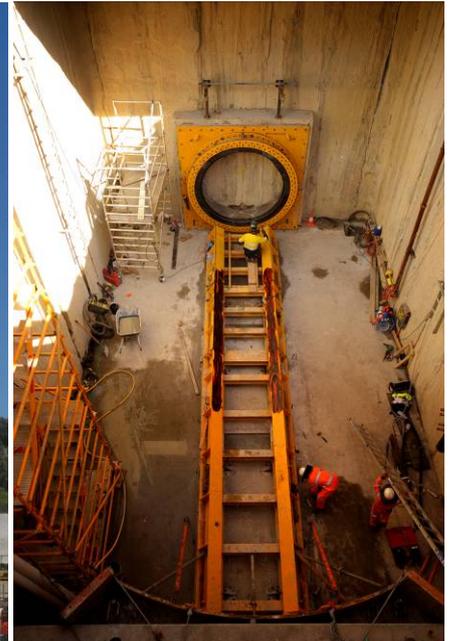


Binningup Desalination Plant

Diaphragm Walls



Owner: Water Corporation
Main Contractor: Southern Seawater Alliance

Design: Worley Parsons
Specialist Contractor: GFWA

THE PROJECT

Binningup Desalination Plant is north of the township of Binningup and about 150 km south of Perth, WA. This plant will have an initial capacity to deliver 50 million litres of potable water per year which is equivalent to 20% of Perth's requirement. Capacity may be increased to 100 giga litres at a future date.

As part of the construction of the Intake Pump Station (IPS) it was required to build a diaphragm wall to create a water tight structure to facilitate effective dewatering prior to excavation. The IPS' walls were designed as five separate shafts with common walls. Construction method was from top to bottom. Various functions of the shafts created complex load, unload and reload scenarios resulting from staged excavation and flooding, and reaction loading during tunnel construction.

At the location of IPS the ground was composed of about 12 m of sandy soil followed by Tamala limestone and very hard Leederville Formation sandstone. Unconfined Compressive Strength tests of the bedrock ranged from 100 to 150 MPa indicating that the material was very hard. As the project was very close to the sea, groundwater level was quite high.

THE ROLE OF GFWA

GFWA was awarded the specialist works for constructing 6,250 m² of diaphragm walls with a thickness of 1 m and 15 barrettes, each 2.8 x 1.0 m. To cut off water flow into the working area, the diaphragm wall was designed to penetrate the ground and extend into Leederville Formation bedrock at the depth of 25 m.

Excavation works were performed using two special cranes. Excavation in the upper 12 m of ground was carried out with an average rate of 10 m² per hour whereas deeper layers proved to be more challenging. Excavation in the soil and weathered rock was done using grabs. Penetration into hard rock was facilitated using box chisels.

Walls were composed of 10 layers of reinforcement. Maximum lift weight of steel cages was up to 72 tons. The peak consumption of concrete was 70 m³ per hour. Cathodic protection was used to allow for the 100 year design life in aggressive environment.

Upon completion of the project a crew of 40 men had worked approximately 20,000 man hours over a period of 6 months to excavate the walls and to place 1,900 tons of steel and 6,350 m³ of concrete.

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