

Update of Fylde Coastal Waters Improvements

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Abstract

In February 1998 as a consequence of the Bathing Water results in 1997, North West Water (NWW), working under the direction of the Environment Agency (EA), commenced a fast-track programme of further investment in the Fylde Coast area. The main objective of these projects was to further reduce storm discharges to an average of three per Bathing Season per outfall and to provide further treatment (UV) for the continuous discharges of final effluent at some of the existing WwTW's.

The paper presented at last years WaPUG meeting "Modelling Requirements to meet an average of 3 spills per Bathing Season" detailed the modelling methodology carried out to determine the storage volumes required.

This paper updates the story, as construction work is now complete, final commissioning of control strategies and post completion modelling to confirm the operation of the control strategies is ongoing. It also looks at briefly at the joint investigations carried out by NWW and the EA and the impact of this work on AMP3.

Background

In response to the EU Bathing Water Directive, North West Water launched in the early 1990's an ambitious clean-up initiative called 'Sea Change', a £500 million programme of work aimed at improving the quality of discharges to the North West coastal waters. The objective was to assist the Environment Agency in bringing the Bathing Waters up to the necessary standard.

Sea Change included a diverse array of projects, including new wastewater treatment works, pumping stations and major sewerage schemes from Merseyside to Silloth near the Scottish Border.

The prime focus of work along the Fylde Coast included :-

A 14km interceptor tunnel along the seafront from Blackpool's Central Pier to Fleetwood to collect and transport flows to Fleetwood WwTW.

A new WwTW at Fleetwood, capable of secondary treatment of 2200l/s.

Additional secondary treatment at the Clifton Marsh WwTW, which serves the Preston and South Fylde areas.

Although each scheme was completed on time in the summer of 1996 and achieved their requirements in terms of discharge consents and spill frequency, the Bathing Waters results were not compliant with the required quality standard.

In February 1998 as a consequence of the Bathing Water results in 1997, North West Water (NWW), working under the direction of the Environment Agency (EA), commenced a fast-track programme of further investment in the Fylde Coast area. The main objective of these projects was to further reduce storm discharges to an average of three per Bathing Season per outfall and to provide further treatment (UV) for the continuous discharges of final effluent at some of the existing WwTW's as detailed below in Table 1.

Blackpool / Fleetwood Additional storm storage tanks (Blackpool 60,000m³)
Additional storm storage tanks (Fleetwood 30,000m³)
Increased pumping rate to Fleetwood WwTW (2300 -2400l/s)

Clifton Marsh WwTW Additional storm storage tanks (63,000m³)
Installation of UV tertiary treatment plant

Bathing Water	1997
West Kirby	Pass
Meols	Pass
Moreton	Pass
New Brighton	Pass
Formby	Pass
Ainsdale	Fail
Southport	Fail
St Annes	Fail
St Annes North	Fail
Blackpool South	Fail
Blackpool Central	Fail
Blackpool North	Fail
Bispham	Pass
Cleveleys	Fail
Fleetwood	Fail
Heysham	Fail
Morecambe South	Pass
Morecambe North	Pass

Fylde
Coast
Area

Bathing Water	1997
Bardsea	Fail
Aldhingham	Fail
Newbiggin	Fail
Walney Biggar Bank	Pass
Walney Sandy Gap	Pass
Walney West Shore	Pass
Roan Head	Pass
Askam in Furness	Fail
Haverigg	Fail
Silecroft	Pass
Seascale	Fail
St Bees	Fail
Allonby South	Pass
Allonby	Pass
Silloth	Pass
Skinburness	Pass

Table 1 1997 Bathing Water results for the North West of England

- Lytham St Annes area** Major network alterations
New pumping station with increased flow to treatment
Additional storm storage tank (6,300m³)
- Hambleton WwTW** Closure of WwTW
New pumping station, 2km rising main inc. major river crossing
- Hesketh Bank WwTW** Additional storm storage tank (1,200m³)
Installation of UV tertiary treatment plant
- Plus** UV plants at 2 other WwTW's (Southport & Preesall)
Diversion of contaminated SW outfall in Blackpool

Where are we now

The schemes were all commissioned on various dates either before or during the 1999 Bathing Season (1st May to 30th September).

- Blackpool / Fleetwood** 15th Sep. 1999 Additional storm storage tanks (Blackpool 60,000m³)
29th June 1999 Additional storm storage tanks (Fleetwood 30,000m³)
1st May 1999 Increased flow to WwTW (2300 - 2400l/s)

The control strategy that runs the entire system, although simple in overall terms is very complex in the number of items of plant monitored and links between new and existing equipment. To ensure the security of the existing sites and equipment the new control system is being brought online in a phased manner.



