



**Groundwater Monitoring**

Site: Hayes

Date: 29.1.20

Weather: Dry and cold

Job No.: 3249

Start time: 11:02

Recent weather: Wet

Engineer: AJ

End time: 11:45

Atm. Pressure: 988



Borehole: BH07

Well Diameter: 0.05 m

Liquid Level: 4.01 m

Base Level: 5.63 m

Response zone

(slotted): 1.00 - 6.00 m

Well vol =  $\pi \times r^2 \times (\text{base} - \text{liquid level}) \times 1000 = 3.18 \text{ l}$ Purge target vol = well vol  $\times 3 = 9.54 \text{ l}$ Well water =  $\pi \times r^2 \times 1000 = 1.96 \text{ l/m}$ Bails needed = purge target vol  $\times$  well water = 19 bails

(Bailer vol assumed = 1l)

| Time  | NAPL Level | Water Level | pH | Electrical Conductivity | Total Dissolved Solids | Dissolved Oxygen | Redox Potential | Water Temp.            | Sampled | Comments                                         |
|-------|------------|-------------|----|-------------------------|------------------------|------------------|-----------------|------------------------|---------|--------------------------------------------------|
|       | (m)        | (m)         |    | ( $\mu\text{S/cm}$ )    | (ppm)                  | (%)              | (mV)            | ( $^{\circ}\text{C}$ ) | (✓)     | (Colour? Turbidity? Odour? Etc.)                 |
| 11:13 |            | 4.37        |    | 1561                    | 801                    |                  | 111             | 12.1                   |         | Brown, opaque, slight hydrocarbon sheen to water |
| 11:21 |            | 4.63        |    | 1498                    | 816                    |                  | 113             | 11.6                   |         |                                                  |
| 11:34 |            | 4.85        |    | 1524                    | 832                    |                  | 116             | 11.6                   | ✓       |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                  |

Key: required input cells

autocalc cells

**Groundwater Monitoring**

Site: Hayes

Date: 29.1.20

Weather: Dry and cold

Job No.: 3249

Start time: 12:03

Recent weather: Wet

Engineer: AJ

End time: 12:58

Atm. Pressure: 988



Borehole: BH08

Well Diameter: 0.05 m

Liquid Level: 3.37 m

Base Level: 6 m

Response zone

(slotted): 1.00 - 6.00 m

Well vol =  $\pi \times r^2 \times (\text{base} - \text{liquid level}) \times 1000 = 5.16 \text{ l}$ Purge target vol = well vol  $\times 3 = 15.49 \text{ l}$ Well water =  $\pi \times r^2 \times 1000 = 1.96 \text{ l/m}$ Bails needed = purge target vol  $\times$  well water = 30 bails

(Bailer vol assumed = 1l)

| Time  | NAPL Level | Water Level | pH | Electrical Conductivity | Total Dissolved Solids | Dissolved Oxygen | Redox Potential | Water Temp.            | Sampled | Comments                                                           |
|-------|------------|-------------|----|-------------------------|------------------------|------------------|-----------------|------------------------|---------|--------------------------------------------------------------------|
|       | (m)        | (m)         |    | ( $\mu\text{S/cm}$ )    | (ppm)                  | (%)              | (mV)            | ( $^{\circ}\text{C}$ ) | (✓)     | (Colour? Turbidity? Odour? Etc.)                                   |
| 12:03 |            | 3.37        |    | 1495                    | 791                    |                  | 125             | 12.1                   |         | Brown, turbid, opaque, slight hydrocarbon odour and sheen to water |
| 12:18 |            | 3.82        |    | 1491                    | 747                    |                  | 119             | 12.1                   |         |                                                                    |
| 12:32 |            | 4.23        |    | 1508                    | 748                    |                  | 117             | 12.1                   |         |                                                                    |
| 12:45 |            | 4.60        |    | 1505                    | 749                    |                  | 117             | 12.1                   | ✓       |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|       |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |

Key: required input cells

autocalc cells

**Groundwater Monitoring**

Site: Hayes

Date: 29.1.20

Weather: Dry and cold

Job No.: 3249

Start time: 8:41

Recent weather: Wet

Engineer: AJ

End time: 9:39

Atm. Pressure: 988



Borehole: BH08

Well Diameter: 0.05 m

Liquid Level: 1.86 m

Base Level: 5.8 m

Response zone

(slotted): 1.00 - 6.00 m

Well vol =  $\pi \times r^2 \times (\text{base} - \text{liquid level}) \times 1000 = 7.74 \text{ l}$ Purge target vol = well vol  $\times 3 = 23.21 \text{ l}$ Well water =  $\pi \times r^2 \times 1000 = 1.96 \text{ l/m}$ Bails needed = purge target vol  $\times$  well water = 46 bails

(Bailer vol assumed = 1l)

| Time | NAPL Level | Water Level | pH | Electrical Conductivity | Total Dissolved Solids | Dissolved Oxygen | Redox Potential | Water Temp.            | Sampled | Comments                                                           |
|------|------------|-------------|----|-------------------------|------------------------|------------------|-----------------|------------------------|---------|--------------------------------------------------------------------|
|      | (m)        | (m)         |    | ( $\mu\text{S/cm}$ )    | (ppm)                  | (%)              | (mV)            | ( $^{\circ}\text{C}$ ) | (✓)     | (Colour? Turbidity? Odour? Etc.)                                   |
| 8:41 |            | 2.02        |    | 1845                    | 912                    |                  | -8.7            | 10.8                   |         | Brown, turbid, opaque, slight hydrocarbon odour and sheen to water |
| 8:56 |            | 2.38        |    | 1903                    | 924                    |                  | -9.2            | 11.3                   |         |                                                                    |
| 9:13 |            | 2.75        |    | 1932                    | 951                    |                  | -9.1            | 12.0                   |         |                                                                    |
| 9:29 |            | 2.83        |    | 1931                    | 953                    |                  | -9.1            | 12.0                   | ✓       |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |
|      |            |             |    |                         |                        |                  |                 |                        |         |                                                                    |

