

CASE STUDY

MILL VALE DEVELOPMENT, MIDDLETON



PILING/GI

CLIENT

Kellen Homes

SCOPE OF WORKS

Vibro Stone Columns and Driven Piling for Low Rise Residential Development

ACHIEVEMENTS

**Excellent communication between RBL site team and Kellen Homes.
Programme reduction.
Continuous site development of multiple piling solutions.**

Project Brief

Roger Bullivant Limited (RBL) was appointed by Kellen Homes to provide a foundation solution for a housing development in Middleton, Manchester. The site has had various historic uses, from a cotton mill to a cigarette manufacturing works, playing fields and landfill; with deposited wastes including inert, industrial, and commercial waste. Due to the various past uses, there was significant enabling works to bring the site to a suitable level.

Proposals were submitted for Driven Piling (both Precast Concrete Piles and Steel Tubular Piles) and Vibro Stone Columns (VSC).



ROGER BULLIVANT

T. 0845 838 1801 roger-bullivant.co.uk info@roger-bullivant.co.uk

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Key Issues/Requirements

- The local geology consists of drift deposits overlying the bedrock. The drift deposit comprises Alluvium and Diamicton in the North with Glaciofluvial sheet deposits in the south, adjacent to the river.
- The bedrock geology comprises the Pennine Coal Measure Formation, with interbedded Mudstone, Coal, and Sandstone. 2 No faults transect the site and orientated North West to South East, therefore depth to bedrock varied significantly.
- As a result of the varying geological conditions and significant remediation works, various solutions were used across the site.
- The local built environment also posed challenges, with the presence of a high-pressure gas main running adjacent to a section of the site, proximity to a precast retaining wall, and adjacent houses within the southern parcel.

Solution

- As a result of the geology and the local built environment, a multidiscipline approach was taken, utilising piled and ground improvement solutions.
- VSCs were utilised in remediated areas to offer a cost-effective solution, where the ground wasn't suitable for ground improvement, a piled solution was offered.
- Where the proximity to existing houses and the retaining wall were an issue, Top Driven Steel Tube was utilised to reduce noise and vibration.
- In the area of the remediated landfill, 200mm sq. Precast Concrete Piles were installed, ranging in depths from 10m up to 16m.
- Heave precautions were required in areas of potential ground heave due to tree influence.
- All piles were designed to Eurocodes. The design approach utilised the static pile formulae based on ground parameters from the site investigation and appropriate safety factors.
- Dynamic testing was carried out, but no further testing was required, as all piles reached the required design depth and in line with the design requirements.
- Top Feed VSCs were used to enhance the bearing capacity of the ground and substantiated through plate and dummy footing testing.
- Material was won from below the landfill and the areas of drift deposits, as part of the remediation process, and used as fill for the areas of Ground Improvement.
- RBL liaised with Kellen Homes with regards to the cut and fill and visited site to ensure the suitability once placed, through trial pitting for ground improvement.
- In certain areas of the site the ground had been treated to achieve the required compaction rate for upfill. Where RBL couldn't penetrate the engineered fill with the poker, pre-bore was employed to maintain the use of VSCs.

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- Using a VSC technique ensured the bearing capacity below the strip footings was improved to achieve up to 125kN/m². RBL produced the VSC layouts in-house, designed to be suitable for the bearing pressure and strip foundation requirements from the client.
- VSCs were installed up to 6m depth through the weaker strata to support the strip foundations and keep total settlements less than 25mm.
- Due to the proximity of the river, natural site topography and surface water runoff, a bottom feed solution was deemed more suitable. A French drain was installed by Kellen Homes to reduce ground water and left for a period of time. The drain was that effective that a bottom feed solution wasn't required and RBL could revert to the original Top Feed VSC solution.
- Plate load tests and dummy foundation tests were carried out for validation of design and quality of the stone column works to satisfy LABC requirements.
- RBL provided a combination of solutions to suit different requirements on site. As the remediation was phased, along with our works, the team were able to react to changes to the foundation solutions seamlessly and provide a cost and time effective solution. This type of project showcases the benefits of using a multidisciplinary specialist.

Construction Director at Kellen Homes said,

“Roger Bullivant Limited were appointed as piling and ground improvement contractor on our Don Street development in Middleton, a very technical difficult site of 311 houses sited on a former factory, land fill site in the town of Middleton, Rochdale.

RBL worked closely with our engineers on developing a range of piling to suit the prevailing ground conditions on this site due to the constraints of a sloping site and presence of newly constructed retaining walls a range of piling solutions was continually developed.

Driven Precast Concrete Piles have been utilised in the areas of poor ground, utilising steel piles to minimise vibration when sited close to structures, as well as Vibro Stone Columns which has been successfully utilised.

Throughout the pre-construction phase the RBL engineers continued to value engineer this project, and have been very helpful through the migration onto the construction phase, which has seen continued production ahead of expected progress.

This development project has been very important in the evolution of Kellen Homes as a major housebuilder of choice and RBL's technical knowledge and expertise and their ability to work on open book basis with our own engineers on such a technically difficult site has been invaluable.”
