

Technical Report

Project:

Silver Hill Farm

Rochdale

Client:

Barratt & David Wilson Homes

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1.0 INTRODUCTION

This report has been produced to address the following Local Authority planning condition:

- *Planning Condition 10 - Related to impact on groundwater resources (in line with Para 174 – NPPF)*

The sections below will discuss and assess the risk associated with the above.

2.0 ASSESSMENT OF PILING RISK

A concern has been raised regarding the potential risk of contamination ground water resources at the Silverhill Farm site from pile related works. It is proposed to utilise driven precast concrete piles on the site.

2.1 Site Investigation Data

The site investigation report (*KPW-BWB-ZZ-XX-RP-GE-0001_Ph1&2*) has identified that the site is not within or close proximity to a source protection zone and the superficial geology beneath the site is a secondary A aquifer and no potable water abstraction licences are present within 2000m of the site. Additionally in section 12.4 it is stated that a lack of contaminants recorded within superficial deposits and predominantly cohesive nature of these deposits it has been assessed as *highly unlikely*.

2.2 Contamination Risk From Piling

The risk of pile works causing contaminants to pollute the aquifer will be nominal as stated within the site investigation report, soils have prominent cohesive material at near surface and therefore will act as an aquitard where this material is present reducing any lateral and horizontal migration of contaminants. The site also does not appear to have significant contamination onsite and as assessed by BWB therefore it is not anticipated the piles will exacerbate the risk.

The following analysis will make reference to the “*Environmental Agency: Piling in layered ground: risks to groundwater and archaeology Science Report SC020074/SR*”. As the piles are being driven, they will be acting as a skin friction design and therefore will be sealed at the pile to soil interface when driven through a cohesive layer with a thickness of at least 2 * pile diameters and solid driven piles with a square cross-section are likely to seal just as well as cylindrical piles, given the similarity of observed deformation mechanisms (*Objective 2 Page 56*). Therefore, the required layer thickness of the cohesive soils required is 400mm and all exploratory hole locations have identified that this has been achieved. To assess the risk of

down drag it is stated the maximum penetration of overlying soil into layers below was $1.5 \times$ pile diameter in cohesive soils and $2.5 \times$ pile diameter in sand layers (Section 2.1 & Objective 3 Page 57). This is further discussed in the report where it states *“in clay layers it can be confidently stated that most of the vertical displacement (except possibly for brittle clays) is likely to be confined within a radius of 1.5 pile widths, providing the maximum particle size of the overlying soil is small relative to the pile width. Also, there is no evidence that overlying soil will continue to be dragged down to lower levels once the pile tip has entered a clay layer.*

Although horizontal displacements were not quantified in the tests, it would be reasonable to suppose that, for cylindrical piles, an upper limit to horizontal displacement would be in line with the results of previous research shown in Figure 2.1b. At a radial distance of 1.5 pile diameters, horizontal displacements could be as large as 15 per cent of the pile diameter, tailing off gradually with increasing distance” (Section 4.3.1 Page 44).

This would equate to 300mm in clay soils and 500mm in granular soils where any potential contamination would be confined and based on the observed ground conditions this would be satisfied.

3.0 CONCLUSION

Based on the site investigation data, minimal contamination and ground conditions there is not considered to be a risk to ground water resources in relation to piling works. Piles will form a seal within the cohesive strata at near surface, mitigating lateral and horizontal migration of contaminants.

Vibration monitoring will be undertaken across site to check vibration. One or multiple monitor(s) would be installed across site, especially in any areas of concern, e.g., nearby residential properties. BS 5228-1:2009+A1:2014 part 2 provides guidance on human response to vibration in buildings; where moderate impact for the vibration level in terms of Peak Particle Velocity (PPV) is defined as above 1.0 mm/s and a PPV of 0.3 mm/s indicates that vibration might just be perceptible and is considered as having a minor impact. The vibration levels monitored would be compared against these criteria and the piling reviewed accordingly.