

New technique on UK soil

Tricky soil conditions on a recent construction project meant Vibro Menard had to employ a country-first solution

Most drillers and geotechnical equipment operators have the fortune to know what to expect on a site and own the tools to press on with the job without delay or digression from the schedule. However, some contractors will tell you otherwise and are often required to think on their feet. Regardless, a degree of ingenuity is sometimes needed at all stages – from production and design of equipment to its implementation on a project.

The Avonmouth wind-power project in the UK lies on a site where parts of the land contain low levels of contamination.

This means that excavation works could disturb contaminants. Any contaminated soils disturbed by works are to be removed by main contractor Lagan Construction. Local watercourses will be protected from contamination by using guidelines on normal pollution prevention and industry best-practice standards.

Industrial development dominates the landscape, set against the open backdrop of the Severn Estuary and the Welsh coast.

The site includes an area managed as a nature reserve, to which only members have access. The reserve supports some important plant and animal species locally. Land-take for the wind turbines is small, and they have been positioned to

The CMCs are anchored in the sand at depths varying from -9m to -14m above ordnance datum (above sea level)

“The bi-modulus columns consisted of combined controlled modulus columns (CMC) and stone columns, which work in synergy to create a more robust structure”

The stone columns have a depth of 2m in the recent clay fill

Avonmouth wind power project

Wessex Water has been granted planning permission to install four wind turbines at Bristol Sewage Treatment Works in Avonmouth, UK.

Each turbine will be capable of generating up to 3MW of electricity, which is the equivalent power that more than 6,000 households use. Following the decision by Bristol City Council in March 2009 to approve planning permission, Wessex Water is now looking into the next stages of developing the project.



protect badgers, water voles, reptiles, great crested newts and invertebrates during construction. Measures are also proposed to enhance the wildlife and educational value of the site.



Sensitive solutions

Project subcontractor Vibro Menard began work on ground engineering for the four wind turbines at the project at Bristol Sewerage Treatment Works in late 2012 for Lagan Construction.

“Due to the tricky soil matrix, we have introduced the bi-modulus technique to the UK for the first time,” Gerry Crawford, Vibro Menard general manager, comments.

Vibro Menard offered the innovative bi-modulus column technique and ground improvement solution to accommodate a foundation load of 150kPa and a slab load of 50kPa for each of the four turbines. The bi-modulus columns comprised combined controlled modulus columns (CMCs) and stone columns, which work in synergy to create a more robust structure; with the CMC columns supporting the load through weak soil to the compact soil, which lies underneath, and the upper stone columns reducing the risk of punching through the load transfer platform.

In total, Vibro Menard installed 2,719 columns, each with a diameter of 320mm by a minimum depth of 9m and a maximum depth of 17m. The columns’

combined length totals 31,289m.

The original design was to include the CMC with intermediate vertical drains to accelerate the settlement in the recent clay fill used to create the working platform but, owing to concerns that these drains could create a pathway for surface contamination, an alternative design was developed to reach depth.

Vibro Menard re-designed the system very quickly adopting a bi-modulus column. This is essentially a CMC to a given depth depending on a good refusal, then a stone column on top of the wet CMC, which stopped short of the surface.

The CMCs stopped 2m from existing ground level, in the case of the foundations; and 1m from EGL, in the case of the floor treatment. This allowed the contractor to excavate foundations into stone columns and not onto set concrete.

“The project was conducted in three shifts: two for the CMCs; and one for the stone columns. The key with this technique is precision and planning; something we feel we have successfully applied to the project’s design,” adds Crawford. ▽

Project particulars

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| Client | Lagan Construction |
| No. of bi-modulus columns | 2,719 |
| Total meterage | 31,289m |
| CMC Ø | 320mm |
| Maximum depth | 17m |
| Minimum depth | 9m |
| 2x No. Enteco E500 CMC rigs duration | E500 No. 8-12 days E500 No. 12-17 days |
| Maximum production per 12 hour | E500 No. 8: 970m E500 No. 12: 1122m |
| Testing | 8 No plate load tests. |
| Foundation load | 150kPa |
| Slab load | 30-50kPa |

Maximum test settlement 4.0mm at 28t, equivalent to 1.5 x working load

Part of the Soletanche Freyssinet Group, Vibro Menard is a design and build specialist geotechnical contractor offering expertise on ground improvement for sites with poor soil. Vibro Menard combines the resources of Vibro Projects and Menard Soltraitment, with a combined experience in soil improvement exceeding 50 years. www.vibromenard.co.uk