Key: required input cells

autocalc cells

**Gas Monitoring**

Site: Hayes

Recent weather: Cold and dry

Precipitation: Light Rain

Job No.: 3249

Date: 1/22/2020

Air temperature: 6°

Ground condition: Damp

Engineer: AJ

Start time: 11:00

Cloud cover: 100%

Pressure trend: Falling

Visit No.: 1

End time: 15:37

Wind velocity and direction: 2mph W

On-site activities (e.g.construction): Site Investigation Works



| Exploratory hole | Time  | Response zone range | Water level | Base level | Atm. pressure | CH <sub>4</sub> |        | LEL  |        | CO <sub>2</sub> |        | O <sub>2</sub> |        |      | H <sub>2</sub> S |        | Flow   |        |
|------------------|-------|---------------------|-------------|------------|---------------|-----------------|--------|------|--------|-----------------|--------|----------------|--------|------|------------------|--------|--------|--------|
|                  |       | (m bgl)             | (m bgl)     | (m bgl)    | (mbar)        | (%)             |        | (%)  |        | (%)             |        | (%)            |        |      | (ppm)            |        | (l/hr) |        |
|                  |       |                     |             |            |               | peak            | steady | peak | steady | peak            | steady | high           | steady | low  | peak             | steady | peak   | steady |
| BH1- J           | 11:10 | 1.00 - 6.00         | 3.62        | 5.88       | 1030          | 0.0             | 0.0    | 0.0  | 0.0    | 0.2             | 0.2    | 21.7           | 20.6   | 10.8 | 0                | 0      | 0.0    | 0.0    |
| BH3 - J          | 12:26 | 1.00 - 5.00         | 1.70        | 5.56       | 1028          | 0.0             | 0.0    | 0.0  | 0.0    | 0.6             | 0.6    | 21.2           | 19.1   | 19.1 | 0                | 0      | 0.0    | 0.0    |
| WS7              | 15:37 | 1.00 - 5.00         | 3.08        | 4.93       | 1027          | 2.7             | 2.1    | 51.1 | 48.1   | 10.5            | 10.5   | 21.2           | 0.0    | 0.0  | 0                | 0      | 0.0    | 0.0    |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| PID (ppm)        |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| Exploratory Hole | Peak  | Steady              |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH1 - J          | 0.0   | 0.0                 |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH3 - J          | 0.0   | 0.0                 |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| WS7              | 2.4   | 2.4                 |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |

Comments: BH01 - J - No backfill around upper part of well, backfill anticipated to have sunk due to age of well.

# Gas Monitoring

Site: Hayes

Recent weather: Rain

Precipitation: Light Rain

Job No.: 3249

Date: 1/29/2020

Air temperature: 3°

Ground condition: Damp

Engineer: AJ

Start time: 8:30

Cloud cover: 10%

Pressure trend: Rising

Visit No.: 1

End time: 13:12

Wind velocity and direction: 4.8 mph SW

On-site activities (e.g.construction): Site Investigation Works



| Exploratory hole | Time  | Response zone range | Water level | Base level | Atm. pressure | CH <sub>4</sub> |        | LEL  |        | CO <sub>2</sub> |        | O <sub>2</sub> |        |       | H <sub>2</sub> S |        | Flow   |        |
|------------------|-------|---------------------|-------------|------------|---------------|-----------------|--------|------|--------|-----------------|--------|----------------|--------|-------|------------------|--------|--------|--------|
|                  |       | (m bgl)             | (m bgl)     | (m bgl)    | (mbar)        | (%)             |        | (%)  |        | (%)             |        | (%)            |        |       | (ppm)            |        | (l/hr) |        |
|                  |       |                     |             |            |               | peak            | steady | peak | steady | peak            | steady | high           | steady | low   | peak             | steady | peak   | steady |
| BH02             | 8:30  | 5.60 - 6.30         | 1.83        | 5.80       | 985           | 0.0             | 0.0    | 0.0  | 0.0    | 0.9             | 0.9    | 20.7           | 18.9   | 18.9  | 0.0              | 0.0    | 0.0    | 0.0    |
| BH07             | 11:08 | 1.00 - 6.00         | 4.01        | 5.62       | 988           | 0.0             | 0.0    | 0.0  | 0.0    | 0.2             | 0.2    | 20.8           | 20.1   | 20.1  | 0.0              | 0.0    | 0.0    | 0.0    |
| BH08             | 12:03 | 4.50 - 6.00         | 3.37        | 6.00       | 988           | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.1    | 20.8           | 20.3   | 20.3  | 0.0              | 0.0    | 0.0    | 0.0    |
| BH08             | 12:32 | 9.00 - 10.00        | 9.32        | 9.62       | 988           | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.1    | 21.2           | 20.3   | 20.2  | 0.0              | 0.0    | 0.0    | 0.0    |
| BH1-J            | 12:52 | 1.00 - 6.00         | 3.64        | 5.88       | 988           | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.1    | 20.6           | 20.1   | 20.10 | 0.0              | 0.0    | 0.0    | 0.0    |
| BH3-J            | 13:36 | 1.00 - 5.00         | 1.69        | 5.56       | 988           | 0.0             | 0.0    | 0.0  | 0.0    | 0.5             | 0.5    | 21.3           | 20.0   | 19.9  | 0.0              | 0.0    | 0.0    | 0.0    |
| WS7              | 13:56 | 1.00 - 5.00         | 3.06        | 4.93       | 988           | 2.1             | 2.1    | 48.1 | 48     | 10.1            | 10.1   | 21.3           | 0.00   | 0.00  | 0.0              | 0.0    | 0.0    | 0.0    |
| PID (ppm)        |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| Exploratory Hole | Peak  | Steady              |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| BH02             | 0.0   | 0.0                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| BH07             | 0.1   | 0.1                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| BH08 (S)         | 0.2   | 0.2                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| BH08 (D)         | 0.0   | 0.0                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| BH1-J            | 0.0   | 0.0                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| BH3 - J          | 0.0   | 0.0                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |
| WS7              | 1.9   | 1.9                 |             |            |               |                 |        |      |        |                 |        |                |        |       |                  |        |        |        |

Comments: BH08 (S) - Shallow Well. BH08 (D) - Deep Well.

BH01 - J - No backfill around upper part of well, backfill anticipated to have sunk due to age of well.

