

MEMORANDUM

To: Andrew Parker

From: Hannah Dashfield

Copies to: geotechnics@hants.gov.uk

Tel: 0370 779 8018

Date: 15/01/2025

**LUMINOUS OAK SEMH SCHOOL,
BOORLEY GARDENS
REF; HCC/2024/0665**

It is understood that two documents have been reviewed by Eastleigh Borough Council (EBC) Pollution Team with regards to the proposed SEMH School at Boorley Gardens.

- Terra Firma (October 2023). Ground Investigation Report. Proposed Educational Development Boorley Gardens, Hampshire. Report Number PO-23-014. Revision 01.
- Terra Firma (26/06/2024). Technical Note. Boorley Gardens School Supplemental Contamination Investigation. Reference PO-23-014. TN01, V01.

It is worth noting that the Terra Firma Ground Investigation Report (GIR) was superseded on 15th March 2024 (revision 2), following completion of the gas monitoring programme (six visits) and winter groundwater monitoring. Report revision 02 is the most up to date for which a copy is available.

Terra Firma have subsequently updated their technical note to include an up-to-date figure 2 incorporating WS107. This copy will be uploaded.

We are in receipt of EBC Pollution Team comments, dated 24th December 2024 relating to contamination matters which can be summarised as;

- Soil and groundwater contamination;
- Ground gas;
- Remedial measures; and
- Watching Brief (including Discovery Strategy)

The key queries that can be taken from EBC can be split into the following eight points, for clarity labelled as A to G, as follows:

- A) Clarification of Terra Firma's report references
- B) PAH hotspot in WS102 (2023 investigation) and possible remedial measures
- C) Deviations on chemical lab testing report
- D) Contamination risk to groundwater
- E) High groundwater table and representativeness of gas monitoring results
- F) Missing Conceptual Site Model (CSM) in GIR
- G) No updated CSM in Technical Note

To assist in addressing the concerns of the EBC Pollution Team, a commentary is set out below.

Timeline

Prior to HCC's involvement in the proposed school development, the following reports were commissioned by third parties for the wider site including the proposed school setting;

- Opus. Desk Study Report (reference; E1589.00/LJE/CDS), dated 2014
- BRD. Ground investigation (reference; BRD2924-OR1-A), dated 2017

In August 2022, HCC undertook a feasibility study for the proposed school site and reviewed the aforementioned Opus Desk Study. Eastleigh Borough Council Pollution Team should refer to the Desk Study by Opus which is appended.

The Preliminary Conceptual Site Model is set out in **Table 4.1** of the Opus report (pages 17 to 20), for the wider site including the proposed school setting. This was completed prior to any ground investigation.

The site's history apparently comprised undeveloped agricultural land. No farm buildings or yard were formerly present on the proposed school site.

BRD undertook intrusive investigations in 2017 for the neighbouring site and identified contamination within the made ground of the farmyard in the form of asbestos from former structures and PAH contamination.

Gap analysis by HCC indicated that no exploratory locations were undertaken within the proposed school development and a ground investigation for the school would be required to confirm the contamination status of the site.

Terra Firma were commissioned by HCC to undertake the works in two phases, as detailed below.

Intrusive Investigations Completed at the Proposed School Site

Terra Firma: First Phase – July 2023

This phase of intrusive investigation were limited by access due by the presence of stockpiles from the main housing developer, of which the movement of these soils were covered by GESL's Materials Management Plan (reference; GE20346/MMPV1.2), dated 29th April 2022.

Updated Contamination Risk Assessment

During the first phase of intrusive investigation at the school site, Terra Firma identified contamination at one of five locations investigated. This is reported in Terra Firma's GIR report, dated March 2024. In summary, determinant concentrations were compared against an end use of *public open space: residential* and elevated PAH compounds were recorded in WS102 within darker Made Ground, visually identifiable as seen in the below photograph.



Contamination was not found in the underlying soils at WS102 or in any other locations investigated during the first phase.

The source of the PAH contaminated material was attributed to crushing activities by the housing developer.

PAH compounds are non-volatile and does not thus present a significant vapour risk. In addition, the compounds are considered likely to be of low solubility and a plausible risk to groundwater has therefore not been identified.

Further investigations were recommended at the site by Terra Firma in accessible areas.

