

# Oldham UPM Study – A Case Study.

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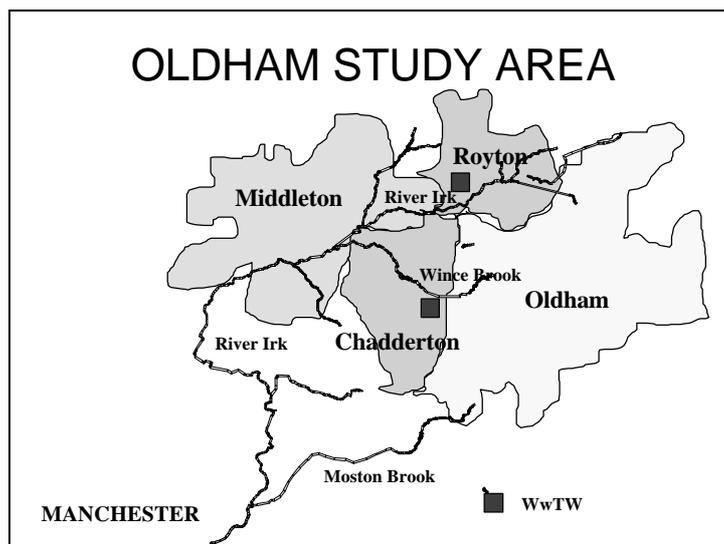
## Introduction

The Oldham UPM Study formed part of the NWW AMP2 UPM Study Programme, which covered nine study areas. The programme was the first and largest commercial use of the UPM Procedures in the UK. Scoping work commenced in September 1994, Data Collection commenced on site in August 1995, and the study commenced in September 1995.

The study programme was managed by NWW. The Oldham UPM Study was carried out by a joint team from Montgomery Watson Ltd and NWW. Data Collection was carried out by Insight surveys, again managed by NWW. Some previous work had been carried out by WRc as part of the Middleton UPM Pilot Study.

## Description of Study Area

The Oldham UPM Study addressed the impact of intermittent discharges on the River Irk and its tributaries, Moston Brook, Boardman Brook and Wince Brook. The study area contains two Wastewater Treatment works, Royton WwTW which discharges effluent towards the head of the River Irk, and Oldham WwTW which discharges near the head of Wince Brook. The Oldham WwTW is effectively two works, the older Chadderton works and the newer Oldham works. The majority of flow enters the Oldham works via the Oldham Deep Interceptor Sewer (ODIS).

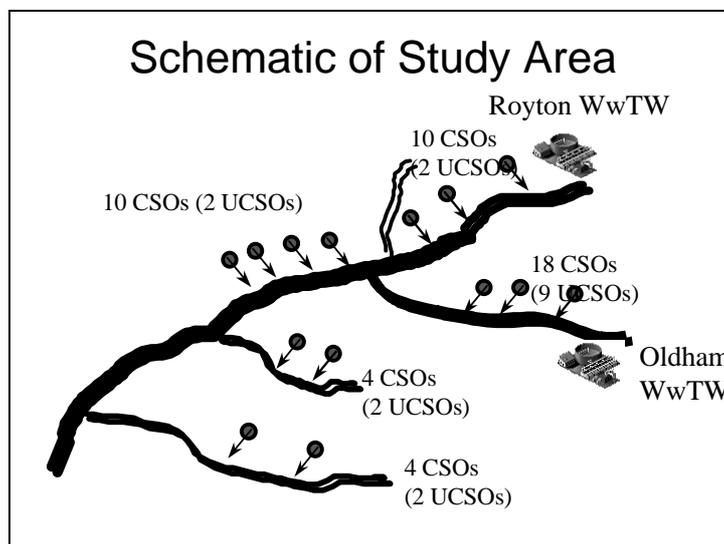


The study area covers a domestic population of 223,000 covering an area of approximately 2800 hectares broken down as follows:-

Catchment	Area (ha)	Population
Oldham	1300	110,000
Chadderton	410	26,000
Royton	320	27,000
Middleton	800	60,000

## Summary of Need

Discharges from the network unsatisfactory overflows (uCSOs), WwTW inlet uCSOs and treated effluent in the Irk catchment were targeted by the Environment Agency as high priority problems requiring attention in the Asset Management Plan (AMP) period 1995-2000. Improvements to the treatment process at both Royton WwTW and Oldham WwTW were included in the National Environmental Programme. The schematic below shows the number of CSOs, uCSOs and the river reaches to which they contribute.



Analysis of the scale of the problem suggested the use of the Urban Pollution Management Procedures. Because of the complexity of the interaction of the wastewater networks, wastewater treatment works and the receiving watercourses, full river impact studies were carried out, including network flow and quality modelling, wastewater treatment process modelling and river impact modelling.

## Details of Study

The full study was carried out using the procedures and methodologies within the Urban Pollution Management manual First Edition.

Where possible existing verified models were used and checked for suitability.