**Gas Monitoring**

Site: Hayes

Recent weather: Storm

Precipitation: None

Job No.: 3249

Date: 2/12/2020

Air temperature: 9

Ground condition: Dry

Engineer: MB

Start time: 14:00

Cloud cover: 50%

Pressure trend: Steady

Visit No.: 3

End time: 16:35

Wind velocity and direction: 17mph WSW

On-site activities (e.g.construction): None



| Exploratory hole | Time  | Response zone range | Water level      | Base level | Atm. pressure | CH <sub>4</sub> |        | LEL  |        | CO <sub>2</sub> |        | O <sub>2</sub> |        |      | H <sub>2</sub> S |        | Flow   |        |
|------------------|-------|---------------------|------------------|------------|---------------|-----------------|--------|------|--------|-----------------|--------|----------------|--------|------|------------------|--------|--------|--------|
|                  |       | (m bgl)             | (m bgl)          | (m bgl)    | (mbar)        | (%)             |        | (%)  |        | (%)             |        | (%)            |        |      | (ppm)            |        | (l/hr) |        |
|                  |       |                     |                  |            |               | peak            | steady | peak | steady | peak            | steady | high           | steady | low  | peak             | steady | peak   | steady |
| BH02             | 15:45 | 5.60 - 6.30         | 1.96             | 5.63       | 1000          | 0.0             | 0.0    | 0.0  | 0.0    | 0.3             | 0.1    | 20.9           | 19.8   | 19.8 | 0.0              | 0.0    | 0.0    | 0.0    |
| BH07             | 15:12 | 1.00 - 6.00         | 4.20             | 5.65       | 999           | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.1    | 20.7           | 13.5   | 13.5 | 0.0              | 0.0    | 0.0    | 0.0    |
| BH08 (S)         | 14:48 | 4.50 - 6.00         | 3.12             | 6.00       | 1000          | 0.0             | 0.0    | 0.0  | 0.0    | 1.2             | 0.9    | 20.5           | 20.0   | 19.9 | 0.0              | 0.0    | 0.0    | 0.0    |
| BH08 (D)         | 14:55 | 9.00 - 10.00        | 6.80             | 9.43       | 1000          | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.0    | 20.9           | 20.3   | 20.3 | 0.0              | 0.0    | 18.4   | 0.0    |
| BH1-J            | 15:32 | 1.00 - 6.00         | 3.66             | 5.88       | 1000          | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.1    | 20.5           | 20.3   | 20   | 0.0              | 0.0    | 0.0    | 0.0    |
| BH3-J            | 14:09 | 1.00 - 5.00         | 1.74             | 5.60       | 1001          | 0.0             | 0.0    | 0.0  | 0.0    | 0.3             | 0.3    | 20.9           | 20.5   | 20.4 | 0.0              | 0.0    | 0.0    | 0.0    |
| WS7 - J          | 15:56 | 1.00 - 4.00         | 1.95             | 4.17       | 1000          | 0.0             | 0.0    | 0.0  | 0.0    | 0.0             | 0.0    | 19.0           | 18.8   | 18.8 | 0.0              | 0.0    | 0.0    | 0.0    |
| WS2 - J          | 14:26 | 1.00 - 3.00         | 1.85             | 2.44       | 999           | 0.0             | 0.0    | 0.0  | 0.0    | 0.3             | 0.3    | 20.9           | 20.5   | 20.5 | 0.0              | 0.0    | 0.0    | 0.0    |
| WS7              | 16:26 | 1.00 - 5.00         | 3.20             | 4.90       | 1000          | 1.4             | 1.4    | 33.9 | 33.9   | 9.8             | 9.8    | 20.1           | 0.0    | 0.0  | 0.0              | 0.0    | 0.0    | 0.0    |
| PID (ppm)        |       |                     | PID (ppm)        |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| Exploratory Hole | Peak  | Steady              | Exploratory Hole | Peak       | Steady        |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH02             | 1.5   | 1.0                 | BH3 - J          | 0.0        | 0.0           |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH07             | 0.7   | 0.6                 | WS7 - J          | 0.4        | 0.2           |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH08 (S)         | 2.7   | 2.6                 | WS2 - J          | 0.4        | 0.0           |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH08 (D)         | 4.0   | 1.0                 | WS7              | 0.1        | 0.0           |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
| BH1-J            | 0.2   | 0.0                 |                  |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |

Comments: BH08 (S) - Shallow Well. BH08 (D) - Deep Well. BH08 (S) - Hydrocarbon odour. WS07 - J - New bung at 14:04, monitored after.

BH01 - J - No backfill around upper part of well, backfill anticipated to have sunk due to age of well. Tap also open - monitored anyway.

