

Clapham, Austwick and Newby WwTW

United Utilities' new wastewater treatment works in the Yorkshire Dales

by Peter T Ratcliffe BSc C Eng MICE

The purpose of this project was to end unsatisfactory discharges to groundwater at three existing works, Clapham WwTW, Austwick WwTW and Newby WwTW, situated in the Yorkshire Dales between Settle and Ingleton. At the original WwTW, sewage was treated by screening and septic tanks, the effluent from Clapham and Austwick was then discharged to lagoons and drying beds respectively, which exfiltrated to ground. At Newby the effluent was discharged to a soakaway. The Groundwater Regulations came into force on 1st April 1999, and in compliance with Groundwater Directive 80/68/EEC, effluent discharges to ground were no longer permitted. Following these changes to legislation United Utilities removed the final effluent from the works by tanker, whilst a permanent solution was sought.



Clapham WwTW - The completed works - March 2011

Courtesy of KMI Plus

Team approach

The project team is an integrated partnership made up of United Utilities, MWH and KMI Plus. The team is made up of staff from all partners with the objective of delivering the best solution, safely, on time and at the lowest whole life cost. The project team manage, design and construct projects through concept, definition, implementation and handover stages of the project.

The £13m project comprised a new WwTW at Clapham, new pumping stations at Austwick and Newby to transfer flows to Clapham WwTW, together with a new outfall pipeline to discharge final and storm effluent to the River Wenning.

Flows and loads

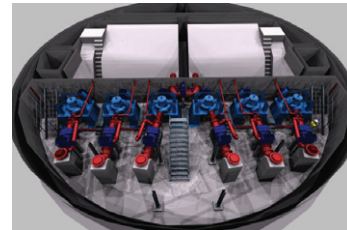
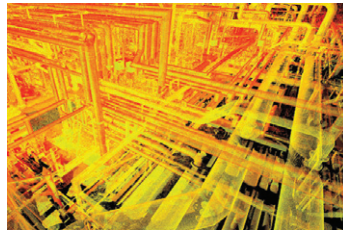
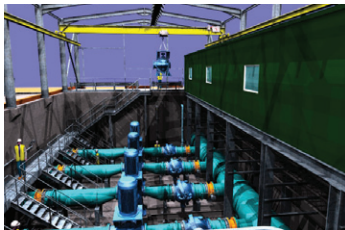
The influent loads and flows have huge variations. The Yorkshire Dales is a popular tourist area famous for its limestone scenery and caves. Ingleborough Cave is a very popular tourist destination. The resident population of 915 increases in summer to a population equivalent of 1,700, due to both tourists staying overnight and day visitors.

Flows into the new Clapham WwTW vary from a minimum 0.8l/s to a peak of 76 l/s during storms. The minimum flow is the night time gravity flow from Clapham village, when the pumped flows from Austwick and Newby are zero (whilst sumps are filling) The design flow to full treatment is 21.4 l/s and excess flows are spilled at the inlet overflow to storm lagoons with a capacity of 2,700m³. When full, the lagoons overflow to the final effluent pumping station, which pumps final and storm effluent to the River Wenning. The storm lagoons are pump returned to the inlet CSO when there is capacity.

Selecting the location for the WwTW

The option of reconstructing all three works and seeking three new discharge consents was considered and dismissed during AMP3. An initial proposal was developed to pump the sewage from all three locations across a watershed to Settle WwTW, which was to be extended to deal with additional flow and load. Settle WwTW is 4.5km to the south east of Clapham. This solution would have a considerable operational cost due to the pumping, so further alternative solutions were sought.

Award winning projects



Innovative solutions

■ Frodsham
 ■ Cheadle
 ■ Leeds
 ■ St Albans



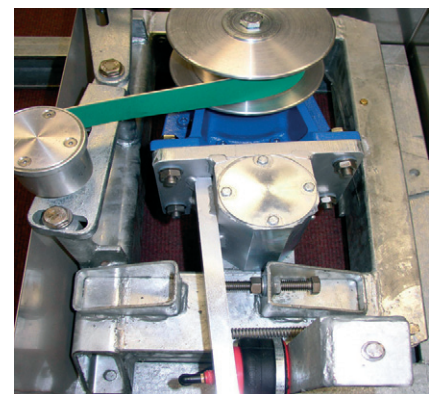
www.ghalivigunn.com

Filter Distributor Drives

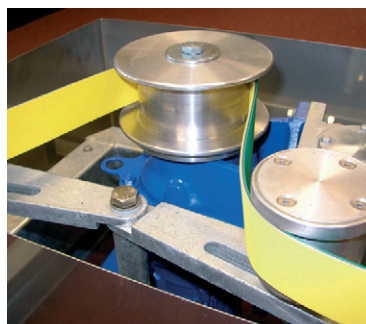
KEEPING YOUR FILTER ROTATING UNDER ALL CONDITIONS



