity belt thickeners, and taken away by road tankers to our treatment works at Preston. It is pressed to a dry soil-like cake then used in landfill.

7 Odour control
Fleetwood Wastewater Treatment Works is unique. It is fully covered and ventilated. All odours are removed from the air using two triple stage scrubbers, before air is released into the outside atmosphere.

8 Return to sea
The final water is a clear liquid which is pumped out into the Lune Deep through a new buried outfall pipe, five kilometres long. Out at sea, wave action, currents, sunlight, salt and marine micro-organisms complete the natural purification process.

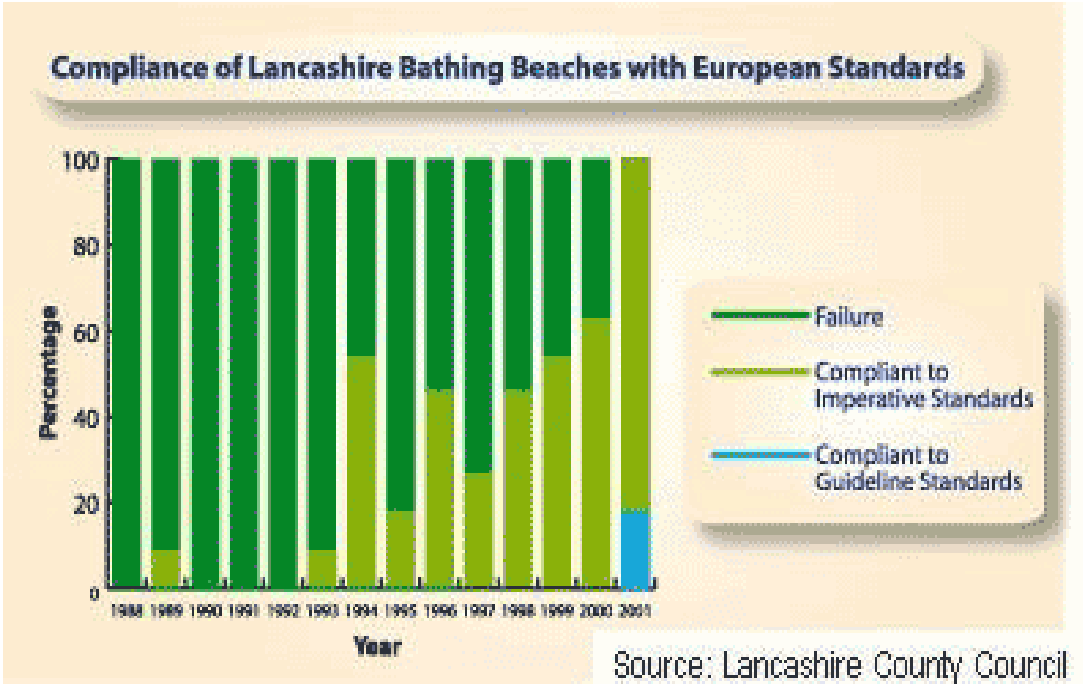


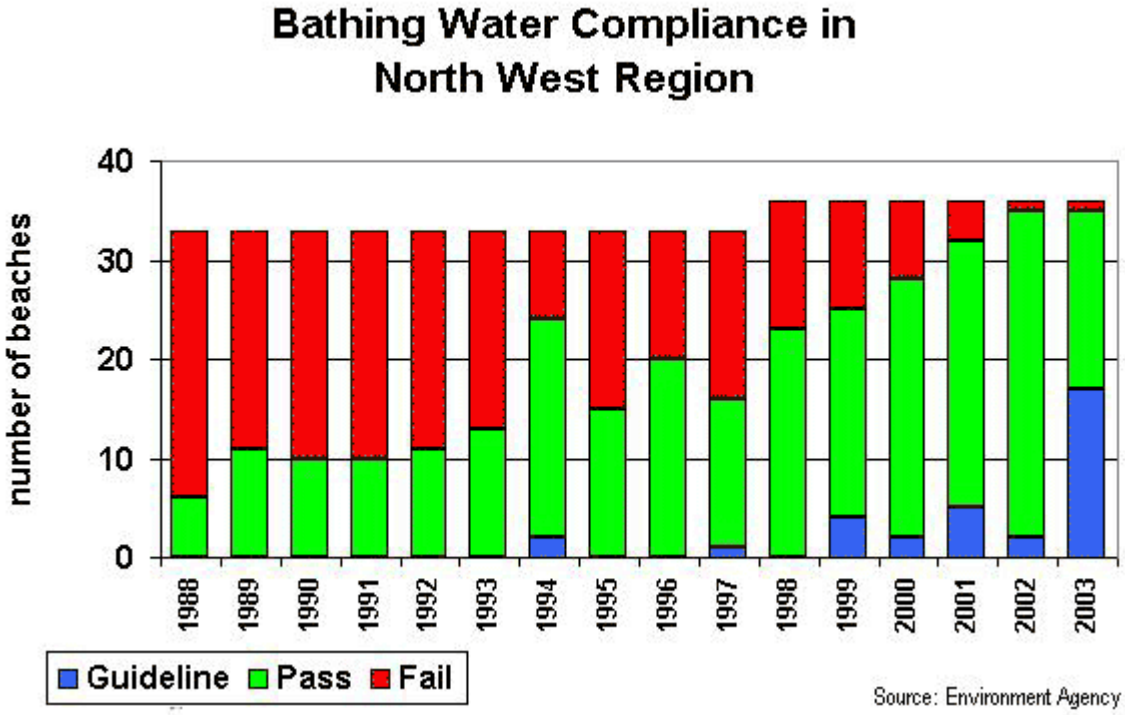
Source – United Utilities Website

The works can treat up to 200 million litres of wastewater a day with an average throughput of 80 million litres. The flow goes through the works at a maximum rate of 2,300 litres per second.

There are 4 tanks at the works to cope with the storm conditions each capable of holding 100,000 cubic metres of water. After a storm the content from the tanks is pumped back to the works for full treatment instead of being dumped straight into the sea as used to happen.

