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LAND NORTH OF EAST HANNEY – TECHNICAL NOTE

This technical note has been prepared to address the items raised within the Vale of White Horse District Council's note to the inspector on the 25th July 2018, which was compiled in relation to a report prepared by Water Resource Associates (WRA) on behalf of East Hanney Parish Council dated November 2017.

Items raised within the note to the inspector have been detailed below, together with our detailed response. To provide a thorough geological assessment of the ground conditions, Mr Murray Bateman, a chartered geologist from Geo Integrity, has been appointed to independently assess the geological findings. His letter report has assessed the original Listers site investigation report, for the development site, together with the WRA report, the ground investigation report, FRA for the adjacent Linden Homes Dandridge Close development and a further separate report prepared by Geo Integrity, for a site which lies immediately to the east of Dandridge Close.

Fluvial Flooding

The development site is shown on the Environment Agency records as almost entirely in Flood Zone 1, apart from small area of Flood Zone 2 which, from the flood map, doesn't appear to be hydraulically linked to a watercourse or drainage ditch.

The area of Flood zone coincides with a low point on the site and we concur with WRA report that there is no connectivity between this area and the ditches surrounding the site. This area closely resembles the main area of surface water ponding shown on the photographic evidence.

It is pertinent to note there have been 3 developments (2 of which have been implemented) which have been granted consent (Dandridge Close P13/V2608/FUL, Steventon Road Nurseries P18/V0692/RM, land west of Steventon Nurseries P15/V2175/FUL) and a draft allocation (land north of East Hanney), all of which have very similar ground

Both the Dandridge Close and Steventon Nurseries permitted developments have implemented a surface water drainage strategy which is based predominantly on infiltration techniques. The Land West of Steventon Nurseries site utilises permeable pavements with an overflow into the adjacent ditch system.

Ground Conditions

The WRA report confirms within section 1-4 that the geology for the site consists of River Alluvium deposits consisting of silty clays, sands, gravels and peats at depths of 1.4m to 1.8m below the surface. This information has been taken from the British Geological Survey (BGS) data which suggests that the land further to the south and east of the A338 consists solely of the Northmoor Sands and Gravel member.

Section 1-5 of the WRA report expands on this data by undertaking three boreholes down to depths of 0.7m in gardens backing onto the western boundary of the site. The results of these boreholes found silty gravels and heavy brown clays.

The extensive ground investigation undertaken within the development site has found fairly consistent ground conditions. These comprise of topsoil, a band of low permeability silty clays, a deeper band of the permeable Northmoor sands and gravels (down to depths of approximately 1.6m), with the relatively impermeable Kimmeridge Clays below.

The Geo Integrity report confirms that the ground conditions found on site, mirror the conditions found both within the adjacent Dandridge Close development and the additional site located to the east.

As such the ground conditions indicated on the BGS maps appear to be incorrect, with the Northmoor sand and gravel strata extending further north to underly the development site. As part of the assessment Infrastruct CS Ltd have compiled sections through the development site, and the adjacent Dandridge Close development, to assess the ground strata and water table in relation to the topographic levels found on site.

Ground Water Levels

As part of the WRA report, groundwater monitoring has been undertaken. These tests were undertaken at depths down to 0.7m, which when related to the intrusive testing on site, correlate of the shallow band of low permeability silty clay soils. Importantly, section 1-5 of the WRA report confirms that groundwater was *'not encountered within any of the boreholes at the time of installation'*.

Further groundwater monitoring suggests the ground water table has been found up to a depth of 0.545m below ground level and the monitoring results can be found within Appendix I of the WRA report.

The Geo Integrity report confirms that the groundwater table found on site relates to a perched water table. An assessment of the aforementioned ground investigation reports across all three sites confirms that the level of this typically lies approximately between 0.15m and 0.3m above the top of the Kimmeridge Clays at a depth of 1.7m.

It is therefore the conclusion of the Geo Integrity that the WRA borehole may have been acting as a sump for the surrounding ground and filling with rain water, giving a false reading of the ground water table.

Surface Water Ponding Observed on site

Section 1-5 of the WRA report confirms that *'the high water levels in borehole 1 were consistent with observations of the surface water ponding on the lower parts of the development site'*. It should be noted that figure 1.6 of the WRA report confirms that the boundary between the site and both Sunrise and Northend Cottage is heavily vegetated making this visual assessment problematic.

It should also be noted that section 1-3 of the WRA report confirms that *'A ground based topographic survey for the site is not available' during the assessment of the site.'*

A detailed topographic survey for the development site has been undertaken and demonstrates areas of the site which are dished, potentially associated with the historical ridge and furrow ploughing.

Given the survey information and the ground conditions found across the site, Infrastruct CS Ltd has attributed the surface water observed on site to be more likely associated with surface water ponding occurring during and immediately after heavy storm events. This is a result of the low permeability silty clays, found below the topsoil, becoming saturated and preventing the water from infiltrating.

This conclusion has also been substantiated with the approved MJA FRA report for the Dandridge Close scheme and the Geo Integrity letter report.

The potential for infiltration devices on the development site

The WRA report undertook shallow infiltration testing and established good infiltration rates of 10^{-4} and 10^{-5} m/s. The report however suggests that due to the high ground water table, that infiltration devices will not be feasible for the disposal of surface water.

The infiltration rates established within the more extensive ground investigation reports both within and adjacent to the site, provided low rates within the high level silty clays, with average rates of between 3.53×10^{-5} and 4.24×10^{-6} m/s, within the Northmoor sand and gravel member.

Given that the findings of the site investigation reports suggest that the ground water table is likely to be at an approximate depth of 1.7m, shallow infiltration devices could be feasible.

Proposed Drainage Strategy

Section 2-4 of the WRA report suggests that any surface water flows off the development site could be discharged at a rate not exceeding 49l/s into the road side ditch system.

This rate far exceeds the standard requirement to manage surface water flows as close to the greenfield status of the current site. As such it is proposed that a hybrid drainage solution could easily be adapted for the site which relies on infiltration down into the permeable sands and gravels found at depth, with a high level restricted overflow into the adjacent ditch system to cater for extreme storm events and in the unlikely event that the ground water table rises and fully saturates the band of sands and gravels.

A drainage strategy reflecting this arrangement has been developed and submitted for approval.

Summary

Taking the above into consideration, a surface water drainage strategy which incorporates best practice SuDS features can be implemented, ensuring surface water flood risk is not increased on-site or the surrounding area, in accordance with the policy requirements and aspirations of the NPPF and PPG.