

# Oldham and Royton Integrated Strategy (ORIS)

UUs' £80m project in the Oldham area of Manchester to improve the environment, future-proof wastewater treatment assets and optimise operation and maintenance

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United Utilities is the regional water company for the North West of England, delivering water and wastewater services to 7m people from Cheshire to the Scottish border. Oldham WwTW and Royton WwTW are two major treatment works located in Oldham, to the north east of Manchester. The Oldham and Royton Integrated Strategy (ORIS) project combines both the wastewater network and wastewater treatment drivers at these two works into a single integrated project. The integrated approach will give significant savings to both capital and operational expenditures and will also release operational land, and replace existing time expired assets. The backbone of the solution is to close Royton WwTW, transfer flow 4km to Oldham and rebuild Oldham WwTW to treat the combined flows to meet a higher river water quality standard. At both sites, additional storm storage is required to improve storm discharge. The project will be commissioned in 2017 and has an approved budget of c£80m.



Oldham WwTW - Courtesy of United Utilities

## Background and need

Both Oldham WwTW and Royton WwTW discharge final and storm effluent to watercourses that are tributaries of the River Irk, and both have AMP5 requirements to improve the river water quality. Oldham WwTW has a population equivalent of 157,000 and Royton WwTW 28,000.

The Oldham and Royton Integrated Strategy was born out of two AMP5 projects.

- **Oldham WwTW Freshwater Fish Directive (FFD)**  
Oldham needed to meet a new tighter final effluent consent of 6mg/l BOD and 1mg/l ammonia (from 15mg/l and 2mg/l respectively) to meet the Freshwater Fish Directive (FFD).
- **Oldham & Royton Storm Tank UIDs**  
Both Oldham WwTW and Royton WwTW storm discharges were classified as UIDs (unsatisfactory intermittent discharge) with a target to improve the River Irk to RE 4 standard.

In addition some of the assets at both Oldham and Royton WwTW are old and will need significant refurbishment and maintenance in the near future.

## Original AMP5 solutions

Initially, individual solutions for both the Oldham and Royton sites were developed independently of each other. These two projects were to be delivered by two separate delivery teams using United Utilities AMP5 delivery partners. The proposed solutions were:

- **Oldham WwTW FFD**  
A new quaternary rapid gravity filter (RGF) on the end of the existing Oldham WwTW process train.
- **Oldham & Royton Storm Tanks UIDs**  
Additional storm water storage, approximately 35,000m<sup>3</sup> at each of the WwTWs (total 70,000m<sup>3</sup>).

During 2012, it became apparent that these two solutions were unlikely to be the best way forward; the additional 70,000m<sup>3</sup> storage would mean that Oldham WwTW and Royton WwTW would operate at FTFT (flow to full treatment) much of the time whilst emptying these large storage tanks.

Prolonged operation at full flow would also make it impossible to take process units off line for maintenance, which in turn would risk compliance. In addition the activated sludge process plant at Oldham dated from the 1930s and required significant maintenance to keep it operational.



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At Royton WwTW UU would need to purchase land to construct the required 35,000m<sup>3</sup> storm storage tanks. United Utilities also became aware of a possible future requirement to meet 6 BOD at Royton WwTW in AMP6 to comply with the Water Framework Directive.

### Oldham & Royton Integrated Strategy (ORIS) Project Concept Phase - Option Selection

The ORIS project was born in June 2012, when finance was approved to look at an integrated solution instead of the two individual solutions. Integrated refers to looking at both the storage and treatment drivers in one project. Four possible Integrated Solutions were considered by the team.

1. Close Royton WwTW and transfer flow to Oldham WwTW for treatment.
2. Develop solutions at each site, integrating the UID and WwTW drivers.
3. Close both sites and develop a completely new WwTW at a new location.
4. Remove surface water run off from the catchment.

