

Coach Road – Whitehaven

Cumbria

Ground improvement by Controlled Modulus Columns (CMC®)



TECHNICAL REPORT RELATING TO CONTAMINATION

Reference **V29777** Pages

Revision	Date	Prepared by	Checked by	Detail of modifications
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1. INTRODUCTION

It is proposed to construct a development of 35no. residential plots in several phases on Coach Road in Whitehaven, Cumbria. The proposed construction footprint runs over MADE GROUND which overlies extremely low strength CLAY with medium dense to dense SAND below. Due to the presence of uncontrolled MADE GROUND and extremely low strength CLAY, a direct construction of any type of structure without soil improvement or replacement will lead to unacceptable post construction settlements and deformations.

Menard has been contracted to do the Ground Improvement works for Phase 1, consisting of Plots 7 to 21 of the development.

The concerned structures are 15no. residential plots, as shown below (Plots 7 – 21).



Figure 1: Site Layout of proposed development

The Environmental Agency has raised comments concerning hydrocarbon contamination associated with the former underground storage tanks and the identified risks to controlled waters.

This document proposes an explanation of the Ground Improvement technique planned on this site in regards to those comments.

2. REFERENCE DOCUMENTS

This report has been established from the following documents:

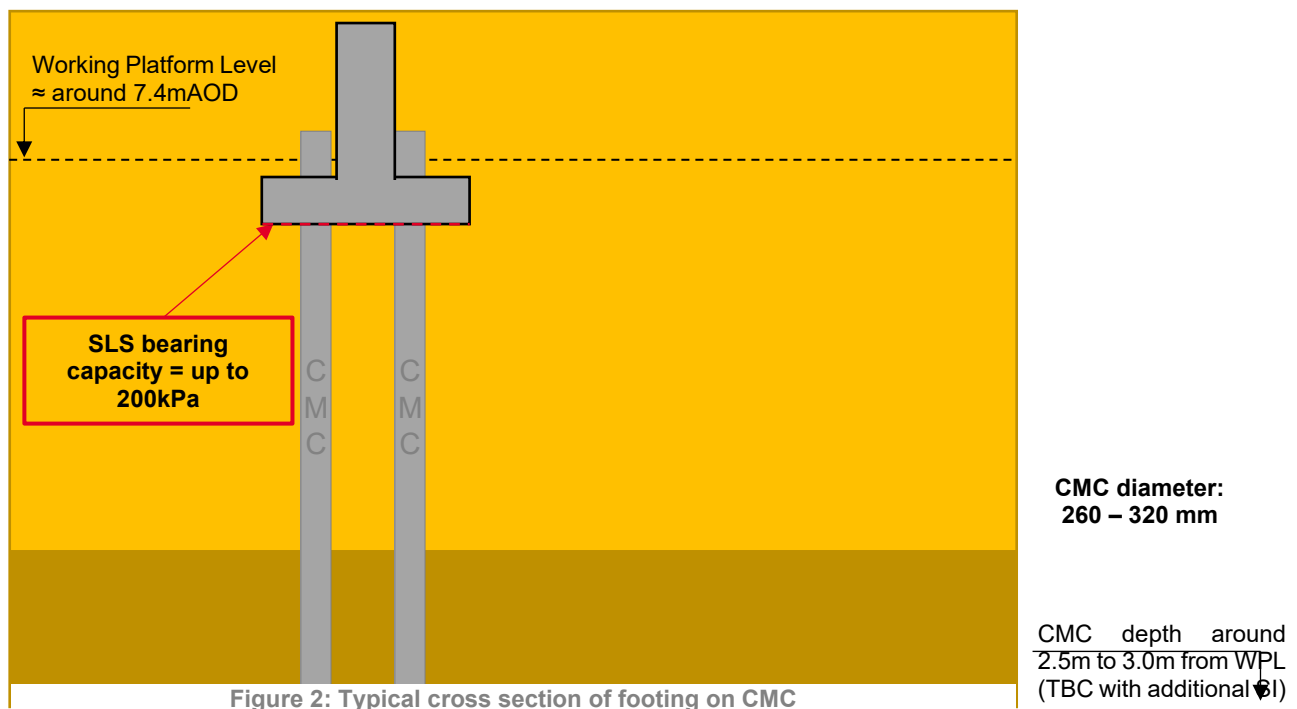
- [1] GEO-ENVIRONMENTAL SITE INVESTIGATION, REC, 45418P1R1, June 2014
- [2] PHASE 2: GROUND INVESTIGATION REPORT, GEO, 2025-7009, December 2025
- [3] Phasing Plan 1a
- [4] V2 Prima Homes Group - Strategy and Methodology

3. TECHNICAL

3.1. Description of the ground reinforcement technique

The Controlled Modulus Columns soil reinforcement technique is intended to improve the soil globally and to reduce its deformability by the use of rigid concrete inclusions. It does not aim to bypass the compressive ground or to build piles that will directly support the entire load from the structure. The objective is to reduce global and differential settlement by relieving the soil from a part of the loads imposed by the structure.

