



Technical Note 09/05/2023MB –Ground Gas Risk Assessment Clarification.

This technical note has been issued following a request by the LPA on behalf of the environmental health officer regarding clarification of the appropriateness of the gas monitoring response zones with respect to the cross-strata results indicated in the report.

Following the request for clarification regarding the appropriateness of the gas monitoring response zones with respect to the cross-strata results indicated in the report, we have taken a further detailed look at the information and data provided within the report and can confirm we are satisfied with our analysis of the ground gas regime at the site.

Of the 18 ground gas monitoring holes installed at the site 11 have response zones in the natural clay with irregular sand pockets/lenses (not continuous horizons). These are not cross strata holes. With the exception of exploratory hole WS2 the holes with a response zone in the clay strata did not show the presence of methane. These holes demonstrated that for the most part CO₂ levels were less than 5%v/v and in all cases were less than 10%v/v. Note that no pressure driving mechanism has been identified and steady flow rates are less than the LOD in all cases.

Of the holes with response zones extending over multiple strata BH1, WS4 and WS8 all show 11 to 15% v/v Carbon dioxide. Which is greater than the levels monitored in the clay only monitoring response zones holes. Both BH1 and WS8 extend to the weathered bedrock which we are aware in the general area contains carbon dioxide. In recent years we have experienced this on several sites in the area and we consider this to be the likely source. Especially given that BH1 has only a Clay with sand lenses response zone and WS8 only has a 0.1m response zone in Made ground before the Clay response zone and then into Bedrock.

This position was confirmed when an additional cable percussive hole was bored to bedrock using 150mm nominal ID steel casing and monitored levels of CO₂ overnight prior to decommissioning the hole with hydrated bentonite grout. The hole was capped and gas readings were taken the following morning. Peak CO₂ levels were recorded at 10% v/v.

WS4 has a 1.20m response zone in a made ground noted to contain silty clay and timber fragments before a 0.40m thick clay with organic inclusions both of which are likely to account for the elevated CO₂ recorded in WS4.

The response zones of WS5 and WS28, both cover Made Ground over a thin layer ($\leq 0.60\text{m}$) of clayey Peat over the Natural Boulder Clay and both holes exhibit less than 5%v/v CO₂.

The response zones of WS20 and WS21 both start in Made Ground and terminate in the natural clay strata. Both of these holes WS20 and WS21 have exhibited less than 5%v/v CO₂ during the monitoring period.



Regardless of the cross strata results the gas risk assessment has accounted for the gas regime across the site based on the monitoring data obtained at a greater frequency and greater duration than the minimum requirements of industry best practice guidance and appropriate mitigation measures have been recommended.

In addition to the risk assessment and above justification for the response zones of some cross strata monitoring installations, the Client has opted to have Gas Membranes installed by a third-party specialist using welded seams rather than taped joints.

In taking a detailed look at the information and data provided within the report we did also notice a couple of minor errors in the risk assessment proforma table (page 19) and have consequently re attached the table below. Most importantly, the changes do not impact the outcome of the risk assessment.

BH Ref.	Response zone /strata	Evidence of contamination	No. of Monitoring occasions	Max. Recorded Methane	Max. Recorded Carbon Dioxide (%)	Min. Oxygen (%)	Max. Recorded Flow (l/hr)	Water Level (mbgl) Highest	Atmospheric Pressure Range (mb)	Is Water Level within top 10% of the response	Are readings considered representative	Explanation / Justification	Gas Screening Value (GSV) Methane	Gas Screening Value (GSV) Carbon Dioxide	Risk Classification & Characteristic Situation
BH1*	1.00 - 8.10m Clay with sand inc/Sandstone	No	14	0.0	15.4	0.0	0.0	0.0	974-1027	N	Y		0.000	0.015	Low Risk CS2
BH2	1.00 - 10.00m Clay with sand inclusions	No	14	0.0	7.8	9.5	0.0	0.0	974-1027	N	Y		0.000	0.008	Low Risk CS2
WS1	1.00 - 6.00m Clay with sand inclusions	No	14	0.0	7.6	13.5	0.0	0.0	974-1027	N	Y		0.000	0.008	Low Risk CS2
WS2	1.00 - 5.70m Clay with sand inclusions	No	14	10.4	10.1	0.1	0.0	0.0	974-1027	N	Y		0.010	0.010	Low Risk CS2
WS3	1.00 - 5.30m Clay with sand inclusions	No	14	0.0	4.6	3.8	0.0	0.0	974-1027	Y	Y		0.000	0.005	Low Risk CS2
WS4*	1.00 - 6.00m Made Ground/Organic Clay / Clay with sand incs.	No	14	0.9	12.9	0.1	0.0	0.0	974-1027	Y	Y		0.001	0.013	Low Risk CS2
WS5*	1.00 - 6.00m Made Ground/Organic Clay / Clay with sand incs.	No	14	0.2	4.8	16.3	0.0	0.0	974-1027	Y	Y		0.000	0.005	Very Low Risk CS1
WS8*	1.00 - 8.50m Clay with sand inc/Sandstone	No	14	0.0	12.5	4.6	0.0	0.0	974-1027	Y	Y		0.000	0.013	Low Risk CS2
WS10	1.00 - 6.00m Clay with sand inclusions	No	14	0.0	4.1	12.8	0.0	0.0	974-1027	Y	Y		0.000	0.004	Very Low Risk CS1
WS16	1.00 - 6.00m Clay with sand inclusions	No	14	0.0	6.9	15.2	0.0	0.0	974-1027	Y	Y		0.000	0.007	Low Risk CS2
WS20*	1.00 - 3.00m Made Ground into Clay with sand incs	No	9	0.0	5.9	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.006	Low Risk CS2
WS21*	1.00 - 3.00m Made Ground into Clay with sand incs	No	9	0.0	1.9	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.002	Very Low Risk CS1
WS22	1.00 - 3.00m Clay with sand inclusions	No	9	0.0	3.6	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.004	Very Low Risk CS1
WS23	1.00 - 3.00m Clay with sand inclusions	No	9	0.0	5.0	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.005	Very Low Risk CS1
WS24	1.00 - 3.00m Clay	No	9	0.0	0.8	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.001	Very Low Risk CS1
WS25	1.00 - 3.00m Clay with sand inclusions	No	9	0.0	2.5	13.5	0.0	0.0	974-1027	Y	Y		0.000	0.003	Very Low Risk CS1
WS26	1.00 - 3.00m Clay with sand inclusions	No	9	0.0	4.9	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.005	Very Low Risk CS1
WS28*	1.00 - 4.00m Made Ground into Clayey Peat into Clay with sand incs.	No	9	0.0	4.9	0.0	0.0	0.0	974-1027	Y	Y		0.000	0.005	Very Low Risk CS1
Zone 1	NA														
Zone 2	NA														
Worst Case		No	212	10.4	15.4	0.0	0.1	0.0	974-1027	Y	Y		0.010	0.015	Low Risk CS2

* Cross Strata Response Zone