Jacobs UK Ltd, one of United Utilities framework Engineering Consultants in AMP5 was appointed to review the options, develop the solutions and produce outline scope documents to allow United Utilities in house estimating team to produce cost estimates for each solution. Jacobs was supported by United Utilities Wastewater Network and River Modelling Team, who carried out all the modelling to determine optimum storm storage volumes at both locations and FTFI figures required to meet the River Water Quality targets.

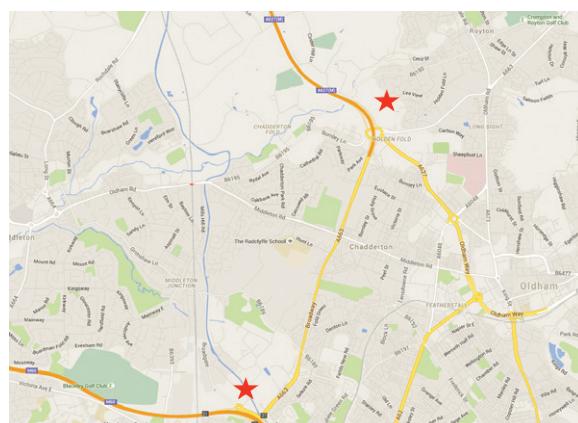
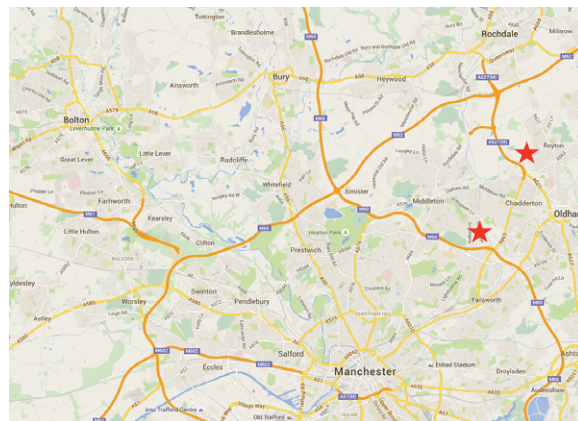
It quickly became apparent that the key was to increase the flow to full treatment as this significantly reduced the volumes of storm storage required. At Royton it was decided to relocate the settled storm sewage outfall from Luzley Brook to the River Irk, where better dilution could be achieved.

Options 2 and 4 were found to be impractical, which left option 1 and 3 in the running. Jacobs developed both these options, and whilst both were possible it was apparent that Option 1, the transfer of flow to Oldham was the more elegant solution. It was also the cheaper solution on a whole life cost basis, and required no land purchase, as UU owned sufficient land at Oldham WwTW to construct the new processes.

Option 3, a completely new WwTW on a new site was dropped when it became apparent that Option 1 was feasible. The land purchase and the need to obtain consents for a completely new WwTW would be both costly and time consuming, and it was unlikely that planning consent would be granted, when a feasible option on land owned by UU existed. Option 1 was therefore accepted by the United Utilities Capital Investment Committee as the preferred solution on 29 May 2013, at an estimated project cost of £114m.

### Definition phase: Development of the preferred solution: Option 1: Close Royton WwTW and transfer flow to Oldham WwTW..

Jacobs was appointed to develop the solution and prepare tender documents. During the concept phase Jacobs had established that a feasible pipeline route existed between Royton WwTW and Oldham WwTW; they now looked for the optimum route, hoping to find a route that minimised impact on traffic and on residents. Jacobs developed a pipeline route between Royton and Oldham that allowed a gravity transfer, thus saving the costs associated with a pumping station. This route also avoided as much highway as possible, thus reducing the impact of pipeline construction on United Utilities customers. It was also decided to retain the existing inlet works at Royton so that the sewage transferred would be screened and degrittied, thus reducing the risk of pipe blockages and minimising pipeline cleaning and maintenance, as well as avoiding the cost of increasing inlet works capacity at Oldham.