Fig 1 Blackpool tanks

Clifton Marsh WwTW 1st May 1999 Additional storm storage tanks (63,000m³)
 1st May 1999 Installation of UV tertiary treatment plant



Fig 2 Fleetwood tanks



Fig 3 Preston WwTW storm tanks



Fig 4 Preston WwTW UV plant

Lytham St Annes area 1st May 1999 Major network alterations and new pumping station
 12th July 1999 Additional storm storage tank (6,300m³)
 Again the new control system is being brought on line in a phased manner.



Fig 5 Lytham PS and storage tank

Hambleton WwTW 29th April 1999 WwTW closed and flows transferred to Poulton PS.

Hesketh Bank WwTW 16th May 1999 Additional storm storage tank (1,200m³)
1st May 1999 Installation of UV tertiary treatment plant

Plus 1st May 1999 UV plants at 2 other WwTW's (Southport & Preesall)
1st May 1998 Diversion of contaminated SW outfall in Blackpool



Fig 6 Southport WwTW UV plant



Fig 7 Preesall WwTW UV plant

Early indications are that all the schemes are working as intended. Concerns about the operability of the large storage tanks in Blackpool and Fleetwood and their possible affect on the WwTW at Fleetwood have so far proved unfounded. The Blackpool tanks have been utilised on over 12 occasions since becoming operational in September and alleviated at least 2 discharges during the Bathing Season.

NWW and the EA have been continuing a number of joint investigations :-

- ◆ Construction of a mathematical model of the Ribble estuary and adjacent coast
This will lead to a better understanding of the local estuarial and inshore currents.
- ◆ 24 hour sampling of Bathing Waters
From the limited information available this has shown that the water quality is worse at high tide than at low tide and also varies considerably between individual sites.
- ◆ Sampling of beach streams
Again this has shown very variable results.
- ◆ Boreholes sampling of the beach itself
This was to check for contaminated groundwater seeping up through the beach itself. Results were negative.
- ◆ DNA fingerprinting of the Coliforms
This is to determine source of the bacterial contaminants, human, animal, or bird faeces. This work is due to be completed in December 1999.

Initial results from some of these investigations and this years sample results have made it clear that discharges from the sewerage system are **NOT** the sole cause of failures of the Bathing Waters and that the marine environment is much more complex than some people first thought. An example of this happened earlier this year.

As Fig 8 shows the new storage tanks at Fleetwood became operational in June and as a result there were no discharges from the Fylde Coast sewer network overflows between end of June and early September. However, the Bathing Waters in Blackpool failed on 8 occasions.

