

Llangefni WwTW

new Biological Nutrient Removal Scheme (BNR) for 30,000 PE

by Colm McCabe

Llangefni WwTW, commissioned in October 2002, serves a population equivalent of 30,000, including high contributions of trade effluent from local industries. The scheme was required to meet Dwr Cymru Welsh Water's AMP 3 quality programme including phosphate removal and to provide increased capacity for industrial growth. It was part funded by the Welsh Development Agency.



Llangefni WwTW (courtesy Meica Process Limited).

The North Wales BNR plant was designed and constructed by the **Welsh Water Capital Alliance** and developed by *Meica Process Limited* with specialist design support from *WEBS Limited* and *Babtie Group*. Construction was carried out by *Dwr Cymru Welsh Water's Capital Alliance Regional Integrated Team of Meica Process Ltd*, and *Galliford Try Plc* who are delivering the AMP3 Capital programmes in North Wales.

Biological treatment

The Llangefni works uses biological treatment principles to ensure compliance with stringent nutrient removal requirements, using a modification of the three stage *Bardenpho* process with anaerobic, anoxic and aerobic tanks arranged in series. Three recycles are included within the system to ensure operational flexibility and minimum pumping and aeration costs.

Chemicals are not required by the plant to achieve a 2 mg/l total phosphorus consent. The biological solution and chemical dosing solutions for phosphorus removal were compared at project feasibility. The biological solution was favoured on the basis of whole life costs. Advantages of the biological solution include:

- * added benefit of Nitrogen removal;
- * improved performance compared to the original filter works;
- * lower sludge production & consequent costs;

- * no chemical costs;
- * environmentally friendly process;
- * simple & reliable operation;
- * no risk of high metal concentrations in treated effluent.

In addition, the plant has been designed with the flexibility to allow for changing characteristics of the trade effluent including increased flows. This includes:

- * use of anaerobic tanks as anoxic tanks;
- * use of anoxic tanks as aeration tanks;
- * dual zones to provide operational flexibility.

The plant has been designed with an emphasis on value for money. Control and instrumentation is limited to those parameters that actually have an impact on the process operation and performance. Tanks are configured as simple "boxes" without costly configurations of multiple specialised zones.

The plant was commissioned in October 2002 and continues to operate successfully within its consent standard of 7 mg/l BOD, 1 mg/l ammonia and 2 mg/l total phosphorus with minimal operational input. No coagulant chemicals have been used at the plant and therefore, there is no long term commitment to significant chemical costs.

