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United Kingdom



24th November 2021

Our ref. RB/21/LP2688

Re: LP2688 Elmgrove Road, Littlehampton - Additional Infiltration Information

Dear Alex,

1 Introduction

Further to recent meetings with the project team and subsequent correspondence from the Local Authority (LA), it has become apparent that the information provided by LEAP to date in respect of infiltration drainage at the above site may not have been fully or correctly assimilated and might benefit from some further explanation.

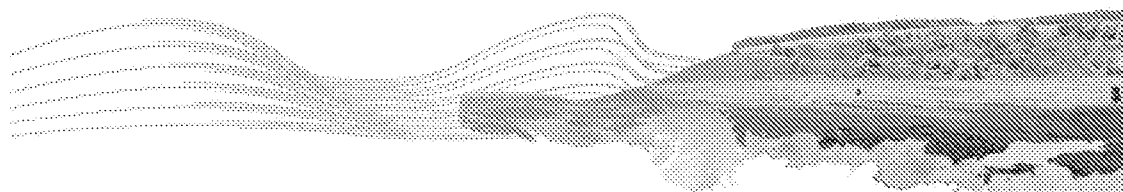
LEAP has consistently reported that the geological and hydrogeological conditions at the site are complex and that overall the site is not generally suited to widespread conventional soakaway drainage. That said, we fully understand and support the planning hierarchy to employ sustainable drainage systems wherever possible. To that end, LEAP has recently been involved in the publication of new guidance to support the testing regimes for soakaways.

With that in mind, we have summarised, and depicted, herein what the current soil and groundwater conditions are with a view to further explaining the limitations of the geological conditions at the site and our reservations regarding soakaway drainage at the site.

2 Site Conditions and Constraints

Ground conditions have been found to be variable across the site but broadly corresponding to a sequence of made ground over superficial sandy gravelly Clays over weak weathered Chalk. Locally, notably in the east of the site, interbedded lenses of loose gravelly Sands were encountered overlying the Chalk. Infiltration rates in the loose sands (e.g. DTP7A and 8) were, not surprisingly, much higher than in the clays but with some significant variations (two orders of magnitude) even between tests at the same location which may be reflective of the limited lateral extent of these sandy lenses. Similarly, the tests which penetrated the top of the chalk (e.g. DTP2, 10 and 11) were also very variable (one order of magnitude).

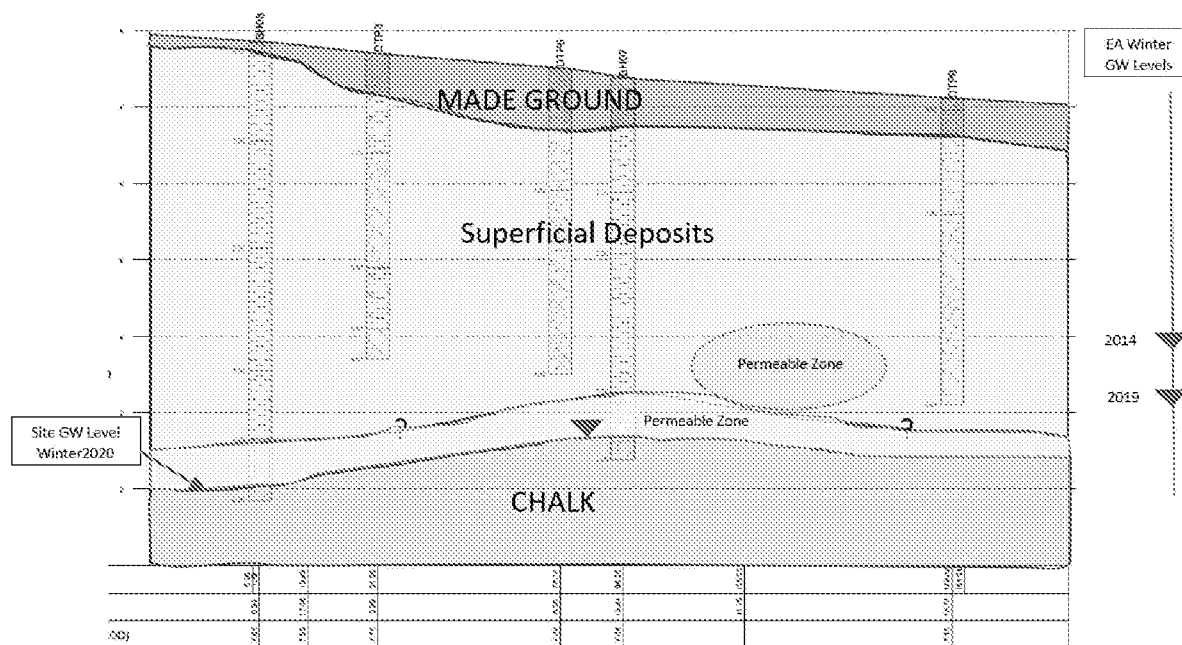
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Further winter monitoring is currently underway, but groundwater levels to date have been identified at depths of around 4.3 to 5.8m below ground level (~2 to 2.7mAOD) in the deeper wells. Long term monitoring from nearby EA records indicates that, since 2015, winter levels rise to around 3.5m AOD in the local area and in the very wet winter of 2014 rose as high as 4m AOD.