Network modelling

Hydraulic models were available for the whole catchment from previous Drainage Area Studies carried out. These were in Walrus format and were converted to Hydroworks models, These were validated as part of the calibration and verification process for the network quality modelling.

Network quality models were built of the ODIS, Chadderton, Royton and Middleton networks.

#### Wastewater Treatment Process Models

Stoat models were built of the Royton and Oldham WwTWs. These were calibrated for both dry and wet weather operation. The storm tanks were included in both the Stoat model and in the wastewater network models.

#### River Models

Calibrated and verified Mike 11 river models were available for parts of the River Irk and Wince Brook from the previous Middleton UPM Pilot Study. These were extended upstream as far as the WwTW. In addition an uncalibrated model was built of the River Irk downstream from the Middleton boundary to the confluence with the River Irwell in Manchester. This allowed checks to be made that solutions developed in the upstream lengths of the river still met standards downstream.

#### Rainfall modelling.

A ten year summer series of rainfall was developed using Stormpac. This was checked against 25 year rainfall records from raingauges within the catchment.

#### Development of BOD Standards for the watercourses.

Analysis was carried out on the River Irk, Wince Brook, Boardman Brook and Moston Brook. The River Irk and Wince Brook had BOD standards developed from the use of the verified Mike 11 models, by using multiple runs with varying BOD loads and plotting against DO predicted in the watercourse. The standards for Boardman Brook and Moston Brook were derived from table 3.3 of the UPM Manual, based on width/depth ratio and the slope of the slackest reach of reasonable length in the watercourse.

<b>Watercourse</b>	<b>Derived BOD Standard (mg/l)</b>
River Irk	Formula A pass forward
Wince Brook	32 mg/l
Moston Brook	45 mg/l
Boardman Brook	Formula A pass forward

#### Checks against Standards

The existing operation of the wastewater system was checked for compliance against standards using mass balance approaches as set out in the UPM Manual. Compliance was checked against the 1 year 6hour Derived BOD standard, and both the 1 year and 1 month 6 hour fundamental unionised ammonia standards.

## **Strategy Development**

If the watercourse was predicted to fail the intermittent standards, a strategy for upgrading work was developed. This considered the following options:-

- Amendments to Flow to Full Treatment at WwTW.
- Storage, either mobilisation of existing or construction of new storage.
- Abandonment of the uCSO
- Increased pass forward of flows downstream.

The use of RTC was also considered.

In all cases the improved final effluent standards required for the continuous discharges from treatment works were used.

### **Strategy Summary**

The overall strategy developed was to pass forward as much flow as possible downstream and increase storage at the WwTW. Where possible uCSOs were abandoned. Any improved CSO was upgraded or reconstructed using an FR0488 type CSO and 6mm equivalent screens.

### **Implementation**

The UPM strategy report was completed in October 1997. The strategy has been further developed by NWW and Bechtel Water Technology, our design and construction management partners. All the projects required for completion in the AMP2 period have been through a detailed optioneering and design process, and are currently in the construction stage. These will be delivered in advance of the March 2005 target dates. Development of the strategy and Throughout the strategy and project development, close consultation with the Environment Agency has taken place.

### **Conclusion.**

The Oldham UPM Study was successful in assisting in the development of a robust strategy for meeting the water quality requirements of the watercourses in the catchment. By using the detailed UPM process the major contributors to the water quality problems could be identified and capital expenditure focused on these problems. In this case, the biggest benefit will be achieved by improvements to the continuous discharges from Oldham and Royton WwTWs.

### **DISCUSSION**

#### **Question**

**Katherine Pygott**

**WS Atkins**

What water quality were you getting at the Irwell? Was this uncalibrated?

#### **Answer**

With uncalibrated model, we just used the model to check we were not making things worse downstream i.e. DO sags.

#### **Question**

**Andy Sharpe**

**Binnie Black and Veatch**

Sampling was triggered based on Met Office predictions, was this successful?

#### **Answer**

Yes it was still using the Met Office forecasts to give the survey contractor 6 hours notice. We are now looking at remote triggering of samples to reduce the time to 2 hours or better. This will be more reliable. The 2 hours can be better but this is not a contractual requirement. The forecast is still a bit uncertain , particularly with large or multi-peak events.

**Question**                      **Jeremy Lumbers**                      **Tynemarch**

The river system was dominated by algal variations upstream and by ammonia concentrations downstream. Would a mini bubbler in the river be beneficial. It may be cheaper than tertiary treatment.

**Answer**

Wince Brook and Royton set for continuous standards and this could be achieved with worke being carried out on the network. Bubblers are being considered elsewhere.

**Question**                      **Chris Sedgwick**                      **Severn Trent Water**

You have put in a lot of storage did you look at the draw down effects of this on the STW and the river?

**Answer**

Not really considered , the storage solution evolved. We ended up with more spills from the storm tanks , but the works were being redesigned at the same time to a much higher 10 – 30 standard. It could have been a problem if the existing works had been retained.