

20th January 2026

ES03967 – Technical Note - Advice Regarding the Construction of Residential Housing at West Lane, Formby, Liverpool, L37 7AZ.

Introduction

EnviroSolution Ltd (ES), has been instructed by Formby Parish Council (FPC) to provide independent geotechnical advice on matters relating to the formation of foundations to a proposed housing development at West Lane in Formby.

It is understood that Redrow Homes Ltd (Redrow) propose to construct a substantial residential housing development at the site and has submitted a planning application that is currently being determined by FPC.

The planning application by Redrow is supported by a Phase 1 and Phase 2 Desk Study and Ground Investigation, which is normal for a development of this nature. This work has been undertaken by Betts Geo Ltd (BGL) and is documented in the following report.

Desk Study and Ground Investigation Report for: West lane , Formby, 21RED194/DSGI, Dated November 2021

This report has been provided to EnviroSolution.

It is in respect of the proposed foundation construction that FPC raises an objection.

Site Context

When required to pass comment on professional opinion then it is important to understand the site context, where these may have a bearing on geoenvironmental considerations. The following has been extracted from the BGL report and has been assumed to be accurate.

Formby Brewery is shown to be located on site from 1848 surrounded by trees and numerous drains within the northeastern corner of the site. The centre of the site is occupied by an open field from 1848 and noted as 'playing fields' from 1968. St Anne's School building is noted on site from 1893 and extended from 1968 along with the introduction of an electricity substation. A footpath is located adjacent to the eastern boundary. Formby Brewery is shown to have been demolished from 1968.

Although the 2017 OS plan shows the school buildings on site, a review of Google Earth Street View (2017) shows the on-site building to have been partially demolished with the electricity sub-station to be the only remaining feature present on the western site boundary.

The surrounding area of the site has predominantly been occupied by open fields to the east, Golf Links to the west and north and residential properties in the south. The Golf Links to the north are noted to have been redeveloped to accommodate an airfield from 1955.

Superficial deposits should be expected to depths of up to between 10m and more than 15m bgl and include a sequence of blown sand, peat and tidal flat deposits. These have particular geotechnical characteristics important when considering long term behaviour.

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Blown Sand: Uniform grain size with polished, rounded grains. Do not show any significant dry density/moisture content peak. A poor foundation formation.

Peat: Highly organic and therefore very compressible. Susceptible to plastic deformation, ie continued strain and stress redistribution with time. Commonly associated with differential settlement problems.

Tidal Flats: Predominantly silts and clays with occasional fine sands, influenced by regular tidal inundation. Geotechnically, they are characterised by high natural water contents, high compressibility, and low undrained shear strength, making them prone to significant settlement under load.

Solid strata comprise the Sidmouth Mudstone Formation, which is of Triassic age. These generally comprise red-brown and grey green mudstones and siltstones.

The BGL report indicates groundwater at very shallow depth.

Foundation Recommendations

Section 14 of the BGL report (ibid) states the following:

... Whilst shallow foundations may look feasible at first glance, the demolition of existing structures will leave site / founding level on, or close to, groundwater levels.

Considering the above, and due to the prevalence of damp PEAT at around 7.00mbgl, it would be prudent to allow for a piled foundation solution across the site.

A specialised piling foundation contractor should be consulted with regards to pile design and selection of appropriate piling method.

At this stage EnviroSolution is in good general agreement with BGL conclusions.

Foundation Proposals

At this stage of the development process, differing views have emerged regarding the most appropriate foundation construction method for the proposed development.

Redrow Homes Ltd has engaged a specialist piling contractor that has proposed the use of driven displacement piles to support the proposed structures.

Upon receipt of this proposal, Formby Parish Council (FPC) raised concerns based on previous experience of driven piling operations undertaken in similar ground conditions within the locality, which are understood to have resulted in significant disturbance and distress to nearby residents. On this basis, FPC requested that Redrow consider the use of a more environmentally acceptable alternative, namely continuous flight auger (CFA) piling.

