

Alcoa Alumina Refinery RSA1, Pinjarra

Prefabricated Vertical Drains



Client: Alcoa
Main Contractor: Leighton Contractors

Specialist Contractor: GFWA
Geotechnical Engineer: Hatch

THE PROJECT

Alcoa World Alumina Australia is a global leader in alumina production and Australia's sixth largest resources sector exporter. The Pinjarra alumina refinery, located approximately 90 km south of Perth, is part of Alcoa's three-refinery system in Western Australia, and one of the world's largest refineries with a capacity of 4.2 million tons per year.

In order to meet production demands a new residual storage area conversion referred to as RSA1 stage 1 (north) has been constructed in Pinjarra Refinery. This project covers an area of 33 hectares and involves 640,000 m³ of residue sand, laying 42 hectares of high-density polyethylene liner and associated road and drainage works.

RSA1 is constructed in a tailings area with up to 23 m of soft material placed over the years. In order to effectively and efficiently control the drainage of the liquids in the ground it was decided to install prefabricated vertical drains (PVD) also known as wick drains.

By providing shorter and guided paths, the wick drains discharge the ground's liquids into the sand blanket and horizontal drainage system and at the same time allow accelerated consolidation and pore pressure dissipation.

THE ROLE OF GFWA

GFWA was awarded the contract for the installation of more than 485,000 metres of prefabricated vertical drains. PVD lengths varied from as low as 13 m to as high as 24 m based on the contour of the soft soil's bedding layer.

Work was carried out using a PVD rig from a working platform that consisted of 2 m of sand.

As part of the quality assurance programme the information of each installed PVD consisting of the sequential reference number, planar coordinates, penetration pressure throughout the installation length, and depth of penetration was electronically logged.

Due to the presence of special chemicals that are required during the process of extracting aluminium from bauxite, in some locations the ground was very dense and prevented mandrel penetration. Hence pre-drilling with an auger was implemented to the depth of 5 m to allow mandrel penetration into the superficial hard layer.