**Gas Monitoring**

Site: Hayes

Recent weather: Storm

Precipitation: Light

Job No.: 3249

Date: 19.02.20

Air temperature: 7

Ground condition: Wet

Engineer: Jake Townsend

Start time: 11:15

Cloud cover: 91%

Pressure trend: Steady

Visit No.: 4

End time: 13:15

Wind velocity and direction: 12mph, WSW

On-site activities (e.g.construction): None



| Exploratory hole | Time  | Response zone range | Water level      | Base level | Atm. pressure | CH <sub>4</sub> |        | LEL  |        | CO <sub>2</sub> |        | O <sub>2</sub> |        |      | H <sub>2</sub> S |        | Flow   |        | CO    |        |
|------------------|-------|---------------------|------------------|------------|---------------|-----------------|--------|------|--------|-----------------|--------|----------------|--------|------|------------------|--------|--------|--------|-------|--------|
|                  |       | (m bgl)             | (m bgl)          | (m bgl)    | (mbar)        | (%)             |        | (%)  |        | (%)             |        | (%)            |        |      | (ppm)            |        | (l/hr) |        | (ppm) |        |
|                  |       |                     |                  |            |               | peak            | steady | peak | steady | peak            | steady | high           | steady | low  | peak             | steady | peak   | steady | Peak  | Steady |
| BH02             | 11:49 | 5.60 - 6.30         | 1.82             | 5.78       | 1022          | 0.1             | 0.1    | 2.0  | 2.0    | 1.2             | 0.7    | 20.9           | 20.2   | 20.0 | ND               | ND     | 0.0    | 0.0    | 15.0  | 13.0   |
| BH07             | 12:00 | 1.00 - 6.00         | 4.16             | 5.78       | 1021          | ND              | ND     | ND   | ND     | 0.1             | 0.1    | 20.9           | 11.7   | 11.7 | ND               | ND     | 0.1    | 0.0    | 1.0   | 1.0    |
| BH08 (S)         | 12:31 | 4.50 - 6.00         | 3.08             | 6.03       | 1021          | ND              | ND     | ND   | ND     | 1.9             | 1.9    | 20.9           | 20.0   | 20.0 | ND               | ND     | 0.1    | 0.1    | 5.0   | 5.0    |
| BH08 (D)         | 12:26 | 9.00 - 10.00        | 6.05             | 9.58       | 1021          | ND              | ND     | ND   | ND     | 0.4             | 0.3    | 20.9           | 20.3   | 20.3 | ND               | ND     | 0.3    | 0.3    | 5.0   | 4.0    |
| BH1-J            | 12:09 | 1.00 - 6.00         | 3.59             | 5.92       | 1021          | ND              | ND     | ND   | ND     | 0.1             | 0.1    | 20.9           | 21.1   | 20.7 | ND               | ND     | 0.0    | 0.0    | ND    | ND     |
| BH3-J            | 13:05 | 1.00 - 5.00         | 1.70             | 5.65       | 1021          | ND              | ND     | ND   | ND     | 0.8             | 0.8    | 20.9           | 19.7   | 19.7 | ND               | ND     | 0.0    | 0.0    | ND    | ND     |
| WS7 - J          | 11:35 | 1.00 - 4.00         | 1.88             | 4.26       | 1021          | ND              | ND     | ND   | ND     | ND              | ND     | 20.9           | 15.0   | 15.0 | ND               | ND     | 0.1    | 0.0    | ND    | ND     |
| WS2 - J          | 12:56 | 1.00 - 3.00         | 1.75             | 2.50       | 1021          | ND              | ND     | ND   | ND     | 0.3             | 0.3    | 20.9           | 20.5   | 20.5 | ND               | ND     | 0.1    | 0.0    | ND    | ND     |
| WS7              | 13:34 | 1.00 - 5.00         | 3.18             | 4.99       | 1021          | 1.4             | 1.4    | 28   | 28     | 9.3             | 9.3    | 0.9            | 0.6    | 0.6  | ND               | ND     | 0.0    | 0.0    | 1.0   | 1.0    |
| PID (ppm)        |       |                     | PID (ppm)        |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |
| Exploratory Hole | Peak  | Steady              | Exploratory Hole | Peak       | Steady        |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |
| BH02             | 0.2   | 0.2                 | BH3 - J          | ND         | ND            |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |
| BH07             | ND    | ND                  | WS7 - J          | 0.1        | 0.1           |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |
| BH08 (S)         | 6.0   | 6.0                 | WS2 - J          | ND         | ND            |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |
| BH08 (D)         | 4.1   | 2.8                 | WS7              | ND         | ND            |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |
| BH1-J            | ND    | ND                  |                  |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |       |        |

Comments: \_\_\_\_\_

BH01 - J - No backfill around upper part of well, backfill anticipated to have sunk due to age of well.

# CERTIFICATION OF CALIBRATION



Date Of Calibration: 10-Jan-2019

Certificate Number: G505555\_1/22280

Issued by: QED Environmental Systems Ltd.

**Customer:** Your Environment Company Limited

Unit 11 Chilgrove Business Centre Chilgrove Park Road Chilgrove  
Chichester West Sussex PO18 9HU UNITED KINGDOM

**Description:** Gas Analyser

**Model:** GA5000

**Serial Number:** G505555

## UKAS Accredited results:

Results after adjustment :

| Methane (CH <sub>4</sub> ) |                        |                 |
|----------------------------|------------------------|-----------------|
| Certified Gas (%)          | Instrument Reading (%) | Uncertainty (%) |
| 5.0                        | 4.8                    | 0.41            |
| 15.0                       | 14.8                   | 0.64            |
| 49.9                       | 49.5                   | 0.94            |

| Carbon Dioxide (CO <sub>2</sub> ) |                        |                 |
|-----------------------------------|------------------------|-----------------|
| Certified Gas (%)                 | Instrument Reading (%) | Uncertainty (%) |
| 5.0                               | 4.9                    | 0.43            |
| 15.0                              | 14.8                   | 0.70            |
| 50.1                              | 50.2                   | 1.1             |

| Oxygen (O <sub>2</sub> ) |                        |                 |
|--------------------------|------------------------|-----------------|
| Certified Gas (%)        | Instrument Reading (%) | Uncertainty (%) |
| 21.0                     | 21.1                   | 0.31            |

The inwards assessment was carried out 03-Jan-2019.

The maximum adjustment is larger than the inwards assessment uncertainty.

Inwards assessment data is available if requested.

All concentrations are molar.

CH<sub>4</sub>, CO<sub>2</sub> readings recorded at : 31.3 °C ± 2.5 °C

O<sub>2</sub> readings recorded at : 22.6 °C ± 2.5 °C

Barometric Pressure : 1020 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:101 IGC Instance:101

Page 1 of 2 | LP015GIUKAS-2.4

**www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk**

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

# CERTIFICATION OF CALIBRATION



Date Of Calibration: 10-Jan-2019

Certificate Number: G505555\_1/22280

Issued by: QED Environmental Systems Ltd.

*The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.*

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

## Non-UKAS accredited results after adjustment:

| Barometer (mbar) |                    |
|------------------|--------------------|
| Reference        | Instrument Reading |
| 1020             | 1020               |

| Additional Gas Cells |                     |                          |
|----------------------|---------------------|--------------------------|
| Gas                  | Certified Gas (ppm) | Instrument Reading (ppm) |
| CO                   | 497                 | 497                      |
| H <sub>2</sub> S     | 257                 | 257                      |

| Internal Flow  |                           |
|----------------|---------------------------|
| Applied (l/hr) | Instrument Reading (l/hr) |
| 5.0            | 5.1                       |
| 10.0           | 10.1                      |

Date of Issue : 11-Jan-2019

Approved by Signatory

Abdul Tantoush

Laboratory Inspection

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:101 IGC Instance:101

Page 2 of 2 | LP015GIUKAS-2.4

[www.qedenv.com](http://www.qedenv.com) +44 (0) 333 800 0088 [sales@qedenv.co.uk](mailto:sales@qedenv.co.uk)

