



# Land Reclamation Monitoring

## Effluent Water Quality Monitoring

CASE STUDY

### SITE DETAILS

Customer: Miller Argent  
Site: Ffos Y Fran Land Reclamation Scheme

### APPLICATION DETAILS

Regulatory driven monitoring of effluent from settling lagoons

### PRODUCTS

WaterWatch2600  
WaterWatch2110 pH  
Turbi-Tech 2000LS

### SERVICES

Full turn-key package design, installation and commissioning

On-Going Service Contract



On the hills above Merthyr Tydfil, Miller Argent is undertaking a highly ambitious land reclamation scheme that is also involving the extraction of coal by opencast methods. Known as the '**Ffos-y-fran Land Reclamation Scheme**', this is the third and final phase of the East Merthyr Reclamation Scheme which is expected to run for another 17 years. The reclamation works will include the removal of known shafts and adits all previously associated with iron ore and coal workings that present a danger to humans, livestock and wild animals.

Praiseworthy though the Scheme is, it has come under attack from certain action groups, some of which have objected to it on environmental grounds largely relating to the extraction of fossil fuels. Notwithstanding the opinions of its detractors, the Scheme will eventually create a better and safer environment for the local community and to its credit Miller Argent is making every effort to ensure that during the working life of the Scheme, the area surrounding the 367ha of derelict land lies comes to no harm. The presence of a full-time Environmental Liaison Officer who is working closely both with the Environment Agency and the local community demonstrates just how seriously Miller Argent takes its responsibilities.

The principal aim of the '**Ffos-y-fran Land Reclamation Scheme**' is to progressively restore the land to its former use and to a simple landform and landscape characteristic of the area void of dereliction. When completed it will incorporate certain features retained throughout site operations and recreate others that are presently considered to be of notable interest. A number of enhancements are also planned for the site to complement the original uses. The land reclamation aspect will commence in year eight of the project and will then continuously progress with the movement of the excavation throughout the scheme.

All urban common land within the planning application site boundary is to be restored to urban common, with the remainder being restored predominantly to agricultural land with certain areas protected for nature conservation, archaeological or local heritage interests. A network of watercourses and drainage channels with small water features will be incorporated throughout the restored area for watering grazing stock, to recreate certain habitats and to compliment the existing adjacent free drainage system, which is of archaeological significance.

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Because of its elevated position and size, Ffos-y-fran covers a wide rainfall catchment area and Miller Argent has to deal with the run-off which is affected by the acute derelict land containing long abandoned mine workings and coal extraction. Part of the Scheme also requires land to store earth removed as part of the coal extraction process and which will eventually be used as backfill in the land reclamation stages. Classified as overburdened land, this area includes the Taff Bargoed River and to ensure that it remains unaffected by the workings, the course of the river has, with EA approval, been diverted through the outlying areas of the site.



One aspect of Miller Argent's commitment to protecting and enhancing the environment has been the attention that it is giving to the treatment and disposal of water from the site. To this end, it has constructed six large water treatment areas on the site and a further two will be constructed at a future date during the restoration period. The treatment areas now being commissioned contain settlement lagoons complete with water treatment plants and the first to come into operation have been equipped with on-line suspended solids, pH, temperature and storm overflow monitoring systems from Partech Instruments.

In order to separate solids and fine particles from the water in the settlement lakes prior to discharge, the first water treatment plants to be commissioned feature flocculation mixing and dosing systems. "For a scheme of this size, we need to capture all the run-off water and water used in operational areas in these lagoons," says Kylie Jones, Environmental Liaison Officer. "Much of the top soil has now been stripped away so the nature of the water has changed quite dramatically and it is now quite heavy. The water first goes into an attenuation lagoon and then into a polishing lagoon. By the time the water has passed through the polishing lagoon it should in theory be suitable for discharge. However, to ensure that we meet our consent levels we operate a polymer flocculation plant which uses a non-ionic floc to assist in the settlement of solids. A new flocculation plant has recently been commissioned on the WCI lagoon and we have installed a Partech Turbi-Tech 2000LS Sensor."

### Partech Turnkey Package Solutions

This project is an example of the complete site services package provided by Partech. Our team of highly experienced engineers can look after all aspects of site surveys, system integration, design, installation, commissioning and training.