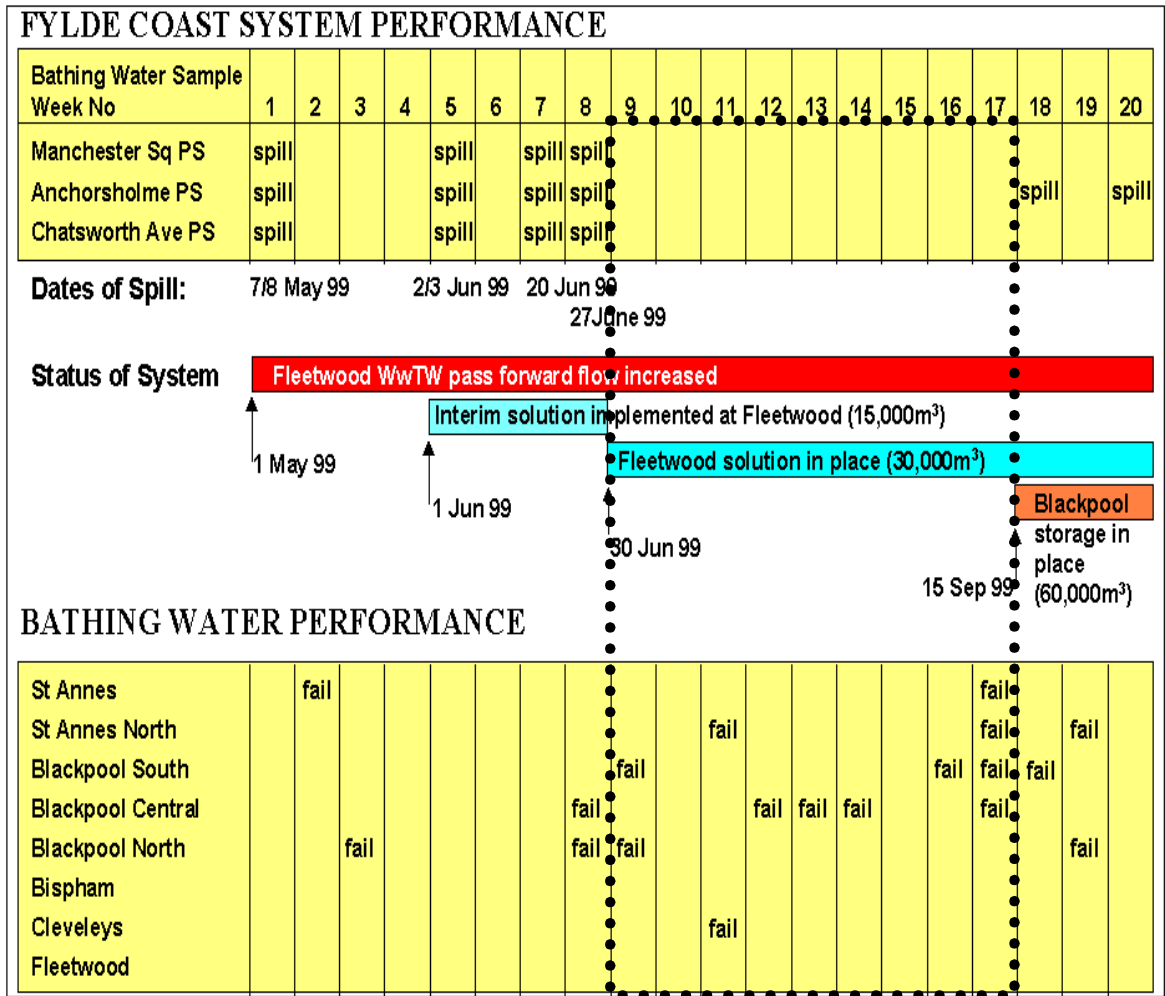


Fig 8 Blackpool discharges v Bathing Water quality

Another area of difficulty is the presentation of the Bathing Water results themselves and the public's perception of the work being carried out to improve the situation.

An example of this is shown below with the normal Pass/Fail table.

When 5 years of Bathing Water results are plotted together the initial picture looks very bleak, as it seems to show that, considering the huge sums of money spent, there has been very little improvement in Bathing Water quality especially on the Fylde Coast.

Bathing Water	1995	1996	1997	1998	1999
West Kirby	N/A	N/A	Pass	Pass	Pass
Meols	Pass	Pass	Pass	Pass	Pass
Moreton	Pass	Pass	Pass	Pass	Pass
New Brighton	Pass	Pass	Pass	Pass	Pass
Formby	Pass	Pass	Pass	Pass	Pass
Ainsdale	Pass	Pass	Fail	Pass	Fail
Southport	Fail	Pass	Fail	Pass	Fail
St Annes	Fail	Fail	Fail	Fail	Fail
St Annes North	Fail	Fail	Fail	Fail	Fail
Blackpool South	Fail	Fail	Fail	Fail	Fail
Blackpool Central	Fail	Pass	Fail	Fail	Fail
Blackpool North	Fail	Pass	Fail	Fail	Fail
Bispham	Pass	Pass	Pass	Pass	Pass
Cleveleys	Fail	Pass	Fail	Pass	Pass
Fleetwood	Pass	Fail	Fail	Pass	Pass
Heysham	Fail	Fail	Fail	Pass	Pass
Morecambe South	Fail	Pass	Pass	Fail	Pass
Morecambe North	Fail	Fail	Pass	Pass	Pass
Bardsea	Fail	Fail	Fail	Fail	Pass
Aldingham	Pass	Fail	Fail	Fail	Pass
Newbiggin	Fail	Pass	Fail	Fail	Pass
Walney Biggar Bank	Pass	Pass	Pass	Pass	Fail
Walney Sandy Gap	Pass	Pass	Pass	Pass	Fail
Walney West Shore	Fail	Fail	Pass	Fail	Fail
Roan Head	Fail	Pass	Pass	Fail	Pass
Askam in Furness	Fail	Fail	Fail	Fail	Pass
Haverigg	Fail	Fail	Fail	Fail	Pass
Silecroft	Pass	Pass	Pass	Pass	Pass
Seascale	Fail	Pass	Fail	Pass	Pass
St Bees	Fail	Pass	Fail	Pass	Pass
Allonby South	Pass	Pass	Pass	Pass	Pass
Allonby	Pass	Pass	Pass	Pass	Pass
Silloth	Pass	Fail	Pass	Pass	Pass
Skinburness	Pass	Fail	Pass	Pass	Pass

Table 2 Bathing Water results for the North West of England

However, another way of looking at the results and probably more accurate in terms of true environmental benefit gained is to plot the geometric means of the individual sample results.