Jackson Rowe instructed the visual removal of the contaminated dark grey made ground prior to site handover to HCC in June 2024. Terra Firma undertook further investigations of the PAH hotspot.

Terra Firma: Second Phase – June 2024

The supplementary investigation involved Terra Firma drilling another hole (WS4) where the PAH hotspot (WS102) had previously been identified in 2023.

A further four locations on the school site were undertaken to target areas of potential concern such as the former stockpile, sweeper pit, plus general coverage of the site.

The 2024 investigations found no PAH compounds to be elevated above their respective screening value.

Revised Conceptual Site Model

Soil Contamination

Following supplementary investigations and the removal of the PAH hotspot originally found at WS102 in the made ground, the site is deemed suitable for its intended use for a *residential end use without home grown produce*. These soil guideline values are more stringent than was adopted in the original Terra Firma GIR report. Remedial measures are not deemed to be required at the proposed school site.

As with any development it is recommended that a watching brief be maintained by the groundwork's contractor with a Discovery Strategy in place, should Unexpected Contamination be encountered. *Details are included in Annex A.*

Proposed Earthworks (Fill) and Re-use of Topsoil

There is no intention to cut at the site but following a topsoil strip, the site levels will raise slightly as shown on the sections below to create the required formation level.



Certified fill will be imported and the groundworks contractor shall provide details of the provenance of any imported fill materials and evidence of compliance to HCC, prior to placement.

During the topsoil strip, if any made ground or unexpected contamination is encountered that should be stockpiled separately and tested to check contaminants and disposed off-site. The Discovery Strategy should be implemented in this case, covered in Annex A of this Memo.

Site won topsoil (Class 5A) can be reused on site in areas of proposed landscaping as it was found to be free of contamination for human health (against residential without home grown produce). Additives of extractable phosphorus and nitrogen will be required and this should be undertaken in line with the requirements of the landscape architect.

Summary

The key queries that can be taken from EBC can be split into the following eight points, for clarity labelled as A to G, as follows:

A) Clarification of Terra Firma's report references

The following reports by Terra Firma should be referred to;

- Ground Investigation Report. Ref; PO-23-014-GIR (Final), Rev 02, dated 15th March 2024
- Boorley Gardens School Supplemental Contamination Investigation Technical Note. Ref; TN01 V02, dated 26th June 2024

In addition, a desk study by Opus was undertaken for the proposed 680 dwellings and school.

- Opus. Desk Study Report (reference; E1589.00/LJE/CDS), dated 2014

B) PAH hotspot in WS102 (2023 investigation) and possible remedial measures

The PAH hotspot in WS102 was attributed to the made ground from the crushing being undertaken in this area. This material was visually removed and then reinvestigated by Terra Firma. Testing on soils did not indicate any contamination to be present above the screening values for a residential end use without homegrown produce and no remedial measures are deemed to be necessary. In any case, a watching brief will be in place.

C) Sample Deviations

We still consider the results on lab report number; 23-26258-3 valid and representative for the soil samples collected by Terra Firma on 19 July 2023. The samples arrived 2 days later than the recommended 14-day limit for TPH and BTEX.

D) Contamination Risk to Groundwater

No unacceptable risks to groundwater were identified at the site from the PAH compounds originally found in the WS102 of the 2023 Terra Firma investigation.

E) High groundwater table and representativeness of gas monitoring results

A precautionary programme of gas monitoring took place at the proposed school site from August 2023 to March 2024, over a range of atmospheric pressures (995 mb to 1022 mb). Groundwater was recorded in the standpipes in Summer 2023 and during winter 2023/2024, fluctuating between 0.50 m and 1.74 m. A shallow water table will reduce the available pore spaces in which soil gas can exist. The results are considered representative of the soil gas regime with the fluctuating water table and no gas protection measures are deemed to be required within the proposed school buildings.

F) Missing Conceptual Site Model (CSM)

Eastleigh Borough Council Pollution Team should refer to the Desk Study by Opus as a Preliminary Conceptual Site Model is set out in **Table 4.1** of the Opus report (pages 17 to 20), for the wider site including the proposed school setting. This was completed prior to any ground investigation.

