Sludge Process Works departs Heathrow

Perry Oaks processing centre makes way for Terminal 5

by Andrew Gosling & Adam Hunter

Mogden Sewage Treatment Works, serving West London's catchment, is located close to Twickenham Rugby ground Since it was commissioned in 1936, as part of a major infrastructure project, the population equivalent has now reached over 1.8 million. Even at the time of construction the works was in the middle of a developing urban area and an alternative site was necessary for storage and processing sludge prior to disposal to agricultural land. The site chosen was Perry Oaks, approximately 10 miles west of Mogden. Twin sludge mains were constructed to pump sludge to the site. At the time this site was close to a small airfield but later this was developed into Heathrow, a rapidly expanding major international airport as we know it to be today - with the Perry Oaks site situated between two main runways. In 2001, agreement was reached between Thames Water and the BAA to decommission a large part of this site, allowing the major area to be released for airport use and Terminal Five development, and to provide alternative sludge processing facilities on the site of an existing small STW at Iver South.

Perry Oaks/Iver South: Aerial view of Iver South Sludge Dewatering works. *Photo: Courtesy Thames Water.*

Perry Oaks Decommissioning

Over a period of many years liquid sludge was processed at Perry Oaks, both by air-drying and in latter years by deep lagoon storage prior to disposal to agricultural land. Clearance of liquid sludge was accelerated during the 1990's and temporary centrifuges were installed to mechanically dewater all sludge received from Mogden.

Decommissioning of the Perry Oaks site and setting up a residual operating area on a smaller part of the site has allowed the major area to be released for T5 development. **Sludge dewatering operations continue on a small area of Perry Oaks until the new facilities at Iver South are complete.**

This has meant that construction at Terminal 5 could be started on the remainder of the site and sludge processing can remain in operation during construction of replacement facilities at Iver South and before final decommissioning.

Relocation scheme

The new works will comprise liquid sludge storage, sludge dewatering using centrifuge plant, and a large area for sludge cake storage.

Enabling works for the scheme are extensive. These include uprating and extending the existing twin sludge mains from Mogden to Iver South, transfer of Iver South STW flows, provision of a new access to the site, together with upgrade and extension to the sludge stream at Mogden to ensure compatibility with the facilities at Iver South.

One of the key initial tasks was the preparation of the Iver South site for development. This has included:

* improving access off the A4 with junction improvement and widening the existing service road;
* construction of a bridge over the Colnebrook river and extending the existing access road into the new site;
* diversion of all sewage flows to a new pumping station with pipelines to an adjacent catchment;
* new power and water supplies;
* isolation of surrounding groundwater and flood water using a bentonite/cement cut-off wall;
* satisfying all planning conditions, technical, procedural and and environmental.

Robust solution

One of the main needs of the plant has been to provide a robust solution, which was sufficiently flexible to receive sludge under various operating conditions and avoid storage at the source works. Sludge is delivered to site via twin 300mm diameter pumping mains and is discharged into two covered storage tanks. These provide initial storage and buffer capacity to give balanced feed to the dewatering centrifuges. The tanks are mixed by a pumped system, which also incorporates an air mixing process. The system

has been shown to be beneficial in minimising odours in the final cake product. In the event that these two tanks are full, the incoming sludge is diverted to one of six buffer storage tanks which are filled in sequence. Finally there is a storage lagoon, which provides an emergency storage capacity but this would only be used under extreme circumstance.

Sludge is drawn from the covered storage tanks to feed one of four dewatering centrifuges, each with a capacity of 60m³/hour. It is dewatered to 25% DS and conveyed by covered belt conveyors to the concrete hard standing area. A front-end loader is provided to move sludge cake from the slab into any of the four large covered storage bays. Each bay holds two weeks stock of sludge during normal operation. An additional uncovered storage is provided to cater for any restrictions on the disposal route to land. Normal duty is provided by two centrifuges, however, a third unit can be brought on line to deal with any backlog caused by power failures or increased sludge production at source.

All site drainage is self contained and joins the process liquors in the site pumping station for pumping to an adjacent sewerage network.

Process water is provided via a borehole, which taps artesian groundwater in the underlying chalk aquifer.Whilst capital costs for this solution are high, the saving in operating cost creates a 2 year payback period. Potable water use is restricted to the welfare facilities in the offices though sufficient supply volumes are available to cover emergency situations where the borehole is unavailable.

New power supplies have been provided and standby generation installed to cover essential operations in the event of a power failure.

Key partners

Thames Water Utilities Ltd entered into alliance arrangements with contractors for delivery of this project.

Laing O'Rourke acted as Principal Contractor for decommissioning work and development of the residual operating area.

Costain Ltd were taken on as Principal Contractor for the main relocation scheme - including works at Iver South, Mogden and pipelines.

Black & Veatch have been responsible for design.

Current status

All main structures are now complete. Plant and equipment has been installed ready for commissioning with handover scheduled for the end of 2005 - ahead of programme.

Key process parameters

Population Equivalent:	**1.8 million;**
Dry solids treated	**85 tonnes/day;**
Incoming sludge	**2833m³/day at 3% DS**
Final product	**340m³/day at 25% DS**

Key features

A flood and groundwater cut-off wall 1250m long and 5m deep, was installed to contain any pollution migration and to exclude ground water and flood water from entering the site.

Liquid sludge storage

1.5 days covered storage in two tanks, each 20m diameter.
4.5 days buffer storage in six tanks each 20m diameter.
5.5 days emergency storage in a lined lagoon.

Sludge cake storage

Perry Oaks/Iver South: Sludge holding tanks from odour control plant.

Photo: Courtesy Thames Water.

8 weeks in 4No. 2 week capacity bays - covered.
22 weeks emergency storage - uncovered.

Centrifuge sludge dewatering plant
Comprising 4No. centrifuges, each capable of treating 50% of the design load operating as Duty, Duty, Catch-up and Standby.

Biological odour control with carbon polishing
To key process plant.
New access roads, bridge and site services; storm water storage for 200 year event; standby power generation; development of groumd water sources to supply all process water requirements on site; offices for 22 personnel; landscaping and bunds at site boundary to provide screening and wildlife habitats; planted bird scrapes to recreate lost lagoon habitat. ■

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Perry Oaks/Iver South: Covered sludge cake area.

Photo: Courtesy Thames Water.

Perry Oaks/Iver South: Centrifuge plant. *Photo: Courtesy Thames Water.*