Wind Farm Foundation Specialists

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ABOUT US

Menard Oceania is a specialist contractor for geotechnical and civil engineering activities operating throughout Australasia and the South Pacific region, with a reputation for quality, innovation and engineered solutions. our expertise in ground improvement, specialist foundations, all methods of grouting, environmental remediation, has facilitated the delivery of cost-effective solutions for the construction of a range of structures.

Our services

With an emphasis on **value added design** and **innovation**, Menard Oceania can bring its extensive experience to projects in the planning and design development phase to provide optimal geotechnical solutions.

Our in-house design capabilities underpin our strength in undertaking contracts in both subcontractor and main contractor capacities at the highest level of technical excellence.

Local expertise supported by a global network

Menard Oceania is the Australian subsidiary of Menard and part of Soletanche Freyssinet Group, who are world leaders in geotechnical, environmental and civil engineering construction.

The combination of Menard Oceania's local resources with the vast experience and history of the Soletanche Freyssinet group generates an unrivalled capability in design and execution of geotechnical projects.

Ground Improvement

- Dynamic compaction
- Dynamic replacement
- Stone columns
- Vibro compaction
- Vertical drains
- Vacuum consolidation

Ground Reinforcement

- Jet grouting
- Grouting
- Controlled modulus columns
- Soil mixing

Drilling

- Anchoring & soil nails
- Micropiles
- Mine backfilling

Environmental Remediation

- Slurry Walls
- PRB Walls
- Soil Remediation

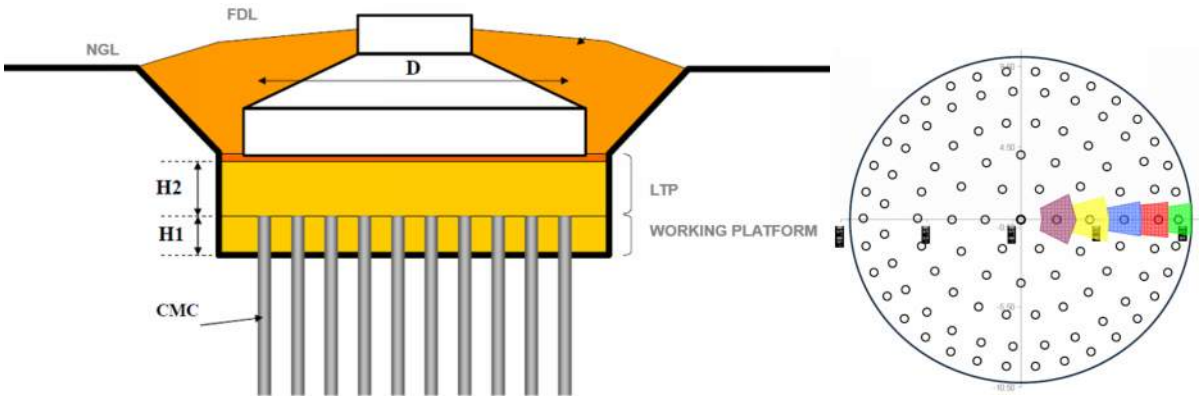
Objectives & Solutions for Wind Farms

Based on our local and global experience, gained through participation in numerous projects in the energy sector and specifically some wind farms that have been constructed in Australia and Europe, we welcome the decision of the Australian Government to expand the use of renewable energy sources, enabling us to offer turnkey design and construct solutions for the foundations and turbine bases of proposed wind farms.

Potential Foundation Problems & Possible Solutions

Where the ground at the site for a wind farm is comprised of either loose or soft soils that do not meet the bearing capacity and settlement criteria for a safe foundation system, it is necessary to treat the ground to create a foundation material adequate to support the wind turbine towers. Menard offers a variety of ground improvement methods involving either direct global improvement of the ground by such techniques as Dynamic Compaction and Compaction Grouting or by the installation of inclusions such as Controlled Modulus Columns, Stone Columns, Dynamic Replacement, Deep Soil Mixing and Jet Grouting. All are methods designed to improve the composite global modulus of the soil and deformability characteristics.

Alternatively, at the other end of the ground strength spectrum, the problems of expensive rock excavation or the logistics associated with a remote site might promote the use of rock anchors to secure the turbine bases, instead of reliance on gravity base structures. Menard has a long history of high capacity permanent rock anchor installation for major structures. Many of the projects undertaken include the installation of large multi strand anchors, like those applicable to wind turbine bases, for dam stability enhancement to meet upgraded dam stability requirements.



Sample design concept for wind turbine foundation ground improvement

The Turnkey Solution for Wind Farm Turbine Bases

Experience suggests that the preferred foundation solution, that minimises uncertainties, ambiguities and centralises responsibility, is the turnkey solution.

Menard can provide turnkey foundation solutions to minimise the clients' risks for all ground conditions by:

- Accurately interpreting the geotechnical investigation report
- Providing an in-house overall foundation design inclusive of
  - Ground improvement methodology and design or
  - Rock anchoring methodology and design
- Performing ground improvement works & quality control
- Performing rock anchoring works & quality control

In Australia, our methods for wind farm turbine foundations have been used in:

- Granville Wind Farm, Granville Harbour, Tasmania
- Woolnorth III Wind Farm, Studland Bay, Tasmania
- Portland II Wind Farm, Cape Bridgewater, Victoria

100 Wind Farms **600** Wind Turbines

Largest European and world's 9th largest wind farm: Fântânele-Cogealac Wind Farm

Wind turbine located partially on soft clay and partially on rock: Hombleux Wind Farm

Portland II Wind Farm at Cape Bridgewater, Victoria

The second phase of Portland Wind Farm in Western Victoria comprises 29 wind turbines, each capable of producing 2 MW of power. The wind turbines towers are 67 m in height with blades of 33 m. Each tower is founded on a large pad footing 14 m in diameter and approximately 3 m below the ground level.

The geology at the site comprised of dune sands of variable strength to depths of approximately 10 m, derived from limestone deposits in the area. Ten turbines were identified as being on loose and compressible soils, which required ground improvement for the proposed gravity base foundation system.

Dynamic compaction, a technique invented by Louis Menard was used to improve the engineering characteristics of the sand to allow the safe transfer of superstructure loads to the foundations without implementation of piles.

Granville Harbour Wind Farm, Tasmania

Granville Wind Farm is located on a remote site that is approximately 35 km northwest of Zeehan on Tasmania's west coast. The project includes 31 wind turbines with the capacity to generate 112 MW of power. Each turbine is 137 m from ground level to rotor hub and 200 m from ground level to blade tip.

The site's ground profile consists of extremely weathered to highly weathered volcaniclastic breccia overlain with stiff clays, silts and embedded basalt cobbles. At 27 turbine locations, the ground did not meet the project's stringent foundation requirements.

Controlled Modulus Columns (CMC), a technique developed by Menard was used to provide safe foundations for the turbines. Due to variation in ground conditions, installed column lengths varied from 4.5 to 21.5 m.