

Our reference: EB1738/GL/5958

15 October 2015

Dave Parr
Kier Construction Northern
Kier House
Windward Drive
Estuary Park
Speke
Liverpool
L24 8QR

Dear Dave,

Re: Gas Monitoring, LIPA, Liverpool

Gas monitoring installations were incorporated in three of the exploratory boreholes advanced at the site and a copy of the borehole logs can be referred to below. Drawing ref. EB1738/L001 records the locations of the exploratory holes, a copy of which can be referred to below. Gas monitoring has been undertaken across the site on six occasions over three months and gas monitoring is now complete.

Barometric pressure was recorded between 997mb and 1013mb.

No Methane (CH₄) or Hydrogen Sulphide (H₂S) were detected during the monitoring visits. No flow has been recorded and so a value of 0.1l/h will be used to calculate the Gas Screen Value (GSV).

A maximum Carbon Dioxide (CO₂) concentration of 1.2% v/v has been recorded in WS06 on the second visit. The maximum concentration of carbon dioxide detected within WS06 and flow rate results in a calculated Gas Screening Value (GSV) of 0.0012l/h.

With reference to Situation A non-traditional construction as defined by the NHBC and the modified Wilson & Card classification as contained within CIRIA C665, the maximum carbon dioxide concentration and gas screening value indicate CS1 gas regime, requiring no gas protection measures for the proposed construction of replacement school buildings.

It is considered that the risk presented to site end users from ground gases is **Low**.

The results of the gas monitoring results can be referred to below.

We hope that the foregoing satisfies your current requirements however, if you require any further information or advice do not hesitate to contact me.

