

WTA01

21st February 2023

FAO Matthew Dixon
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Altrincham
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Dear Matthew

TECHNICAL BRIEF - GROUND GAS PROTECTION MEASURES REQUIRED – SEQIRUS SITE 6, INCUBATOR EXTENSION - SPEKE, LIVERPOOL

1. Introduction

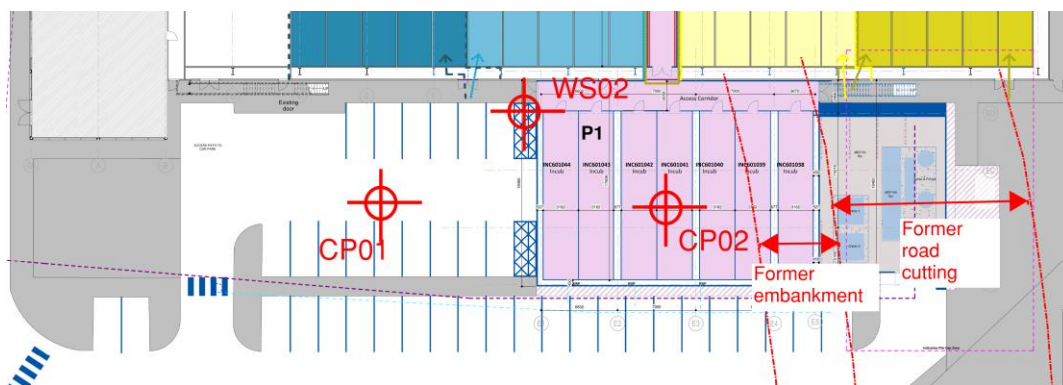
Betts Geo were asked to produce a technical brief on the gassing potential of the former road cutting infill material as concerns have been raised by the local council on the ground gas protection required.

This report should be read in conjunction with the following third party report:

- Ground Investigation Report for Seqirus Site 6, Speke, Liverpool by Tetra Tech – Report ref: B033528.GIR.2 – April 2022

In summary, the proposed development consists of the extension of a main incubator facility (which is classed as industrial land use).

A former embankment and former road cutting exist under the eastern portion of the proposed extension, where made ground has been identified during the third party SI. Despite third party ground gas monitoring undertaken on the site finding no elevated levels of ground gas on the site, the local council has raised concerns with the results given that no gas wells were installed directly within the made ground strata and instead were installed to the west in natural strata (extract below):



2. Results of Third Party Gas Monitoring

As mentioned above, Tetra Tech undertook 6 gas monitoring in three locations across the site and the results of the gas monitoring can be seen below:

Table 8-1 - Summary of Ground Gas Monitoring Data

Location	Max. Methane (Steady) (% vol)	Max. Carbon Dioxide (Steady) (% vol)	Min. Oxygen (Steady) (% vol)	Max. Carbon Monoxide (Steady) (ppm)	Max. Hydrogen Sulphide (Steady) (ppm)	Max.* Borehole flow (Steady) (l/h)	Condition of Response Zone (Visits)
CP01	0.20	2.00	19.80	1	<1	0.30	Not Flooded
CP02	0.20	2.20	13.90	1	<1	0.30	Not Flooded
WS02	0.20	0.20	17.40	<1	<1	0.30	Not Flooded

Note: Results based on worst case steady readings.

*Where negative flow identified the minimum steady concentration was recorded.

As a result of the gas monitoring and subsequent results and GSV's, Tetra Tech categorised the site as very low risk, and as a result no specialist ground gas protection measures were deemed to be required across the site as part of the proposed extension.

3. Third Party Holes in Made Ground Strata

Despite no gas wells being installed within the made ground strata, two (2 No) exploratory holes were undertaken in the area - WS03/WS03A/CP03. These holes described the made ground material to a maximum of 4.10mbgl and comprising of SAND and GRAVEL with occasional brick, concrete and sandstone.

The made ground material appears to be inert with no organic content noted within the logs in the area.