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

**JOB DETAILS:**

Job No: YE7331  
Visit No: 1 of 3  
Operator: RG

**Project Manager:**

|                     |                                                                                                                                                                                               |                            |        |                  |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------|------------------|
| ND - Not detected   | *Previous installs                                                                                                                                                                            | <b>Worst-possible GSVs</b> |        | MG - Made ground |
| NR - Not recorded   |                                                                                                                                                                                               | 0                          | 0.0015 | NAT - Natural    |
| NA - Non applicable |                                                                                                                                                                                               |                            |        | C - Cohesive     |
| <b>NB:</b>          | Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs. |                            |        | G - Granular     |

**METEOROLOGICAL AND SITE INFORMATION:**

(Select correct box with X or enter data, as applicable)

|                             |                                          |                                           |                                            |                                              |                                 |
|-----------------------------|------------------------------------------|-------------------------------------------|--------------------------------------------|----------------------------------------------|---------------------------------|
| State of ground:            | <input checked="" type="checkbox"/> Dry  | <input type="checkbox"/> Moist            | <input type="checkbox"/> Wet               | <input type="checkbox"/> Snow                | <input type="checkbox"/> Frozen |
| Wind:                       | <input type="checkbox"/> Calm            | <input checked="" type="checkbox"/> Light | <input type="checkbox"/> Moderate          | <input type="checkbox"/> Strong              |                                 |
| Cloud cover:                | <input type="checkbox"/> None            | <input type="checkbox"/> Slight           | <input type="checkbox"/> Cloudy            | <input checked="" type="checkbox"/> Overcast |                                 |
| Precipitation:              | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Slight           | <input type="checkbox"/> Moderate          | <input type="checkbox"/> Heavy               |                                 |
| Time monitoring performed:  |                                          | <input type="checkbox"/> 15:45 Start      |                                            | <input type="checkbox"/> 16:45 End           |                                 |
| Barometric pressure (mbar): |                                          | <input type="checkbox"/> 1016 Start       |                                            | <input type="checkbox"/> 1017 End            |                                 |
| Pressure trend (Daily):     |                                          | <input type="checkbox"/> Falling          | <input checked="" type="checkbox"/> Steady | <input type="checkbox"/> Rising              |                                 |
| Source:                     |                                          |                                           | timeanddate.com                            |                                              |                                 |
| Air Temperature (Deg. C):   |                                          | <input type="checkbox"/> 22 Before        |                                            | <input type="checkbox"/> 21 After            |                                 |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

|                                  |                       |          |                       |          |                      |         |
|----------------------------------|-----------------------|----------|-----------------------|----------|----------------------|---------|
| <b>Ground gas meter:</b>         | GA5000                |          |                       |          |                      |         |
| Gas Range:                       | <b>CH<sub>4</sub></b> | 0 - 100% | <b>CO<sub>2</sub></b> | 0 - 100% | <b>O<sub>2</sub></b> | 0 - 25% |
| Gas Flow range:                  |                       |          |                       |          |                      |         |
| Differential Pressure:           | +/- 500mbar           |          |                       |          |                      |         |
| <b>Date of last calibration:</b> |                       |          |                       |          |                      |         |
| <b>Date of next calibration:</b> |                       |          |                       |          |                      |         |