Notwithstanding earlier correspondence, it is the professional opinion of EnviroSolution that, from a geotechnical perspective, CFA piling represents the preferred foundation solution for the ground conditions known to be present within the Sefton area. CFA piling allows pile installation to a defined depth within identified bearing strata while minimising vibration and disturbance to surrounding ground and adjacent properties.

It is understood that FPC formalised its objection to the proposed foundation construction method by way of correspondence dated 17 November 2025. Additionally, a technical response prepared by Betts

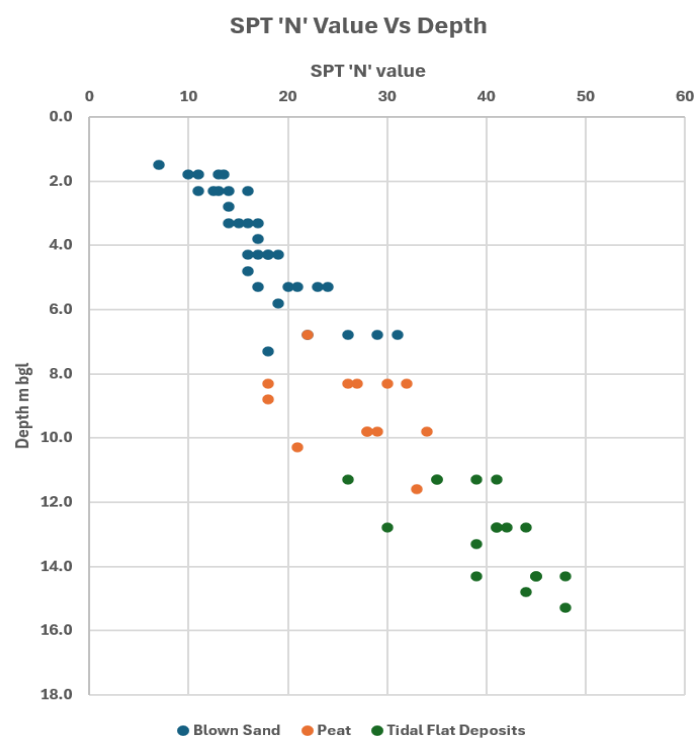
Geo Ltd (BGL) has been made available for review and forms part of the information considered in the preparation of this Technical Note.

BGL Justification for Piling Method

BGL replied to FPC’s concerns regarding piled foundation methodology on 25 November 2025, Ref: 21/RED/194/MJF/GP/LR5.

Having reviewed this response, which seeks to address issues of piling suitability, noise and vibration, EnviroSolution considers that the justification provided does not adequately engage with the ground conditions demonstrated by the intrusive site investigation.

In the first instance, EnviroSolution considers that up to this point, too little attention has been given to the ground conditions demonstrated by the intrusive site investigation. We summarise these with this simple graph of the results of standard penetration test ‘N’ values vs depth.



High groundwater levels present challenges for all forms of foundation construction, including driven displacement piles, where rapid displacement of saturated soils can induce excess pore pressures and local artesian effects.

Furthermore, the site investigation records do not support the assertion that the peat encountered is “soft”. The boreholes were advanced using light cable percussion (shell and auger) methods, which successfully penetrated the organic layers without difficulty. This indicates that the material does not present an inherent obstruction to bored or CFA pile construction.

Accordingly, it is incorrect to conclude that CFA piles are unsuitable in these ground conditions.

On the contrary, CFA piles offer several advantages in profiles comprising loose sands and peat, particularly where vibration control and settlement risk are critical considerations. As CFA piles are

drilled rather than driven, installation generates minimal vibration, making them suitable in proximity to sensitive receptors, buried services, and highly compressible soils.

The cast-in-situ nature of CFA piles also limits disturbance to surrounding ground, reducing the potential for the development of negative skin friction in consolidating peat layers when compared with displacement piling methods.

While it is acknowledged that specialist piling contractors can provide assurances regarding load capacity and long-term performance, the ground conditions at this site present particular challenges for conventional driven pile design.

