

## CASE STUDY

# PFA DELIVERS COST EFFECTIVE GROUND STABILISATION ADVANTAGES FOR BY-PASS CONSTRUCTION



Grouting holes being drilled on site

### The scheme

RWE Power International provided Pulverised Fuel Ash (PFA) from RWE's Aberthaw power station for a grouting scheme to facilitate the construction of a new 7km bypass close to Pontypridd, South Wales.

The new bypass was constructed to reduce the amount of traffic passing directly through Church Village and to alleviate the heavily congested A473 which links Pontypridd and Talbot Green.

Ground stabilisation specialist Forkers Ltd was employed by the main project contractor to treat shallow mineworkings at four locations along the route.

If left untreated these former coal mines, identified by consulting engineers Atkins, posed a threat to the future stability of the area and therefore its suitability for development and construction.

### Siteworks

Ground stabilisation works started in September 2008. Probe drilling was used to locate mineshfts and then Forkers drilled approximately 2,300 boreholes/68,000m to treat shallow mineworkings and injected some 9,000 tonnes of PFA grout.

Ground stabilisation was completed on time and within budget in January 2009, enabling the overall project to be completed as scheduled in April 2009.

### What is PFA?

Pulverised Fuel Ash (PFA) is the by-product of pulverised coal burnt in the furnaces of most modern power stations. It is produced in the form of a very fine glassy powder varying in colour from cream to dark grey.

Together with Furnace Bottom Ash (FBA), which is also produced by burning coal to generate power, PFA is recognised as a safe and versatile construction material.



Grouting pipework



Grout mixture being prepared

### Why PFA?

PFA rather than sand grout was selected due to its long term compressive strength when mixed with cement. The mix also conformed to the flow and bleed characteristics specified for the job - using sand would have required more water and increased logistical difficulties and therefore costs. The flow properties of PFA grout allow it to be pumped further, again making site logistics easier to manage.

From an environmental perspective, the use of PFA rather than sand reduced the need for quarried products. In addition, the density of sand is considerably greater than PFA so much more sand would have been needed to produce the same volume of grout; the lower density and cost per tonne of PFA considerably reduced the cost of the grout mix. The reduction in material movements also results in reduced CO<sub>2</sub> emissions.

Speaking of the use of PFA in ground stabilisation projects, [Chris McCooey](#), Commercial Manager at Forkers said: *"We're always keen to use PFA if possible because of cost and its particulate nature which has benefits in the mixing and pumping process. Using PFA is also beneficial from a sustainability perspective. By re-using a by-product of the power generation process, we can avoid unnecessary quarrying of raw materials."*

### What is grout?

Grout is required when inaccessible voids require filling to improve ground stability, increase the shearing resistance and strength and reduce permeability. This is normally achieved by injecting suspensions, emulsions and solutions into the ground to improve the geotechnical properties of the soils and rocks.

PFA grouts are suspension compositions produced on site, normally using PFA, Portland cement and water. PFA has been used for many years as an alternative to sand and cement grouts because of the technical, durability and economic advantages it offers.

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