\_\_\_\_\_



# Ground Gas and Groundwater Monitoring Record Sheet

## JOB DETAILS:

**Client:** Paragon  
**Site:** Bulls Bridge Industrial Estate  
**Date:** 03.07.2019

**Job No:** YE7331  
**Visit No:** 3 of 3  
**Operator:** NH

**Project Manager:**

| Monitoring Point | GAS CONCENTRATIONS |        |      |        |                       |        |                        |        |                          |        |               |        | VOLATILES      |                        | FLOW DATA        |        |                                     | Worst-credible GSVs              |                | WELL AND WATER DATA |                    |                   |                      |                    | Comments |                   |
|------------------|--------------------|--------|------|--------|-----------------------|--------|------------------------|--------|--------------------------|--------|---------------|--------|----------------|------------------------|------------------|--------|-------------------------------------|----------------------------------|----------------|---------------------|--------------------|-------------------|----------------------|--------------------|----------|-------------------|
|                  | Methane (%v/v)     |        | %LEL |        | Carbon dioxide (%v/v) |        | Carbon monoxide (ppmv) |        | Hydrogen sulphide (ppmv) |        | Oxygen (%v/v) |        | PID Peak (ppm) | Product thickness (mm) | Flow rate (l/hr) |        | Differential borehole Pressure (Pa) | Time for flow to equalise (secs) | Methane (l/hr) | CO2 (l/hr)          | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) |          | Response Zone     |
|                  | Peak               | Steady | Peak | Steady | Peak                  | Steady | Peak                   | Steady | Peak                     | Steady | Min.          | Steady |                |                        | Peak             | Steady |                                     |                                  |                |                     |                    |                   |                      |                    |          |                   |
| BH1*             | 0.0                | 0.0    | 0.0  | 0.0    | 0.2                   | 0.1    | 2                      | 2      | 0                        | 0      | 20.0          | 20.8   |                |                        | -0.5             | -0.5   |                                     |                                  | 0              | 0.0005              | 3.72               | 5.95              |                      |                    |          | Sample taken      |
| BH3*             | 0.0                | 0.0    | 0.0  | 0.0    | 0.7                   | 0.7    | 3                      | 2      | 0                        | 0      | 19.5          | 19.5   |                |                        | -0.9             | -0.9   |                                     |                                  | 0              | 0.0063              | 1.82               | 5.62              |                      |                    |          | Sample taken      |
| WS2*             | 0.0                | 0.0    | 0.0  | 0.0    | 0.3                   | 0.3    | 4                      | 2      | 0                        | 0      | 20.0          | 20.4   |                |                        | -0.7             | -0.7   |                                     |                                  | 0              | 0.0021              | 2.20               | 2.48              |                      |                    |          |                   |
| WS2              | 0.0                | 0.0    | 0.0  | 0.0    | 2.2                   | 2.2    | 26                     | 4      | 0                        | 0      | 17.4          | 17.4   |                |                        | -0.8             | -0.8   |                                     |                                  | 0              | 0.0176              | 1.97               | 2.89              |                      |                    |          | Sample taken      |
| WS3              | 0.0                | 0.0    | 0.0  | 0.0    | 0.3                   | 0.2    | 2                      | 2      | 0                        | 0      | 18.2          | 18.9   |                |                        | -0.7             | -0.7   |                                     |                                  | 0              | 0.0014              | 1.67               | 1.87              |                      |                    |          |                   |
| WS4              | 0.0                | 0.0    | 0.0  | 0.0    | 0.9                   | 0.9    | 6                      | 3      | 0                        | 0      | 20.0          | 20.0   |                |                        | -0.8             | -0.8   |                                     |                                  | 0              | 0.0072              | 1.80               | 2.39              |                      |                    |          |                   |
| WS5              | 0.0                | 0.0    | 0.0  | 0.0    | 4.8                   | 4.8    | 4                      | 3      | 0                        | 0      | 13.4          | 13.4   |                |                        | -0.6             | 0.6    |                                     |                                  | 0              | 0.0288              | 2.88               | 3.85              |                      |                    |          | Sample taken      |
| WS6              | 0.0                | 0.0    | 0.0  | 0.0    | 0.6                   | 0.6    | 7                      | 2      | 0                        | 0      | 16.6          | 17.7   |                |                        | -0.4             | -0.4   |                                     |                                  | 0              | 0.0024              | 3.86               | 4.95              |                      |                    |          | Sample taken      |
| WS7              | 0.0                | 0.0    | 0.0  | 0.0    | 8.6                   | 8.6    | 4                      | 4      | 0                        | 0      | 5.5           | 5.5    |                |                        | -0.3             | -0.3   |                                     |                                  | 0              | 0.0258              | 3.25               | 4.98              |                      |                    |          | Sample taken      |
| WS8              | 0.0                | 0.0    | 0.0  | 0.0    | 0.4                   | 0.4    | 26                     | 3      | 0                        | 0      | 18.3          | 19.7   |                |                        | -0.3             | -0.3   |                                     |                                  | 0              | 0.0012              | 4.90               | 4.95              |                      |                    |          |                   |
| WS9              | 0.0                | 0.0    | 0.0  | 0.0    | 4.0                   | 4.0    | 3                      | 1      | 0                        | 0      | 12.2          | 12.2   |                |                        | -0.1             | -0.1   |                                     |                                  | 0              | 0.004               | dry                | 1.41              |                      |                    |          |                   |
| WS10             | 0.0                | 0.0    | 0.0  | 0.0    | 4.0                   | 4.0    | 2                      | 1      | 0                        | 0      | 17.0          | 17.0   |                |                        | 0.0              | 0.0    |                                     |                                  | 0              | 0                   | 3.15               | 4.16              |                      |                    |          | Sample taken      |
| MW5              | 0.0                | 0.0    | 0.0  | 0.0    | 3.2                   | 3.2    | 6                      | 3      | 0                        | 0      | 8.5           | 8.5    |                |                        | -0.9             | -0.9   |                                     |                                  | 0              | 0.0288              |                    |                   |                      |                    |          | No removable bung |
| MW6-3            | 0.0                | 0.0    | 0.0  | 0.0    | 2.4                   | 2.4    | 125                    | 3      | 0                        | 0      | 14.6          | 14.6   |                |                        | -0.9             | -0.9   |                                     |                                  | 0              | 0.0216              |                    |                   |                      |                    |          | No removable bung |
| Max              | 0.0                | 0.0    | 0.0  | 0.0    | 8.6                   | 8.6    | 26                     | 4      | 0                        | 0      | 20.0          | 20.8   | ND             | ND                     | 0.0              | 0.6    | ND                                  | NA                               | 0.0000         | 0.0288              | 4.90               | 5.95              | NR                   | NR                 |          |                   |
| Min              | 0.0                | 0.0    | 0.0  | 0.0    | 0.2                   | 0.1    | 2                      | 1      | 0                        | 0      | 5.5           | 5.5    | 0.0            | 0.0                    | -0.9             | -0.9   | 0.0                                 | 0                                | 0.0000         | 0.0000              | DRY                | 1.41              | 0.00                 | 0.00               |          |                   |

ND - Not detected  
 NR - Not recorded  
 NA - Non applicable

\*Previous installs

**Worst-possible GSVs**

0 0

MG - Made ground  
 NAT - Natural  
 C - Cohesive  
 G - Granular

**NB:** Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

## METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen  
 Wind: ☒ Calm ☒ Light ☐ Moderate ☐ Strong  
 Cloud cover: ☒ None ☐ Slight ☐ Cloudy ☐ Overcast  
 Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy  
 Time monitoring performed: 09:20 Start 12:10 End  
 Barometric pressure (mbar): 1024 Start 1024 End  
 Pressure trend (Daily): ☒ Falling ☐ Steady ☐ Rising  
 Source:  Wunderground  
 Air Temperature (Deg. C): 19 Before 21 After

## INSTRUMENTATION TECHNICAL SPECIFICATIONS:

**Ground gas meter:** GA5000  
**Gas Range:** CH<sub>4</sub> 0 - 100% CO<sub>2</sub> 0 - 100% O<sub>2</sub> 0 - 25%  
**Gas Flow range:** +/-  
**Differential Pressure:** +/- 500mbar  
**Date of last calibration:**  
**Date of next calibration:**

**Gas Monitoring**

Site: Hayes, London

Recent weather: Hot and dry

Precipitation: None

Job No.: 3249

Date: 23/07/2019

Air temperature: 33°

Ground condition: Dry

Engineer: AJ

Start time: 17:03

Cloud cover: 5%

Pressure trend: Steady

Visit No.: 1

End time: 17:26

Wind velocity and  
direction: 13 mph SEOn-site activities  
(e.g.construction): Active Site