It is EnviroSolutions view that the results provide reasonable grounds for pile design.

It is noted that BGL, in their responses to FPC's requests for clarification made no indication of pile design. In terms of length and diameter or allowable load capacity.

Rather, BGL attempt to dismiss the CFA option. BGL state:

"Ground investigation data indicates high groundwater levels, soft organic soils and peat, all of which significantly limit the reliability of CFA/bored techniques here."

This statement has no technical justification. High groundwater levels are a problem for any type of ground engineering, not least for driven displacement piles, that can result in local artesian conditions, where groundwater floods above ground. Reference to the plot of SPT 'N' values vs depth above show that the organic, peat layer is not 'soft'. The site investigation boring method is known both as 'light cable percussion' and 'shell and auger' and is a basic ground displacement method of soil sampling. Clearly, in this case the boring method had no problem in penetrating these layers.

It is therefore incorrect to assert that CFA piles are not suitable in these ground conditions.

Rather, CFA piles offer distinct advantages in ground profiles that include loose sand and peat, particularly where vibration control and settlement risk are critical.

Because CFA piles are drilled rather than driven, they generate minimal vibration during installation, making them suitable near sensitive structures, buried utilities, or weak, highly compressible soils where lateral shaking could cause instability.

Their cast-in-situ nature also limits the degree to which they disturb surrounding ground, which can reduce the development of negative skin friction in peat layers compared with displacement methods.

It is recognised that specialist piling companies have the experience to provide guarantees on the long term load bearing capacity and long-term settlement behaviour of their foundation products.

Notwithstanding this, the ground conditions at Sefton are particularly problematic from a classical driven pile design perspective.

- Saturated, uniformly graded fine wind-blown sands can be subject to liquefaction under strong impact or vibrational loading;
- Organic peaty deposits have plastic, time dependent stress-strain properties. While providing positive skin-friction to a sett while driving. This can reverse to a negative skin friction with time.

In this case the CFA pile can be designed on the basis of a socket into the dense sands below 12m bgl. This level of design cannot be provided by driven piles.

Summary

It is conceded that driven piles, by contrast to CFA piles, are typically faster to install and can offer a lower cost per unit capacity when ground conditions allow straightforward driving to a suitable bearing stratum. This will clearly be a driver for most developers.

The displacement mechanism provides high shaft resistance in granular soils, and the installation process gives immediate feedback through driving resistance.

However, the primary drawback is vibration: driven steel or precast concrete piles can transmit significant dynamic energy through loose sand and peat, potentially affecting adjacent assets and inducing additional settlement in sensitive layers.

It is noted that BGL stated the following on this matter:

Selection of a low-noise piling hammer, calibrated to ground resistance.
Use of temporary acoustic shrouds or screens where practicable.
Restricted working hours aligned with Environmental Health guidance.
Pre- and post-construction noise and vibration monitoring to confirm adherence to agreed thresholds.
A communication plan to inform nearby residents in advance of piling works and expected durations.

It is EnviroSolutions opinion, that these do not satisfactorily provide sufficient mitigation of risk.

EnviroSolution, would request the following:

- technical specification of the piling hammer to be used;
- details of acoustic shrouds and confirmation that these protect both the above and below ground receptors;
- confirmation on working hours with respect to the local receptors;
- details of the pre- and post works monitoring programme including levels of acceptable noise and vibration levels and positions of measurement.

This disturbance also increases the likelihood and magnitude of negative skin friction where piles pass through peat that continues to consolidate post-construction.

While driven piles may be cost-efficient in clean sands or where rock is shallow, they can require predrilling or specialised tips to penetrate variable strata, eroding their economic advantage.

For sites where vibration limits and long-term settlement are key risks, CFA piles generally provide better control, albeit sometimes at higher direct installation cost.

We hope that you find these comments helpful; however, should you require any further clarification, then please do not hesitate to contact us again.

Yours sincerely

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