Overall, even when taking a positive and proactive approach to implementing sustainable drainage, this gives a severely constrained picture for the site, as evidenced by the following indicative section, taken West to East through the centre of the site and showing the extents of exploitable permeable soils from an infiltration point of view. Current measured groundwater and historic peak groundwater from EA records are also shown. It should be noted that the vertical scale on the drawing has had to be exaggerated (by a factor of around 10) to make the relevant information visible:



3 Pragmatic Approach to Design

It can be seen from the above that the soils that could currently be exploited are very limited in extent and if historic groundwater levels are replicated may be almost fully saturated which would contravene the LA requirement of keeping discharges above the highest recorded groundwater level and in the worst case could result in flooding. Furthermore, it is noted that CIRIA C753 states that “the base of the proposed infiltration component should be at least 1m above the maximum anticipated groundwater level (taking in to account any seasonal variations in levels and any underlying trends)”. Compliance with that requirement would essentially negate any of the currently identified permeable soils from being exploited for soakaway drainage.

4 Conclusions and Recommendations

LEAP has consistently cautioned about the limitations of soakaway drainage for this site due to the natural geological and hydrogeological conditions. Given the variable permeability of the chalk and the potential for it to be fully saturated during high groundwater conditions, it is not recommended as a suitable discharge medium for soakaway drainage and further testing is not considered to be appropriate. The limited lateral extent of the permeable sands should also be taken into account in design.

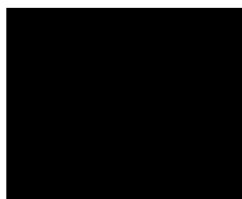
Soil strength testing has indicated that whilst chalk solution features are not considered to be prevalent across the site and hence a 20m buffer between soakaways and structures is not required. However, locally loose soils pervade – notably in the east - and pockets of deep made ground are also present (presumed to be the result of relict foundations). As such, it has been recommended that settlement should be anticipated and that soakaways should be kept at least 10m remote from structures. This has been corroborated by the settlement that has already occurred at the soakage test locations.

Soakage into any made ground should be completely avoided. Regulatory consent will be required for any soakaway drainage scheme, noting in particular the potential lack of unsaturated zone beneath the lowest discharge level.

Finally, it should be noted that all tests to date have been undertaken in summer, following a generally dry period, and whilst the tests have been set to sit above the previous winter high groundwater level, it should be assumed that winter infiltration rates could be lower and / or storage further limited by higher groundwater conditions.

Please do not hesitate to contact the undersigned if you require any further information.

Yours faithfully,



Richard Brinkworth

This letter report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed.

This report is generally consistent with the Eurocode requirements for a Ground Investigation Report, noting the limitations on brief to provision of pile design information only. However, the laboratory testing has been carried out on samples which do not comply with the Eurocode classifications as identified in tables 2 and 3 of EN ISO

22475-1. This report should not be deemed as a Geotechnical Design Report, and where any calculations have been made, these are not Eurocode compliant and are for indicative purposes only.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

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