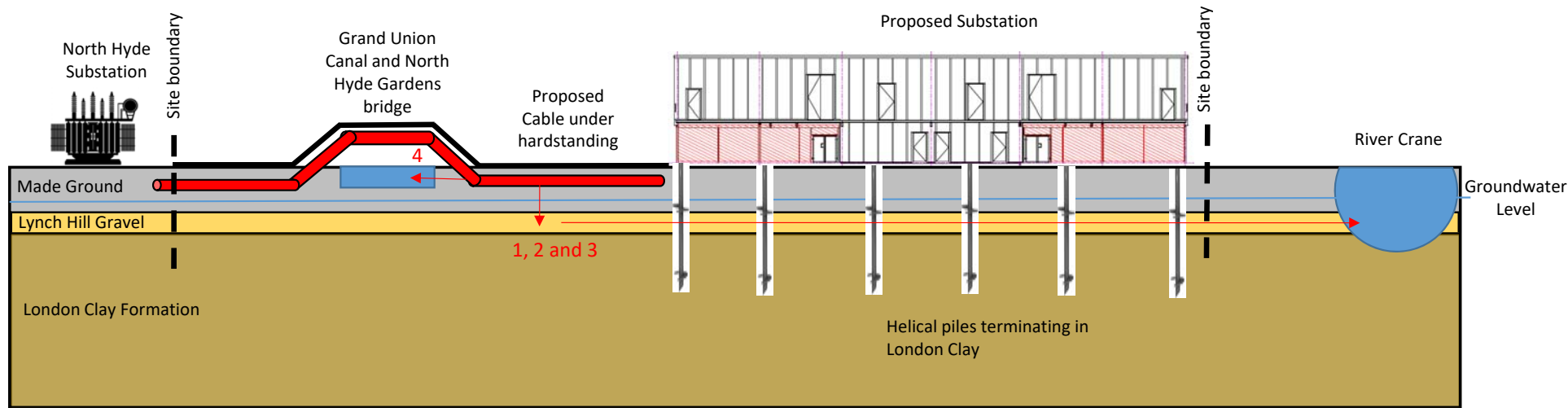
| Exploratory hole | Time  | Response zone range | Water level | Base level | Atm. pressure | CH <sub>4</sub> |        | LEL  |        | CO <sub>2</sub> |        | O <sub>2</sub> |        |      | H <sub>2</sub> S |        | Flow   |        |
|------------------|-------|---------------------|-------------|------------|---------------|-----------------|--------|------|--------|-----------------|--------|----------------|--------|------|------------------|--------|--------|--------|
|                  |       | (m bgl)             | (m bgl)     | (m bgl)    | (mbar)        | (%)             |        | (%)  |        | (%)             |        | (%)            |        |      | (ppm)            |        | (l/hr) |        |
|                  |       |                     |             |            |               | peak            | steady | peak | steady | peak            | steady | high           | steady | low  | peak             | steady | peak   | steady |
| WS202            | 17:03 | 1.00 - 4.00         | Dry         | 3.98       | 1015          | 0.0             | 0.0    | 0.0  | 0.0    | 0.1             | 0.1    | 20.5           | 19.9   | 19.9 | 0.0              | 0.0    | 0.0    | 0.0    |
| WS203            | 17:15 | 1.00 - 2.90         | Dry         | 2.87       | 1015          | 0.0             | 0.0    | 0.0  | 0.0    | 0               | 0      | 20.5           | 20.1   | 20.1 | 0.0              | 0.0    | 0.0    | 0.0    |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |
|                  |       |                     |             |            |               |                 |        |      |        |                 |        |                |        |      |                  |        |        |        |

Comments: PID = 0ppm

Ground gas monitoring undertaken 6 hours (WS202) and 3 hours (WS203) after installation



## Conceptual Site Model Cabling Route



| Number | Pathway                                                                                                                                                                                                                                  |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Vertical migration of dissolved phase contamination by groundwater flow along a preferential pathway created by piling into the Principal Aquifer (Lynch Hill Gravel).                                                                   |
| 2      | Vertical migration of dissolved phase contamination by groundwater flow along a preferential pathway created by excavating and installing the cables and lateral migration through the Lynch Hill Gravel and into the River Crane.       |
| 3      | Vertical and lateral migration of previously unidentified contaminants to the Principal Aquifer and River Crane.                                                                                                                         |
| 4      | Vertical migration of dissolved phase contamination by groundwater flow along a preferential pathway created by excavating and installing the cables and lateral migration through the Lynch Hill Gravel and into the Grand Union Canal. |



## CABLING WORKS RISK ASSESSMENT

| Source                                                                             | Pathway                                                                                                                                                                                                                                  | Receptor                              | Risk                                                                                | Justification                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Groundwater Contamination<br>(Metals including nickel and PAH including Total PAH) | Vertical migration of dissolved phase contamination by groundwater flow along a preferential pathway created by excavations relating to the cabling route, into the Principal Aquifer (Lynch Hill Gravel).                               | Principal Aquifer – Lynch Hill Gravel |    | The thickness of the aquifer is limited due to historical gravel extraction at the site. The Lynch Hill Gravel was not identified within the Vodafone plot and therefore it is not considered to be a significant groundwater resource in this area. Furthermore, the site is not situated in a groundwater source protection zone, and no potable groundwater abstractions have been identified within 1km of the site. |
| Groundwater Contamination<br>(Metals including nickel and PAH including Total PAH) | Vertical migration of dissolved phase contamination by groundwater flow along a preferential pathway created by excavations relating to the cabling route, and lateral migration through the Lynch Hill Gravel and into the River Crane. | River Crane                           |    | Groundwater was identified at a depth of between 1.80mbgl and 4.90mbgl and the deepest excavations for the new cabling route will reach a maximum depth of 1.40mbgl. As such, the potential for contaminants to migrate into the River Crane is considered to be low.                                                                                                                                                    |
| Potential unidentified contaminants                                                | Vertical and lateral migration of previously unidentified contaminants to the Principal Aquifer and River Crane.                                                                                                                         | Principal Aquifer and River Crane     |    | Based on the investigations completed to date, potential areas of additional contamination are considered to be low. A watching brief is to be undertaken during the excavation works.                                                                                                                                                                                                                                   |
| Groundwater Contamination<br>(Metals including nickel and PAH including Total PAH) | Vertical migration of dissolved phase contamination by groundwater flow along a preferential pathway created by excavating and installing the cables and lateral migration through the Lynch Hill Gravel and into the Grand Union Canal. | Grand Union Canal                     |  | The Grand Union Canal is a man-made, concrete lined watercourse. As such, the potential for contaminants to migrate into the canal as a result of the excavation work for new cables is low.                                                                                                                                                                                                                             |

APPENDIX 9: ENVIRONMENT AGENCY OBJECTION LETTER

Michael Briginshaw  
London Borough of Hillingdon  
Development Control  
Civic Centre High Street  
Uxbridge  
Middlesex  
UB8 1UW

**Our ref:** NE/2020/132545/01-L01  
**Your ref:** 75111/APP/2020/3643  
**Date:** 10 December 2020

Dear Michael

**Proposed installation of cabling and associated works between the North Hyde substation and new HV substation (proposed under application reference 75111/APP/2020/1955)**

**Land at Bulls Bridge Industrial Estate, North Hyde Gardens, Hayes**

Thank you for consulting us on the above application.