Oldham WwTW and Royton WwTW location map  
Courtesy of United Utilities



Oldham WwTW - Aeration lanes built in the 1930s  
Courtesy of United Utilities



Royton WwTW - Courtesy of United Utilities





At Oldham WwTW, where United Utilities owned sufficient land to construct the new works (see photo below) a completely new fully nitrifying activated sludge process with deep final settlement tanks followed by rapid gravity filters to provide tertiary filtration was proposed.

During this period United Utilities was developing its AMP6 strategy, which included using design build contractors to bring more innovation to solutions. It was decided that ORIS would be tendered as a design and build contract, and Jacobs work order was changed to reflect this.

Jacobs new task included developing a reference design for both the pipeline and the wastewater works, and gathering data to be issued to tenderers. This included wastewater, topographical, geotechnical and ecological surveys as well as trawling various archives at UU for useful as built and historic records.

The reference design included the transfer pipeline, together with a layout for both Royton and Oldham WwTW. The FTFT had been increased at Oldham to 2,245l/s, approximately 6 DWF. The process selected was a nitrifying ASP with deep final tanks and a tertiary rapid gravity filter. The storm storage volumes were significantly reduced, Royton requiring an additional 5,700m<sup>3</sup> and Oldham an additional 12,000m<sup>3</sup>.

Using the reference design a planning application was submitted and approval received in August 2015.

Whilst carrying out the Flood Risk Assessment it became apparent that on large storms that commenced when the storm tanks at Oldham were already full, the transfer of 325l/s from Royton increased the flood risk in Wince Brook, downstream of Oldham WwTW. There are four properties that already flood and the ORIS project made the flooding slightly deeper on critical duration





storms. On storms that commenced with the storm tanks empty the flood risk was reduced. A number of mitigation options are currently being pursued and it is hoped that a joint project can be carried out with the EA and local authority that will both mitigate any increase in flood risk caused by the project and also mobilising sufficient flood plain storage to remove the four properties from the flood register.

#### Commercial

A full OJEU notice was placed in September 2013 inviting interested contractors to register their interest and respond to a prequalification questionnaire during November and December 2013. A short list of 5 tenderers which included several Joint Ventures was selected. Tenders were invited in February 2014 based on a Design & Build Contract using the I Chem E Red Book Form of Contract.

Whilst assessing the tenderers, United Utilities received the interim AMP 6 determination from OFWAT and learnt that the Oldham and Royton Integrated Strategy Project would not be fully funded. This diverted the team from tender assessment to supporting the Project Sponsor in providing information to OFWAT to successfully justify the funding of the project. The team also reviewed the scope and requirements of the project, which resulted in the removal of the requirement for tertiary filtration; however most tenderers decided to retain the filtration so as to ensure they could comply with the process guarantees.

#### Contract award to Black & Veatch

The project main contract was awarded to Black & Veatch on 18 May 2015 and the scope comprises:

- New 4.0km of gravity transfer pipeline to Oldham WwTW to transfer 325l/s.
- New 7,280m<sup>3</sup> storm storage.
- Associated HV and LV systems.
- Telemetry.
- Demolition of redundant assets.

#### Oldham WwTW

- Reception of new transfer pipeline.
- New FTFT control increased to 2,245l/s.
- Refurbishment of existing primary settlement tanks.
- New fully nitrifying ASP.
- New deep final settlement tanks.
- Tertiary filtration by disc filter.
- New SCADA for the full site, including sludge processing areas, Royton WwTW and the transfer pipeline.
- Upgrade to HV systems.
- Telemetry.
- Additional 12,000m<sup>3</sup> of storm storage.
- Demolition of redundant assets.
- Landscaping and invasive species eradication.

#### Conclusion

At the time of writing (August 2015), Black & Veatch are carrying out the design, which is scheduled to be significantly complete by Christmas 2015. Construction will commence in September 2015, with ground remediation and will be complete in 2018. It is anticipated that United Utilities and Black & Veatch will jointly provide an article highlighting the detail design and construction of this project in a future issue of UK Water Projects.

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#### Royton WwTW

- New inlet CSO and storm storage.
- New FTFT control set to 325l/s.
- New storm outfall to River Irk.

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