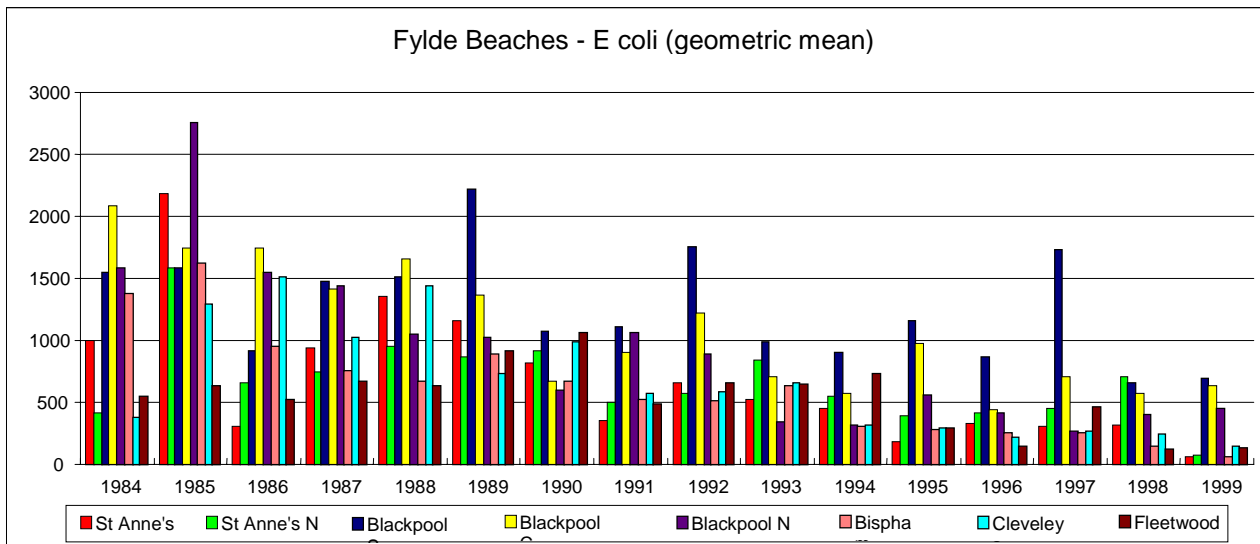


Fig 2. Geometric means

As can be seen from the chart above there has been a constant year on year improvement for the majority of beaches since 1994.

Plans for the future

As a result of having to carry out ground freezing on the connecting tunnels at both Blackpool and Fleetwood the phased commissioning of the automatic control systems was not completed as early as had been anticipated. This has had the knock on effect of delaying the post completion modelling runs to validate the control strategies.

The proposed work is as follows :-

1. Collect detailed data (rainfall, flow, level, pump operation etc.)
2. Run the rainfall/flow data through the models, either as single storms or continuous simulation.
3. Compare the model results with the data recorded on the SCADA and other systems and against what the detailed control strategies stated.

This action plan has been agreed with the EA as a way of checking the systems performance. This work is under way for the Lytham St. Annes area and together with the other areas will be completed this winter.

Impact on AMP 3

North West Water unlike the other water companies has a large number of UCSO's in its AMP3 Intermittent Discharge Programme designated as Bathing Water overflows. This means that they will have to meet the average 3 spills per bathing season requirement.

The modelling methodology used to size the various storage tanks for the recent projects was discussed in detail in last year's paper. This was derived in a very short timescale and was the correct and only way of achieving the required outputs.

This methodology set new standards for this area of hydraulic modelling. But to stand still would be to effectively go backwards. Therefore, we are currently reviewing this methodology and identifying areas where further improvements can be made.

This new improved methodology will be implemented for the Bathing Water element of the AMP3 Intermittent Discharge Programme.

Discussion

Question

Martin Osborne

BGP Reid Crowther

On the spills diagram that showed improvements and sampling results, when was the polluted surface water sewer connected to the sewer?

Answer

At the beginning of 1998 so this did not feature in the results.

Written Question

Jon Farrer

Bullen Consultants Ltd

Because there are numerous unfinished UPM projects in Preston/Blackburn/Nelson etc. along the Ribble Valley would these radically improve water quality (when completed) along the Fylde Coast area?

Answer

The Blackburn and Nelson UPM projects whilst bringing benefits to both the local and wider river environments are unlikely to have a major impact on the Fylde Coast area.

The Preston UPM project is only looking at one sub-catchment of the Preston area and again whilst bringing benefits to both the local and wider river environments are unlikely to have a major impact on the Fylde Coast area.

However, for AMP3 the EA have designated ALL the UCSO's in the Preston area as impacting on Bathing Waters and therefore they will all have to meet the Ave 3 spills / Bathing Season standard. There is currently no evidence that any of these UCSO's have a direct impact on the Fylde Coast area.