Chemical testing within CP03 shows the total organic carbon content of the made ground to be 0.20% (see extract below):

EMT Sample No.	4-8	7-9
Sample ID	CP03	CP03
Depth	1.00	3.00
COC No / misc		
Containers	V J T	V J T
Sample Date	25/02/2022	25/02/2022
Sample Type	Soil	Soil
Batch Number	1	1
Date of Receipt	01/03/2022	01/03/2022
Free Cyanide	<0.5	<0.5
Total Organic Carbon*	-	0.20
Fraction Organic Carbon	<0.001	0.002
ANC at pH4	-	0.51
ANC at pH7	-	0.07
Loss on Ignition*	-	<1.0
pH*	9.61	8.95

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	8.3
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	92.3
Particle Size <4mm =	>95%		
EMT Job No	22/3369	Landfill Waste Acceptance Criteria Limits	
Sample No	9	Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill
Client Sample No	CP03		
Depth/Other	3.00		
Sample Date	25/02/2022		
Batch No	1		
Solid Waste Analysis		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill
Total Organic Carbon (%)	0.20		
Loss on Ignition (%)	<1.0		
Sum of BTEX (mg/kg)	<0.025		
Sum of 7 PCBs (mg/kg)	<0.035		
Mineral Oil (mg/kg) (EH_CU_1D_AL)	147		
PAH Sum of 17(mg/kg)	2.43		
pH (pH Units)	8.95		
ANC to pH 7 (mol/kg)	0.07		
ANC to pH 4 (mol/kg)	0.51		

4. Classifying Ground Gas Potential by Total Organic Carbon Levels

Within BS 8485:2015 Annex D there is a principal of classifying the ground gas risk based on the total organic carbon (TOC) level and composition/age of made ground rather than installation of ground gas wells and subsequent monitoring.

For the purpose of this site the made ground has been categorised as low organic content and no deeper than 5m therefore the following principles apply:

Scenario and source of ground gas	Gas monitoring ?	Gas protection?
Natural soils with low organic content and 1m to 5m of Made Ground that comprises general infill and car park construction materials TOC less than 6%. Eg Made Ground over London Clay, Mercia Mudstone, Lias Clay, Chalk, Gault Clay, Glacial Till		 Determine gas protection using TOC content of Made Ground and Table 2

Table 2 Limiting values of organic content in Made Ground

Characteristic situation (BS 8485 and CIRIA C665)	Depth of Made Ground (m)	Maximum total organic carbon content of Made Ground – TOC (%) see note 1 and 2		Comments
		New Made Ground	Made Ground in place for > 20 years	
CS1	Maximum 5m Average < 3m	≤1.0	≤1.0	Limiting values based on reported soil organic matter (SOM) content of natural soils up to about 1%
CS2	Maximum 5m Average < 3m	≤1.5	≤3	Limiting values based on gas generation modelling assuming slow degradation Equilibrium methane concentration in building above <0.01%
CS3	Maximum 5m Average < 3m	≤4	≤6	Limiting values based on gas generation modelling assuming slow degradation Equilibrium methane concentration in building above <0.01%
This method can only be used to define characteristic situations up to 3.	Gas monitoring required where TOC is greater than 6%. Gas monitoring results will show whether the high TOC is available and conditions are suitable to generate ground gas.			

5. Conclusion

Based on the composition of the made ground material identified in the third party holes, and its total organic carbon content value obtained from chemical testing, Betts Geo therefore deem that there is no significant source of ground gas identified within the made ground material and as such the gassing potential is deemed low. The site can therefore be classed as CS1 – no specialist ground gas protection required.

It is also important to note that the proposed end use is low risk as the building is not occupied at all times and there is likely to be significant air flow throughout the building.

We trust that this information is satisfactory, however if you have any queries then please get in touch.

Yours sincerely

A handwritten signature in black ink that reads "J Skues".

Jenny Skues
Senior Geo-Environmental Engineer
BETTS GEO