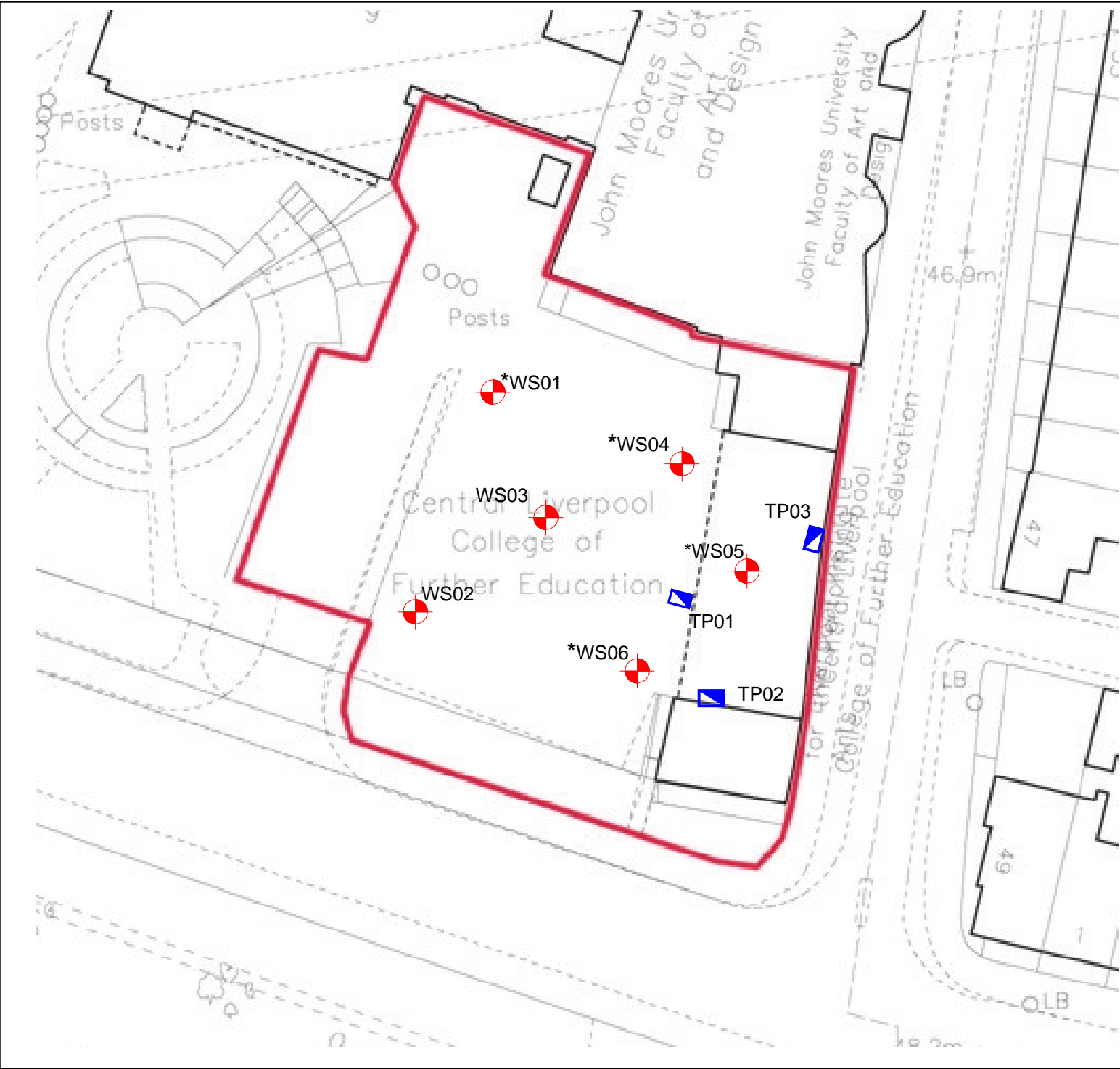




Yours sincerely,

G Lownsbrough
Environmental Engineer
For and on behalf of
Curtins Consulting Ltd

Appended:

Borehole Location Plan – EB1738/L001 (1 page)
Borehole Logs (3 pages)
Gas Monitoring Results (6 pages)



-  6x Window Samples with x4 Installs
-  3x Hand dug trial pits





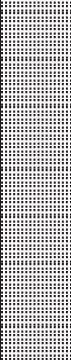




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|------|--------------|-------|-----|-------|
| Rev: | Description: | Date: | By: | Chkd: |
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

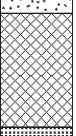
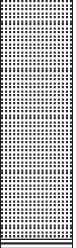








Curtins Consulting Ltd,
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures - Civils - Environmental - Infrastructure - Transport Planning - Sustainability - Expert Advisory Services
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| | | | | |
|---|-------|--------------|--------|----------|
| Status: | | | | |
| INFORMATION | | | | |
| Project: | | | | |
| LIPA 6th Form | | | | |
| Drg Title: | | | | |
| Borehole Location Plan | | | | |
| Scale: | Size: | First Issue: | Drawn: | Checked: |
| NTS | A3 | | GL | DM |
| Drg No: | | | | Rev: |
| EB1738/L001 | | | | B |
| © This drawing is the copyright of Curtins Consulting Ltd | | | | |

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|---|-----------------------|------------------------|----------------------|----------------------------|--|---|--|-------------------------------|--|
|  IAN FARMER ASSOCIATES | | | | | | Site LIPA 6th Form, Liverpool | | Number WS02A | |
| Excavation Method Drive-in Window Sampler | | Dimensions | | Ground Level (mOD) | | Client Curtins Consulting | | Job Number 41712 | |
| | | Location | | Dates 15/07/2015 | | Engineer Curtins Consulting | | Sheet 1/1 | |
| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water | Instr |
| 0.80 | D1 | | | | (0.40) 0.40 (0.20) 0.60 (0.40) 1.00 | MADE GROUND: Tarmacadam. MADE GROUND: Grey, sandy GRAVEL. Gravel is subangular to subrounded, fine to coarse including sandstone and limestone. Brown, very gravelly, medium SAND. Gravel is subangular to subrounded, fine to coarse including sandstone, flint and siltstone. SANDSTONE recovered as medium sand and gravel. Gravel is subrounded, fine to coarse including sandstone and flint. |     | |     |
| 1.50 | D2 | | | | (2.00) 3.00 | Terminated at 3.00m | | | |
| Remarks Between 1.20m and 2.00m: recovery = 100%. Between 2.00m and 3.00m: recovery = 100%. Excavating from 0.00m to 1.20m for 1.00 hour. | | | | | | | Scale (approx) 1:40 | Logged By MO | Figure No. 41712.WS02A |

