



# MARINE STRUCTURES

## FISHERMAN ISLANDS S3B

### Vacuum Consolidation

## AUSTRALIA



Aerial view of the site

#### Owner

Port of Brisbane Corporation

#### Engineer

Coffey Geotechnics

#### General contractor

Menard Oceania

#### Period of works

January 2009-December 2010

#### Main figures

##### Menard Vacuum (TM)

Vacuum Consolidation of 93,500m<sup>2</sup> in a single operation

##### Cut-off walls

10,100m<sup>2</sup>

##### Wick drains

2.1M lineal meters up to maximum 40m deep



Vacuum pumps

### Project description

Following on from the success of the ground improvement trials for Paddock S3A conducted by Menard Oceania for the Port of Brisbane Corporation using a combination of Vacuum Consolidation, wick drains and surcharge; Menard was awarded the worlds largest package of works where Vacuum consolidation and surcharge was performed in a single operation encompassing a treatment area of 93,500m<sup>2</sup> up to 40m deep.

### Ground conditions

The subsurface ground conditions were significantly different from existing developed areas due to the presence of a high water table, in-situ compressible clays up to 30m thick, a layer of dredged river mud varying in thickness of between 7m to 10m over the top of the reclamation with an additional sand capping layer.

### Solution

Menard was engaged to develop this area as a future warehouse storage location generally with 25kPa live loading criteria with up to 36kPa being adopted in specific areas. An in-service areas with a maximum residual settlement criteria of 150mm over 20 years.

The conventional scheme of wick drains & surcharge meant that the consolidation period would take up to 6 years. It also meant that there was a 50m wide stability berm required around the perimeter of the proposed treatment area which would not have been fully treated hence diminished the commercially available net area post treatment.

Menard was retained by POBC to treat the whole S3B area by means of the Menard Vacuum consolidation method combined with a conventional surcharge being placed on top of the membrane. With this system, the treatment area was extended right up to the edge of the retaining bund hence greatly improving the nett usable area post treatment. In addition, the entire area was handed back to POBC 24 months after commencement of construction of the ground improvement works on site.

Due to the presence of the sand capping, to ensure that an effective seal was achieved to enable a stable and constant vacuum pressure to be maintained over the 18 month vacuum period; a soil bentonite cut off wall up to 16m deep was installed around the vacuum perimeter. In addition, as a secondary measure, a 6m deep HDPE vertical liner was installed into the cut off trench.

The 30 No. vacuum pumps were monitored daily and maintained over the 18 month pumping period that saw some areas settle up to 4.0m in some of the deeper treatment areas. In addition to the vacuum, sand surcharge was added in 2 stages – approximately 1.5m after 22 weeks and up to an additional 1.4m after 28 weeks. Actual settlement values were used to check and back calculate the anticipated theoretical settlements throughout the 18 month consolidation period.