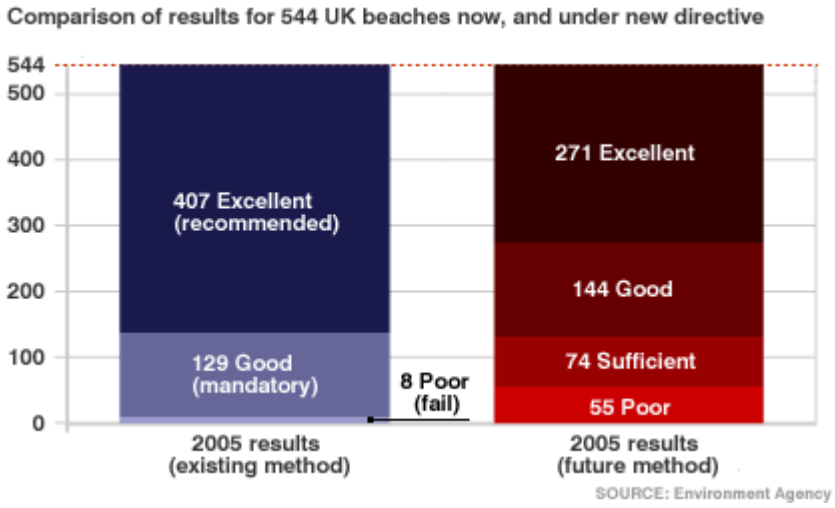
Appendix 3 – The state of compliance of Lancashire Beaches before and following the “Sea Change” and Fylde2 improvement works.





Appendix 4

Comparison of How British Beaches will conform under the Water Quality Rules of 76/160/EEC (existing method) and 2006/7/EEC (new method) Bathing Water Directives.



WATER QUALITY RULES COMPARED

Excellent (or Recommended): Up to 5% risk of sickness after immersing head
Good (or Mandatory): 5% to 15% risk
Poor (or Fail): More than 15% risk

Excellent : Up to 3% risk of sickness after immersing head
Good : 3% to 5% risk
Sufficient (which EU states must reach): 5% to 8% risk
Poor : More than 8% risk

Graphic looks at 544 out of UK total of 559 coastal beaches
Future method results (2002-2005 data set) are worst-case scenario
Results could be improved by predicting pollution incidents

Story from BBC NEWS:
By Alix Kroeger
BBC European Union reporter, Strasbourg
http://news.bbc.co.uk/go/pr/fr/-/2/hi/europe/4620842.stm
Published: 2006/01/18 12:32:50 GMT

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