We **OBJECT** to the planning application, as submitted, because the risks to groundwater from the development are unacceptable.

The applicant has not supplied adequate information to demonstrate that the risks posed to groundwater can be satisfactorily managed. We recommend that planning permission should be refused on this basis in line with paragraph 109 of the National Planning Policy Framework.

**Reasons for objection**

Our approach to groundwater protection is set out in "The Environment Agency's approach to groundwater protection" (Feb 2018 V1.2). In implementing the position statements in this guidance we will oppose development proposals that may pollute groundwater especially where the risks of pollution is high and the groundwater asset is of high value. In this case the following position statement applies: *A5-Supply of adequate information*.

Groundwater is particularly sensitive in this location because the proposed development site:

- is located upon a Principal Aquifer within the Lynch Hill Gravel Member. To ensure development is sustainable, applicants must provide adequate information to demonstrate that the risks posed by development to groundwater can be satisfactorily managed. In this instance the applicant has failed to provide this information and we consider that the proposed development may pose an unacceptable risk of causing a detrimental impact to groundwater quality because insufficient information has been provided to demonstrate the proposed development does not pose an unacceptable risk to controlled water including groundwater:

Specifically, there are two issues which need to be addressed:

1. The cable route on the northern side of the site will be located within an historical landfill. We are aware that a site investigation risk assessment has been undertaken within this area and submitted in support of a planning application for the main data center. However, no investigation appears to have been undertaken within the area of the proposed cable and the conceptual site model and risk assessment have not given consideration to the potential for the works to install the cable to create a preferential pathway for contamination present within the landfill to migrate.
2. Our position statement *C5- pipelines and high voltage fluid filled cables* details when we will object to the installation of high voltage cables, including where these are sub-water table within a principal aquifer. The applicant has not provided sufficient information to demonstrate that the proposed installation of this cable will be in line with the requirements of this position statement.

In addition, the Thames river basin management plan requires the restoration and enhancement of water bodies to prevent deterioration and promote recovery of water bodies. The proposal could result in deterioration of groundwater within the Lower Thames Gravels Water Framework Directive (WFD) groundwater body via mobilization of contaminants with the historic land fill or the leakage of fluids from the high voltage cable.

### **Overcoming our objection**

In accordance with our Groundwater Protection: Principles and Practice we will maintain our objection until we receive a satisfactory risk assessment that demonstrates that the risks to groundwater posed by this development can be satisfactorily managed.

This assessment must include sufficient information to demonstrate if the proposal will comply with requirements of position statement C5, including details of the any fluid within the high voltage cable and groundwater levels within the Lynch Hill Gravels (including seasonal highs).

Detailed site investigation and a risk assessment to assess the potential for the installation of the cable and associated works to result in mobilization of contaminants within the historic land fill is required. Depending on the results of this site investigation and risk assessment a remedial options appraisal and risk mitigation measures may be required.

This objection is in line with policies SO10 (Land, Water, Air and Noise) DMEI 11 (Protection of Ground Water Resources) DMEI 12 (Development of Land Affected by Contamination) in the London Borough of Hillingdon Local Plan.

Please let me know if you have any questions.

Yours sincerely

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**Planning Advisor**

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## APPENDIX 10: EXTENT OF SURVEY AND LIMITATIONS

## EXTENT OF SURVEY AND LIMITATIONS

This report is for your sole use, and consequently no responsibility whatsoever is undertaken or accepted to any third party for the whole or any part of its contents. Paragon accept no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned or a third party with whom an agreement has not been executed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Paragon, a charge may be levied against such approval.

The report has been designed to address potential source, pathway and receptor pollutant linkages associated with the proposed development, by means of intrusive investigation. The content and findings of the report are based on data obtained by employing site assessment methods and techniques, considered appropriate to the site as far as can be interpreted from desk-based materials and a visual walkover of the site. Such techniques and methods are subject to limitations and constraints set out in the report. The findings and opinions are relevant at the time of writing, and should not be relied upon at a substantially later date as site conditions can change. For example, seasonal groundwater levels, natural degradation of contaminants etc.

No liability can be accepted for the conditions that have not been revealed by the exploratory hole locations, or those which occur between each location. Whilst every effort will be made to interpolate the conditions between exploratory locations, such information is only indicative and liability cannot be accepted for its accuracy. By their nature, exploratory holes provide a relatively small and localised snapshot of the ground conditions relative to the size of the site.

Specific comment is made regarding the site's status under Part 2A of the Environmental Protection Act (EPA) 1990, which provides a statutory definition of Contaminated Land and as revised under The Contaminated Land (England) (Amendment) Regulations 2012. Unless specifically stated as relating to this definition, references to 'contamination' and 'contaminants' relate in general terms to the presence of potentially hazardous substances in, on or under the site.

The opinions given within this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. If additional information or data becomes available which may affect the opinions expressed in this report, Paragon reserves the right to review such information and, if warranted, to modify the opinions accordingly. Paragon reserves the right to charge additional fees for; un-anticipated second opinion reviewing of previous reports.

Paragon has prepared this report with reasonable skill, care and diligence. The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources. We cannot provide guarantees or warranties for the accuracy of third-party data, which is reviewed in good faith and assumed to be representative and accurate.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed. No liability can be accepted for the effects of any future changes to such guidelines and legislation. In the event that guidance / legislation changes it may be necessary for Paragon to update or modify reports. The risk assessment is completed in line with the relevant land use agreed for the site and the time of completing the works. Changes to site conditions or land use may require a reassessment.