Our product range includes monitors for a wide range of parameters covering water, wastewater, surface water and industrial effluent applications. We can provide dosing control systems, data transmission, and sample preparation.

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Partech Instruments' Turbi-Tech 2000LS Sensor is designed for monitoring Turbidity in effluent discharges and can also be configured to monitor Suspended Solids in the final effluent flow if preferred. This gives an indication of process problems that are causing solids to leave the site and enter the watercourse. Armed with this information, the plant operator can make adjustments to the control system to prevent pollution and make efficiency improvements. Where discharge consent levels are particularly tight, turbidity monitoring at the final outflow should be considered as essential.

The Partech Turbi-Tech 2000LS sensor is calibrated in accordance with Reference Method 2540 D Total Suspended Solids (Dried) and is operated in conjunction with the WaterWatch 2600 Multi-parameter. This sensor uses Infrared light that is either scattered or absorbed by the particles in suspension, with the amount of received light being proportional to the level of suspended solids. The geometry of the sensor, either light scatter or light attenuation, is chosen to suit the suspended solids or turbidity range. The amount of received light is converted into Suspended Solids by the 7200 monitor using algorithms that have been developed specifically for these applications.

At the water discharge points currently being operated Miller Argent has positioned Partech's Turbi-Tech 2000LS Sensor and WaterWatch pH package to ensure that there is 24x7 monitoring of the water quality in accordance with the consented range of pH5 to pH9 and that suspended solids are below 50ppm. "It was important to the EA, as well as ourselves, that we were able to have a continuous monitoring regime as opposed to taking random samples when requested," says Kylie Jones.

"We had to find a way on continuously monitoring discharge water and this was an area of technology in which we had very little knowledge. In the initial phases we did have many discussions with the EA in order to ensure that we would satisfy their requirements," continues Kyle Jones. "After meetings with several manufacturers, we elected to go with Partech because their equipment had MCERTS approval and thus the backing of the EA. Plus, they were prepared to offer a high level of technical support. Since the first systems were installed and commissioned, they equipment has proved to be most reliable even during the most horrific winter conditions when the plant was unmanned."

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Currently, there are two water treatment sites where the Partech instruments are installed, these being WCI and WB. At WCI the Partech system has been installed close to the flocculation plant and it benefits from the availability of a permanent power supply. At WB and at the other more remote treatment plants waiting commissioning, there is no power supply and this has been a major concern for Miller Argent. For the WB site, Partech was able to provide reassurance that its battery packs would be up to the task and that frequent visits to check them would not be necessary as they came with a remote monitoring system.

The systems are monitored directly by Partech at its HQ, so if any incidents trigger alarms or the battery life at WB drops to a low level, Partech can alert Kylie Jones both by email and text message to her mobile telephone. Visits to the lagoons for the purpose of cleaning the Turbi-Tech sensors are also kept to a minimum because the sensors have an integral self-cleaning system, with the retractable sensor probes being set to a 60 minutes cleaning regime.

A significant benefit of having the Partech equipment close to the flocculation plant identified by Kylie Jones is the fact that she can go there with pump operators, open the cabinet door and push a button to see immediately how the plant is performing. "It's a great visual aid and I can take anyone there and show them what the discharge level is in real-time," continues Kylie Jones. "It's highly educational for all plant operatives because from seeing the suspended solids discharge levels it is possible to evaluate the performance of the flocculation plant. The Partech equipment is not connected to the polymer dosing pumps, but it is something that we could well look at in the future when we come to commission new lagoons."

All the information gathered by the Partech equipment is archived and made available to the EA for inspection. Having archived results enables both the EA and Miller Argent to track the performance of the Ffos-y-Fran water treatment infrastructure and to identify where and when problems may have occurred.

"With a project of this size, the management of the water treatment lagoons is one of the biggest challenges that we will have," comments Kylie Jones. "We release 100lt/s through the hydro-break in WCI and WB and for the other lagoons now being built the outflow will be 300lt/s. Ensuring that we meet our EA discharge consents is a priority and with the employment of the suspended solids monitoring systems, we will have a continuous picture of what is happening even at the treatment lagoons that are farthest away from our office-based laboratory. We need to be confident in our water treatment plants and this is equipment that is giving us that confidence."

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