| | | | | | | | | | |
|--|-----------------------|------------------------|----------------------|----------------------------|--------------------------------------|---|--|-------------------------------|--|
|  IAN FARMER ASSOCIATES | | | | | | Site LIPA 6th Form, Liverpool | | Number WS04A | |
| Excavation Method Drive-in Window Sampler | | Dimensions | | Ground Level (mOD) | | Client Curtins Consulting | | Job Number 41712 | |
| | | Location | | Dates 15/07/2015 | | Engineer Curtins Consulting | | Sheet 1/1 | |
| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water | Instr |
| 0.50 | D1 | | | | (0.20) (0.20) (0.30) | COBBLES. Brown, fine SAND. |  | |  |
| 1.20 | D2 | | | | (0.60) 0.90 | MADE GROUND: Grey, sandy GRAVEL. Gravel is subangular to subrounded, fine to coarse including brick, limestone and sandstone. Weathered SANDSTONE recovered as reddy, brown, medium SAND and GRAVEL. Gravel is subangular to subrounded, fine to coarse including sandstone. |   | |   |
| 2.30 | D3 | | Damp(1) at 2.20m. | | (1.30) 2.20 (0.20) 2.40 | Grey MUDSTONE. Terminated at 2.40m |   | Z1 |   |
| Remarks Excavating from 0.00m to 1.20m for 1.00 hour. | | | | | | | Scale (approx) 1:40 | Logged By MO | Figure No. 41712.WS04A |



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|---|-----------------------|------------------------|----------------------|----------------------------|------------------------------|--|-------------------------------|----------------------------|----------------------------------|
| Site LIPA 6th Form, Liverpool | | | | | | Number WS06A | | | |
| Excavation Method Drive-in Window Sampler | | Dimensions | | Ground Level (mOD) | | Client Curtins Consulting | | Job Number 41712 | |
| | | Location | | Dates 15/07/2015 | | Engineer Curtins Consulting | | Sheet 1/1 | |
| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water | Instr |
| 0.40 | D1 | | | | (0.40) | MADE GROUND: Tarmacadam. | | | |
| 0.60 | D2 | | | | (0.40) (0.50) | MADE GROUND: Grey, sandy GRAVEL. Gravel is subangular to subrounded, fine to coarse including sandstone and limestone. | | | |
| | | | | | (1.50) | Weathered SANDSTONE recovered as reddy brown, very gravelly SAND. Gravel is subangular to subrounded, fine to coarse including sandstone, flint and siltstone. | | | |
| | | | | | 2.00 | Terminated at 2.00m | | | |
| Remarks Excavating from 0.00m to 1.20m for 1.00 hour. | | | | | | | Scale (approx) 1:40 | Logged By MO | Figure No. 41712.WS06A |

Curtins Consulting

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



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| GAS MONITORING LOG SHEET |
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Project: LIPA **Date:** 30/07/2015

Job Number: EB1738 **Visit:** 1

Client: **Weather:** Sunny

Barometric State: Falling **Ground Conditions:** Dry

| Borehole Reference | Barometric Pressure mb | Flow l/hr | | Methane % | | Carbon Dioxide % | | Oxygen % | Hydrogen Sulphide ppm | Water Level m bgl | Note |
|--------------------|---------------------------|--------------|-----|--------------|-----|---------------------|-----|-------------|--------------------------|----------------------|------|
| | | Max | SS | Max | SS | Max | SS | | | | |
| WS02 | 1013 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.6 | 21.2 | 0 | Dry | |
| WS04 | 1013 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 20.6 | 0 | Dry | |
| WS06 | 1012 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 21.4 | 0 | Dry | |

Notes**Logged by**

GL

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

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Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

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| GAS MONITORING LOG SHEET |
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Project: LIPA **Date:** 13/08/2015