- High Torque Capacity for Large Bacteria Beds
- Excellent Reliability
- Flexible Speed Ranges
- Programmable Media Flushing Regime



- Low Energy Consumption
- Universal – Can be Fitted onto any Distributor
- Gives Consistent Effluent Treatment
- Ideal Replacement for Inefficient Hydraulic Drives



AVAILABLE OPTIONS INCLUDE:

- Continuous Operation even during Power Outages
- Drive Speed set Proportional to Flow through the Bed
- Custom Speed Ranges to Suit Special Applications.

For more information and further details please contact:
Drive Systems Limited T: 01772 703222 F: 01772 703272
www.drivesystems.co.uk e-mail: info@drivesystems.co.uk



Winter at Clapham WwTW: 5 January 2010

Courtesy of KMI Plus

A more economical solution was identified to site a new treatment works near Clapham, which reduced both pipeline lengths and static head. A number of possible locations for the new works were considered. The selected site is in agricultural land alongside the existing Clapham WwTW. This has the advantage of being fed by gravity from Clapham, good road access for construction and subsequent operation and it was also low lying and therefore easier to minimise the visual impact by landscaping. The Clapham site is about mid way between the outlying villages of Austwick and Newby, from where flow would need to be pumped to Clapham.

The scope was accepted by United Utilities Project Review Group in 2007. The design at the chosen site was developed and the Solution Scope Book issued for pricing in December 2007. Planning consent was sought, and approval for Clapham WwTW was received in April 2008.

Outfall location selection

The selected site is alongside Clapham Beck, adjacent to the existing Clapham WwTW. Clapham Beck is a small watercourse and the EA advised that the consent would be 10 : 15 : 1 (BOD : SS : NH₃), whereas if the new works was to outfall to the River Wenning, 1.5km away the consent would be 30 : 45 : 2. It was considered that the 1mg/l ammonia consent would place United Utilities at significant risk of failure, and it was decided to discharge to the River Wenning.

Scope of works

The scope comprised a new WwTW at Clapham, together with pumping stations and pipelines to transfer flows from Austwick and Newby. The works is a traditional biological filter works, with a tertiary nitrifying SAF and a final effluent pumping station. In addition there are sludge storage and thickening facilities and an odour control unit.

In more detail Clapham Wastewater Treatment Works comprised:

- Inlet overflow
- Inlet works
- Primary Settlement Tanks
- Interstage Archimedean screw pumping station
- Biological Filters
- Humus Tanks
- Tertiary Nitrifying SAF
- Final Effluent Pumping Station
- Sludge Storage / Thickening Tanks
- Odour Control Unit
- Control and Welfare Building
- Storm sewage lagoon return pumps
- Landscaping

Pipelines & pumping stations comprised:

- Austwick Pumping Station, nutriox dosing, combined sewer overflow, and 2.57km of pipeline
- Newby Pumping Station, nutriox dosing, combined sewer overflow, and 2.19km of pipeline
- Final Effluent Pumping Station from Clapham Wastewater Treatment Works to the River Wenning Outfall and 1.57km of pipeline

Detail design

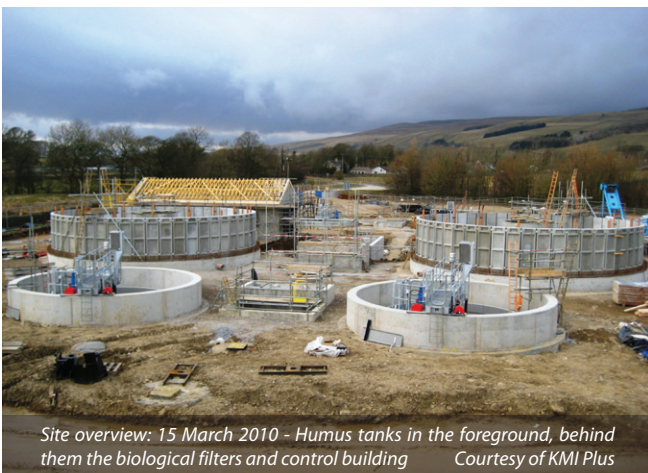
Following financial approval and award of the contract in March 2009, the construction partner, KMI Plus, carried out the detail design and construction.