G) No updated CSM in Technical Note

There is no updated CSM in the Terra Firma technical note as there is not a complete pollution linkage following the removal of the PAH hotspot in WS102 in July 2023. However, to recap the findings of 2023 and 2024 Terra Firma investigations a **Revised Conceptual Site Model** is included in table below for completeness.



Revised Conceptual Site Model

Source	Location	Exposure Pathway	Potential Receptor	Probability of Exposure	Details
HUMAN HEALTH					
PAH Compounds in made ground of former crushing area from housing developers groundworks contractor	WS102 (2023 investigation)	Ingestion and Dermal	Construction workers	Dismissed	PPE usage to address risk in CDM
			Site users	Negligable	Identified source already removed. Discovery strategy will remain in place for unexpected contamination.
Asbestos	Screening undertaken on soil samples across site and no asbestos detected	Inhalation	Construction workers	Dismissed	No source identified. Discovery strategy will remain in place for unexpected contamination
			Site workers	Dismissed	
Pesticides and Herbicides from former agricultural use	Screening undertaken on soil samples	Ingestion and Dermal	Construction workers	Dismissed	No source identified.
			Site users	Dismissed	
Ground Gas	Made Ground	Inhalation and Explosion	Construction workers	Dismissed	No concentrations of gases or flow recorded during gas monitoring programme. No landfills identified within 250 m of site
			Site users	Dismissed	
GROUNDWATER					
Groundwater Contamination	Hydrocarbons	Vertical migration	Groundwater	Dismissed	PAH compounds are low solubility. Site underlain by low permeability clays of the Wittering Formation.

Trust this assists? Happy to answer any further queries.

Yours Sincerely,

Hannah Dashfield BEng MSc FGS
Senior Geotechnical Engineer
Hampshire Engineering Services
Universal Services Directorate
Hampshire County Council





Annex A: Watching Brief including Discovery Strategy

Watching Brief

Unexpected Contamination can be identified visually:

- Asbestos (cement board or fibrous materials);
- Made ground or rubble material may contain ACMs;
- Soil different in character to expected;
- Oily pockets within the soil;
- Oily sheen on water;
- Staining on soils;
- Bright coloured soils; and / or
- Black ashy materials.

Soils exhibiting strong odours may indicate potential contamination. Smells may include;

- Sweet or fishy;
- Fuel (diesel or petrol);
- Oil; and / or
- Chemicals.

Other signs that contamination may be present could include;

- Light headedness and / or nausea;
- Burning of nasal passages; and / or
- Blistering or reddening of skin due to contact with soils.

All groundworkers should be made aware of the responsibility to observe, report and act on any potentially suspicious or contaminated materials.

Where any odorous, discoloured, or suspicious material is identified during groundworks, work in that area will cease and groundworkers should report to the site manager immediately and the discovery strategy implemented.

The Discovery Strategy will define the procedures to be followed on site in the event that contamination is discovered.

During site inductions and tool-box talks, the site manager should brief groundworkers on the discovery strategy. The discovery strategy is to be followed by all groundworkers. A copy (included in Appendix A) should be displayed on site, so that contact can easily be made with a geoenvironmental specialist if any suspicious substances are encountered.

Discovery Strategy

On discovery of any suspicious material during groundworks, the following procedure should be followed:

- Groundworks to cease work in the area;
- Groundworker immediately reports findings to site manager;
- Cordon off area where potential contamination is suspected;
- Site manager to document the date discovered, make a plan detailing the position the contamination and take photographs of the potentially contaminated area;
- Site manager to notify and engage an independent geoenvironmental specialist for advice on how to proceed / remediate to mitigate the risks posed;
- A geoenvironmental engineer should attend site to inspect, collect samples for laboratory testing and attempt to quantify the volume;
- Report occurrences to the Eastleigh Borough Council EBC Pollution Team as soon as reasonably possible and the Local Planning Authority in writing within 14 days;
- Geoenvironmental consultant to provide laboratory results to local authority;
- The LPA will then consider if the findings have any impact upon the development. An approval from the LPA must be sought prior to implementing any proposed mitigation action;
- Remediate or remove contaminated soils under supervision of geoenvironmental engineer;
- Geoenvironmental engineer to monitor and validate, submitting findings to Local Authorities before groundworks can continue in affected area.