



Technical Note

Site: Woodcroft Farm Phase 2B (Farmyard Area) **Ref:** GE16943-FG-TN01-191205
Client: Linden Homes South **Date:** December 05, 2019
To: Jonathan Driver – Havant Borough Council **Cc:** K McGuire - Linden Homes South

RE: Woodcroft Farm Development Site (Phase 2B) – Discharge of condition 11, further investigation, risk assessment, remediation method and verification reporting

This technical note provides a response to the queries raised by Havant Borough Council in relation to controlled waters with regards to the discharge of condition 11 for Phase 2B of the Woodcroft Farm development.

The superficial deposits beneath the site (Head Deposits) were noted to be classified as a Secondary 'A' Aquifer. The bedrock geology beneath the site was shown to be located on the boundary of two classifications, Principal Aquifer (Tarrant Chalk) and Secondary 'A' Aquifer (Lambeth Group).

The site was indicated to be located within a Source Protection Zone, Inner Zone (Zone 1), with regards to the protection of groundwater for potable supply.

Several phases of site investigation works have been undertaken by Geo-Environmental reported within a Soil Contamination Assessment Letter Report ref; GE16662-FG02-170929, dated 29th September 2017 and Remediation Strategy and Verification Plan (Farmyard) ref; GE16943-RSVP-FY- JUN18, dated 28th June 2018.

Groundwater was not encountered during any of these phases of investigation or during any subsequent monitoring rounds. Boreholes were constructed to a maximum depth of 25m bgl and therefore it is assumed that groundwater is present at a depth greater than 25m bgl, i.e. there is a substantial thickness of unsaturated zone beneath this site.

Within the farmyard area, encountered ground conditions were found to comprise a mantle of Topsoil or Made Ground overlying soft to firm CLAY and sandy CLAY inferred to be of the Head Deposits and/or Lambeth Group, which in turn was found to overlie structureless weathered 'putty' CHALK inferred to be the highly weathered upper profile of the Tarrant Chalk Member.

Made Ground was found to be present to depths of between 0.25m and 2.2m bgl, the clays and sandy clays of either the Head Deposits or the Lambeth Group were found to be present up to depths of 1.8m and 2.5m bgl. The weathered structureless chalk was only encountered within two of the trial pits excavated within the farmyard area, other pits terminating at shallower depths. Investigation across the wider site also encountered a highly weathered chalk and thus structureless chalk is considered prevalent across the site.

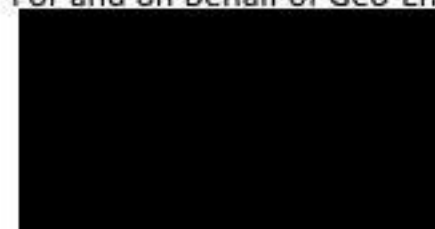
The presence of clays and weathered structureless putty chalk encountered within the farmyard area provide a very low permeability layer, which would act as an aquitard that sits above the structured chalk of the Tarrant Chalk Member the Principal Aquifer. Therefore, the soils encountered within the investigation locations beneath the farmyard area, to a maximum depth of 2.5m bgl, are of very low permeability and would inhibit any mobilisation or migration of contaminants identified within these soils. In addition, it was also considered that the contaminants identified within the soils in the farmyard area of the site were likely to be bound within the clays encountered and therefore not mobile.

Groundwater has not been encountered during any phases of investigation undertaken by Geo-Environmental and is considered to be present at depth i.e. greater than 25m bgl, therefore groundwater is not in contact with the encountered contaminants within the shallow soils, nor is there a plausible migration pathway due to the presence of an aquitard layer.

Arsenic and Nickel were encountered at elevated concentrations within TP314 at a depth of 1.6m bgl within the natural clays at this location. The identified contaminants were bound to the soil and are not considered to be mobile. In addition, groundwater is not in contact with these soils and there is a significant thickness of unsaturated zone (>25m) within which dilution, attenuation and degradation mechanisms would prevail. A review of the BGS normal background concentrations for both these metals was undertaken. For both metals, the site falls within the Principal classification, therefore the background concentration for Arsenic is 32mg/kg and for Nickel is 42mg/kg (albeit this tends to relate to Topsoil and not necessarily the underlying natural soils). The recorded concentrations of both determinands within TP314 were above the respective normal background concentrations. It may be that these recorded elevated concentrations are representative of the variation in natural concentration within the soils, or as a possible result of pesticide storage/use on the site. However, given the depth at which they were encountered, that this relates to one small/localised point on site (therefore of very limited volume), their lack of apparent mobility and the lack of any pollutant pathways they are not considered to represent a risk to either human health or controlled waters, and therefore no remedial measures or further action are considered to be necessary in relation to these elevated concentrations of Arsenic and Nickel.

It is considered that development proposals within the farmyard area (Phase 2B) will not impact on groundwater, which is anticipated (from investigation) to be present at depth (>25m bgl). Development and construction works will be undertaken within the shallow soils, in the Made Ground or Topsoil, and the Head Deposits and Lambeth Group, these soils are considered to be of negligible permeability and to be acting as an aquitard to the Principal Aquifer situated at depth beneath the site. Development proposals are not considered to create any new pathways to controlled waters beneath the site and encountered contaminants (within the Made Ground and natural soils) are not considered to be mobile, nor are pathways for mobilisation considered to be present. The development proposals are not considered to present or create a risk of harm to the Principal Aquifer or groundwater resource at significant depth beneath the site. Therefore, no remedial measures in regard to controlled waters are considered to be necessary.

For and on Behalf of Geo-Environmental



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