During construction it became apparent that the EA would also require a phosphate consent of 2mg/l, and an iron consent of 5mg/l. A sampling regime was put in place to sample raw sewage at Clapham and Austwick. The phosphate would be removed by precipitation following dosing of ferric sulphate, there was sufficient



Clapham WwTW: Site Overview - 1 march 2010

Courtesy of KMI Plus



Site overview: 15 March 2010 - Humus tanks in the foreground, behind them the biological filters and control building

Courtesy of KMI Plus



Clapham WwTW: Completed works March 2011

Courtesy of KMI Plus

alkalinity in the raw sewage to negate the need for alkalinity dosing. A ferric sulphate plant was designed with minimum alterations to the site layout. It was decided that the ferric sulphate dosing plant would use a Lintott package plant designed to be compliant with United Utilities asset standards. The bundled dosing rigs, and ferric sulphate storage tank were all enclosed in a single GRP unit which was factory built by Lintott and delivered to site. Site work was limited to the construction of a concrete slab and making cable and dosing line connections.

The addition of this ferric sulphate dosing plant required a separate planning application. Consent was received on 18 October 2010.

Construction

The site works started on 14th April 2009 with construction of pipelines. It was a condition of the access agreements with the landowners that in order to minimise disturbance and reinstatement of the fields, pipelaying would be carried out in the summer months. Construction of the treatment works commenced in September 2009.

The site team was determined to maintain good relationships with the farmers along the pipeline route. This started with pre-entry meetings, continued with regular meetings throughout construction and culminated in giving the landowners a guided tour of the new treatment works on completion.

Another feature of the pipeline was 2 (No.) crossings of a new 1,200mm regional trunk gas pipeline, that was constructed by National Grid ahead of our project. United Utilities arranged for sleeves to be installed by National Grid to accept the wastewater pipeline which saved time and cost when installing the wastewater pipeline.

The construction of the WwTW commenced in September 2009 with several minor changes to layout being made to ease construction. The detail design team held their monthly design meetings on site to ensure close liaison with the construction team, which gave benefits by ensuring the design suited the proposed construction methods.

There were some changes caused by the previously mentioned ferric dosing plant and additional work on the storm lagoons. To reduce the visual impact some 3,800m³ of surplus excavated material was used to form landscaping mounds and these were planted with native trees.

Following process commissioning of the Clapham WwTW the first discharge of final effluent to the River Wenning was on 8th February 2011.

Summary

The site team had worked 666 days, over 148,000 man-hours without a RIDDOR incident. It would be impossible to have a better safety record.

Following the contract award there was continued close liaison and cooperation within the project team and together with careful site management, regular value engineering reviews and constant involvement of the local United Utilities Operations staff, the adoption of cost saving ideas generated a saving of £1m, which was shared between United Utilities and its partners.

It isn't often that we have the opportunity to build a new green field wastewater treatment works. The team really enjoyed working on this project.

The Editor & Publishers thank Peter T Ratcliffe of MWH, a Senior Design Manager working in United Utilities Process Alliance, for preparing the above article for publication.



Odour control unit stack and sludge tanks

Courtesy of KMI Plus



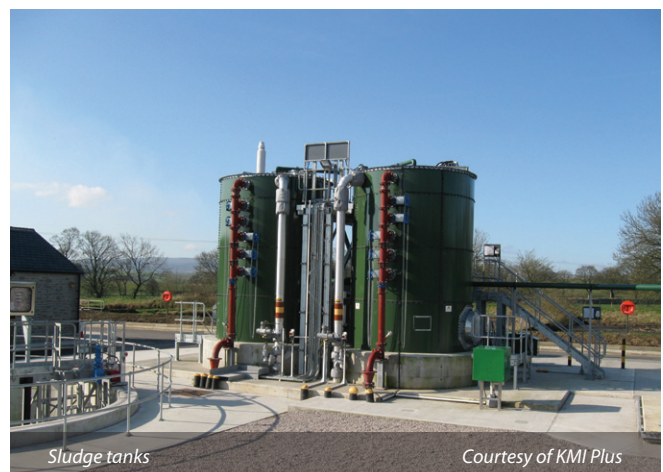
Clapham WwTW Inlet screens and Lintott Ferric Dosing Package Plant

Courtesy of KMI Plus



Clapham WwTW Positioning interstage screw pumps

Courtesy of KMI Plus



Sludge tanks

Courtesy of KMI Plus