Job Number: EB1738 **Visit:** 2

Client: **Weather:** Sunny

Barometric State: Steady **Ground Conditions:** Dry

| Borehole Reference | Barometric Pressure mb | Flow l/hr | | Methane % | | Carbon Dioxide % | | Oxygen % | Hydrogen Sulphide ppm | Water Level m bgl | Note |
|--------------------|---------------------------|--------------|-----|--------------|-----|---------------------|-----|-------------|--------------------------|----------------------|------|
| | | Max | SS | Max | SS | Max | SS | | | | |
| WS02 | 998 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 21.5 | 0 | Dry | |
| WS04 | 998 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 20.0 | 0 | Dry | |
| WS06 | 999 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 1.2 | 22.6 | 0 | Dry | |

Notes**Logged by**

GL

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

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| GAS MONITORING LOG SHEET |
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Project: LIPA **Date:** 27/08/2015

Job Number: EB1738 **Visit:** 3

Client: **Weather:** Sunny

Barometric State: Falling **Ground Conditions:** Dry

| Borehole Reference | Barometric Pressure mb | Flow l/hr | | Methane % | | Carbon Dioxide % | | Oxygen % | Hydrogen Sulphide ppm | Water Level m bgl | Note |
|--------------------|---------------------------|--------------|-----|--------------|-----|---------------------|-----|-------------|--------------------------|----------------------|------|
| | | Max | SS | Max | SS | Max | SS | | | | |
| WS02 | 1011 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 18.6 | 0 | Dry | |
| WS04 | 1011 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 19.2 | 0 | Dry | |
| WS06 | 1010 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 18.5 | 0 | Dry | |

Notes**Logged by**

GL

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

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| GAS MONITORING LOG SHEET |
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Project: LIPA **Date:** 11/09/2015

Job Number: EB1738 **Visit:** 4

Client: **Weather:** Overcast

Barometric State: Steady **Ground Conditions:** Dry

| Borehole Reference | Barometric Pressure mb | Flow l/hr | | Methane % | | Carbon Dioxide % | | Oxygen % | Hydrogen Sulphide ppm | Water Level m bgl | Note |
|--------------------|---------------------------|--------------|-----|--------------|-----|---------------------|-----|-------------|--------------------------|----------------------|------|
| | | Max | SS | Max | SS | Max | SS | | | | |
| WS02 | 998 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 19.6 | 0 | Dry | |
| WS04 | 998 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 21.1 | 0 | Dry | |
| WS06 | 999 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 20.5 | 0 | Dry | |

Notes**Logged by**

GL

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

Curtins Consulting

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| GAS MONITORING LOG SHEET |
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Project: LIPA **Date:** 25/09/2015

Job Number: EB1738 **Visit:** 5

Client: **Weather:** Sunny

Barometric State: Steady **Ground Conditions:** Dry

| Borehole Reference | Barometric Pressure mb | Flow l/hr | | Methane % | | Carbon Dioxide % | | Oxygen % | Hydrogen Sulphide ppm | Water Level m bgl | Note |
|--------------------|---------------------------|--------------|-----|--------------|-----|---------------------|-----|-------------|--------------------------|----------------------|------|
| | | Max | SS | Max | SS | Max | SS | | | | |
| WS02 | 1010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 15.2 | 0 | Dry | |
| WS04 | 1010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 20.1 | 0 | Dry | |
| WS06 | 1010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.6 | 21.2 | 0 | Dry | |

Notes**Logged by**

GL

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

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Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902

**GAS MONITORING LOG SHEET****Project:** LIPA **Date:** 09/10/2015**Job Number:** EB1738 **Visit:** 6**Client:** **Weather:** Sunny**Barometric State:** Falling **Ground Conditions:** Dry

| Borehole Reference | Barometric Pressure mb | Flow l/hr | | Methane % | | Carbon Dioxide % | | Oxygen % | Hydrogen Sulphide ppm | Water Level m bgl | Note |
|--------------------|---------------------------|--------------|-----|--------------|-----|---------------------|-----|-------------|--------------------------|----------------------|------|
| | | Max | SS | Max | SS | Max | SS | | | | |
| WS02 | 996 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.6 | 0 | Dry | |
| WS04 | 997 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 21.3 | 0 | Dry | |
| WS06 | 997 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 1.1 | 21.2 | 0 | Dry | |

Notes**Logged by**

GL

*1% gas volume = 10,000 ppm**Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.**All other gases recorded at 'steady state' unless otherwise stated*