These columns distribute the loads uniformly throughout the soil mass to form a composite structure [concrete column + surrounding soil material]. The entire process is vibration free and operates in-the-dry without spoil, which allows for cleaner project sites.



3.2. Method of execution

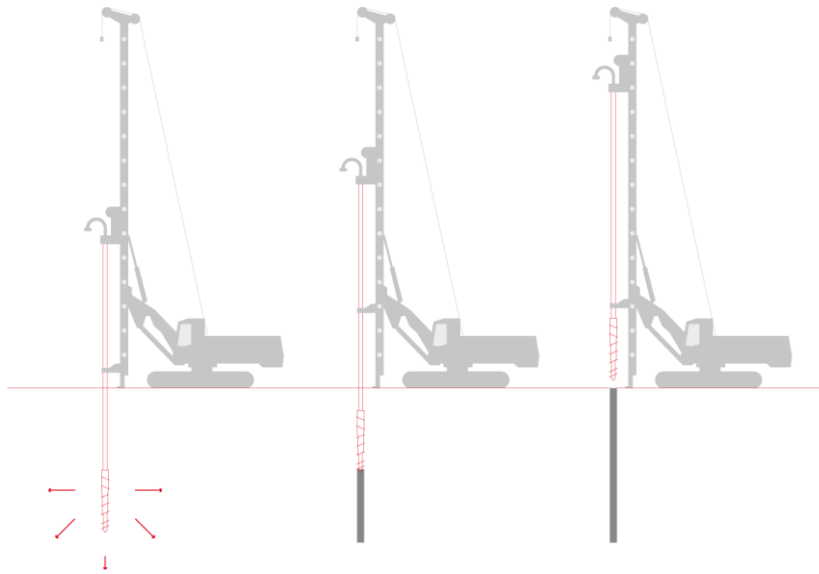


Figure 3: CMC installation process

A specially designed auger, powered by equipment with large torque and downward thrust capacity, displaces the soil laterally, with virtually no spoil or vibration. The displacement auger is pushed into the ground to the required depth resulting in increased density of the surrounding soils around the auger. If the soil is too compact to drill with this method, a regular CFA auger can be used.

During the auger extraction process, a column is developed by grouting under controlled limited pressure (less than 5 bars) through the stem of the displacement auger to achieve a predetermined stiffness ratio with the surrounding soil. The result is a composite soil/concrete ground improvement system. Current practice is to install columns with diameter varying between 260 and 450 mm.

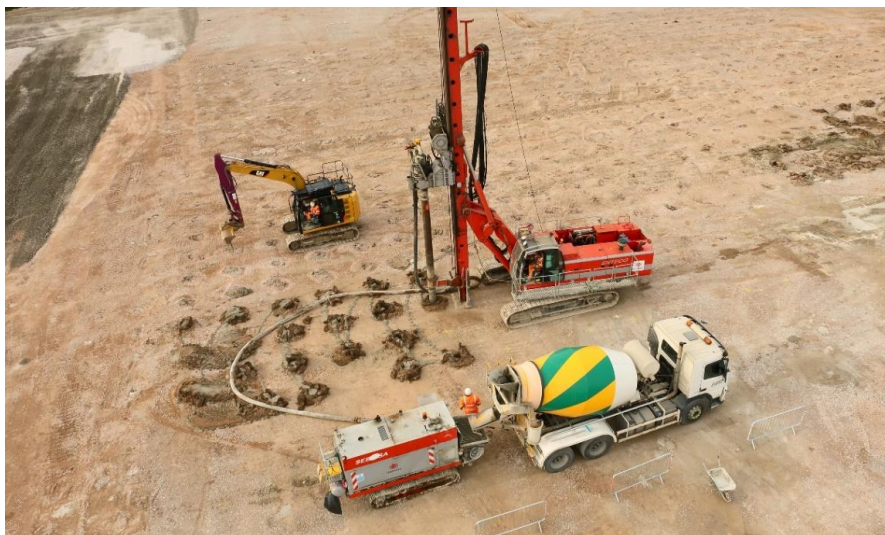


Figure 4: CMC setup on site

4. COMMENTS IN REFERENCE TO CONTAMINATION

4.1. Removal of contamination

Prior to Menard's works, our client Prima Homes Group Ltd will remediate contaminated areas as per their Remediation Strategy.

Prima Homes Group Ltd will provide Menard with a validation report of the completed remediation, ensuring all contamination has been removed prior to CMC works.

4.2. Groundwater contamination

The CMC technique used **does not create any preferential pathways** for underground water. Because it uses a displacement auger rather than an extraction auger, the ground is pushed back around the auger rather than taken up to the surface.

Concrete is pumped through the auger right after drilling, with the auger still in the ground. The column is then concreted up under the pressure of the pumped concrete. That allows minimal possibility of the water moving underground.

4.3. Advantages compared to other possible solutions

The CMC ground improvement technique allows the development to be built without the use of traditional deep foundation (traditional piling). As explained in Section 3, because the CMC works with the ground that it's improving, there is no need to drill and anchor the foundations in the bedrock, like a traditional piling approach would. That way, the depth of ground in contact is minimal.

The CMC installation is also a vibration-free process and therefore minimises the disruptions to the ground and the environment.